

# Vulnerable yet Viable: Stakeholders' Role in Small-Scale Fishermen Governance towards Viable Life

HAPSARI AYU KUSUMAWARDHANI<sup>1</sup>, INDAH SUSILOWATI<sup>2</sup>, HADIYANTO<sup>3</sup>

<sup>1</sup>Economic Development Studies, Faculty of Economics and Business, Diponegoro University, Semarang, INDONESIA

<sup>2</sup>Economic Development Studies, Faculty of Economics and Business, Diponegoro University, INDONESIA

<sup>3</sup>School of Postgraduate Studies, Diponegoro University, INDONESIA

*Abstract:* - This research aimed at identifying stakeholders' participation in the appropriate strategy of small-scale fishermen governance in the waters of Karang Jeruk Conservation Area in facing vulnerability along with actor typology and analyzing the strategy of how small-scale fishermen survive with their vulnerability based on stakeholder. This research used a qualitative research paradigm. The data were collected using an in-depth interview method and were analyzed using stakeholder analysis with MACTOR (Matrix of Alliances and Conflicts Tactics, Objectives and Recommendations) to identify the stakeholders' power, relationship and actor alliance pattern and using ATLAS.ti to identify small-scale fisherman governance strategies by stakeholders. The research results show that most actors were the key players and had low divergence. Small-scale fishermen's governance strategy requires facilities, infrastructure, institution preparation, and community empowerment. Such development needs various parties' involvement, including the regulator, executor, supporting institution, target and community as the main actors

*Key-Words:* small-scale fisheries, fishermen, vulnerable, viable, actor, MACTOR.

Received: September 9, 2022. Revised: January 15, 2023. Accepted: February 16, 2023. Published: March 10, 2023.

## 1 Introduction

Power is the central concept in learning about complex governance systems since it determines how stakeholders influence each other to achieve the result they desire, [1]. Stakeholders' increased involvement and participation have been part of the sustainable development agenda, [2]. Stakeholders' participation is one way to end social and environmental injustice, [3], [4]. Consequently, stakeholders of different levels and sectors influence each other and are sometimes involved in conflict or cooperation to form governance arrangements and influence good results, [5].

Most fishermen in Tegal Regency, Central Java Province, are small-scale. Different from fishermen in Tegal City, fishermen in Tegal Regency are dominated by small-scale ones. According to Law No.45/2009, a small fisherman is an individual whose livelihood is catching fish to fulfil his daily life needs using a maximum five-gross-ton-sized fishing boat. Most fishermen in Tegal Regency have a boat of 3-5 GT, [6]. Meanwhile, only a few of them have a boat over 5Gross Ton. Their catching equipment is dominated by *purse seine*, *payang*, *badong*, and *gillnet*.

In small-scale fishery, some literature studies argue that fishermen are not always the poorest of the poor (in the case of money ownership). Still, they are the most vulnerable because of high exposure to natural, health or economic shock, and disasters, [7]–[9]. Nayak and Berkes, [10] explain that small-scale fishermen's vulnerability in material, relational, and subjective aspects, covering the material level (covering natural, financial, and physical), relational level, and subjective level (covering human and social capital); thus it is divided into human, physical, capital, social, and financial.

Most of the fishery in the world is small-scale, [11]. SSF Guidelines offer the opportunity to form the high commitment needed by states or other actors to be taken in promoting small-scale fishery sustainability. SSF Guidelines call for states and civil community organizations to take actual actions to bring small-scale fishermen and fishery workers out of poor and marginalized situations that they often suffer on a global scale. Achieving small-scale fishery's sustainability and survival is an ambitious objective, [11]. This is eventually a matter of governance with relatively big complexity and

urgency. As such, supporting small-scale fishers and enabling them to develop is not only about their service to the public but also about social and ethical values. In other words, this is smart politics from ecological, economic, and social perspectives and 'the right thing to do', [12].

One of the essential aspects of sustainable development is the actor's role, [13]–[15]. The stakeholders can support providing facilities needed to face the vulnerability of the first level. The actor is an important component since it not only determines how a sustainable objective is achieved but also determines the indicators as the footing of sustainability, [16]. Governance is closely related to the actors involved, [17]. Besides, Sururi, [18] states that collaborative governance can be developed into an innovation policy model for sustainable development. According to the research by Zacharias, [19], in southern Mozambique, coastal communities are most vulnerable to physical, financial and social capital. According to the research conducted by Suharno et al., [20], fishery resources are exploited excessively. Based on such conditions, appropriate rules and policies are needed in the institutional management of fishery resources for their preservation. The research results show that stakeholders involved in fishery management are the subject, audience, actor, and player. Lina M. Saavedra-Díaz et al., [21] in their research state that Colombian small-scale fishermen face various problems and conflicts. While many issues are shared between individuals on the two coasts of the Atlantic and Pacific (bi-coastal), other problems unique to a subset of the community only occur in one of the coasts (uni-coastal) or individual locations. Comparison from previous studies that discussed Coastal communities are vulnerable to physical, financial and social capital and appropriate rules and policies are needed in fisheries resource management institutions. Stakeholders have a role in dealing with these institutions. Stakeholders have a role in dealing with the situation.

