EREM 79/2
Journal of Environmental Research, Engineering and Management
Vol. 79 / No. 2 / 2023
pp. 50–63
DOI 10.5755/j01.erem.79.2.32378

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Received 2022/09 | Accepted after revision 2023/03

https://doi.org/10.5755/j01.erem.79.2.32378

Investigating the Policy Priority of Sustainable Livelihood of Small-Scale Fishing Household: Evidence During the Pandemic from Prigi Bay, Trenggalek, Indonesia

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The development of coastal fisheries in the Trenggalek regency area is growing rapidly due to technological advancement. Technology has become a stimulant for the community in utilizing fishery resources. The sustainability of the livelihoods of fishing communities in Prigi Bay in 2019 was analyzed using the sustainable livelihood approach (SLA), showing that social capital during the COVID-19 pandemic experienced changes in social and economic aspects. According to previous SLA results, this study examines the policy priorities of small-scale fishing households in Prigi Bay. This study investigates the policy priorities to improve the sustainability of fishers' livelihoods using the analytical hierarchy process (AHP) criteria. The analysis results indicate that local culture is consequential and greatly impacts household sustainability. It is due to the custom, which maintains culture of not going to catch fish on Fridays. The culture has not been drafted as a local regulation. Therefore, the local government should draft regional regulations regarding the clean sea program on Fridays that all coastal communities must follow. It will affect the fishers' sustainable livelihood because production activities are not only in the sea but also outside the sea. For example, people could perform off-fishing activities such as planting crops and maintaining social relationships with family or neighbours.

Keywords: policy priority, small-scale fishing household, local culture, sustainable livelihood.

Introduction

The development of coastal fisheries in the Trenggalek Regency is very rapid. Starting with the Cofish Project activities in Prigi Bay from 1998 to 2005, the construction of the Prigi Archipelago Fishery Port has provided a solid foundation for the management of fishery resources (Susilo et al., 2017). The management of the Prigi Bay area is based on four project components, including biodiversity, strengthening economic enterprises, improving fishing port facilities, and strengthening institutions. The four project components have stimulated the community to utilize fishery resources. The fishing community has also responded to the development of fishing technology because they already use several types of fishing gear. Thus, fishing patterns have also developed; there is not only one-day fishing, but many people are starting to catch fish in more than one day (Purwanti et al., 2020).

Another development in Prigi Bay is a coastal tourist area. Some areas developing for coastal tourism include Karanggongso Beach, Prigi Beach and Prigi Harbor Area, Cengkrong Beach and mangrove forest areas for tourism and Damas Beach (Purwanti et al., 2021). Every year, there is also a sea-picking event and tourist attraction organized by the fishing community. The massive infrastructural development in Prigi's National Harbour and tourism make livelihoods in the Prigi Bay area more advanced. Undeniably, developments in Prigi Bay have impacted improving people's lives in Prigi Bay. However, the COVID-19 pandemic has shocked the world and affected the lives of the fishing communities in Prigi Bay. Several studies have shown the impact of COVID-19 causing fishers' income to decrease due to the disconnection of the fish marketing chain (Kurnia, 2020; Mardhia et al., 2020). In addition, the coastal tourism sector is also experiencing a slump due to the decline in tourist visits (Dwita, 2020).

Fishers' households are vulnerable to socio-economic changes due to the pandemic, so efforts are needed to strengthen the socio-economic resilience of fishing households to sustain their livelihoods. Purwanti et al. (2022) studied the socio-economic conditions of fishers' households during the COVID-19 pandemic through the economic sustainability of fishers' households by adopting the framework used by the Department for International Development (DFID) (1999) in the sustainable livelihood approach (SLA). The SLA is one of the methods to increase understanding of household livelihoods using a holistic approach to capture the community's ability to carry out their lives by using the capacity/ability and ownership of resources (assets) to achieve livelihood levels. It provides an understanding of poverty's primary causes and dimensions that focus on several factors (Triyanti and Firdaus, 2016). The SLA approach is measured based on technical feasibility indicators identified into five forms of capital: human capital, natural resource capital, financial capital, physical capital and social capital (Purwanti et al., 2017).

