



Participatory fisheries governance in Indonesia: Are octopus fisheries leading the way?

Rayhan Dudayev^{*}, Lugas Lukmanul Hakim, Indah Rufiati

Yayasan Pesisir Lestari, Jl. Badak Sari I No.3 Sumerta Kelod, Denpasar Timur, Denpasar, Bali, Indonesia

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ABSTRACT

Indonesian fisheries law and policy is currently dominated by hierarchical or centralised governance models which have several shortcomings compared to participatory governance. The octopus fisheries governance in four villages of Bulutui, Gangga Satu, Popisi, and Darawa in Sulawesi, Indonesia present a unique model of participatory fisheries governance. In this paper, we use T.S. Gray's fisheries governance model to identify best practice for participatory fisheries governance at the village level (*de facto*) and analyse Indonesian fisheries law (*de jure*) to support best practice therein. This study shows that of the four models of participatory fisheries governance, applying a hybrid approach between *community partnership* and *co-management* is the most suitable partnership model (*de jure* and *de facto*). The hybrid model can be applied for both villages with *adat* communities, i.e. communities where customary tenurial claims are still practised, acknowledged under law and respected by migrant communities, and for those villages with non-*adat* communities. It is recommended that octopus fisheries policy incorporates participatory governance in the future to allow active participation of the community in managing their fisheries with a clear legal status.

1. Introduction

Small-scale inshore fisheries (e.g. coral reef fisheries) are the backbone of socio-economic well-being in coastal communities [1], particularly in the tropics [2], including Indonesia [3]. As one of the largest producers of wild-captured fish, Indonesia accounted for 9.9 million tons of the global catch in 2016, of which 60% was from small-scale fishers (SSF) [3]. Despite this significant contribution of SSF, Indonesian coral reef fisheries, such as octopus fisheries, are vulnerable to collapse.

Many of the challenges facing SSF stem from the model of marine and coastal resource governance adopted at all administrative levels – national, provincial, district and local [4], and this is also true for Indonesia. Fisheries governance requires legally binding rules, customary social arrangements, and interactions between public and private components to ensure administration and regulation of the sector [5]. VanVliet and Dubbink (1999) suggested three models of fisheries governance: hierarchical governance, market governance, and participatory governance [6,12]. Hierarchical governance is synonymous with a top-down or centralised management system that is still dominant in fisheries management, but more recently participatory

governance is being emphasised [6]. The characteristic style of participatory governance is one of consensus-seeking negotiation, which is not shared by either the command style of hierarchical governance or the exchange style of market governance [6,7].

A major concern with a centralised (command and control) governance model is that all waters turn *de facto* (open access - how the law is applied on the ground empirically [8]), even though they were previously *de jure* (regulated - what it is written in the law or formal rules). In published literature, proponents for command-and-control governance argue that the state cannot be separated from fisheries governance [6,9,10] while critics of this governance model have focused on poor fisheries knowledge and insufficient capacity within governments to enforce rules and regulations [6,11]. To address the shortcomings associated with command-and-control governance models, participatory fisheries governance can be adopted to involve coastal communities in fisheries management. Participatory fisheries governance is characterised by four models, namely industry self-regulation, co-management, community partnership, and environmental stewardship [6]. The benefits of managing fisheries in a participatory way have been studied for more than 30 years [6,13]. Involving local communities in fisheries management through participatory processes could fill existing knowledge gaps

^{*} Corresponding author.

E-mail addresses: rayhan@pesisirlestari.org (R. Dudayev), lugas@pesisirlestari.org (L.L. Hakim), indah@pesisirlestari.org (I. Rufiati).

within the government since the communities possess a deep understanding of their marine environment and have established systems of fisheries management. For instance, on the Maluku Islands in the East of Indonesia, local communities have used harvesting fisheries management for hundreds of years [11]. Communities are more likely to comply with locally established rules [6], thus fisheries governance that incorporates traditional management measures through participatory governance may be more effective.

