



Assessing Procedural Justice in the Administration of Small-Scale Benthic Fisheries in Chile

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In order to navigate toward ocean sustainability, policies, programs, and scientific research must address issues of justice. In fisheries management, justice has generally been understood in terms of the distribution of social, cultural, and economic benefits. However, there are also important procedural justice challenges in the fisheries system, which are fundamental to the long-term sustainability and equity of the oceans. Procedural justice is related to the conditions under which the negotiation for benefit distribution takes place. That is, the procedures, structures, and processes that lead to the distribution of resources. In this study, we empirically assess fishers' perceptions of procedural justice components within a small-scale fishery management policy in Chile which has been shifting toward a polycentric type of governance during the past 7 years. We specifically assess perceptions of management committee members. Management committees have been constituted as spaces of collective action for participatory decision-making. We decompose procedural justice in seven subcomponents and assess perceptions associated to achievement in the administration of fisheries. Our results show that management committee members perceive heterogeneity in the achievement of different procedural justice components, which is a central element in achieving equitable development in the oceans. The highest perceptions of achievement were found in the procedures for the selection of participants, the use of various types of technical and local knowledge for decision-making, and the perception by participants of ethical and impartial procedures. We also identified significant challenges related to an inflexible legal structure that hinders adaptive management and learning as a tool for institutional transformation. In addition, mechanisms for communicating decisions to users and clear accountability procedures were perceived as weak. It is critical to address these gaps as they can jeopardize the implementation and legitimacy of fisheries management. Focusing on different components of procedural justice can provide an important lens through which advances and gaps in fisheries policy can be identified and worked upon.

Keywords: equity, fisheries, participatory decision-making, knowledge, communication, accountability, adaptive capacity

INTRODUCTION

The oceans are critical to global human well-being (Costello et al., 2020). However, as a result of intensive extraction, marine environments are exposed to overexploitation and habitat destruction (Jackson et al., 2001; Halpern et al., 2008). While some fisheries have managed to revert overexploitation (Duarte et al., 2020), 34% of fisheries remain overexploited and the oceans are far from recovering their abundance and diversity of species (Food and Agriculture Organization (FAO), 2020). In attempts to achieve sustainability, scientific research has focused largely on understanding the ecological components of the ecosystem, and developed a series of management approaches for managing fish stocks (Pauly et al., 2002; Bavinck et al., 2018). Unfortunately, the challenge of managing fisheries and reverting over-exploitation have, in the past, overshadowed aspects associated to social equity and justice (Halpern et al., 2013; Bennett et al., 2019).

In order to advance toward ocean sustainability, policies, programs, and scientific research must address issues of justice (Ostrom, 2005; Fabinyi et al., 2015; Hamann et al., 2018; Leach et al., 2018; Österblom et al., 2020). Scientific literature on justice is broad and comes from different disciplinary backgrounds. Accordingly, there are diverse definitions and concepts. In this article we will draw from literature on social justice to define distributive and procedural justice. Distributive justice refers to the equitable distribution of benefits generated in the extraction and production of marine resources (Österblom et al., 2020). On the other hand, procedural justice is related to the conditions under which the negotiation for benefit distribution takes place (Soltau, 2009). That is, the procedures, structures and processes that lead to the distribution of resources (Daigle et al., 1996). Procedural justice encompasses rules of participation, access to information, and the general ability of parties to negotiate on equal terms (Soltau, 2009). Procedural justice is about how decisions are made, who is included, and the principles that are used to define which procedures are fair or unfair (Martin et al., 2013). The fundamental principles of procedural justice are the full participation of stakeholders, the ability to freely express opinions, respect, impartiality, and adequate information for decision-making (Gross, 2007).

Justice in the oceans has become a central topic over the past decade, and different approaches have been addressed for its study (Martin et al., 2019). Marine justice promotes the transition from social conflict to sustainability, raising equity and human needs on the global agenda (Tafon et al., 2021). On the one hand, research on ocean justice has focused on fishers' social movements, contributing to the discussion on food sovereignty and exclusion in global fisheries, stemming from industrialization and privatization (Mills, 2018; Pictou, 2018). On the other hand, human rights-based approaches have focused on the recognition that small-scale fisheries tend to be marginalized from benefits and participation in decision-making (Pattanaik, 2007; Ratner et al., 2014). Human rights-based frameworks unveil inequalities on power structures that determines access to marine resources, wellbeing, and

social distribution of negative externalities, such as pollution, degradation, and overexploitation (Allison et al., 2012; Ratner et al., 2014). In addition, equity and environmental justice have also been signaled as key criteria for marine protected areas (Gill et al., 2019). The geographic distribution of marine protected areas, their governance structure, and participation mechanisms have social implications for the distribution of benefits and access to their ecosystem services (Jones, 2009; Singleton, 2009; Richmond and Kotowicz, 2015).

