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Drawing on the project initiators' perspectives to evaluate TURF implementation in the Kepulauan Seribu Marine National Park: an online Q methodology study

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Territorial User Rights for Fisheries (TURF) are established to grant privileged rights exclusively to local fishing communities to manage their stock within a bounded fishing ground. Theoretically, they will improve their sense of ownership which will eventually lead to stewardship and responsibility. In Indonesia, contemporary TURF has been introduced to meet such social outcomes and address the overfishing problems caused by open-access systems. The primary objective of this study was to determine how different project initiators perceive the system's performance of TURF in Kepulauan Seribu Marine National Park. This study used an online Q methodology to determine what key actors thought of similarities and differences in TURF implementation by developing a concourse based on the original TURF project success elements. The results show that there are two different perspectives on what the essential aspects of TURF succeed in Kepulauan Seribu. The first opinion group appreciated the technical design of TURF, particularly the exclusion mechanism and boundary, which are crucial. A second opinion group argues that the clarity of rights, roles, and responsibilities is fundamental. Both opinion groups agreed that consistent law enforcement is the key to a successful TURF implementation. This study evaluated key stakeholders' perspectives on co-management programs to identify points of consensus and disagreement that could ultimately help ensure the long-term success of TURF and similar co-management programs.

KEYWORDS

territorial user rights for fisheries (TURF), stakeholder perspectives, Q methodology, overfishing, fisheries co-management, marine governance

1 Introduction

Overfishing is widely recognized as a significant global threat to the sustainability of coastal ecosystems and fishery resources (Warren and Steenbergen, 2021). Small-scale fisheries often have detrimental effects on the livelihoods of vulnerable people. Local fishers suffer losses under an open-access system, leading to overfishing problems (Gelcich et al., 2012; Arthur, 2020). Open access regimes have contributed to overfishing, as they allow unrestricted fishing activities without adequate rules and limitations (Wade et al., 2019). Under today's conditions, open access often leads to a "race to fish." It incentivizes fishers to maximize their catch before competitors exhaust their resources (Rosenberg, 2017). To address overfishing problems, it is necessary to establish a governance structure that enables communities to actively manage their fisheries resources (Ostrom, 1990; Hilborn, 2007).

Overfishing is generally managed using various tools. Notable examples include creating no-take zones to protect fish stocks and regulating fishing efforts to control fish mortality by regulating quotas, licenses, closure seasons, and size restrictions (Afflerbach et al., 2014). Such strategies require strong governance structures and stakeholder awareness (Gutiérrez et al., 2011; Lechuga Sánchez et al., 2021). Although establishing marine protected areas (MPAs) has been shown to enhance fish biomass by protecting critical habitats (Villaseñor-Derbez et al., 2019; Estradivari et al., 2022), it still provides relatively little incentives for fishers (Ovando et al., 2013). Territorial User Rights for Fisheries (TURF) approach is yet another mechanism growing in importance that can theoretically can resolve the overfishing problem because, conceptually, TURFs provide local fishers with more transparent and secure property rights (Grafton et al., 2006; Costello et al., 2010). In Indonesia, customary-based TURFs, for example, *sasi laut* in Maluku, are commonly perceived as successful tools for regulating the sustainable utilization of the protected species and ecosystems in the area (Siry, 2006; Halim et al., 2020).

With a track record of success with its traditional rights-based approach in *sasi laut*, there has been an increasing effort to scale up the system into a more contemporary practice in non-customary-based communities (Halim et al., 2020). In this study, the contemporary TURF system refers to an area-based fisheries co-management model that was formalized through a formal procedure (Halim et al., 2020) and thus acknowledged by the local authority (the Kepulauan Seribu Marine National Park). The contemporary TURF system engages local actors, government officials, and other stakeholders to develop a shared fisheries management plan that local fishers will implement with the support of the authority. Within Indonesia it is distinguished between a contemporary and a traditional TURF system. The former is a recently established TURF and the latter is a TURF with a long history established by the community (Halim et al., 2020). Quynh et al. (2017) conducted a comprehensive literature study that found a limited research on the assessment of TURF, especially on how the technical design and management plan of TURF affects its implementation.

TURF management is commonly evaluated quantitatively by monitoring its impact on biodiversity indicators, such as fish

biomass (Gelcich et al., 2012; Lester et al., 2017; Viana et al., 2019), fish landing data (Aburto et al., 2014), and fish logbook data (Alves et al., 2022). Several studies have evaluated TURF implementation using various approaches in addition to quantitatively assessing its implications for biodiversity status. A TURF evaluation in Mexico focused on ecological, social, and governance aspects and found that TURFs can boost species abundance over the long term of TURF implementation ((Villaseñor-Derbez et al., 2019). Another study in Chile used a Likert scale-based questionnaire to assess TURF performance (Crona et al., 2017). This study of Chile suggests that social capital is likely to be developed and maintained through active and engaged leadership; thus, participation in leadership is fundamental. It is interesting to note that this study primarily considered the viewpoints of fishers. Unlike previous studies, our study included all actors establishing and managing the TURF. It is critical to understand key actor's perspectives, because their perceptions would shape their attitudes and behaviors towards strategies or decisions they would make in TURF implementation (Bowman et al., 2021).

This study evaluated the implementation of a contemporary TURF system in Indonesia through a case study. This study aimed to understand stakeholders' views on the success elements of TURF in Kepulauan Seribu. It also intended to utilize the Q methodology as an alternative monitoring tool to evaluate project output. The main justification for utilizing the Q methodology is that we believe that the successful implementation of TURF management hinges on the collaborative efforts and proficiency of key actors in comprehending and implementing the jointly developed management plan. Effective interpersonal communication among key actors is critical to prevent potential future misunderstandings. By allowing for the exploration of diverse perspectives owned by all groups who implemented the project, the Q methodology provides a systematic and comprehensive analysis of stakeholders' perspectives on TURFs. It uses rigorous factor analysis to understand the project's initiators perceptions and responses to TURF management in the Kepulauan Seribu Marine National Park.