Despite the potential benefits of participatory governance, aspects of Indonesian fisheries governance remain dominated by command and control. Indonesia's 1945 constitution, article 33(3), asserts the power of the state to control land, waters, and the natural resources therein for the greatest prosperity of the people [14]. This command-and-control model of fisheries governance is implemented through a hierarchical system with a more 'directive' approach [6,11], allowing the state to govern marine resources centrally. Indonesia's fisheries are controlled and managed by the state authority, mainly the Ministry of Marine Affairs and Fisheries (MMAF) [15] and regulated through fishing zones based on size of fishing vessel [20]. Fisheries management decisions are often taken with limited consultation with fishers, with small exceptions [3,32].

At the same time, small-scale octopus fisheries governance at village level (the fourth sub-national governance level) has been developed in collaboration with communities. Indonesian coastal communities are divided into three categories: customary (*adat*), local, and traditional communities, according to law No. 27 2007 [21]. Pesisir Lestari, an Indonesian NGO (supported by UK-based NGO, Blue Ventures), has been working with 10 local Community-based Organisations (CBO) and NGO partners across 8 provinces in Indonesia to support communities to manage their octopus fisheries, including *adat* and local communities. Using similar approaches from Madagascar and Rodrigues Island [17], Pesisir Lestari and its partners have worked closely with communities to identify fisheries governance models that promote participatory monitoring and management. These models involve the active participation of communities in fisheries profiling, octopus fisheries monitoring, data feedback sessions, and decision making processes for fisheries

management and evaluation.

Using a case study from Sulawesi, this paper aims to identify opportunities for participatory octopus fisheries governance within the existing Indonesian national regulatory frameworks. Further, this paper examines the effectiveness of different participatory governance models for improving octopus fisheries governance in Indonesia and fisheries governance more generally. The implementation of octopus fisheries governance is analysed in four villages (Darawa, Bulutui, Gangga Satu and Popisi) in Sulawesi using a participatory fisheries governance framework from T.S. Gray [6].

2. Methodology

2.1. Study Site

The research area is located in 4 villages in 3 different provinces: 1) Darawa Village in Wakatobi - Southeast Sulawesi; 2) Popisi Village in Banggai Laut - Central Sulawesi; 3) Bulutui community in Minahasa Utara - North Sulawesi; and 4) Gangga Satu community in Minahasa Utara - North Sulawesi (Fig. 1). Pesisir Lestari works in collaboration with the NGO partners Forkani, LINI, and YAPEKA in the three provinces respectively. The data collection process within these sites was aligned with the start of projects in each area, starting from 2017 with LINI and FORKANI and from 2018 with YAPEKA, then ending in July 2021.

2.2. Research methods

2.2.1. Fisheries Governance Framework

This paper uses T. S. Gray's fisheries governance framework which includes hierarchical, market and participatory governance [6]. In this framework, Participatory governance is further divided into four distinct subtypes: industry self-regulation; co-management; community partnership; and environmental stewardship [6]. This paper analyses fisheries management guidance policy (*de jure*) and the octopus fisheries case study (*de facto*), against the characteristics of three of these participatory governance subtypes: co-management, community