Solving these main fishery problems requires establishing a fishery strategy that may prioritize solutions at various levels: national, coastal, and local. This study explains the solutions identified by the three groups of stakeholders: fishermen, local leaders, and fishery experts, to improve small-scale fishery management in Colombia. The specific recommendation here is presented to reform and reconstruct the governance through joint management and to develop consensus among the stakeholders-government and users. The same also occurs with the fishermen in Munjung Agung village who catch fish around the waters of the

Karang Jeruk conservation area. The small-scale fishermen face various problems and conflicts and need support from actors who play a role in their lives.

This research aimed to identify the stakeholders' participation in the appropriate governance strategy for small-scale fishermen to face vulnerability along with actor typology based on power and the relationship between actors and actors' attitudes towards the objective. The second aim of this research is to analyze the strategy of how small-scale fishermen survive with their vulnerability based on Stakeholder

## 2 Materials and Methods

This research used qualitative methods in all stages of the research process. The key stakeholders were taken from Munjung Agung Village or Kampung Nelayan Larangan, Karang Jeruk Conservation Area, Kramat District, Tegal Regency. This research used primary data from 15 stakeholders consisting of academics (Academics), the business player (Business), the government (Government) and community figures (Community). The research's analysis instrument used in the stakeholder analysis was MACTOR (Matrix of Alliances and Conflicts: Tactics, Objectives and Recommendations), [22]–[25] to observe the characteristics, describe the power and attitude of the actors towards the objective of small-scale fishermen development, and the relationship of interest between the actors. The second analysis instrument was ATLAS.ti which was used to answer stakeholder-based adaptation strategies for small-scale fishermen. The in-depth interview results were transcribed and processed using the qualitative analysis software ATLAS.ti 7.0. After the interview, the next step was making codes associated with the transcript; thus, qualitative results would be obtained from the qualitative data.

## 3 Results and Discussion

The rapid expansion of the human population, depletion, and degradation of surface and ground water resource, frequent drought and climate change are expected to add some pressure to the community that depends on fishery for a living, [26]. However, the survival and sustainability of small-scale fishery and community that relies on it in the suburbs are threatened by a number of factors such as overexploitation of fish resources, water pollution, decreasing quantity of water and climate change. [27]. However, it is not impossible that they cannot

have a viable life. An adaptive strategy is needed to reduce fishermen's current and future vulnerability, [28]. Defining a traceable governance strategy for small-scale fishermen requires stakeholders' role, who are those directly involved in fishermen's daily life. From this approach, actor is defined as an entity with a position in the system learned and serving to mobilize their resources to influence the outcome directly or indirectly through their influence on other actors, [16].

### 3.1 Evaluating the Actors' Balance of Power, Convergence, and Divergence

In the last few decades, researchers have developed various methods to analyze stakeholders' involvement in the governance system, [29]–[31]. The stakeholder analysis (SA) has been a standard instrument for identifying and characterizing stakeholders, [32]. Before entering into governance strategy, we have first identified the stakeholders. This research involved 15 stakeholders involved in small-scale fishermen's daily life around the Karang Jeruk Conservation Area, Tegal Regency. The stakeholders involved some actors from Academics, Business, Government and Community (A-B-G-C).

Table 1. Stakeholder Identification

No	Actor	Role	Strategic Objective
1	Lecturer of the Faculty of Fishery and Marine Affairs of Diponegoro University, Brackish Expert (AcFPIK1)	Contributing notions and ideas for objective planning of small-scale fishermen's vulnerability, playing more role in catching gear, coral reef, and MPA	Sustainable environment, environmental awareness
2	Lecturer of the Faculty of Fishery and Marine Affairs of Diponegoro University, Coral Reef Expert (AcFPIK2)	Contributing notions and ideas for objective planning of small-scale fishermen's vulnerability, playing more role in waste management and forest	Sustainable environment, environmental awareness

		cover	
3	Owner of LKP Pasopati (LKP)	Contributing the view of employment expansion and skill improvement for small-scale fishermen	Education, employment expansion
4	Stall owner (stall)	As common people, owner of stalls around the coast, and as wife of a small-scale fisherman, contributed views, ideas, and power in village development.	Community economy
5	Head of Coastal Fishery Port Office of Larangan (PPP)	Contributing place for governmental activities and fishery business system activities providing a point where boats is moored to, tied to, and/or for fish offload equipped with sailing safety facilities and fishery supporting activities	Port and small-scale fishermen control
6	Head of Wild Fisheries and Coastal Resources Section of the Department of Animal Husbandry, Fishery,	Planning and implementing local development program in the field of wild fishery and coastal resources management	MPA, catching gear, environmental awareness control

	and Marine Affairs of Tegal Regency (DKKP1)		
7	Staff of Fishermen Empowerment of the Department of Animal Husbandry, Fishery, and Marine Affairs of Tegal Regency (DKKP2)	Planning and implementing local development program in the field of fishermen empowerment	Fishermen empowerment
8	Head of TPI Larangan (TPI)	Contributing place for fish auction, price stabilizing function, and fishermen's welfare function.	Fishermen welfare
9	Secretary of KUB Teri Nasi Fishermen (KUB)	Creating and giving inputs of creative ideas and management of tourist destination.	Fishermen connectivity
10	Village-Owned Enterprise Worker (BumDes)	Giving inputs and ideas on development	Development
11	Fish seller (Fish-seller)	Fish seller that buys fishermen's catches in TPI contributes to give inputs and ideas on development	Good value chain development
12	Fisherman 1 (fisher1)	Representative of fishermen with gillnet	Eradication of poverty, local wisdom conservation
13	Fisherman 2	Representative of fishermen with catching gear purse	Eradication of poverty, local wisdom conservation