This study examines a specific TURF system initiated by the environmental NGO, Rare Indonesia. Following the formal partnership agreement between the park authority and fishers in the TURF group, the TURF was officially implemented in 2018. Although this study was conducted in Indonesia, it offers potential lessons for the national, regional, and international contexts. At the 15th Conference of the Parties (COP) of the Convention on Biological Diversity (CBD) in 2022, all parties expressed growing concerns about the need to intensify efforts to achieve the 2020 Aichi Target 11, which aims to formally protect 10% of the world's oceans (Estradivari et al., 2022). This last COP discussed the other effective area-based conservation measures (OECMs) as a new framework to complement MPAs (Estradivari et al., 2022). An essential principle of OECMs is that they relate to a geographically-defined area, which aligns with the TURF principle (Nguyen Thi Quynh et al., 2017). In the Philippines (Afflerbach et al., 2014) and Belize (Alves et al., 2022), an approach similar to TURF, the managed-access approach, has been implemented. In Indonesia, the TURF approach has been strongly advocated by the national

and provincial governments and environmental NGOs (Halim et al., 2020). Therefore, understanding the different perspectives on the effectiveness of those involved is important for future endeavors in small-scale fisheries management in Indonesia and beyond.

The objectives of our study are to investigate the perspectives of the TURF project initiators and identify similarities and differences in the implementation of TURF in Kepulauan Seribu. The research questions were as follows: (1) What similarities and differences in perspectives exist in TURF implementation in Kepulauan Seribu? (2) How can these differences be understood?

2 Materials and methods

2.1 Study area

This study was conducted in the Kepulauan Seribu Marine National Park, which is a government entity that holds the management rights of the park areas, including the waters and fisheries resources where the TURF is located. It is situated in northern Jakarta, the capital city of Indonesia. The TURF area was adjacent to Kelapa, Kelapa Dua, and Harapan islands (Figure 1). Once the target species (squid) had been identified, local fishers met several times to co-design the management of the TURF. It was agreed that TURF should not be located too far from the fisher’s settlement and should not be too large to facilitate community-based monitoring and surveillance. Theoretically, an ideal TURF

area should be located close to the local community to reduce the cost of monitoring and increase the likelihood of more effective enforcement of TURF rules (Wilen et al., 2012).

2.2 Q methodology

The Q methodology originated in the field of psychology (Brown, 1993; Stephenson, 1993; Newman and Ramlo, 2010) and has since been adopted by scientists and practitioners as a means of exploring human subjectivity on a variety of topics (Dieteren et al., 2023). The method, for example, has been used in work on environmental policy and discourse to gain a more thorough understanding of stakeholder perceptions ranging from sustainable mountain development (Moser and Baulcomb, 2020) to marine governance and fisheries management field (Zabala et al., 2018). The Q methodology is a well-established method that could provide a basis for systematically studying actors’ subjectivity, including their opinions, attitudes, beliefs, and perspectives on a given topic (Dieteren et al., 2023). When used to evaluate a policy that might affect how human actors interact and utilize their natural resources, Q methodology could suggest more effective policy solutions by identifying similarities and differences in implementation strategies (Eden et al., 2005).

The Q study began by developing a list of statements (concourse). Following the development of the concourse, a shorter list of representative statements (a Q set) was established. Additionally, a list of potential key stakeholders (P set) was created.