The results of the study by Purwanti et al. (2022) show that fishers' households during the COVID-19 pandemic are less sustainable because the sustainability value ranges between 43.77 (natural capital) to 54.10 (social capital). Also, Arai et al. (2022) found that, during the COVID-19 pandemic, adaptive capacity played an important role for small-scale fishermen by changing their livelihoods to remain sustainable. However, in a stagnant global economy, alternative sources of income may not necessarily help small-scale fishers.

Based on the findings of Purwanti et al. (2022), this study will examine in more depth the policy priorities that local governments must take to improve the sustainability of fishers' livelihoods through the analytical hierarchy process (AHP) criteria. AHP is an analytical tool to support decision-making and help solve complex problems through a hierarchical structure of measures based on stakeholder input and analysis results by drawing various considerations to develop weights or priorities (Munthafa and Mubarok, 2017). The process hierarchy analysis is the best measurement to assess fishers' most economical and sustainable livelihood options, leading to the best result for making an alternative model.

Radiarta et al. (2015) used AHP to look at aspects that affect aquaculture development based on the blue economy. Meanwhile, Razi (2016) determines the priority of fishery extension in the aquaculture business in Bogor City using AHP. This research using the AHP method will further sharpen the Purwanti et al.'s (2022) findings before where, during the COVID-19 pandemic, the livelihoods of small-scale fishermen in Prigi Bay were sustainable on social capital, then physical capital, natural capital, financial capital and human resources, respectively. Based on these five capitals, priority

activities will be obtained from the capital with the highest value to strengthen the sustainability of small-scale fishers' lives. The results of this study are expected to be used as input for policymakers to make policies to improve the livelihoods of small-scale fishers.