In ocean related topics, justice has generally been understood in terms of the distribution of social, cultural, and economic benefits (Ribot and Peluso, 2003; Bennett et al., 2019; Österblom et al., 2020). The allocation of fishing rights in a context of resource depletion is a critical issue for benefit distribution (Österblom et al., 2020). Therefore, the focus of public policy has been mostly on distributive justice; that is, the way authority distributes use rights over limited resources among stakeholders (Rawls, 2001). However, there are also important procedural justice challenges in the fisheries system, which are fundamental to the long-term sustainability and equity of the oceans (Ribot and Peluso, 2003; Gelcich et al., 2010; Scholtens, 2016; Estévez et al., 2020). In marine systems, procedural justice has been less addressed in literature and public policy than distributive justice. This is unfortunate as procedural justice considers the fairness of the structures and processes used in decision-making (Kravitz et al., 1997) and perceptions of impartiality and fairness in decision-making (Cohen, 1985; Daigle et al., 1996; Gross, 2007). People will tend to question the legitimacy of decisions if they feel that the procedures for reaching them are not fair (Tyler, 1988). Therefore, procedural justice is a necessary condition for institutional stability and can play a key role in compliance with fishery regulations and ocean sustainability (Cohen, 1985; Partelow et al., 2019; Shirley and Gore, 2019).

Empirical research on stakeholder perceptions of the constitutive elements of procedural justice is receiving increasing attention in ocean policy (Blader and Tyler, 2003; Pieraccini and Cardwell, 2016). Scholars have operationalized procedural justice identifying components that determine the legitimacy of the decision-making process (Blader and Tyler, 2003; Okereke, 2017; Solomon, 2019). Some conceptual frameworks have focused primarily on the relationship between courts of law, citizens, and police officers (Tyler and Wakslak, 2004; Tyler, 2005). In these frameworks the components of procedural justice have highlighted, on the one hand, how officers treat citizens (e.g., dignity, respect, and courtesy) and on the other hand, the quality of decision-making (e.g., fair, neutral, consistent, and absent of bias) (Sunshine and Tyler, 2003; Tyler, 2017). In an alternative approach, Leventhal and colleagues develop a framework of analysis for procedural justice applied to non-legal settings (Leventhal, 1980; Colquitt, 2001). This approach allows to discern between the diverse components of procedural justice that operate at local levels (Daigle et al., 1996).

Leventhal (1980) proposes a model for conceptualizing procedural justice, in which individuals can evaluate the implementation of each of its components. Leventhal's model

focuses on creating cognitive maps of benefit distribution procedures and stakeholder perceptions of them (Daigle et al., 1996). Leventhal's model includes seven procedural components (Leventhal, 1980): (1) *Selection of Agents* considers the procedures for electing decision-makers, who may be elected by vote or nominated by authorities. (2) *Setting ground rules* considers the procedures for informing about available benefits and how to access them. (3) *Gathering information* considers procedures for collecting and using information on beneficiaries and decision-making. (4) *Decision making structure* considers the procedures that define the structure for decision-making, which acquires greater importance in collective decisions. (5) *Appeals* considers procedures for submitting complaints or appeals regarding benefit distribution or decision-making, which may include formal or informal processes. (6) *Safeguards* considers procedures to ensure that decision makers fulfill their responsibilities with honesty and integrity, including processes for accountability and sanctions. (7) *Change Mechanisms* considers procedures for changing and regulating the processes that determine benefit distribution and correcting unfair situations.

Based on Leventhal's model (Leventhal, 1980), Tyler (1988) proposed six rules to estimate achievement for the specific procedural justice components. These rules include: (1) Control that estimates the influence of stakeholders on decision-making. (2) Consistency that estimates the coherence of procedures among people and over time. (3) Impartiality that estimates if the authorities favor one or the other actor in the application of the procedures. (4) Decision Accuracy that estimates the correctness and quality of decisions. (5) Correctability that estimates the ability to modify or reverse decisions through the process and (6) Ethicality that estimates whether authorities respect people's rights in proceedings. These rules are subjective evaluations regarding the achievement of procedural justice (Daigle et al., 1996) and provide an understanding of the actors' concerns with respect to procedural justice (Colquitt, 2001; Blader and Tyler, 2003).

Perceptions of justice in decision-making play a key role in the legitimacy of innovative governance models for fisheries (Estévez et al., 2020; Estévez and Gelcich, 2021). Novel approaches to governance in common oceans should be based on the principles of equity, justice, and participation in decision-making (Rudolph et al., 2020). This is especially the case in many small-scale fisheries, that have historically been managed in a top-down manner and which are now transitioning toward co-management and participatory forms of governance. Small-scale fisheries therefore provide a unique setting to explore procedural justice. Here, we empirically assess fishers' perceptions of procedural justice components in a small-scale fishery of Chile which has been shifting toward a polycentric type of governance during the past 7 years. We used Leventhal's conceptual model to assess procedural justice components (Leventhal, 1980) and Tyler (1988) framework to assess fishers' perceptions of procedural justice. We discuss the implications

of these findings for informing transitions toward fisheries sustainability more broadly.