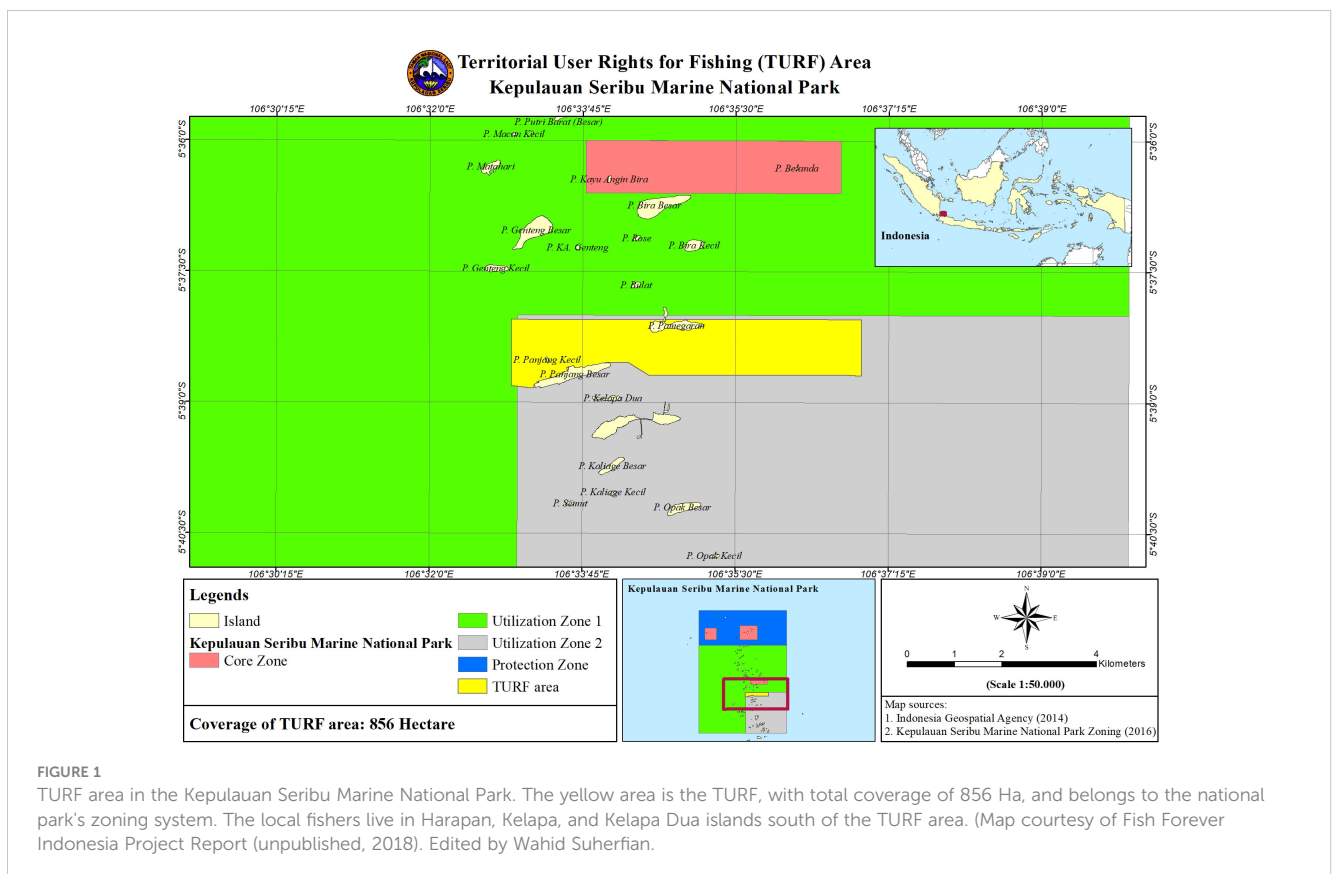


FIGURE 1
 TURF area in the Kepulauan Seribu Marine National Park. The yellow area is the TURF, with total coverage of 856 Ha, and belongs to the national park’s zoning system. The local fishers live in Harapan, Kelapa, and Kelapa Dua islands south of the TURF area. (Map courtesy of Fish Forever Indonesia Project Report (unpublished, 2018). Edited by Wahid Suherfian.

Following this process, each respondent conducted a Q-sorting process. Q-sorting revealed different patterns of perspective after respondents sorted each statement into a grid (see Figure 2). The results of Q-sort analysis explore patterns within and across individuals by focusing on their discursive understanding of a particular topic (Brown, 1993; Ramlo, 2023). The ability to produce statistically significant results from a relatively small sample size (Barry and Proops, 1999) is one of the key strengths of the Q methodology. In addition, in contrast to standard survey analysis, the Q methodology transforms subjective information into quantifiable data (Pike et al., 2015; Hagan and Williams, 2016).

2.3 Concourse development and pretesting

A concourse is a specialized term for statements that respondents are asked to sort into a Q study. Unlike conventional surveys, where the sample typically represents the total population, the Q methodology uses a list of statements (concourse) as the sample (Watts and Stenner, 2012, p. 34). This set of statements that can be extracted from several sources (Zabala et al., 2018; Ramlo, 2023), for example expert interviews, lectures, discussions, scientific literatures, or any relevant written information including grey literatures. The collection of statements (concourse) must be subjective rather than factual. Researchers can determine it based on their comprehension of the literatures or discussions with competent people related to the research questions. Furthermore, as Stephenson (1993, p. 5-7) has already pointed out that a set of statements can also be derived from the researcher’s own self-analysis, which should be related to the research question.

As our study aimed to understand the similarities and differences in the perspectives of the project initiators, we compiled a list of statements according to the design principles that are the fundament of the TURFs established within Rare’s Fish Forever program, to which the analyzed project belongs. The design principles are as follows: 1) community support, 2) local enforcement system, 3) exclusive access area, 4) fisheries policy, 5) fisheries management rules, 6) fish recovery zone, 7) monitoring and evaluation, and 8) links to markets. Eight elements were

extracted from the comprehensive literature on property rights, small-scale fisheries management, co-management, and marine conservation (Arrivillaga et al., 2015)

The first draft of the Q set consisted of 74 statements. After reviewing and selecting statements that had relatively similar meanings, we decided to pre-test 25 statements. Pre-testing was conducted with three people from two different stakeholder groups to check if the statement set was understandable, the instruction was comprehensive, and the data collection process was feasible for respondents. The pre-test was also crucial to ensure that all statements adequately covered the topic and to allow respondents to input additional statements. The pre-test resulted in 20 statements (Table 1). Five statements were dropped because some had meanings close to another statement. The transformation of the concourse from the first list into final statements, including its association with the eight elements of success, is presented in the Supplementary Information.

2.4 Respondent selection

In 2014, an environmental NGO, Rare Indonesia, introduced expertise and funding to introduce the TURF approach. Both parties worked together to design the TURF, starting from identifying TURF management objectives, determining species target and TURF area, establishing the TURF group, and developing TURF rules collaboratively with the local fishers. Furthermore, some faculty members from IPB University provided expertise in designing a customized TURF system at Kepulauan Seribu. The TURF management group consisted of fishers who signed a formal partnership agreement with the national park. It allowed the TURF group to manage the TURF area according to mutually agreed upon management rules.

We aimed to identify individuals with considerable knowledge and practical experience in implementing TURF. We not only interviewed people who collaborated directly with the local fishers but also interviewed leaders in management positions. In addition to the respondents from the national park, Rare Indonesia, and IPB University, we have included prominent actors from the local

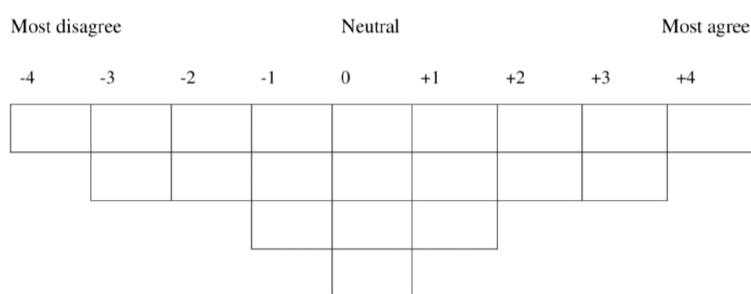


FIGURE 2 It is a default Q-sort design with a forced-choice normal distribution. The Q-sort in this study consists of a nine-point scale (-4 to +4) to allow all 20 statements fit in the boxes. The vertical column (Y-axis) comprises the sorted statements by each respondent. There should be only one statement for each vertical column. While the horizontal column (X-axis) entails the preference of each respondent upon the statements, ranging from the most disagree to most agree.