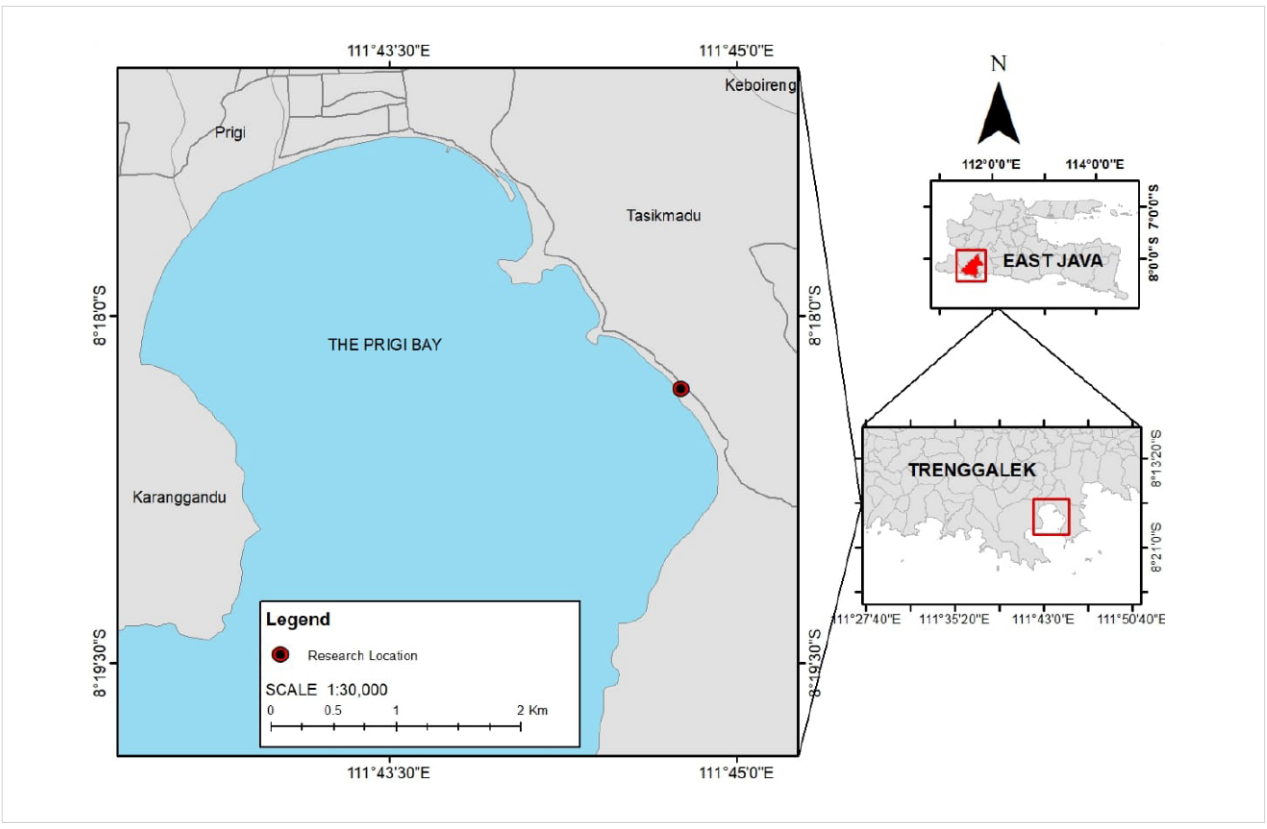
Methodology

This research area is Prigi Bay, Tasikmadu Village, Watulimo District, Trenggalek Regency. The study area extended over 111º 43' 08" BT - 111º 45' 08" BT and 8º 17' 43" LS - 8º 24' 25" LS, with both beaches and mountains in the area (see *Fig. 1*). Prigi Bay is located on the coast south of Trenggalek with a potential fishing port. This area is the biggest fishing port in East Java, Indonesia, beside Muncar, Banyuwangi. The fishing port is the backbone of this area due to the expanding transportation area through the south coast route. Tasikmadu Village has a community-based supervision under the local government, and they manage it greatly. The Indonesian Statistics (2017) data documented that a family of Tasikmadu was approximately 12.685 people consisting of 6.549 male and 6.226 female population with 4.291 households with 75% as fishers resulting in over-reliance on fishing activities. Additionally, due to the geographical area, most residents engaged in small-scale fisheries, agriculture, and wage labour.

This quantitative study focuses on the sustainability of small-scale fishing households during the pandemic in Prigi Bay Trenggalek, Indonesia. A total of 75 small-scale fishing households that joined the local fisher community (KUB) forum supervised by the local government participated in this study from June to August 2021. We collected the data for this study through questionnaires using a 0 to 10 point scale range through focus group discussion. The criteria for small-scale fishers were to use a boat with less than 20 GT and make one-day fishing. This respondent's character is used to analyze the sustainability of fishers' household livelihoods based on the five capitals that make up a sustainable livelihood.

The main variables for each capital that are considered in the sustainability of fisheries households (Purwanti et al., 2022) include (1) local culture for social capital,

Fig. 1. *Map of the study region*



(2) asset ownership for physical capital, (3) availability of land owned by Indonesian Ministry of Forestry but the local people have the right to work the land (*gopla*) for natural capital, (4) sources of operational fishing costs for financial capital, and (5) productive age of fishers for human capital. These five variables are used for the analytical hierarchy process (AHP) criteria.

For more details in the AHP analysis, this research took 20 key figure respondents to determine policy priorities for the sustainability of small-scale fishing households. It includes the officers from the Indonesian Ministry of Forestry (three people), the officers from the Indonesian Ministry of Fisheries and Marine (three people), the district officers (two people), the village officers (two people), the Community Supervisory Group (three people), two people from a Tourism Awareness Group, three fishery household economists, and two coastal environmental experts. The AHP decision supports the model which describes complex problems into a hierarchy representing complex problems in a multi-level structure (Saaty, 2010). Therefore, to identify the policy priorities for the sustainability of small-scale fishing households, this research needs 12 stages displayed in *Table 1*.