MATERIALS AND METHODS

Research Setting

Chile has important small-scale fisheries. In 2018, marine resources landings from artisanal fishers accounted to 57% of overall fisheries landings (SERNAPESCA, 2019). Since the promulgation of the General Law of Fishing and Aquaculture (GLFA) in the 1990s, a process of institutional transformation in the administration of marine resources was initiated. The right to extract benthic resources was limited exclusively to artisanal fishers, excluding industrial fishing from the system. Additionally, in order to ensure the sustainable management of benthic resources, a Territorial Use Rights for Fisheries (TURFs) was implemented in 1997 (Gelcich et al., 2010). This regime granted exclusive use rights to extract benthic resources over determined coastal maritime territory to organizations of artisanal fishers, excluding any person or other organization from the right to extract resources in that space (Gelcich et al., 2010). In practice, TURF excludes fishers from outside the organization to extract any resource from this area, including crustaceans and fish.

In 2013, important changes were made to the GLFA, establishing the creation of management plans and management committees for the co-administration of marine resources in open access areas. The management plans regulate the extraction of a resource (or a group of related resources) in areas of historical open access (benthic, crustaceans, pelagic, and demersal fish). The management committees are constituted as multi-sectoral spaces for participatory decision-making, in which the actors establish operating rules for a resource (or group of resources) in a variable geographical space: from a gulf for benthic resources, to a macro-zone for fishes. For benthic resources, management committees are chaired by an official of the Undersecretary of Fisheries and Aquaculture (UFA), and are composed of a maximum of seven representatives of the artisanal fisheries, a representative of the processing plants, and representatives of State services directly involved in the administration of marine resources. Each group (artisanal fishers, formal plant processors, and government agencies) directly elects representatives according to procedures established by Law (Supreme Decree N95-2013). Currently there are 36 management committees along the Chilean coasts, of which 20 administrate benthic fisheries.

Management committees operate as a relative autonomous unit of decision-making, defining operational rules for fisheries (Estévez and Gelcich, 2020). Management committees have the principal objective to design and implement a management plan, based on the ecosystem approach. The main actions contained in the management plans are related to regulate access and extraction of resources, through control and monitoring strategies, training, and research. The management committees have a deliberative character in their operation, where their members discuss the pros and cons of the decisions under

evaluation. Decisions adopted by the management committee must be approved by simple majority, considering one vote for each titular member. Once the management plan is approved by the management committee and formalized by resolution of UFA, compliance with the plan is mandatory for all users of the fishery. In addition, the law constitutes Scientific Committees that define the maximum sustainable yield and/or extraction quota for fisheries.

Figure 1 shows the stages to create a management committee and get the approval of the management plan, and its subsequent implementation and evaluation. The process begins with the approval of the decree creating the management committee, and the subsequent election of its titular and substitute members. The authority representing the UFA is constituted as the president of the management committee. After this, the management committee starts the process of creating the management plan, with the support of technical organizations. The proposed management plan is submitted for public evaluation, prior to its approval by the UFA. The seven components of procedural justice can be coupled to each of the stages of building a management plan (**Figure 1**). Change Mechanisms and Safeguard components are crosscutting to all stages. In this study, we considered two of the largest and constantly operating multi-species management plans and interviewed their committee members: (1) Bay of Ancud Management Committee and (2) Gulf of Arauco Management Committee.

Bay of Ancud Management Committee

The legal constitution of the Bay of Ancud Management Committee culminated in the year 2014. The area of enforcement of the management committee covers two relevant bays: Bahía Guapacho and Bahía de Ancud, Region of Los Lagos, where historically the artisanal fishers have carried out extraction activities of benthonic resources. The management plan, approved in 2017, covers an area of approximately 191 km², including 25 rocky habitat benthic resources both invertebrates and algae (SUBPESCA, 2017). More than 500 divers and seaweed collectors extract the resources specified in the management plan (SUBPESCA, 2017).

Gulf of Arauco Management Committee

The Gulf of Arauco Management Committee began operations in 2012, 1 year before the enactment of the GLFA modifications. This management committee operates in the Gulf of Arauco, Biobío Region. The Gulf of Arauco management plan was officially approved in 2015. This plan establishes the administration of three soft substrate benthic resources: navajuela (*Tagelus dombeii*), huepo (*Ensis macha*), and taquilla (*Mulinia* spp.) (SUBPESCA, 2014). The management plan covers an area of approximately 150 km², in which about 1000 divers extract the resources specified in the plan.

Research Approach

To evaluate procedural justice in both case studies, we considered the seven components proposed by Leventhal (1980). These components were adapted, and operationally defined for application in the management committees (**Table 1**). Each of the

seven components was evaluated using the six rules of behavior proposed by Tyler (1988; **Table 2**). Each participant answered a 42-question questionnaire (**Supplementary Material**). Each question was composed of a seven-level Likert scale: 7 = totally achieved, 1 = totally not achieved. A seven-level scale is widely used to grade within the Chilean educational systems, and therefore establishes a measurement scale that is easily understood by the interviewees. For each interviewee, perceptions of the level of achievement in each rule were recorded for the seven components of procedural justice using the Likert scale. In addition, an open-ended question was included in each component to record the arguments justifying the evaluations on the Likert scale. We applied the questionnaires to eight members of the Bay of Ancud Management Committee and eight members of the Gulf of Arauco Management Committee, which corresponds to 60 and 80% of the total elected participants, respectively (including both titular and substitute members). The interviews were conducted in Spanish during 2020. This project had the approval of the research Ethics Committee of the Pontificia Universidad Católica de Chile (number 170522004).