TABLE 1 Q-Set and factor characteristics.

Statement	Factor 1			Factor 2		
	Rank	Z-score	Sort	Rank	Z-score	Sort
#1. The National Park is the one that is responsible to ensure TURF rules are well implemented	8	0.49	1	20	-1.69	-4
#2. A TURF that has no boundary mark will not work	2	1.39	3	15	-0.37	-1
#3. TURF rules are good, but the implementation is still not good	6	0.68	2	2	1.55	3
#4. A TURF improves the organizational capacities of the members	3	1.26	3	6	0.71	1
#5. The ocean and its resources are God’s gift, so all fishers from anywhere can catch fish in the TURF area	20	-1.76	-4	11	-0.2	0
#6. Since TURF has been installed, fishing activities can be done closer, and it is saving time	14	-0.35	-1	10	0.15	0
#7. It would be better to have minimum one “no-take” zone within TURF area	9	0.41	0	8	0.56	1
#8. Working together is more profitable than working alone	5	0.98	2	7	0.67	1
#9. TURF rules should only apply to local fishers in three islands (Harapan, Kelapa, and Kelapa Dua)	17	-1.09	-2	14	-0.25	-1
#10. TURF provides economic benefits for me	13	-0.3	-1	13	-0.23	-1
#11. Fisher does not need to record their catch because their job is only catching fish	18	-1.38	-3	18	-1.54	-3
#12. Catch reporting will only work if there is a prize	15	-0.61	-1	16	-0.46	-2
#13. The daily needs of fisher’s households can be fulfilled from TURF area	11	-0.2	0	12	-0.23	0
#14. The fish in the sea will never run out no matter how we manage it	19	-1.67	-3	19	-1.62	-3
#15. Without consistent enforcement of regulations from the authority, TURF will not give any benefit	1	1.48	4	1	1.61	4
#16. There should be more women actively involved in TURF management activities	7	0.57	1	4	0.84	2
#17. The average of fishing caught is increasing since TURF management was installed	12	-0.23	0	9	0.27	0
#18. The TURF design process was inclusive and participatory	4	1	2	5	0.75	2
#19. We must manage all species, not just squid	10	-0.01	0	3	0.94	3
#20. The one that responsible for coral reef monitoring is Rare Indonesia because it is their program	16	-0.69	-2	17	-1.45	-2

The green highlighted cells reflect consensus for both factors, while the blue highlighted cells reflect distinct statements between factors. We titled factor 1 “Exclusive rights” and factor 2 “Insufficient enforcement.” In addition, the term used for consensus is “Consistency is the key.”

In each factor, rank displays the order of a statement; Z-score indicates how far a statement is from average, and sort demonstrates a statement’s sort.

fisher’s community in each island according to their roles in the Kepulauan Seribu TURF project. Further detailed contributions and roles played by each respondent are presented in Table 2.

Eleven respondents participated in our study using a purposive sampling method. Each had sufficient knowledge, experience, and relevance to the TURF project. Table 3 provides the short profile of the respondents. The Q methodology allows for a meaningful interpretation and statistically significant results even with few respondents (Ramlo, 2023). Barry and Proops (1999) suggested that statistically meaningful results could be obtained even with as few as 12 respondents.

Due to COVID-19 accessibility issues in the marine park area, we focused only on a small number of fishers in the TURF management group, instead of taking samples from a total local fisher population. However, we still managed to sample respondents with similar levels of participation in the TURF design and implementation. We successfully approached three fishers, one from each island, to perform Q sort. Unfortunately,

we were not able to add more fishers in this study due to the limited time to conduct fieldwork and the increasing risk of the COVID-19 delta variant at that time. While we would have liked to obtain more samples for comparison, we felt that three of the seven fishers assigned to manage the TURF group on a daily basis provided meaningful results using the Q methodology.

2.5 Data collection

Easy HtmlQ was used to develop and execute the online Q sort procedure. Due to COVID-19 restrictions, we used Zoom to meet the respondents and conduct Q sorting. The respondent could see each statement on the shared screen and drag and sort them into the various boxes inside the forced distribution grid (see Figure 2). The Q grid boxes were categorized into three main categories: agree, neutral, and disagree. First, the respondent sorted all statements into these three categories. Second, they could drag and put each

TABLE 2 Contribution from each respondent in the Kepulauan Seribu TURF project.