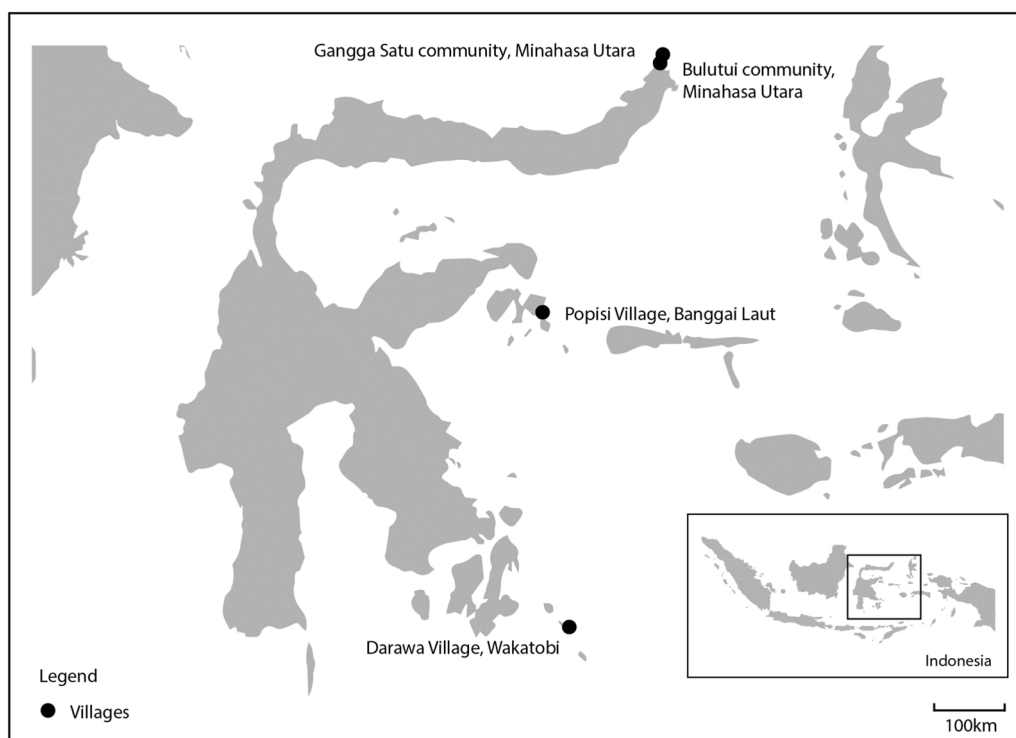


Fig. 1. Octopus Fisheries Management - Case Study Area.

partnership and environmental stewardship. Consideration of the industry self-regulation subtype is excluded as both practically and legally it is not applied in Indonesian octopus fisheries.

2.2.2. Data Collection Process

Data were collected through review of literature and legal documents, interviews, and focus group discussions. To examine the *de jure* context of fisheries governance implementation in Indonesia, we used the doctrine legal research method of legal content analysis using thematic parameters [46]. We compared relevant articles related to fisheries governance from 13 regulations at different levels (acts and their derivative regulations; Table 1) with the thematic parameters of participatory fisheries governance to determine whether the existing legal framework provides opportunities for applying the participatory fisheries governance framework. The legal comparison was also used to determine whether there is a conflict between the regulations in terms of supporting participatory fisheries governance (using Law No. 12 2011 [21] on Lawmaking).

To construct a general overview of octopus fisheries in the study area (the four villages in Sulawesi), a review was conducted of grey literature produced by Pesisir Lestari and partners which included quarterly and annual partner progress reports ($n = 13$) and technical documents such as lessons learned briefs ($n = 7$). The relevant information was categorised by: 1) data collection; 2) decision making for temporary closure; 3) monitoring and surveillance; and 4) evaluation of the closure. A focus group discussion was then held in August 2021 with eight participants from FORKANI, LINI, and YAPEKA to review and build on the literature review. To verify and ground truth the overview, three interviews were conducted with octopus fishers from all four villages at the study site. The verified study site overview resulted in an account of the *de facto* octopus fisheries governance. The participatory governance framework was then used to assess the model of participatory governance being implemented at the study site.

Finally, this paper compared *de jure* and *de facto* results with the framework and synthesised the results to identify opportunities for implementing participatory governance models in Indonesia.

3. Case Study of Participatory Octopus Fisheries Management

Locally-led fisheries management aims to rebuild fisheries using temporary seasonal closures as a catalyst for management. Prior to

Table 1
Indonesian Fisheries Regulatory Framework Summarising Indonesian Fisheries Governance.

Law (<i>de jure</i>)	Scope of Provisions	Mode of Governance Provided	Notes
Fisheries law (Act No. 45 Year 2009) and its derivative regulations	Fisheries resources governance (data collection, management plan, management implementation, and law enforcement)	Co-management and environmental stewardship	The governance includes both area-based and species-based fisheries management
Management of Coastal Area and Isles Law (Act No. 1 Year 2014) and its derivative regulations	Marine governance within 0–12 mil (planning, control, utilisation, supervision, and law enforcement)	Community partnership and co-management	The governance includes coastal community (<i>adat</i> , local, and traditional community) and marine resources within 0–12 mil
Village law (Act No. 6 Year 2014) and its derivative regulations	Village governance	Community partnership	The governance includes village government and community at village level

closure implementation, local data collectors (usually represented by local youth, fishers, buyers, or buyers' families) collect data on octopus fisheries. The data collected are managed, analysed, and visualised by Pesisir Lestari and partners. The result of the analysis is then interpreted and fed back to the communities through regular data feedback sessions (Fig. 2). During these sessions, the communities discuss the data to know the state of their fisheries and understand the use of data as the basis for implementing octopus fisheries temporary closures. Initial engagement with the communities lasted around one year before they decided to have a temporary closure. The community uses a combination of data and local knowledge on fishing site productivity, accessibility, habitat condition, potential conflict, season, and weather to select the location and time for closures.