	(fisher2)	seine	conservation
14	Fisherman 3 (fisher3)	Representative of fishermen with catching gear <i>payang</i>	Eradication of poverty, local wisdom conservation
15	Fisherman 4 (fisher4)	Representative of fishermen with catching gear <i>badong</i>	Eradication of poverty, local wisdom conservation

The stakeholders were then classified into different categories based on their dependence and influence. The stakeholders' dependence and influence were processed using the MACTOR analysis instrument. The analysis mapping matrix was divided into 4 quadrants, namely: a). context setter, b). key players, c). Subject, and d). Crowd.

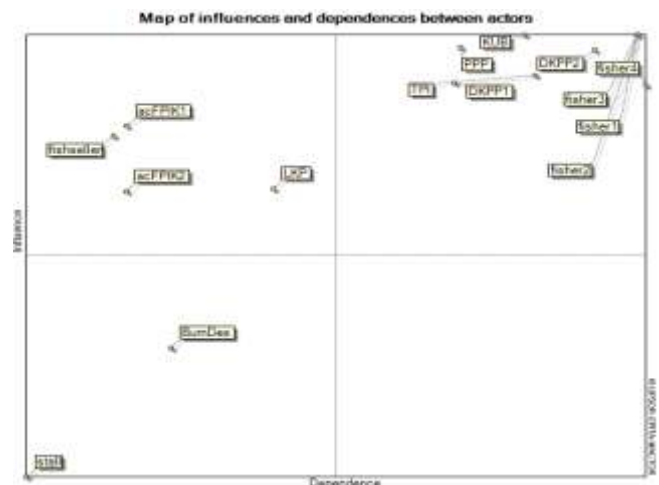


Fig. 1: Stakeholder Mapping Based on Level of Dependence on Influence

Key player is a party with high dependence and influence in governance attempts in the face of small-scale fishermen's vulnerability. Relay actor are actors expected to play a role in field execution of various decisions. Actors of this type will be the spearhead and determinant of the success of development operation pursuant to their respective capacity and role. This position is taken by the Department of Marine Affairs, Fishery, and Animal Husbandry of Tegal Regency of the Wild Fishery and Coastal Resources Management office, the Department of Marine Affairs, Fishery, and Animal Husbandry of Tegal Regency of Fishermen Empowerment and Coastal Fishery Port Section (PPP), Fish Auction House of Larangan (TPI), KUB Fishermen (Joint Venture Group), and fishermen with gillnet, purse seine, *payang*, *bubu/badong*.



The subject was the party with high dependency but low influence. In this research, the subject quadrant was vacant. The context setter category, meanwhile, was the party with high influence but a little dependence and could be a significant risk, thus it needs to be managed. The parties of this group include academics (acFPIK1 and acFPIK2), fish seller, and owner of Course and Training Agency. This party can be classified as a policy user; thus, it needs to be empowered. The crowd category is the party with low influence, such as the administrator of Village-Owned Enterprise and small stall around the coast.

The next measure was measuring the convergence between actors with the objective (using order 2) as presented in figure 2. The graphic of convergence between actors maps the actors related to their convergence, where the closer an actor is to the other, the more intense their convergence is.

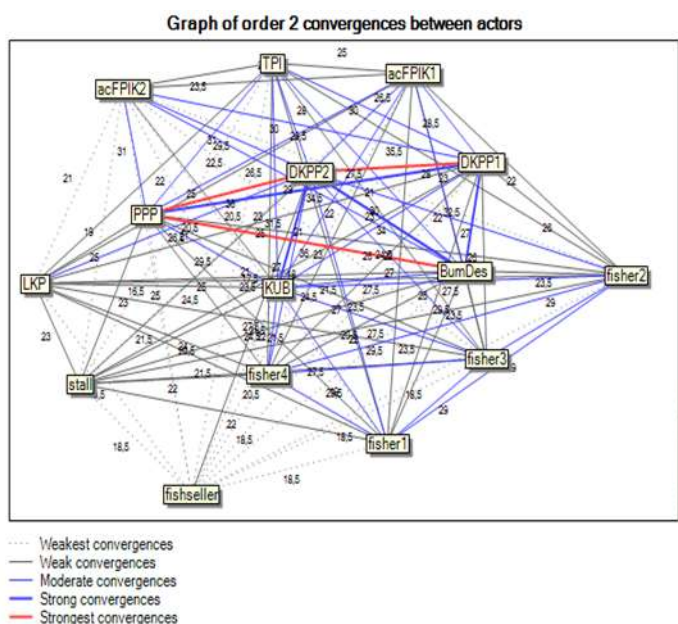


Fig. 2: Graphic of Convergence between Actors

Red line shows in figure 2 the level of convergence between actors. Lines of different colours and thickness show differences in the level of convergence between actors. Red convergence between the Department of Fishery, Animal Husbandry, and Marine Affairs (Diponegoro University Academician), KUB, PPP and BumDes shows the closeness/strength of convergence level between the actors.