RESULTS

Selection of Participants Component

Procedures for selection of management committee participants showed a high level of achievement (**Figure 2**). In both case studies, the criteria of consistency, impartiality and ethicality showed positive perceptions with average values of 6.4 and 6.3 for Bay of Ancud and Gulf of Arauco, respectively. In general, interviewees reported that the selection of participants is a democratic and free process, in which artisanal fishers can choose their representatives for the management committee based on an established election system. Interviewees agreed that the authorities were impartial in this process, and their role focused on promoting the greatest possible participation of fishers in the selection of participants. Also, interviewees indicated that the authorities met the criterion of ethical behavior. One interviewee highlighted: “We, the fishers, freely elect our representatives, the authorities are concerned with ensuring greater participation, but they do not interfere in the elections, they do not get involved” (Interviewee Bahía de Ancud).

The quality of the decisions was evaluated at 5.1 and 5.6 for Bay of Ancud and Gulf of Arauco, respectively. This relates to the low representation of other actors of the system in the management committee. For example, in the Bay of Ancud the processing plants have no elected representatives, even though by regulation they are entitled to a titular member and a substitute member; and in the Gulf of Arauco, the commercial intermediaries only participate as non-voting guests. In the Selection of Participants component, the greatest weakness is observed in the capacity to correct the decision (correctability) (close to 4.5 in both case studies). Interviewees perceive there are not clear known mechanisms for requesting reviews of decisions if participants eventually considered that the procedures are not in accordance with the rules.

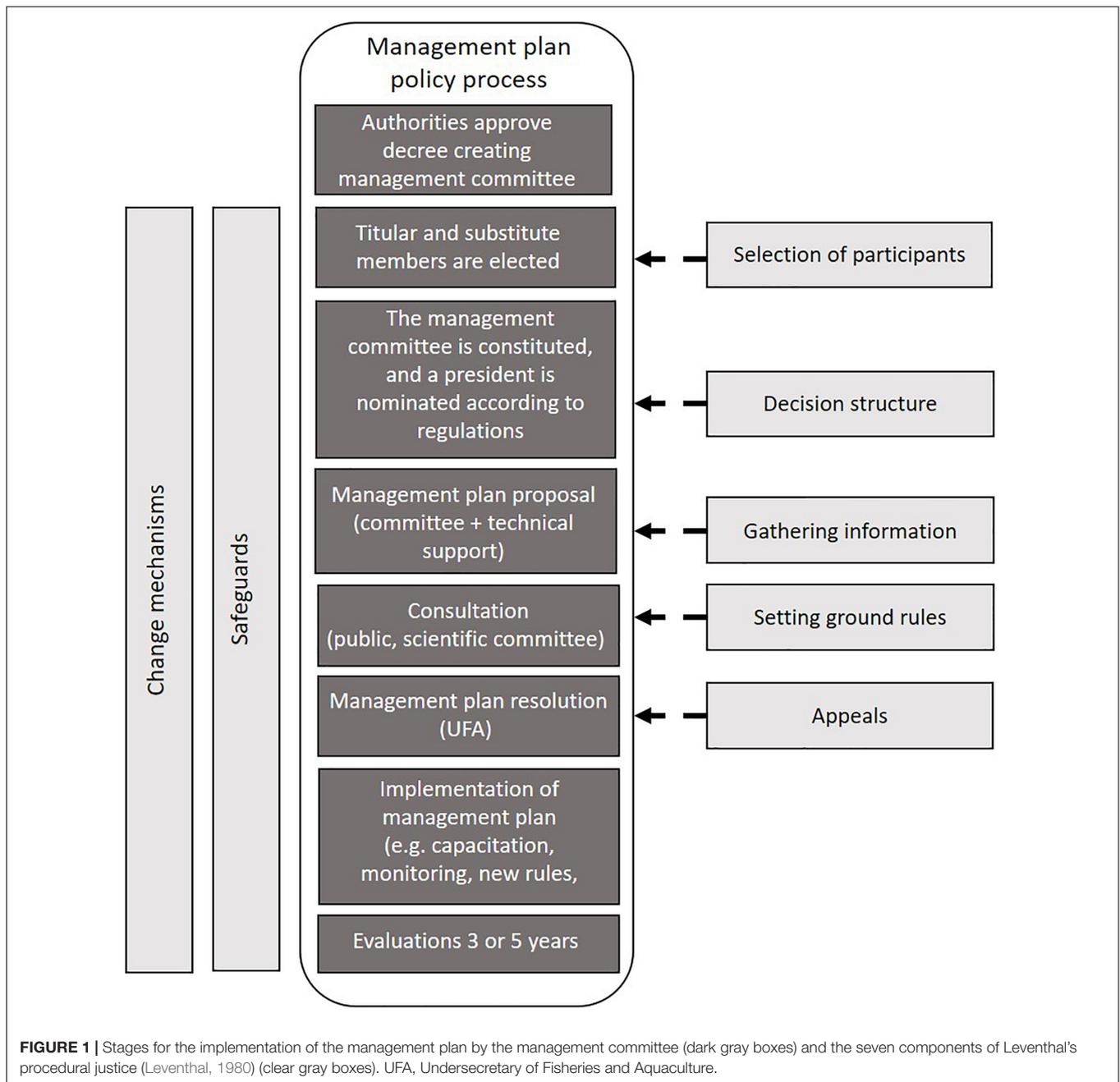
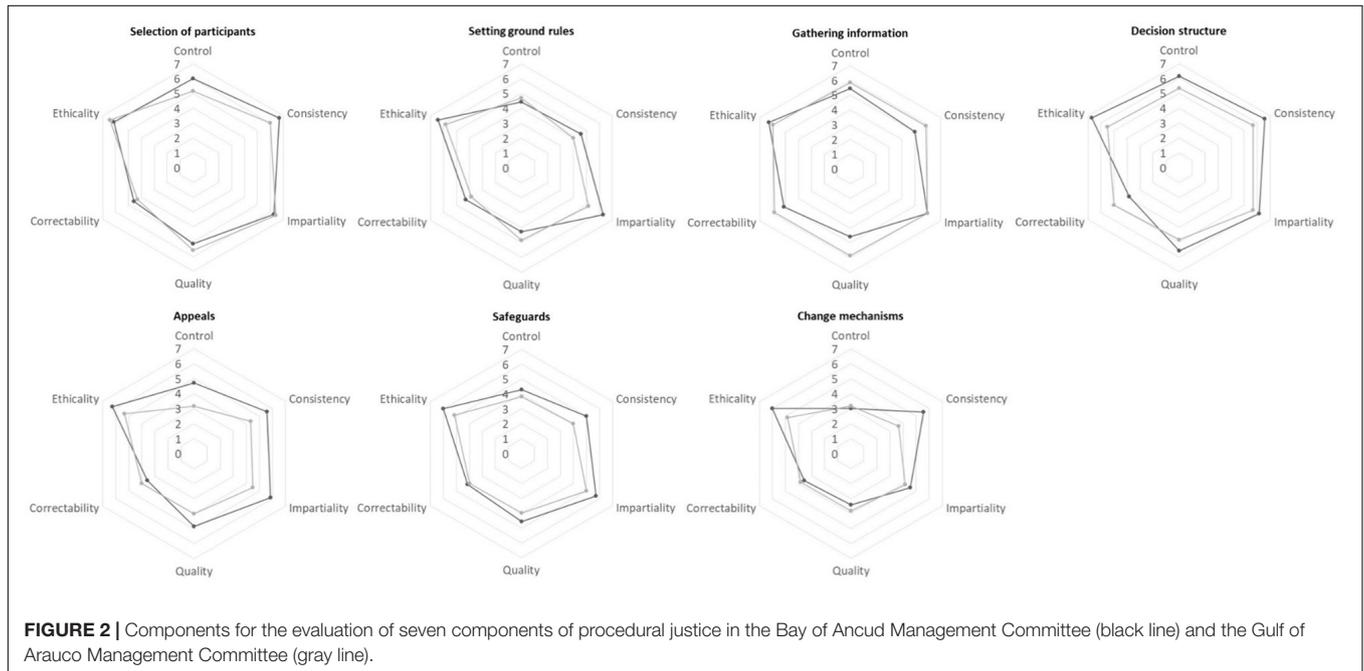