Table 1. *The stages of making policy priorities for the sustainability of small-scale fishing households*

Stage	Description
1	Determine the objectives in the policy priorities for the sustainability of the fishers' household.
2	Determine the AHP criterion: local culture for social capital; asset ownership for physical capital; availability of *gopla* land for natural capital; source of operational fishing costs for financial capital; and productive age of fishers for human capital.
3	Alternative policies based on literature review or theory by an expert focus group discussion (FGD).
4	Arrange these criteria in the form of a paired matrix.
5	Sum the column matrix.
6	Calculate the value of the criteria column elements with the formula for each column element divided by the number of column matrices.
7	Calculate the priority value of the criteria with the formula for adding up the row matrix from step 4 and the result in step 5 divided by the number of criteria.
8	Test the consistency of each paired matrix with the formula for each paired matrix element multiplied by the priority value of the criteria. The results of each row are summed, and priority criterion values as much as λ1, λ2, λ3, ..., λn. Calculate the maximum lambda value with the formula: $\lambda_{max} = \frac{\sum \lambda}{n}$ λ – number of eigenvalues of the matrix; n – comparison matrix.
9	Calculate the consistency index (CI) with the formula: $CI = \frac{\lambda_{max} - n}{n - 1}$ CI – Consistency index; λ_{max} – Perron value; n – comparison matrix.
10	Calculate the consistency ratio (CR) with the formula: $CR = \frac{CI}{RI}$ CR – consistency ratio; CI – consistency index; RI – random index; If CR < 0.1, the pairwise comparison value in the given criteria matrix is consistent.
11	Develop a row matrix between the criteria where contents are the results of the calculation processes in step 4, step 5, and step 6.
12	The final result is a global priority as the decision-makers' value is on the basis of the highest value.

Results and Discussion

Priority factors for the sustainability of small-scale fishers' household

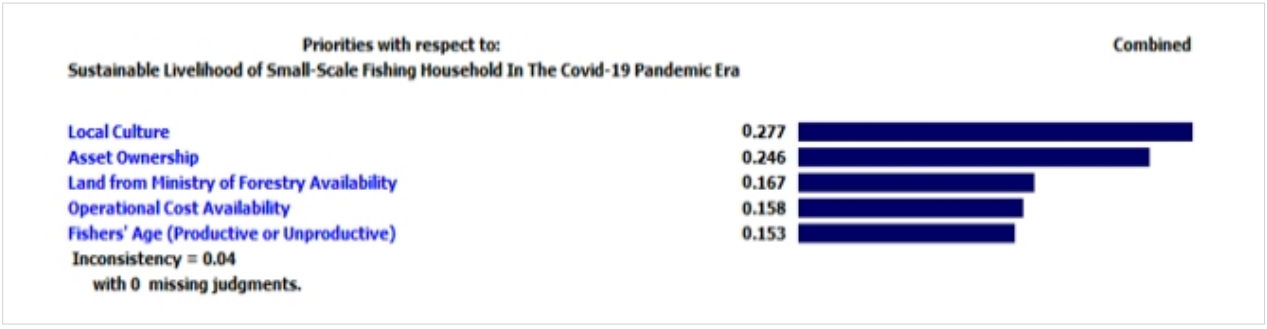
In general, small-scale fishing households have problems with the sustainability of life. In order to mitigate the difficulties faced, the government needs to prioritise policies that will affect fishers. The results of the previous research using multi-dimensional scaling (MDS) Rap-household, which is the ordination technique to determine the position of good and bad points of each indicator, and with the support of Rap-household, the similarity or dissimilarity of each indicator can be determined. The previous studies produce the main factors in each capital that are considered in the sustainability of fisheries households, local culture, asset ownership, availability of *gopla* land, sources of operational fishing costs, and fishers' productive age (Purwanti et al., 2022). Therefore, this research continues the previous study by using the finding variable for the criteria in the AHP. At the same time, policy alternatives are generated based on theory and the results of focus group discussions with experts.