The decision-making process for closures involves stakeholders such as octopus resource users (fishers and buyers), other fishers, farmers, tourism workers and entrepreneurs, village government, and some community members from neighbouring villages. The decision is made and agreed upon by the community, then formalised through a community agreement or a more formal regulation such as a village regulation or village head decree.

During the closure implementation, monitoring and surveillance are conducted by a community-based monitoring and surveillance group (*Kelompok Masyarakat Pengawas*; POKMASWAS) and an octopus fishers group. The village government enforces the law through giving social punishments or sending official warning letters to the rule breaker. An evaluation is conducted 30 days following each closure to allow the community to learn about the process and adapt the management implementation plan. Through another data feedback session facilitated by Pesisir Lestari and its CBO/NGO partners, the community evaluates the implementation of management measures as a part of the adaptive fisheries management cycle.

4. Result and Discussion

Indonesian law and octopus fisheries management case studies meet the participatory fisheries governance framework as follows (Table 2)¹:

4.1. Community partnership

4.1.1. *De jure*

Based on legal analysis conducted in this study, the existing Indonesian marine and village legal framework provides a direct democracy and an opportunity for coastal communities and village level government to have self-regulation (Table 4). This allows them to apply two other community partnership characteristics: a small, face-to-face scale with fishers as prominent players in governance, and local fisheries level management. Direct democracy and self-regulation are also legally applied for community partnerships.

4.1.1.1. Direct democracy and self-regulation. The customary marine tenure legal framework enables direct democracy for fisheries governance, guaranteed in Indonesian constitution Article 18B (2): the state recognises and respects traditional communities' "traditional customary rights" as long as they remain in existence, provided they are in accordance with societal development [25], the principles of the Unitary State of the Republic of Indonesia, and are regulated by law. Customary communities also have the right to self-regulate customary uses of the marine areas they traditionally depend on, through an amendment that accommodates participatory community partnership (Law No. 1 2014 [22], amending Law No. 27 2007 [23] as legalised and mandated by the Constitutional Court No. 3/PUU-VIII/2010 [24]).

Securing recognition of community ownership of coastal areas and

¹ "amendment to law no. 27/2007 on the management of coastal." <http://faolex.fao.org/docs/pdf/ins139269.pdf>. Accessed 15 Jul. 2021.

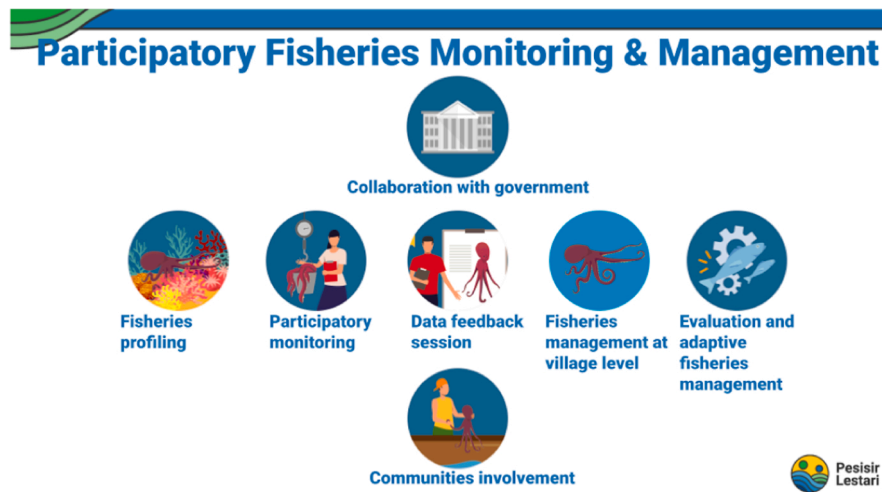


Fig. 2. Process of Participatory Octopus Fisheries Monitoring and Management.