TABLE 1 | Definition of the components used to assess the achievement of procedural justice in management committees (based on Leventhal, 1980).

Components	Definition
Selection of participants	Procedures for selection of management committee participants
Setting ground rules	Procedures for communicating to stakeholders the benefits associated with fisheries management and the decisions taken by the management committee
Gathering information	Procedures for the management committee to gather and use information for decision-making
Decision structure	Procedures to define the structures and processes for reaching agreements and making decisions in the management committees
Appeals	Procedures for participants to impugn decisions made by the management committee
Safeguards	Procedures to ensure transparency and accountability in management committee decisions
Change mechanisms	Procedures for management committee members to modify decision-making rules

TABLE 2 | Definition of the rules used to assess the achievement on each of the procedural justice components in management committees (based on Tyler, 1988).

Rules	Definition
Control	Influence of the management committee participants on the results of the procedures
Consistency	Consistency of procedures used in management committees over time and in various situations
Impartiality	Impartiality of the authorities in the application of management committee procedures
Decision accuracy	Quality of the results of the procedures in the management committees
Correctability	Ability of the participants in the management committees to correct or modify the results of the procedures
Ethicality	Ethical behavior of authorities in the application of management committee procedures



Setting Ground Rules Component

In the procedures to set ground rules and communicate them to stakeholders, a relatively low perception of achievement was observed (Figure 2). In both cases studies, the criteria of control, consistency, and correctability presented values between 3.9 and 4.7. Officially, the authorities publish the proceedings of the meetings in the web pages of the management committees. However, there is consensus among the interviewees that the vast majority of artisanal fishers do not access these information systems. Communication mechanisms are mostly based on informal modes, such as meetings between artisanal fishers and telephone conversations. The informality of these mechanisms generates low consistency in the communication of management committee decisions. As one of the interviewees explained: “After each session of the management committee, I call an assembly of my association, there I report the agreements of the committee, the most interested fishers call me by phone, but not everyone cares, it depends on more if there is an important issue for them” (Interviewee Gulf of Arauco). Also, the interviewees agreed on a relatively low evaluation on the quality of the communication mechanisms (under 4.9 in both cases). Quality in this component related to the informality of communication, and the variability of the types of information delivered to the different actors

in the system. Therefore, the stakeholder access to diverse informative contents.