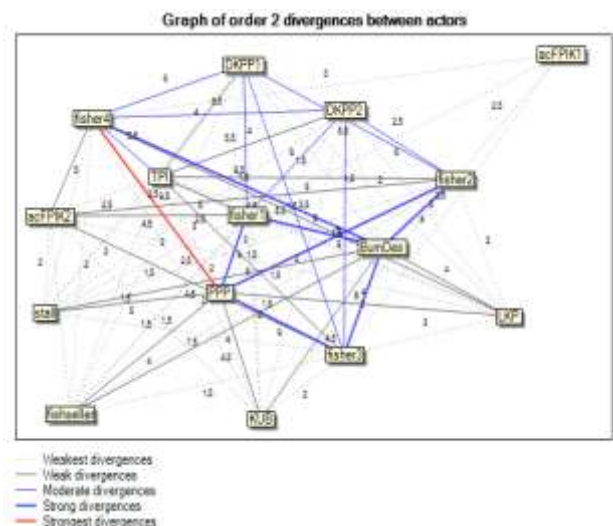


Fig. 3: Graphic of Divergence between Actors

In regard to divergence, however, actor with relatively high divergence level is fishermen that represent fishermen with catching gear *badong* with stakeholder PPP (coastal fishing port) since fishermen with fishing gear *Badong* and stakeholder PPP (coastal fishing port) tend to be in a passive relationship. This is due to the lack of government programs for fishermen with *badong* fishing gear compared to fishermen with other fishing gear. *Badong* is a minority fishing gear used by fishermen who catch fish around Karang Jeruk conservation

### 3.2 Adaptive Capacity and Potential Source of Resilience/Transformation based on stakeholder

Besides examining stakeholders' characteristics by observing the level of influence and dependence and the actors' divergence and convergence patterns, this research analyzed the strategy of how small-scale fishermen survive with their vulnerability based on stakeholder using a qualitative approach with in-depth interview with the stakeholders, of which results were transcribed and processed using qualitative analysis software ATLAS.ti 7.0. After the interview, the next step was creating codes with the interview transcript associated, thus quantitative results would be produced from the qualitative data. The quantitative results were used as the measure of emphasis or the extent of informants' perception of the predetermined criteria. The results of code and criteria processing with ATLAS.ti show that there are five indicators prioritized by the stakeholders, thus the results below have been found.

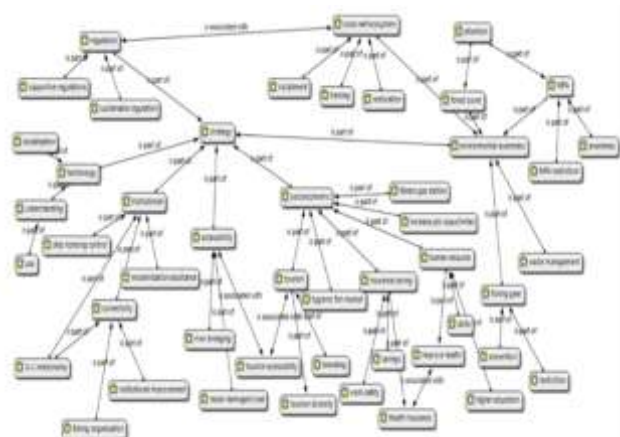


Fig. 4: Network of Relationship between Factors of Criteria (In-depth Interview with Stakeholders)

Based on the results of ATLAS.ti analysis above, there are 6 main variables found from the in-depth interview with the stakeholders. The six variables emphasized by the stakeholders are social-economic, institution, Environmental Awareness, Institutional, accessibility, and technology. Table 2 explains the network of relationship between the factors of small-scale fishermen's vulnerability strategy criteria in more detail

#### 4 Discussion

Understanding the roles and coordination between the stakeholders involved is greatly needed in in-depth study on small-scale fishermen's vulnerability governance. With stakeholders' participation, *minapolitan* development will be realised as desired. This is related to the process where the stakeholders influence and share supervision over development initiative and decision as well as resources that may affect them, [33]. Actor convergence illustrates similarity in actors' attitude towards the objective. Actors with similar attitudes will be convergent, while those with different attitudes will be divergent, [25]. The convergence analysis is intended to find out possible points of actors' potential alliance. Convergence maps can be used to determine which actors can cooperate in avoidance of possible conflict.

Table 2 shows the recapitulation results based on the results of in-depth interviews with the stakeholders in the research, which are the explanation of relationship networks arising from the processing by atlas.ti. The indicators used to facilitate analysis on adaptation of Vulnerability and Adaptive Response where the aspects that need to be noted regarding the strategy are explained with 5 important points, namely social-economic,

institution, institutional, environmental awareness, and technology.