No	Participant	Role in the Kepulauan Seribu TURF project
1.	NP01MN	This person functioned as a supervisor within the Kepulauan Seribu Marine National Park and provided occasional assistance to the campaign manager of the TURF project in implementing the project work plan. Specifically, this includes contributing to high-level decision-making.
2.	RI02AY	Within Rare Indonesia, this person was a mentor and project manager who assisted the campaign manager in the implementation of the campaign manager's work plan.
3.	RI03RJ	Within Rare Indonesia, this person was a mentor and helped the campaign manager to collect technical fisheries data as a basis to design the TURF.
4.	IU04FS	As a member of IPB University, this person provided expertise (as a consultant) in designing and implementing the TURF management plan. The person possesses expertise in fisheries data collection and monitoring.
5.	IU05PD	As a member of IPB University, this person provided expertise (as a consultant) in designing and implementing the TURF management plan. The person possesses expertise in fisheries co-management and policy.
6.	NP06PM	This person was the unit leader of the Kepulauan Seribu Marine National Park and sharing authority with the TURF group representing the local fishing community. This person had the management authority over the TURF area.
7.	NP07KT	This person was the campaign manager in the Kepulauan Seribu Marine National Park and was responsible for the design and implementation of the daily work plan of the TURF project.
8.	RI08HK	Within Rare Indonesia, this person served as the program director who supervised the program manager from Rare Indonesia. This person made technical and strategic decisions about the design and implementation of TURF in consultation with various stakeholders.
9.	TG09WH	This individual represented the fishers from Harapan Island. Additionally, this person had been designated as the core committee member in the TURF group. This individual is a senior fisher, who is both respected and trusted by the majority of fishers on Harapan Island.
10.	TG10SF	This individual represented the fishers from Kelapa Island. Additionally, this person had been designated as the core committee member in the TURF group. This individual is a senior fisher, who is both respected and trusted by the majority of fishers on Kelapa Island.
11.	TG11AW	This individual represented the fishers from Kelapa Dua Island. Additionally, this person had been designated as the core committee member in the TURF group. This individual is a senior fisher, who is both respected and trusted by the majority of fishers on Kelapa Dua Island.

statement into all boxes, ranging from boxes with values of -4 to +4. After Q sorting, a short interview was conducted to confirm and elaborate on each respondent's most agreed (+4 and +3) and disagreed (-4 and -3) statements. We asked why they placed certain statements in the +4, +3, -3, and -4 boxes. If necessary, follow-up questions were asked to clarify their explanations. Finally, before completing the entire Q sort procedure, they were asked to fill out a short demographic survey.

2.6 Data analysis

Data from online Q sorting were analyzed using a quantitative factor analysis to identify multiple perspectives. KenQ software was used to perform factor analysis. Centroid factor analysis was applied and combined with varimax factor rotation. The significance of a factor is statistically determined by its eigenvalue and composite reliability. An eigenvalue indicates the extent to which an object (such as a matrix) is stretched or compressed when subjected to a particular statistical calculation (Barry and Proops, 1999). In Q methodology, eigenvalues are used to determine the extent to which each pattern or factor explains the differences in respondents' opinions. It is commonly accepted in Q studies to focus on factors with an eigenvalue of 1.00 or higher (Watts and Stenner, 2012, p. 105). Composite reliability is another statistical criterion used to determine the significance of a factor. This reliability depends on the number of respondents defining the factor. The more respondents define a factor, the higher the reliability, and therefore the reliability of the factor (Zabala and Pascual, 2016). In addition, interview transcripts from the respondents were created to help better understand the various patterns of thought surrounding the given topic (Zabala et al., 2018).

3 Results

We examined all factors' eigenvalues (EV) according to the Kaiser-Guttman criterion (Watts and Stenner, 2012, p. 105). Centroid factor analysis was used to analyze the Q sort data. This resulted in two-factor solutions, with composite reliabilities of 0.952 and 0.941, respectively, explaining each factor's degree of validity. The maximum value of composite reliability is 1.00, which reflects statistical validity (Watts and Stenner, 2012, p. 105).

Factor 1 had an EV of 4.8367 and Factor 2 had an EV of 1.0379. The total explained variance was 53%. Table 1 indicates the z-scores, the mean number of statements assigned in the matrix, and the resulting rank of importance of the statements, as seen by the factor. This allowed us to compare the differences and consensus between the two factors concerning the different statements.

In the following, we describe each factor and give it a name that best represents the perspective. In brackets, we first state the number of the statement and then the assigned sort.

3.1 Factor 1: exclusive rights

Respondents who belong to this factor consider the practice of exclusive rights a crucial element in ensuring TURF work. They

TABLE 3 Respondents' short profile.

Characteristic	Number	Percentage
Age		
Below 40 years old	6	54.6%
Between 40-50 years old	4	36.5%
Above 50 years old	1	9%
Education		
No bachelor's degree	3	27.2%
Bachelor's degree	3	27.2%
Graduate degree	5	45.6%
Sex		
Males	9	81.8%
Females	2	19.2%
Stakeholder's group		
Kepulauan Seribu Marine National Park (field officers and manager)	3	27.3%
Rare Indonesia (program managers and director)	3	27.3%
IPB University (technical experts)	2	18.2%
TURF management group (fishers)	3	27.2%

believed that TURF would not work without a clear boundary (#2, +3). Despite the challenges of defining clear boundaries at sea, they think that they should be defined as clearly as possible because this is the main principle distinguishing TURF from other fisheries management systems. Similarly, there is concern about who can go fishing in the TURF area (#5, -4). Although all respondents agreed that fishery resources are a common good, they did not believe that a condition in which any fisher could easily catch fish in the TURF area would be ideal. This factor highlights the view that any fisher who utilizes resources within a TURF area should follow TURF management rules, regardless of their origin. Therefore, they oppose the statement that all TURF management rules are only applicable to local fishers from the Harapan, Kelapa, and Kelapa Dua islands (#9, -2). This factor's main highlight is the concept of exclusive rights, which distinguishes it from Factor 2. They are more concerned about rights allocation and implementation.

This factor had an eigenvalue of 4.8367, accounting for 44% of the study variance. This factor comprised five respondents. Two respondents from Rare Indonesia played a crucial role in directing and implementing the project. Furthermore, two other respondents from IPB University advised on the TURF program. Finally, an officer from the national park who had a supervisory role during the TURF project also contributed to this factor. This factor was not loaded by any member of the TURF group (fishers). All of them were proven to have a strong influence on organizing and executing the TURF program. They initiated, developed, and implemented the conceptual project approach.