Gathering Information Component

The procedures for collecting and using information for decision-making were perceived to achieve high achievement (Figure 2). Especially in the Gulf of Arauco where criteria were evaluated between 5.9 and 6.0. In the Bay of Ancud case study, the criteria of consistency and quality were evaluated with intermediate scores (5.0 and 4.6, respectively). This management committee includes a higher number of species in the management plan, therefore collecting consistent and quality information for all species is harder, and economically more expensive. In both case studies, participants recognized a high level of control over the procedure, which is reflected in the requests and use of relevant information for decision-making. Information being gathered has related mainly to resource stock studies. Accordingly, management committees have updated information and suggested control measures, such as maximum extraction limits and closures. Interviewees indicated that the management committees invite experts to recommend decisions, including academics, public officials, representatives of artisanal fisheries, and the commercialization chain. One interviewee highlighted:

“In the management committee we discuss various topics, and we do not have the knowledge of each one to make decisions, (...) for example if we are discussing how to improve commercialization, we invite intermediaries, processing plants, and even experts in economics” (Interviewee Bay of Ancud).

Decision Structure Component

In procedures that define the structures and processes for decision-making, the evaluations presented important differences between the two case studies (**Figure 2**). In both case studies, decision-making procedures include extensive participant discussion for each topic. Subsequently, the participants vote to resolve the decision. The interviewees indicated that most decisions are taken unanimously. In the Bay of Ancud, the component was evaluated with a grade over 5.6 for all criteria, with the exception of the correctability criterion (3.9). In this procedural component, correctability referred to the difficulty in correcting decisions based on monitoring and new information available. Interviewees indicated a low capacity to correct decisions based on monitoring and new available information, thereby reducing adaptive capacity. As one of the interviewees mentioned: *“In the management committee decisions are made mostly by common agreement, but we have a low capacity to monitor and re-change decisions, so we cannot correct them in time”* (Interviewee Bay of Ancud). In the case of the Gulf of Arauco, the criteria were evaluated at 5.3 on average. However, the quality of decisions was evaluated with a moderate level of achievement (4.8), mainly related with delays in resolving problems (e.g., the regularization of the informal divers).

Appeals Component

In the procedures for establishing complaints or appeals of management committee decisions, a relatively low level of achievement was observed in the Gulf of Arauco, and a moderate level in the Bay of Ancud (**Figure 2**). In both cases, ethics was the criterion with the highest level of achievement. This relates to the trust that management committee participants have toward the authorities in the context of management committees. Obstacles in this component related to the lack of flexibility in regulations. In both case studies a relatively low level of control over this procedure is observed, understood by the interviewees as a low capacity to impugn or reverse decisions made by the management committees. As one of the interviewees mentioned: *“When decisions are made, they are established, I don’t know, I really don’t know how we could correct a decision, neither can we monitor the direct results of each of the decisions”* (Interviewee Gulf of Arauco). This jeopardizes the adaptive capacity of the system. The impugnation procedures established in the law for all administrative acts, including decrees or resolutions, also apply to the management committees, but these are bureaucratic and have not been widely available to participants.

Safeguards Component

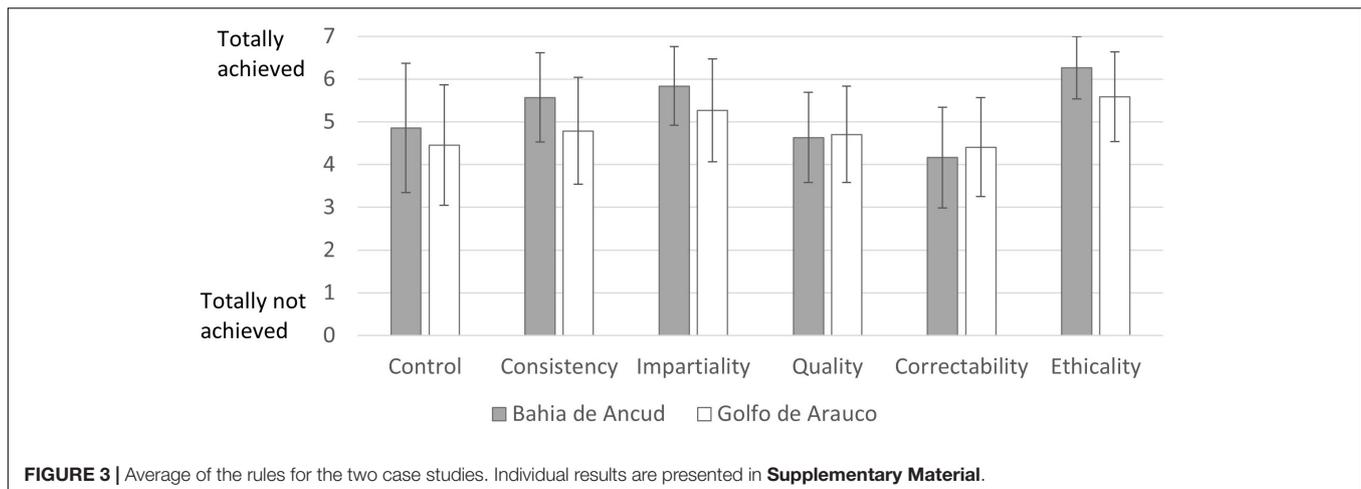
Moderate levels of achievement were observed in procedures that ensure transparency and accountability in decision-making (**Figure 2**). In both case studies, interviewees indicated that they perceive limited control over these procedures (4.3 in