For the social-economic indicator, the first adaptation is to change the way of life through self-resilience. Stakeholders recommend fishermen to have insurance, both health and labor insurance. This is very important to consider that most of them do not have any health or labor insurance. In case of accident or sickness, they would be eligible to claim the insurance as stated in the research conducted by, [34].

The other issue related to insurance is that they have such insurance, but do not pay the premium, thus it cannot be used when needed. These are the existing important problems in the coastal community of Munjung Agung. According to the stakeholders, an extension is needed around the fishermen, such as opening a branch office near fishermen settlement.

Third, it is to emphasize awareness of the importance of human resources quality through education, both formal and informal. Formal education as per the government's 12-year mandatory education program and informal education to improve skills in other fields. Informal education such as course and training can improve employment opportunity, [35].

Further, with regard to social-economy, facilitation of access to boat fuel is needed. It has been a while that the gas station (SPBU) is inactive. It is expected that the SPBU can be reused, especially with the oil fuel subsidy currently given to small-scale fishermen. The stakeholders also talked about possible tourism around fishermen settlement Munjung Agung. Larangan Coast is a relatively good potential tourism, that the coastal tourism area has even started. The potential tourism should certainly be supported with good accessibility. Good accessibility is quite useful for improvement of local sustainable economy and development, [36]–[38]. In the institutional aspect, the stakeholders create a connection for smooth and ease of connectivity, boat permit control and adaptation to a more modern system. Connectivity is an attribute of adaptive capacity. Adaptive capacity often depends on the following factors: response diversity, collaborative capacity, connectivity, reserves, and learning capacity, [39].

Environmental awareness is also one aspect emphasized by the respondents. The more aware a community of their environment and environmental preservation, environmental awareness will have a positive impact on environmental sustainability and preservation amidst the globalization threat [40].

Table 2. Indicator of Adaptive Capacity and Potential Source of Resilience/Transformation based on stakeholder

Identification	Indicator of Adaptive Capacity	Potential source of resilience/transformation
Social-Economy	<ul style="list-style-type: none"> <li>Changing way of life through self-resilience</li> </ul>	<ul style="list-style-type: none"> <li>Having insurance, both for health and labor insurances</li> <li>Insurance office branch near fishermen settlement</li> <li>Emphasizing awareness of the importance of Human Resources quality through formal or informal education and good health`</li> </ul>
	<ul style="list-style-type: none"> <li>Facilitation in accessing fuel for boat</li> </ul>	<ul style="list-style-type: none"> <li>Re-functioning of SPBN (Gas Station for Fishermen)</li> </ul>
	<ul style="list-style-type: none"> <li>Existence of tourism to provide more employment to surrounding people</li> </ul>	<ul style="list-style-type: none"> <li>Creating the existing tourism diversity</li> <li>Good tourism accessibility</li> <li>Creating branding to attract tourists</li> </ul>
Institution	<ul style="list-style-type: none"> <li>Creating connectivity for smooth and convenient relationship</li> </ul>	<ul style="list-style-type: none"> <li>Increasing function and awareness in fishermen organization</li> <li>Creating good relationship between the government, community organization and the society</li> <li>Improving irregular institution</li> </ul>
	<ul style="list-style-type: none"> <li>Adaptation to more modern system</li> </ul>	<ul style="list-style-type: none"> <li>Coaching for institutional modernization</li> </ul>
	<ul style="list-style-type: none"> <li>Boat Permit Control</li> </ul>	<ul style="list-style-type: none"> <li>Controlling and coaching for boat licensing</li> </ul>
Environmental Awareness	<ul style="list-style-type: none"> <li>Waste management</li> </ul>	<ul style="list-style-type: none"> <li>Good waste management around tourism area and the environment, by procuring trash bins</li> </ul>
	<ul style="list-style-type: none"> <li>Forest cover</li> </ul>	<ul style="list-style-type: none"> <li>Improving socialization and awareness related to the importance of natural ecosystem</li> <li>Planting mangrove</li> </ul>
	<ul style="list-style-type: none"> <li>Environmentally friendly catching gear</li> </ul>	<ul style="list-style-type: none"> <li>Preventing use of non-environmentally-friendly catching gear</li> <li>Prohibition from using non-environmentally-friendly catching gear</li> </ul>
	<ul style="list-style-type: none"> <li>Maintaining Coral Reef Ecosystem</li> </ul>	<ul style="list-style-type: none"> <li>Restoring coral reef as fish habitat</li> <li>Adding artificial coral reef for new fish habitat</li> <li>Strict regulation related to destruction of coral reef ecosystem</li> <li>Training for surrounding community to maintain and plant coral reef</li> </ul>
	<ul style="list-style-type: none"> <li>Marine Protected Area</li> </ul>	<ul style="list-style-type: none"> <li>Restrict fishermen to enter conservation area</li> <li>Improving fishermen's awareness related to conservation area</li> </ul>
Institutional	<ul style="list-style-type: none"> <li>Government's Regulation</li> </ul>	<ul style="list-style-type: none"> <li>Supporting regulation</li> <li>Sustainable regulation</li> </ul>
Accessibility	<ul style="list-style-type: none"> <li>Improving Accessibility</li> </ul>	<ul style="list-style-type: none"> <li>Repairing damaged roads</li> <li>River dredging</li> <li>Increasing tourism accessibility</li> </ul>
Technology	<ul style="list-style-type: none"> <li>Understanding of the importance of technology</li> </ul>	<ul style="list-style-type: none"> <li>Regular socialization with fishermen</li> <li>Use of technology</li> </ul>