Table 2
Analysis of Octopus Fisheries Governance and Indonesian Fisheries Governance Policy.

No	Mode of Governance	Subject	Legal Basis in Indonesia	Characteristic	Fisheries management guidance policy (<i>de jure</i>)	Octopus fisheries case study (<i>de facto</i>)
1	Community Partnership	Community-based governance	<ul style="list-style-type: none"> • Law No. 1 year 2014 on Coastal Area and Small Islands[22] • Law No. 6 year 2014 on Village and its derivative regulations • MMAF Regulation No. 8 year 2018 Procedures for Determining Customary Institutions Management Areas in Coastal Area 	Direct democracy and self-regulation[6] A small, face-to-face scale, and fishers are prominent players[6] Local level fisheries management [18,19]	✓ ✓ ✓	✓ ✓ ✓
2	Co-Management	Multi stakeholders (government, industry, communities/ local users)	<ul style="list-style-type: none"> • Law No. 31 year 2004 on Fisheries amended by Law No. 45 2009 • MMAF Regulation No. 22 year 2021 on Development of Fisheries Management Plan and Fisheries Management Institutions in the Fisheries Management Area (FMA) 	Power sharing, community-oriented resource-based, and Partnership-based[42,44] Genuine partnership in decision-making: power sharing is a must [43]	✓ –	✓ ✓
3	Environmental stewardship	NGO or environmental agency	<ul style="list-style-type: none"> • MMAF Regulation No. 9 Year 2015 on Ecosystem Approach Fisheries Management (EAFM) 	The ecosystem-based approach (EBA) Environmentalism and participation capitalising on the knowledge of a wide range of stakeholders[45].	✓ ✓	✓ –

Exists: ✓ Does not exist: –

small islands in government zoning plans and policies remains a challenge. To apply community partnership fisheries governance, a customary community must obtain legal recognition from the state for its marine area (regulated in MMAF Regulation No. 8 2018 [26] concerning Procedure for Declaration of Management Area of Adat Community in Spatial Utilisation of Coastal and Small Island). Although these regulations were introduced in 2014 [27], only 34 customary coastal communities have obtained legal recognition from the regency level government. It is also a challenge to apply community partnership fisheries governance for non-customary communities. Registration within a provincial coastal zoning plan may allow the community to secure use, but not management rights [28] under the Coastal

Management Law. At the same time, Village Law No. 6 2014 [29] and its derivative regulations² leaves the opportunity for non-customary communities to apply community partnership fisheries governance. Several provisions legitimise the Village Government to conduct local level coastal and fishery management, including article 60 (2e) Law 1 2014 and Article 19 of Law 6 of 2014 [29].

4.1.2. *De facto* (case study)

Based on the case study findings, the existing fisheries community governance model meets all the criteria of the community partnership model.

² Article 7(1) of Law No. 12 2011 on Lawmaking, Indonesian laws consist of hierarchy including the 1945 Constitutions, MPR Decrees, Law, Government Regulation Lieu of Law, Presidential Regulation, Provincial Local Regulation, Regency/City Local Regulation. The consequence of this hierarchy is “lower” laws must comply with and defer to “higher” laws.

4.1.2.1. Direct democracy and self-regulation. The decision making process for temporary closures utilises direct democracy within a forum or community meeting with stakeholders at the village level. The decision is made and agreed by octopus fisheries users, including fishers and buyers, in collaboration with the village government. Collaboration with village governments is considered to be part of the community partnership model because the decision-making process between the village government and community is direct and agreed by communities. The village government legalises the decisions through village regulation.

4.1.2.2. A small, face-to-face scale, and fishers are prominent players. The community also communicates the process to other communities in other villages to get their support and compliance with the octopus fisheries temporary closures. Communication takes place mostly through small face-to-face sessions called community data feedback sessions, fishers group meetings, or community meetings. These sessions are attended by around 15–50 people and are conducted to obtain community consent. The small-scale setting allows community members to have direct conversations with each other to decide on each step-in fisheries management. However, there is limited involvement from the upper level of government, industry, and scientists in the implementation process. Communities are the main participants in every stage of fisheries management.