3.2 Factor 2: insufficient enforcement

This factor highlights that a lack of clarity regarding all stakeholders' rights, roles, and responsibilities is a barrier that slows down an effective TURF implementation. They strongly oppose the Kepulauan Seribu Marine National Park as the primary institution enforcing the TURF rules (#1, -4). Respondents who were loaded to this factor also believed that instead of only managing squids, it would be preferable to manage all the fish caught (#19, +3). Furthermore, regarding rights, roles, and responsibilities, they agree that although they already have a good set of management rules, the implementation is still far from ideal (#3, +3).

This factor accounted for 9% of the study variance, with an eigenvalue of 1.0379. Four respondents loaded on this factor. They came from the national park and the TURF management group. Both stakeholder groups were essential for implementing the TURF. The national park is an authority that grants management rights to the TURF management group. Two of them are field officers of the national park and two are respected local figures who actively organize the TURF management group. All lived on the islands and interacted closely during the project.

3.3 Consensus: consistency is the key

Despite the distinct viewpoints between these factors, they shared numerous similarities as well. This study had 13 consensus statements according to the definition within the Q Methodology. A consensus statement is a statement that has been sorted identically in both factors, indicating a homogeneous viewpoint (Zabala and Pascual, 2016). These are, for example, statements #15 (4, 4), #14 (-3, -3), #11 (-3, -3), #18 (2, 2), #10 (-1, -1), #17 (0, 0) and #13 (0, 0), which were ranked according to their absolute value, meaning that a higher value indicates a clearer opinion. The most notable is statement #15: without consistent enforcement of regulations from the authority, TURF will not give any benefit. Both factors placed it as the most agreed statement. Second, statements not sorted identically but with a difference of one were also considered consensus statements. These are statements #8 (2, 1), #16 (1, 2), #12 (-1, -2), #6 (-1, 0), #7 (0, 1), and #4 (3, 1).

4 Discussion

Aiming to understand the project initiators' perspectives on TURF implementation in Kepulauan Seribu, Q methodology factor analysis resulted in two viewpoint groups and several statements that formed a consensus among them. First, we discuss the consensus statement, "Consistency is the key," and then address the differences between the "Exclusive rights" and the "Insufficient enforcement" viewpoints. Consensus is good, as it shows common ground. As in most cases, it does not mean that no action is required, but joint problem recognition is an excellent start. Disagreements are more challenging to address.

It is an interesting consensus that both factor groups equally disagreed with statement #14: Fish in the sea will never run out no matter how we manage it (#14, -3). Nine out of 11 respondents in both groups believe that there will be no more fish in the sea if fish stocks are not responsibly managed. In fact, two out of three respondents from the TURF group confirmed that they are catching less fish today than they did a few years ago. As one of the TURF group members said, *“If we catch all the fish without letting the smaller ones get bigger, it does make sense that they will go extinct.”* Declining catch is a key indicator of overfishing problem (Beckensteiner et al., 2020), and TURF in Kepulauan Seribu is assumed to address this problem. Aburto et al. (2013) suggested that TURF could influence the fishing behavior of local fishers to not overfish. In addition, having a TURF area that is close to the local fishers settlement makes it more cost effective to perform monitoring, as it can be done simultaneously when they are fishing (Oyanedel et al., 2017). Agreement on the need for management is a good starting point.

Another consensus among all parties is that fishers who are meant to be the main beneficiaries of TURF should be doing catch reporting, which directly relates to the first consensus and provides an essential building block for proper management. The future stock is uncertain without accurate and reliable fish catch data (Fujita and Bonzon, 2005). Both groups agreed that fishers should actively participate in catch reporting (#11, -3). An “Exclusive rights” respondent argued, *“The essence is that fishers are the ones who should know their fisheries resources condition, so this is called being responsible. If the fisher uses natural resources, they must be responsible for ensuring sustainability. They must know how the condition of the fish they catch is.”* This is somewhat aligned with a response from a senior member of the TURF group, *“Doing catch reporting is important because we can know our income by looking again in the logbook. Although it is not easy, especially when we are still wet and tired after fishing, this is what should be done. I did it quite often, but since the pandemic, I stopped because I also rarely go fishing, simply because the demand is also decreasing.”* It seems clear that fishers lack the agency to manage the fish stock in cooperation with the state. However, the time and resource constraints of fishers have been pointed out.

Regarding the economic gain from TURF implementation, there is a slight disagreement with the statement that TURF provides an economic benefit for the local fishers, particularly those belonging to the TURF management group (#10, -1). This perception seems to be supported when looking at the catch reporting data. Analyzing the logbooks does not show any increase in catches. There is consensus that the TURF does not provide a positive economic benefit, at least from its establishment until recently. In the medium run, cooperation will persist only if actors clearly see the benefits of doing what they do (Jagers et al., 2012; Oyanedel et al., 2017). From this perspective, it is crucial to inquire about why the TURF does not provide any benefits yet and how tangible benefits can be generated.

Trust and leadership are crucial for sustaining TURF implementation (Lechuga Sánchez et al., 2021). In the early stage of TURF implementation, it is vital to have reliable leaders to establish trust (Andrachuk et al., 2018). A study of TURF in Galicia

showed that it took years to build trust among leaders from the implementing parties (Macho et al., 2013). One of the fishers shared his opinion about internal staff replacement within the national park structure, which challenged their trust. On the one hand, the newly appointed national park leader did not know about the formal partnership agreement between the former national park leader and the TURF group, when he arrived. Therefore, he did not approach the TURF group. On the other hand, the leader of the TURF group did not approach actively the newly appointed leader of the national park. Therefore, the significant role of the TURF group in implementing TURF in Kepulauan Seribu was not recognized, instead mistrust emerged.