Source: primary processed data, 2021

Environmental maintenance and preservation in the coastal development process have the potential for adaptive capability and for the community to adapt to the region's new condition. Considering the importance of environmental preservation, the coastal, and surrounding community can prevent and not cause damage, [41]. A resilient environment and a coastal community's flexibility are the power to protect not only small-scale fishermen, but also the people of coastal communities and avoid conflict. The awareness of environmental preservation will eventually support fishermen settlement development in the Karang Jeruk conservation area.

In regard to the understanding of the importance of technology, the stakeholders recommended the importance of technology for the existence of small-scale fishermen. The research conducted by Benard & Dulle, [42]. The implementation of information and communication technology (TIK) in the traditional fishermen community in Zanzibar, Tanzania states that traditional fishermen's knowledge of weather conditions, fish catching method, market and marketing, and fish conservation and processing is still lacking. The traditional fishermen also still face many constraints in using TIK devices as the means to obtain the information used to catch fish such as lack of fund, bad network connectivity, and lack of training and seminar on the use of TIK, while TIK contributes to improving fishermen's life significantly, [43]. The latest information on weather and market access provided through TIK helps fishermen feel at ease and comfortable at the sea and broaden their market. Another research conducted by Sabu *et al.*, [44] finds that Global Positioning System (GPS) devices and cellular phones are useful to improve fishermen's productivity. In addition, the use of technology is also the effort to realize one of the programs Quick Wins out of the nine agenda of the work cabinet's national development priority 2014-2019 (Nawacita).

## 5 Conclusions

This research concludes that there are some actors involved in the governance for 'vulnerable yet viable' different rooms of power, among the government, private sector,

and the society. The results of analysis on the influence and dependence between actors placed the actors in a strategic context where the actors are expected to appreciate each other's competitive advantages.

The other result is that most of the actors are convergent. Thus, it is necessary to improve collaboration and form a very strong alliance between the convergent actors in order to achieve their objectives. Meanwhile, for divergent actors where there may be potential future conflict, good communication is needed between them. Besides, the results of ATLAS.ti processing identified with the governance strategy recommended by the stakeholders is divided into some main aspects. This includes social-economy, related to life changes for self-resilience; institution, related to strengthening connectivity, transformation of modern system and control; environmental awareness, related to perceived environment as one of the centers of activities for people living in coastal area, with the benefit of maintaining sustainable sea ecosystem being for the fishermen to be able to benefit from them in the future; institution, related to government regulation; accessibility, related to infrastructure improvement; and understanding of the importance of modern technology. This research can be the development of research related to the life of small-scale fishermen based on stakeholders and how the convergence and divergence between stakeholders. This research can also help determine which stakeholders should be involved in consult and the appropriate policies to implement.

Further research can explore the vulnerability of small-scale fishermen from stakeholders' perspective more thoroughly, and also gather information through the FGD method that was presented in this research because of social distancing for the covid-19 pandemic. Lastly, a comparative analysis of various case studies at different, more advanced levels and contexts can improve our findings

## Acknowledgements:

This research is part of the PMDSU scholarship research scheme. For this reason, the author would like to express her gratitude and appreciation to the Directorate of Higher Education Degree, Ministry of Research and



Technology/National Research and Innovation Agency (Kemenristek/brin) the Government of Indonesia for supporting funding for this research and the publication of this article. The author also thanks all members of V2V Global Partnership for the valuable support.