4.1.2.3. Local fisheries level - local stakeholders who have an interest in the marine resource. In addition to the community consent process, there is community participation in data collection, decision making, and temporary closure implementation. Local octopus fishers, buyers, and village government play an important role in each stage. Fishers are the source of information and the actor of management. Some buyers work closely with community data collectors, or they may play an important role as data collectors themselves. The village government provides support for the law and policy making process. The participatory data collection process is conducted by the community with assistance from a local partner NGO. This process allows the community to collect the information needed, to use it as evidence when making proposals to the village government in the decision-making process, and to use it as the basis for communicating their management planning to other stakeholders.

4.2. Co-management

4.2.1. De jure

based on the legal analysis, Indonesian Law No. 31 2004 [30] as amended by Law No. 45 2009 [31] on area- and species-based fisheries management meets co-management criteria (Table 4). However, derivative level regulations, for example MMAF Regulation No. 22 2021 [32] and MMAF Decree No. 70 2016 on Blue Swimming Crab (BSC)³ Management Plan [33], don't meet co-management criteria.

4.2.1.1. Power sharing community-oriented resource-based, and Partnership-based. Law No. 31 2004 [30] concerning Fisheries as amended by Law No. 45 2009 [31] recognises the existence of local wisdom which requires fisheries governance to be conducted collaboratively with other stakeholders, especially customary communities. Article 6 paragraph (2) states that fishery management for the purpose of catching and cultivating fish must take into account customary law and/or local wisdom as well as the participation of the community, meaning that the decision-making process should not be undertaken solely by the government. The participative decision-making process is also emphasised

in Article 52 stating that the government regulates, encourages, and/or conducts research and development of fisheries to produce the knowledge and technology needed to develop fishery businesses in order to respect traditional wisdom and local culture.

4.2.1.2. Genuine partnership in decision-making: “power sharing is a must”. According to Article 46 (1) of MMAF regulation No. 22 2021 [32] that is derived from the Law No. 31 2004 [30] as amended by Law No. 45 2009 [31], fisheries management in a fisheries management area (FMA) is led by the fisheries management commission. The commission has the task of formulating inputs in the implementation and evaluation of the fisheries management plan, as well as recommendations for formulating policies for sustainable fisheries management in accordance with their authority, assisted by the scientific panel and the consultative panel. The consultative panel consists of associations in the fields of seas and fisheries, customary institutions, and non-governmental organisations, as referred to in Article 44, and has the task of delivering the aspirations and participation of the stakeholders. The co-management characteristic is thereby accommodated at policy level although the role of the consultative panel is limited. Using Arnstein's ladder of participation concept, this would be considered tokenistic participation [34]. This provision also contradicts article 6 paragraph 2 of Law No. 31 2004 [31] which states that fisheries management requires power sharing with communities.

A co-management model without equal power sharing is also utilised in species-based fisheries management. In MMAF Decree No. 70 2016 on Blue Swimming Crab (BSC) [33] Fisheries Management Plan, the roles of every stakeholder related in BSC fisheries are defined clearly (Table 3).⁴

As shown in Table 3, the mode of fisheries governance applied in BSC management is command and control with the dominance of the government's role. It is not yet clear whether crab management involving fishers allows the fishers to obtain power in making decisions [35].

4.2.2. De facto (case study)

The case study shows that the implementation of the fisheries community governance model meets all the criteria of the co-management model.

4.2.2.1. Power sharing community-oriented resource-based and Partnership-based. The case study shows that the existing governance model for octopus fisheries management provides power sharing among village government, octopus fishers, and buyers, with the consent from other community members including other fishers and farmers. The idea to create temporary closures comes from the octopus fishers and buyers who are empowered by data. After they reach an agreement, they propose the idea to the village government for it to be discussed in community meetings. The role of the government is to make sure that the

Table 3
Roles of Stakeholders in Blue Swimming Crab Fisheries Governance.