The results of the AHP analysis show that, of the five criteria, local culture is the criterion that becomes the main priority in achieving the sustainability of fishers' households, with a value of 0.277, as presented in *Fig. 2*. Local culture is a solution to preserving waters. Some customary regulations are often more obeyed than government regulations because the community can ostracize you if you violate customs (Widianto et al., 2020). For example, *Hukurila Village* is one of the villages still bonded to Ambon City's customs. As a traditional village, community life is still full of activities related to customs that apply and are held from generation to generation. Life between communities is still well established regarding social and religious relations. Various problems in building inter-community connections are carried out by deliberation for consensus. Customary village institutions facilitate them, often called the "three stone furnaces", namely the *saniri negeri (the legislative)* and king, priests and teachers.

The three aspects, such as government, religion and education, integrate into a single unit that supports each other in building community relations. One of the social and togetherness activities is the *masohi* work tradition, a culture of cooperation still maintained by the community, for example, in managing gardens and building people's houses (Sahureka, 2016). Meanwhile, traditional local culture in using marine resources refers to the Wabula community, which they cannot separate from their understanding of the marine environment. The local knowledge system divides the marine environment into two areas, namely *Pangkolo and Nambo. Pangkolo* is a marine environment within and connecting land boundaries and a mangrove ecosystem habitat.

Meanwhile, *nambo* is an environment that includes coastal and deep-sea waters (Mustari et al., 2019). The value of local culture is adopted as a system of values and institutions related to the utilization and conservation of marine and coastal natural resources that people depend on for their survival so that they will not run out and become extinct (Amu et al., 2016). Local culture in Prigi Bay before the COVID-19 pandemic still existed and was valid. Seventy-five respondents proved it; as many as 72 people, or 96%, stated that local culture still exists and applies. Likewise, until now, it still exists and is valid, as seen by 75 respondents who said that local knowledge still exists and applies. Shown by the holding of the *Larung Sembonyo* traditional ceremony,

Fig. 2. *Results of priority and inconsistency in fishers's household sustainability goals*



which embodies a form of gratitude for the fishers for the catches obtained, this ceremony is still ongoing today. This ceremony is usually held in the *Selo* (on the Javanese calendar) or in June (on Gregorian Calendar).

Limited ownership of assets is a general characteristic of people experiencing poverty, including fishers, which is reflected in the house's condition, simple household appliances, a slum living environment and indebtedness. When the seasons change, some fish they can catch often change, but the small fishers cannot adjust the fishing gear they should use according to the season (Tain, 2011). The local fisher community (KUB) forum is an alternative strategy for traditional fishing communities in Prigi Bay in their survival mechanism, which is generally constrained by limited ownership of land resource assets and little capital (Rofiningin et al., 2016).

Before the COVID-19 pandemic, many people knew that 53% of the production assets used by fishers were fixed and did not experience development. Fishers' assets are not growing because the income earned by fishers is decreasing. As a result, fishers cannot increase the use of their production assets, especially fishing boats. The income earned is used to meet the needs of daily living and capital for fishing. However, as many as 46% of respondents stated that their production assets were entirely developed, and the rest were growing. It means that 20% of respondents said there was a development in their production assets, with the replacement of boat assets for rejuvenation and fishing gear.

Meanwhile, during the COVID-19 pandemic, 87% of the production assets used by fishers were permanent and did not develop, and 13% stated that their production assets were entirely developed. One of the causes of this asset's development is diversification in fishers' livelihoods. They go to the sea and cultivate agricultural land belonging to the Ministry of Forestry (*Gopla* in Javanese). They then sell the results from the processing of agricultural land to increase their income.

Gopla was originally deviant because it used forest land belonging to the Ministry of Forestry, pioneered by Mr Paniyo, who also has the nickname *Gopla*. Over time the term *gopla* was used by people who imitated Mr Paniyo's behaviour in the sense of participating in forest land cultivation without a permit (Susilo et al., 2017). In addition to catching fish, small-scale fishers also carry out *goplo* activities. As mentioned, *Goplo* is an activity to utilize forest land for productive crops through social forestry programs. The availability of this land in Karanggongso Hamlet is quite extensive.