the Bay of Ancud and 3.8 in the Gulf of Arauco). A low perception of achievement in this component generates greater concern considering that it is a crosscutting component, which has implications for all stages of the management committee (**Figure 1**). Participants of the management committee are not responsible for accountability. This responsibility belongs to the authorities and the technical agencies contracted to implement specific projects. In addition, the accountability mechanisms are not consistent over time and across projects. One interviewee highlighted: *“We, in the management committee, do not have procedures to account to the citizens, the authorities publish the acts in their web page, in addition for each project the detail of the expenses is presented at the end, but it is not always like that, this is an aspect to improve”* (Interviewee Gulf of Arauco). It is important to emphasize that the interviewees consider that authorities are impartial and exercise their accountability function in an ethical manner. Therefore, concern about accountability processes does not relate to the behavior of the authorities, but rather to the lack of clarity and consistency of regulations in this regard.

Change Mechanisms Component

Procedures that allow changes to the operating rules of the management committees are perceived as being absent (**Figure 2**). The worst evaluated criterion refers to the control (3.0 in the Bay of Ancud and 3.2 in the Gulf of Arauco). This is also a crosscutting component, so the low perception of achievement has implications for all stages of the management committee (**Figure 1**). This is explained because the management committees do not have the authority to modify the legal rules of operation, including the number of participants and responsibilities. These rules are only modified through resolutions or decrees of the Ministry of Economy. Management committees can only define some aspects of internal functioning. As one of the interviewees mentioned: *“we do not manage the rules of the game, the ground is defined by the law, we adjust our actions to the procedures already established, this limits us a lot”* (Interviewee Bay of Ancud). These issues again signal the lack of adaptive capacity of the governance structure. The quality criteria was evaluated with low achievement by the interviewees (3.4 in the Bay of Ancud and 3.8 in the Gulf of Arauco). This is explained by the changes made in the regulations that determined the number of participants in each management committee, limiting the representation of diverse actors in the system.

Figure 3 presents the average assessment of the six criteria considered in the evaluation of procedural justice. In both case studies, the criteria of ethics and impartiality were evaluated with the highest level of achievement. Additionally, these two criteria presented a relatively low dispersion among the estimates of the interviewees, which shows a consensus regarding the ethical behavior and impartiality of the authorities in both case studies. In general, it was observed that the correction capacity in the procedures is low, this alert about the adaptive capacity of the management committees. In the control criterion, relatively high dispersion in estimates was observed, indicating a high perception of influence in some of the components of procedural justice (participant selection, data collection,



and decision-making), and low influence in other procedures (communication and accountability).

DISCUSSION

Calls to promote and assess procedural justice are increasingly common in environmental studies (Barnett and Eakin, 2014; Pieraccini and Cardwell, 2016; Partelow et al., 2019; Shirley and Gore, 2019; Bennett et al., 2020). However, the focus of policy and research in coastal fisheries has generally been on distributive justice (Österblom et al., 2020). In this study, we focus on the different components of procedural justice, based on rules to evaluate the achievements and challenges in Chilean small-scale fisheries. Few studies have addressed users' perceptions toward procedural justice in fisheries (Barnett and Eakin, 2014; Gustavsson et al., 2014; Daigle et al., 1996). To our knowledge, this is the first study that decomposes procedural justice in seven components, evaluating six rules across the components in the administration of fisheries. Our results show that management committee members, that participate in these novel collective action arenas (Estévez and Gelcich, 2020), perceive heterogeneity in the achievement of different procedural justice components, which is a central element in achieving equitable development in the oceans (Österblom et al., 2020).

We identified positive perceptions on different procedural justice components. First, the management committees establish a transparent, consistent, and democratic system for the selection of artisanal fishers' representatives. In both case studies, artisanal fishers have the possibility of selecting their representatives, ensuring total impartiality and non-intervention of the authorities in this process. The right to select decision makers is a central part of participation in democratic system, but also central element of procedural justice (Pieraccini and Cardwell, 2016). Stakeholder participation, although mediated through their representatives, builds trust, addresses resistance to institutional change, and empowers resource users in fisheries systems (Gelcich et al., 2009; Ebel et al., 2018; Crandall et al., 2019). However, the expansion of participation mechanisms

in Chile should strengthen deliberative forms of dialogue and ensure that decision-makers represent the diversity of existing interest groups (Gelcich et al., 2019; Estévez and Gelcich, 2020).