*References:*

- [1] M. N. Reyhani and P. Grundmann, "Who Influences Whom and How in River-Basin Governance? A Participatory Stakeholder and Social Network Analysis in Zayandeh-Rud Basin, Iran, *Int. J. Light. Mater. Manuf.*, 2021, doi: 10.1016/j.envdev.2021.100677.
- [2] L. L. Benites-Lazaro and N. A. Mello-Théry, Empowering communities? Local stakeholders' participation in the Clean Development Mechanism in Latin America, *World Dev.*, vol. 114, 2019, doi: 10.1016/j.worlddev.2018.10.005.
- [3] K. Hornik, B. Cutts, and A. Greenlee, Community theories of change: Linking environmental justice to sustainability through stakeholder perceptions in Milwaukee (WI, USA), *Int. J. Environ. Res. Public Health*, vol. 13, no. 10, 2016, doi: 10.3390/ijerph13100979.
- [4] K. Joseph, Stakeholder participation for sustainable waste management, *Habitat Int.*, vol. 30, no. 4, 2006, doi: 10.1016/j.habitatint.2005.09.009.
- [5] Ö. Bodin, M. M. García, and G. Robins, "Reconciling conflict and cooperation in environmental governance: A social network perspective," *Annual Review of Environment and Resources*, vol. 45, 2020, doi: 10.1146/annurev-environ-011020-064352.
- [6] Dinas Perikanan Kelautan dan Peternakan Kabupaten Tegal, *Data Produksi Perikanan Tangkap Kab. Tegal Tahun 2020*, 2020.
- [7] C. Bene, When fishery rhymes with poverty: A first step beyond the old paradigm on poverty in small-scale fisheries, *World Dev.*, vol. 31, no. 6, 2003.
- [8] E. A. Allison, B. Horemans, and C. Béné, Vulnerability reduction and social inclusion: strategies for reducing poverty among small-scale fisherfolk, 2006.
- [9] S. Jentoft, A. Eide, M. Bavinck, R. Chuenpagdee, and J. Raakjær, *A Better Future: Prospects for Small-Scale Fishing People*, in *Poverty Mosaics: Realities and Prospects in Small-Scale Fisheries*, 2011.
- [10] P. K. Nayak and F. Berkes, *Interplay Between Local and Global: Change Processes and Small-Scale Fisheries*, 2019.
- [11] R. Chuenpagdee and S. Jentoft, Transforming the governance of small-scale fisheries, *Marit. Stud.*, vol. 17, no. 1, 2018, doi: 10.1007/s40152-018-0087-7.
- [12] S. Jentoft and R. Chuenpagdee, *The Quest for Transdisciplinarity in Small-Scale Fisheries Governance*, 2019.
- [13] C. Bryant and A. Bousbaine, Actor Dynamics and Sustainable Development: Emerging Roles of Researchers, *Rev. Can. Géographie Trop.*, vol. 1, no. February, pp. 1–5, 2014.
- [14] M. Zahradnik, J. Dlouhá, and S. Burandt, Actor analysis as a tool for exploring the decision-making processes in environmental governance, in *Exploring regional sustainable development issues. Using the case study approach in higher education*, Grosvenor House Publishing Ltd United Kingdom, 2014.
- [15] L. M. Hermans, *Actor analysis for water resource management*. Netherland : Eburon Publisher, 2005.
- [16] A. Fauzi, *Teknik Analisis Keberlanjutan*. Jakarta: PT Gramedia Pustaka Utama, 2019.
- [17] A. Sururi, Collaborative Governance Actor in the Revitalization Program of Old Banten Religious Tourism Area, *Policy Gov. Rev.*, vol. 4, no. 2, 2020, doi: 10.30589/pgr.v4i2.216.
- [18] A. Sururi, Collaborative Governance Sebagai Inovasi Kebijakan Strategis (Studi Revitalisasi Kawasan Wisata Cagar Budaya Banten Lama), *HUMANIKA*, vol. 25, no. 1, 2018, doi: 10.14710/humanika.v25i1.18482.
- [19] D. A. Zacarias, Understanding community vulnerability to climate change and variability at a coastal municipality in southern Mozambique, *Int. J. Clim. Chang. Strateg. Manag.*,