Government*	Small Scale Fishers (SSF)	Industry	NGO
Regulator, mediator, infrastructure provider, provide data and information that could improve BSC management policy and law enforcement	Provide commodity, comply with the regulation, and key stakeholders supporting the policy	Comply with the regulation, buy commodities from SSF, Provide commodity	Mediator between industry, SSF, and industry and government partner

³ This fisheries species based management was chosen since octopus fisheries is not yet regulated in Indonesia

⁴ Both central and local level government

majority of people agree to developing solutions to strengthen the agreement, e.g., facilitating community agreement on rules, regulations, and sanctions. The agreed regulation is then communicated back to the community and to non-octopus fishers who have interests in the area. The government aims to get their feedback and their agreement in order to minimise conflicts of interest. After the majority of the communities have raised their concerns and shown their support, the village government will strengthen the decision through village policy, e.g., village regulations or village head decrees referring to Law No. 6 2014 on Village [29]. The agreement (including rules, regulations, and sanctions) is communicated both within the village and to other villages, formally or informally, to obtain support and compliance. Lastly, to secure community marine tenure, Pesisir Lestari's NGO partner facilitates the community (represented by the village government) to participate in co-management with MPA managers to govern octopus fisheries at the provincial level.

4.2.2.2. Genuine partnership in decision-making: “power sharing is a must”. During closure implementation, monitoring and surveillance are conducted by the community. These activities involve several community members from a local community surveillance group (POKMAS-WAS), an octopus fishers group, and a general fishers group (consists of octopus and non-octopus fishers, such as seaweed farmers) coordinated with the local authority (which could be national park or regency level of marine affairs and fisheries department) [36]. For law enforcement, surveillance groups who observe violations coordinate with the village government to enforce the law. The sanctions applied are social punishment through warning letters to specific people, or to other heads of the village.

4.3. Environmental stewardship

4.3.1. De jure

The legal framework related to environmental stewardship of fisheries governance covers two characteristics: the ecosystem-based approach, and environmentalism and participation capitalising on the knowledge of a wide range of stakeholders (Table 4).

In Indonesia, environmental stewardship governance is accommodated through the Ecosystem Approach to Fisheries Management (EAFM) concept that is regulated through MMAF Regulation No. 9 Year 2015 [37]. The EAFM concept is derived from the Convention on Biological Diversity (CBD) that is ratified through Law No. 5 1994 [40]. Garcia (2003) defines EAFM as an approach which strives to balance diverse objectives by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and by applying an integrated approach to fisheries within ecologically meaningful boundaries [38]. Based on the definition and principles of EAFM, the implementation of EAFM in Indonesia requires structural and functional adaptation at all levels of fisheries management including the central and regional levels. This requires a change in mindset so that the fisheries authority is not just carrying out fisheries administrative functions, but is also carrying out fisheries management functions [39]. Application of EAFM tools also requires involvement of several stakeholders including government, industries, civil society, NGOs, and academics.

4.3.2. De facto (case study)

the case study in octopus fisheries shows that the biological approach is used by the community for implementing temporary closures. However, the approach is still limited in terms of protection of octopus habitat due to limited resources (Table 4).

4.3.2.1. The ecosystem based approach. The decision-making process within the community is facilitated by Pesisir Lestari's NGO partners and makes use of the octopus fisheries data collected by the community

Table 4

Summary of both *de jure* and *de facto* of fisheries governance.

Community Partnership	Co-management	Environmental Stewardship
<i>De jure</i> (normatively)		
<ul style="list-style-type: none"> • <i>Adat</i> (customary) communities have the right to apply local decision-making processes in fisheries management with some requirements[26]. • <i>Non-adat</i> (customary) communities represented by village governments have the opportunity to govern their natural resources. 	The Indonesian fisheries regulatory framework allows stakeholders other than the government such as fishers and industries to participate in the decision-making process with limited power sharing[33]. The main decision maker is still the government.	Involvement of a broader set of stakeholders including civil society (fishers) is needed to assess fisheries management. Together with other stakeholders, fishers could be part of the governance body that runs the fisheries management functions, with specific roles.
<i>De facto</i> (empirically)		
Both <i>adat</i> and non- <i>adat</i> communities conduct local decision-making processes including fisheries resource information, collecting fisheries data, establishing local law and policy-making processes, surveillance and monitoring at village level in coordination with government, notably the marine area authority [36].	The decision-making process of local fisheries governance includes other fisheries users, authorities for the marine area, and village government, especially in surveillance and law enforcement processes.	With good assistance from an NGO, fishers are capable of conducting monitoring and management measures based on data, albeit with limitations on other ecosystem considerations and industry and academics involvement.