Finally, another consensus relates to one of the main messages of property rights theory: the importance of enforcement (Basurto, 2005; Nguyen Thi Quynh et al., 2017). Both factors agree that enforcement is critical to success (#15, +4). One respondent from the “Exclusive rights” viewpoint argued that *“In my opinion, this program is very related to the basis of the rules. That is one of the crucial conditions, it is. Because the National Park itself has rules, right? For example, the zoning system, and so on. So, when there are rules that have not been implemented yet, is there a TURF or not? I will be honest; there is no benefit in having TURF here, isn't it?”* This argument is brought forward by the key players who are implementing the project deliverables and those assisting TURF group members as consultants during the entire process of TURF establishment. Both of these factors indicate that collaborative enforcement should improve the successful implementation of TURF in Kepulauan Seribu. Oyanedel et al. (2017) discussed in their article about TURF reserves design that the inclusion of both local fishers and authority should be considered in the designing phase of TURF, and if it goes well, it might strengthen community support.

The main idea of the TURF concept is to delegate certain management rights and their enforcement to the local community groups (Oyanedel et al., 2017). Aligned with this concept, a TURF management group that filled up by local fishers was established in Kepulauan Seribu. The national park granted partial management rights to local fishers through a formal institution, the Partnership Agreement. Thus, although the national park holds higher authority, the TURF management group has the power to enforce regulations. However, the TURF group members seem slightly passive and wait for guidance from the government authority. As one in the “Exclusive rights” viewpoint said, *“Authority in this context, it doesn't have to be the government, right? But also referring to the community group. As a partner who did get the rights, they have the rights and obligation to take care of the TURF and the rules they own, so if they are not consistent in implementing the rules, it will fall apart. It would be funny if they (the local community) asked us back, “what are the benefits of TURF?” if they didn't enforce the rules themselves.”* The three TURF group members interviewed believed that the budget and infrastructure embedded in the government are fundamental to consistently enforcing the law.

Although there is a strong consensus that enforcement is central, we found that there is a lack of effective enforcement. This is a good condition for initiating a change. However, qualitative data indicate the need for action to enable TURF

group members to enforce the rules. If this requires a change in their self-concept of them, an increase in stewardship by TURF members, or the necessary budget or infrastructure is an open question.

The claim from the previous paragraph that fishers do not enforce their property rights is also put into perspective by examining statement #1, with which there is disagreement. Factor analysis showed that both fishers' and national parks' respondents believed that enforcement is crucial for success. However, the "Exclusive rights" viewpoint, which represents the authority, instead believes that the national park should be responsible for implementing rules (#1, +1). This perspective is completely refuted by respondents in the "Insufficient enforcement" viewpoint (#1, -4). The fisher's and national park's respondents in this study strongly disagree that park officers are the ones who should implement TURF rules. The main argument was that the establishment of the TURF in Kepulauan Seribu never used a top-down approach. Instead, all parties contributed, and finally, a compromise set of rules was agreed upon. They strongly believe that it should be up to the local actors to ensure that TURF works. As the overall intention of a TURF is to decentralize the responsibility to the local level (Aburto et al., 2013), one is wondering why the "Exclusive rights" viewpoint sees the park authority as the main responsibility for rule implementation. Either the park authority or project initiator (Rare Indonesia) do not want to see their importance and power being reduced, or from their perspective, allowing the implementation of the rules by the fishers themselves will not result in a sustainable outcome. Potentially, this could be because of both.

The final argument that the local community may not be able to manage the resource sustainably is challenged by the following view: The "Exclusive rights" viewpoint strongly believes that the process of TURF establishment has improved the organizational capacity of the members (#4, +3). One of the respondents belonging to the "Exclusive rights" viewpoint argued: *"I agree because this was really in the form of a bottom-up, so it's like even though we have a conservative system, and usually all fishermen can't join, but then ideas, input, problems, the challenges, and solutions were also from them, starting from them, coming from them, they discussing it, yes, this means that it helps to increase their capacity in terms of building institutions. Then, during the project, we also conducted several trainings to teach them."* In addition, most respondents with the "Insufficient enforcement" viewpoint also believe that establishing the TURF has increased their capacity, but is much more cautious (+1).

The following two statements, in which there is strong disagreement, are linked. Most respondents in the "Insufficient enforcement" viewpoint are unsure whether the ocean and its resources are God's gift and, therefore, everybody should be allowed to fish in the TURF area (#5, 0). This argument is opposed by respondents from the "Exclusive rights" viewpoint (#5, -4). One explained, *"The sea and fish are a gift from God; that is correct. But how we use and manage it is part of our efforts to maintain sustainability. If people can freely catch fish wherever they want, the first thing is that we negate or minimize the role of the locals who have tried to save the fish habitat by allowing it to grow. That will give a disincentive to the group, and then they can't see any*

direct benefit as those who conserve their resource through TURF." Theory and the original program indicate that excluding outsiders is crucial for success, so locals who carry the costs of implementing and running TURF can also benefit (Castilla and Defeo, 2001; Sikor et al., 2017).

Aligned with the prioritization of the local community to utilize the TURF area, respondents who loaded in the "Exclusive rights" viewpoint expressed their strong agreement with the statement that a TURF without a proper boundary will not work (#2, +3). They argue that without a clear delineation of the TURF area, there will be confusion and ambiguity in implementing the management rules, particularly in informing non-local fishers about the TURF territory. One said, *"The foundation of TURF is territorial management or spatial management. So, if there are no clear or no boundaries at all, it is not TURF management."* Another one supported this argument by stating, *"The boundary markers don't solve the problem, but they help make a declaration that someone owns this area, I think."* However, the "Insufficient enforcement" viewpoint provides a different perspective and disagrees with the above statement (#2, -1). This contradicts the theory, claiming that a clear delineation of who is in and out is essential for the success of any TURF. Only then can those taking the cost of organizing the local management regime also capture the benefits (Lechuga Sánchez et al., 2021). On the other hand, the perspective of local users is that fish are gifts from God; therefore, everybody should be allowed to fish in the TURF area. Boundaries are not seen by the fishers as closed and clear as theory would like to have them. Allowing outsiders to fish in the TURF might be a way of reducing conflicts or – if it is reciprocal – a form of insurance, in case once fish is scarce in the own area.