- vol. 11, no. 1, 2019, doi: 10.1108/IJCCSM-07-2017-0145.
- [20] Suharno, A. Arifin, and A. Yunanto, The Stakeholder Analysis for Fisheries Management, SHS Web Conf., vol. 86, 2020, doi: 10.1051/shsconf/20208601020.
- [21] L. M. Saavedra-Díaz, R. Pomeroy, and A. A. Rosenberg, Managing small-scale fisheries in Colombia, *Marit. Stud.*, vol. 15, no. 1, 2016, doi: 10.1186/s40152-016-0047-z.
- [22] C. Fontaine, A. Haarman, and S. Schmid, Stakeholder theory of MNC, no. December. 2005.
- [23] T. Widayati, W. Waridin, and I. Mafruhah, Environmental performance and agricultural productivity: Assessing the convergence and divergence of demand-driven agricultural extension, *Int. J. Energy Econ. Policy*, vol. 9, no. 4, 2019, doi: 10.32479/ijep.7688.
- [24] A. L. Dewa, N. SBM, M. Thohir, and I. Susilowati, Analysis of seaports efficiency in supporting inter-island transportation, *Econ. J. Emerg. Mark.*, vol. 10, no. 1, 2018, doi: 10.20885/ejem.vol10.iss1.art6.
- [25] I. Mafruhah, S. Supriyono, N. S. Mulyani, and N. Istiqomah, Causality between tourism industry development and the ecological sustainability in marine environment: A convergence and divergence among stakeholder with mactor analysis, *Int. J. Energy Econ. Policy*, vol. 10, no. 4, pp. 85–92, 2020, doi: 10.32479/ijep.7989.
- [26] R. I. McDonald et al., Urban growth, climate change, and freshwater availability, *Proc. Natl. Acad. Sci. U. S. A.*, vol. 108, no. 15, 2011, doi: 10.1073/pnas.1011615108.
- [27] B. Marshall, *The Fishes of Zimbabwe and their Biology*, Smithiana. Grahamstown: The Southern African Institute for Aquatic Biodiversity, 2011.
- [28] B. Utete, C. Phiri, S. S. Mlambo, N. Muboko, and B. T. Fregene, "Vulnerability of fisherfolks and their perceptions towards climate change and its impacts on their livelihoods in a peri-urban lake system in Zimbabwe, *Environ. Dev. Sustain.*, vol. 21, no. 2, 2019, doi: 10.1007/s10668-017-0067-x.
- [29] G. Epstein, A. Bennett, R. Gruby, L. Acton, and M. Nenadovic, Studying power with the social-ecological system framework, in *Understanding Society and Natural Resources: Forging New Strands of Integration Across the Social Sciences*, 2014.
- [30] T. H. Morrison et al., The black box of power in polycentric environmental governance, *Global Environmental Change*, vol. 57. 2019, doi: 10.1016/j.gloenvcha.2019.101934.
- [31] L. Partzsch, Power with' and 'power to' in environmental politics and the transition to sustainability, *Env. Polit.*, vol. 26, no. 2, 2017, doi: 10.1080/09644016.2016.1256961.
- [32] M. S. Reed et al., Who's in and why? A typology of stakeholder analysis methods for natural resource management, *J. Environ. Manage.*, vol. 90, no. 5, 2009, doi: 10.1016/j.jenvman.2009.01.001.
- [33] G. Aulia, Partisipasi stakeholder dalam pelaksanaan Program Adiwiyata di SMP Negeri 4 Bojonegoro, *Kebijak. dan Manaj. Publik*, vol. 4, no. 3, 2016.
- [34] FAO, Guidelines for increasing access of small-scale fisheries to insurance services in Asia. 2019.
- [35] M. Dunn, Nonformal, Informal Education and Poverty Reduction – A Role For Tvet?, *Int. J. Educ.*, vol. 6, no. 2, 2012, doi: 10.17509/ije.v6i2.5295.
- [36] OECD, Economic Benefits of Improving Transport Accessibility. Roundtable Report 165, *Int. Transp. Forum*, vol. ITF Roundt, no. 165, 2017.
- [37] Rebstock, Economic Benefits of Improved Accessibility to Transport Systems and the Role of Transport in Fostering Tourism for All, Roundtable Econ. Benefits Improv. Access. to Transp. Syst., 2017.
- [38] E. Vitale Brovarone and G. Cotella, Improving rural accessibility: A multilayer approach, *Sustain.*, vol. 12, no. 7, 2020, doi: 10.3390/su12072876.
- [39] D. A. Kerner and J. S. Thomas, Resilience attributes of social-ecological systems: Framing metrics for management, *Resources*, vol. 3, no. 4, 2014, doi: 10.3390/resources3040672.
- [40] Niswatin, Wasino, Suyahmo, and T. Arsal, Education of Environmental

- Awareness Based on Larung-Sesaji Ritual in Coastal Community of Bluru Village, Sidoarjo Sub-District, Sidoarjo District, 2020, doi: 10.2991/assehr.k.200620.039.
- [41] E. Supriadi, N. Nurhalimah, and K. Bisri, Adaptation and Forms of Social Capital of Coastal Communities in Environmental Preservation (Study of Tambak Lorok Community North Semarang, Semarang City), *Mimb. J. Sos. dan Pembang.*, vol. 36, no. 2, 2020, doi: 10.29313/mimbar.v36i2.5491.
- [42] R. Benard and F. Dulle, Application of ICT tools in communicating information and knowledge to artisanal fishermen communities in Zanzibar, *Knowl. Manag. E-Learning*, vol. 9, no. 2, 2017, doi: 10.34105/j.kmel.2017.09.014.
- [43] S. Omar and A. Chhachhar, A review on the roles of ICT tools towards the development of fishermen, *J. Basic Appl. Sci. ...*, vol. 2, no. 10, 2012.
- [44] M. Sabu, C. S. Shaijumon, and R. Rajesh, Factors influencing the adoption of ICT tools in Kerala marine fisheries sector: an analytic hierarchy process approach, *Technol. Anal. Strateg. Manag.*, vol. 30, no. 7, 2018, doi: 10.1080/09537325.2017.1388363.

### **Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)**

Hapsari Ayu Kusumawardhani carried out the field data, performed the data analysis and wrote an article.

Indah Susilowati as a reviewer and supervisor. critically reviewed, updated, expanded and improved the original draft of the manuscript.  
Hadiyanto as a reviewer and supervisor. critically reviewed, updated, expanded and improved the original draft of the manuscript.

### **Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself**

This research is part of the PMDSU scholarship research scheme. For this reason, the author would like to express her gratitude and appreciation to the Directorate of Higher Education Degree, Ministry of Research and Technology/National Research and Innovation Agency (Kemenristek/brin) the Government of Indonesia for supporting funding for this research and the publication of this article. The author also thanks all members of V2V Global Partnership for the valuable support.

### **Conflict of Interest**

The authors have no conflicts of interest to declare that are relevant to the content of this article.

### **Creative Commons Attribution License 4.0 (Attribution 4.0 International, CC BY 4.0)**

This article is published under the terms of the Creative Commons Attribution License 4.0

[https://creativecommons.org/licenses/by/4.0/deed.en\\_US](https://creativecommons.org/licenses/by/4.0/deed.en_US)