A second aspect which is well perceived by fishers refers to the ability of management committees to access and utilize biological information to inform decisions. Management committees have mandated the generation of studies on the status of the most important resource populations. These biological studies are complemented by local knowledge of the state and location of stocks by artisanal fishers. Despite this progress, socio-economic information is seldom collected, and there is greater uncertainty regarding the situation of fishers and the potential social consequences of management plans. The perception that knowledge integration is taking place, while not formally established in procedures, is relevant, considering that other studies have reported gaps in this regard (Gelcich et al., 2019). Advancing toward the co-production of knowledge in natural resource management increases the legitimacy of alternatives, which is especially relevant in the transformation of small-scale fisheries (Abreu et al., 2017).

A fundamental element for procedural justice refers to the recognition of achievements in the ethical dimension. This dimension showed high levels of achievement in both case studies. This recognition of procedural ethics is especially relevant in a context of mistrust of institutions in Chile and Latin America (PNUD, 2019). In addition, in the Chilean fishery system, trust is a critical element for management, because authorities cannot coordinate all activities, ensuring compliance and cooperative actions without a high level of trust among stakeholders (Gelcich et al., 2019). Trust among stakeholders is also a key driver for governance transformation, and a strong predictor of management legitimacy (Gelcich et al., 2010; Hough et al., 2010; Eggert et al., 2018). Despite the scores achieved in the case studies, addressing different components of justice allowed to identify the need to strengthen accountability mechanisms, which are also related to ethics and the legitimacy of decision-making.

Results of the procedural justice assessment show challenges associated with management committee's implementation,

which, if unresolved, will constrain the ability to strengthen justice in the Chilean fishing system. The greatest weaknesses were observed in the crosscutting components, which have implications for all stages of the management committee (Figure 1). The management committees operate on the basis of rules established in the GLFA that make the structure inflexible. This causes the management committees to have low adaptive capacity to change the mechanisms and rules for decision-making. An aspect that has already been highlighted in other studies is that the participant structure in management committees is stable, which determines the number of participants and groups that are represented (Gelcich et al., 2019). These restrictions on the participation of other interest groups, such as intermediaries, non-profit organizations, and local governments can lead to the delegitimization of these collective action spaces. Adaptive capacity focuses on learning, and is a central element for governance in natural resource management (Folke et al., 2005). A second challenge for procedural justice relates to strengthening the mechanisms for communicating benefits and decisions to stakeholders. Communication is a fundamental aspect of governance, enabling communication and interaction with the artisanal fishers who are the foundation of the system. The lack of effective communication generates a risk of illegitimacy for management committees (Gelcich et al., 2019).

There are several future lines of research in the relationship between justice and fisheries systems. First, it is relevant to evaluate the procedural justice model in a broader range of stakeholders. In this study, we focused on gathering the perceptions of management committee representatives, selected by the fishers through free and transparent election processes. It is a future challenge to consider evaluations of procedural justice not only for representatives on management committees, but also for the artisanal fishers and users. Likewise, it will be relevant to discuss these results and gather the perceptions of those who can modify the rules of the management committees, such as the Chilean congress and government authorities. For this, qualitative research strategies can facilitate the comparison of different subjective perceptions regarding the relationship between equity, justice, and benefit distribution (Dawson et al., 2018; Bennett et al., 2020). Including multiple stakeholders will help understand the importance of geographic, demographic, and management variables in the perception of justice in decision-making procedures (Bennett et al., 2020).

The work presented in this study has allowed to operationalize existing frameworks for the study of procedural justice. Integrating this understanding with insights from studies of justice in marine protected areas (Halpern et al., 2013; Richmond and Kotowicz, 2015; Hill et al., 2016; Gill et al., 2019; Kockel et al., 2019; Bennett et al., 2020), land conservation (McDermott et al., 2013; Pascual et al., 2014; Zafra-Calvo et al., 2017; Dawson et al., 2018; Friedman et al., 2018; Moreaux et al., 2018), and environmental studies (Faber and McCarthy, 2003; Schlosberg, 2007) could enable further advancement.

We argue that procedural justice is critical to promoting equity in small-scale benthic fishing systems. Chile has conducted an innovative process, in which, through inter-sectoral management

committees, it has increased the participation of communities in decision-making. Management committees are part of a fisheries governance system that includes different administration regimes (Estévez and Gelcich, 2020). An important challenge is to generate coherence in the decision-making processes between different governance systems that share a geographic space. For example, within the areas regulated by the Bahía Ancud Management Committees and Golfo de Arauco Management Committees, there are TURF areas that are regulated by different procedures, but should promote the strengthening of procedural justice.

This study shows that management committee members perceive heterogeneous levels of achievement in procedural justice components. Main gaps which are key to address relate to challenges, such as strengthening the capacity to modify rules by management committees, and accountability of decision-making. We conclude that addressing different components of procedural justice can be used as a lens to enlighten and inform necessary reforms to fishery governance.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of the Pontificia Universidad Católica de Chile. Written informed consent for participation was required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fmars.2021.636120/full#supplementary-material>

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