The last statement of disagreement discussed here relates to the scope of the TURF, whether it should manage squid as a target species or if it should manage all species. The "Insufficient enforcement" viewpoint states that the TURF in Kepulauan Seribu must manage all species (#19, +3). One argued, *"Fishers could not choose to catch only squid; thus, why don't we just manage all species here?"* However, the "Exclusive rights" viewpoint does not think it should be further discussed (#19, 0) as the project's intention was clearly to exercise a TURF model that focuses on single species as a target (Nguyen Thi Quynh et al., 2017). Theoretically, a TURF can only manage fish stocks that are not highly migratory (Gelcich et al., 2012), for example, squid. However, the argument from one of the fishers that they cannot choose to catch only squid is correct. Adapting neat theoretical tools to local realities is not easy.

This study provides several lessons to be learned. First, factor analysis showed that technical design is fundamental. Technical designs of TURF in Kepulauan Seribu include the size of the TURF area, including boundaries, TURF rules, and the TURF management group. Nevertheless, ensuring that the design can be implemented consistently is more important. Strong collaboration and equal cooperation between implementing partners are required. The lack of trust can be overcome by creating an accountable system (Lechuga Sánchez et al., 2021) and developing a clear division of tasks, roles, and responsibilities, including indicators for assessing performance. In addition, prioritizing quick wins that

benefit the implementing partners also needs to be sought. Identifying stakeholder interests to recognize the tangible and immediate benefits expected by each party is recommended. Understandably, it is more challenging to maintain motivation and confidence that what local fishers do is meaningful without the expected benefits.

5 Limitations

Our study has several limitations. One of the limitations is related to the limited number of participating fishers. Despite attempting to gather more fishers to participate in the Q-sort, COVID-19 restrictions prevented the first author from accessing the islands where the fishers resided. As a result, most respondents joined online through Zoom, which was not feasible for fishers because of poor Internet connectivity.

The first author directly discussed with three fishers after the entry restriction was lifted. However, due to time constraints, at the end of fieldwork, only 11 respondents were included in the study. This study highlights the importance of increasing number of respondent from fishers, mainly to better understand the effects of TURF implementation.

The limited participation of women and young people has impacted the implementation of TURF in Kepulauan Seribu. [Lechuga Sánchez et al. \(2021\)](#) found that young people are more motivated to preserve the fisheries resources as they require them for themselves and future generations, which can positively affect the management of the resources ([Lechuga Sánchez et al., 2021](#)). Similarly, women's participation in implementing TURF in Kepulauan Seribu could be improved. The local social system prioritizes men in organizational matters, contributing to this situation. [Ram-Bidesi \(2015\)](#) study in Fiji discussed that women play a crucial role in managing marine resources as fisherwomen and parents because they are essential for instilling the appropriate social and moral values in their children to follow sustainable fishing practices. It would be beneficial if women played a more significant role in managing TURF in Kepulauan Seribu.

6 Conclusion

The contemporary TURF system in Indonesia faces many challenges for its sustainable operation. TURF in Kepulauan Seribu was installed in 2018 to, among other things, address the issue of overfishing. Using the Q methodology, this study shows two dominant perspectives (exclusive rights and insufficient enforcement) as the elements that influence the implementation of TURF in Kepulauan Seribu. This study demonstrated how stakeholder perceptions can be validated to inform better implementation strategies. Both opinion groups strongly agreed with the importance of consistent law enforcement. This consensus needs to be considered by the authority that has mandate to monitor and enforce regulations within the national park area (the TURF area is included). This is remarkable as a success in

creating a joint vision for their TURF. However, along with the agreement that enforcement is crucial, both groups agree that enforcement of TURF rules does not seem to work properly in Kepulauan Seribu. Therefore, it is not particularly important for local fishers and park officers to revisit their jointly developed TURF management plan, but the perspectives need to be captured by Rare Indonesia in anticipation of the project's replication.

Differences between the "Exclusive rights" viewpoint and the "Insufficient enforcement" viewpoint seem to exist regarding how this problem should be solved and what the priority should be. According to the respondents who belong to the "Exclusive rights" viewpoint, technical design is essential, especially regarding the boundary and exclusive access rights to the TURF area. Meanwhile, the respondents who belong to the "Insufficient enforcement" viewpoint believed that although the existing TURF management rules are good and jointly agreed upon through a participatory and democratic process, the authorities and the fishers' group should always maintain clarity of rights, roles, and responsibilities. Despite seeing the TURF group as the main actor responsible for managing their TURF, they also seemed to see difficulties playing an active role in the enforcement process. Limitations in financial resources, infrastructure, capacity, or time resources are mentioned as reasons. These limitations caused a lack of ownership by TURF group members. Based on these findings, policy adjustments may be made, such as allocating an additional budget from the national park to the TURF group, which can be used to hold meetings to discuss about TURF implementation according to their jointly developed work plan. The TURF in Kepulauan Seribu is unique. Nevertheless, one could generalize that overcoming challenges, such as establishing resource stewardship, a sense of ownership, responsibilities, and abilities, is difficult and seems to require more attention.

This study demonstrated that Q methodology is useful in identifying areas of agreement and disagreement in the implementation of the TURF management plan. Understanding what, how, and why key stakeholders think about TURF's implementation is crucial. Despite the limited number of fishers who participated in Q sort, this approach provides acceptable stakeholder perspectives. Therefore, it could suggest further policy adjustments that need to be made by decision-makers.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary Material](#). Further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

For this study, RF and AS contributed to the conception and design of the study. RF conducted the data collection with the supervision of AS. RF organized the database and was responsible for the statistical analysis. RF wrote the first draft of the manuscript. RF and AS worked collaboratively, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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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.2023.1229096/full#supplementary-material>

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