through participatory monitoring. The data used are based on landing data and mostly consist of production data and octopus numbers in fishing sites. Some communities also consider the habitat condition. However, communities do not yet use biological octopus data such as Spawning Potential Ratio (SPR), age, size and sex structure and ecological data in their considerations for closures.

4.3.2.2. Environmentalism and participation capitalising on the knowledge of a wide range of stakeholders. There is no participation from other stakeholders, such as environmentalists, government, academia, or industries. The role played by Pesisir Lestari and CBO/NGO partners is to introduce the management measures and facilitate the implementation process within the community. More perspectives from other stakeholders representing their expertise might be needed to meet the criteria of the environmental stewardship model, considering that other stakeholders may share the same interests in the resource.

4.4. Study limitations

It should be noted that even though the community practices integrate the concept of participatory fisheries governance, currently, this effort by communities is not entirely independent from the ongoing work and support provided by local NGOs. Without NGO support, decision-making processes may be conducted solely by the government and therefore would be more hierarchical. Thus, further study is needed to examine how participatory governance can continue when NGOs are no longer present.

5. Conclusion

Although legally the Indonesian government is responsible for fisheries management, in practice there is considerable scope for participatory governance. At the village level, communities in collaboration with village-level government have the right to govern their fisheries

resources.

This study shows that among four models of participatory fisheries governance, applying a hybrid approach between community partnership and co-management is the most suitable partnership mode (*de jure* and *de facto*) that can be employed in Indonesia to govern nearshore fisheries. Legally, the community partnership model is suitable for both customary communities (such as Darawa) and non-customary communities (such as Popisi Village). Customary communities' rights (including marine tenure rights) that allow them to make decisions are guaranteed in the Indonesian constitution. Although customary communities can apply a community partnership model (*de jure*), coordination with marine authorities (*de facto*) is mandatory. Non-customary communities (such as Bulutui, Gangga Satu, and Popisi) could also apply the community partnership model through a village regulatory framework. Yet, *de facto* requires application of both community partnership and a co-management approach. As such, it is obligatory for communities and village-level governments to collaborate with authorities governing an area, for example marine protected area managers. This co-management mode is recommended since there is a huge opportunity for fisheries governance at village-level to be supported by the marine authority. In particular, the marine authority can provide financial support through mid-term regional development plans [16]. Further, environmental stewardship has been applied by communities in four villages although they do not yet rigidly apply EAFM standards.

Opportunities to enable *adat* community and village institutions to formally manage their fisheries resources exist within Indonesian law. Providing communities with a framework of legal opportunities to implement community partnership and co-management governance is therefore necessary for nearshore fisheries management, especially of octopus species. As there is not yet species-based fisheries management for octopus, this can be done by regulating octopus fisheries and allowing the application of the community partnership model in combination with the co-management model. The application of the community partnership model requires distribution or devolution of power to the grassroots level [41]. In the Indonesian context, village-level power belongs to the village-level government (referring to Law No. 6 2014 on Village) [29] and customary communities that have obtained legal recognition (referring to Law No. 1 2014) [28]. The co-management model delineates a clear role for fisheries resource users in decision making for fisheries management. Similarly, the clear role of fishers and other stakeholders in decision making processes can be provided in octopus fisheries policy development under Regulation No. 22 2021 of the MMAF [32].

CRediT authorship contribution statement

Rayhan Dudayev: Methodology, Formal analysis, Conceptualization, Writing - original draft, Writing - review & editing. **Lugas Lukmanul Hakim:** Conceptualization, Formal analysis, Methodology, Writing - original draft, Writing - review & editing. **Indah Rufiati:** Formal analysis, Methodology, Visualization, Writing - original draft.

Declaration of competing interest

None.

Data Availability

No data was used for the research described in the article.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2022.105338.

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