Out of 75 respondents, 37 (49%) stated that the available land was large. Due to the potential availability of vast land, most respondents, apart from fishers, also work in the agricultural sector by utilizing this land for planting. The plants used are dominated by annual plant species such as cloves. At the same time, during the COVID-19 pandemic, 55 of 75 respondents stated that the availability of this land in Karanggongso Hamlet was relatively small.

Fishing communities have unique characteristics and habits, including characteristics in financial management. One of the inherent characteristics of fishing communities is dependent on finding solutions to economic problems for intermediary traders (*pengamba'* in the Madurese or *ponggawa* for the Makassar) (Indriadewi Atmadjaja, 2017). In addition, fishers' loans to relatives are usually allocated by traditional fishers to meet their daily needs, and moneylenders are traditionally given by fishers for unexpected costs such as the need for sudden medical expenses or even accidents (Hamdani and Wulandari, 2016).

Most Karanggoso fishers before the COVID-19 pandemic received operational fishing costs from the ship owners' moneylenders. Of 75 respondents, 36 people (48%) obtained loans from them. The more straightforward borrowing process without many requirements (administration, guarantees, payback intervals) makes fishers prefer to borrow money for fishing capital from fishers compared to financial institutions. However, the consequence is that fishers must sell the catch obtained to fishers at a lower price determined by a single observer.

Productive age is assumed to be able to work optimally to get maximum income. Working in fishing requires good health, a lot of human resources, proficiency in the operation of fishing gear, and knowledge of the fishing area. As the age reaches the old/unproductive level, the ability to work decreases because of the declining health and workforce. A relatively young age does not guarantee to perform optimally because of the lack of skills and knowledge of fishing areas obtained from work experience, which is still minimal (Suroyya et al., 2017).

Before the COVID-19 outbreak, 46 of 75 respondents (61%) were of productive age (under 50 year old). Then,

during the COVID-19 pandemic, there was a rise in fishers' productive age as the number increased to 60 respondents (80%). Productive age is when a person can do a job optimally. Most respondents are of productive age, so the time spent is still relatively high. However, as many as 37% of respondents devote less time to work in the fishery sector. It is because they only save their work for fishing during the four-month fishing season. They do not go to sea during the mid-season and during the fish season.

Meanwhile, 12% devote a lot of work time to the sea because they have done fishing all their life. Since the COVID-19 pandemic, the outpouring of respondents' working time in the fishery sector has been low. It can be seen in 75 respondents; 45 people (60%) have a low outpouring of working time because fishers do not carry out fishing activities in the medium season and when the fish is not in season. However, as many as 27% of respondents devote much time to work in the fishery sector. Meanwhile, 13% devote a lot of work time to the sea because they have done fishing activities all their life.

Policy priority with local culture

In sustainability of the household through the criteria of local culture, the most important thing to do is to maintain the no sea fishing on Friday culture. The amount of sustainability for doing this culture is 0.555 (*Fig. 2*). Other forbidden fishing days are Eid al-Fitr, Eid al-Adha, *Kenduri Laot*, Independence Day commemoration and tsunami day commemoration. In addition, this local culture provides opportunities for breeding fish and other marine biotas, maintaining social relations, resolving conflicts, being grateful, remembering heroes and strengthening faith. It is the practice of preserving the universal relationship between the Creator, nature and humans (Nurkhalis and Sempena, 2018).

Fishers in Prigi Bay have a tradition every Thursday afternoon to Friday morning not to go to sea. They do not do fishing activities because Muslims are obligated to perform Friday prayers every Friday. Another ceremony called *The Larung Sembonyo* ceremony is held on Monday or Saturday *Kliwon* (Javanese date) in the *Selo* month (Javanese calendar). *Larung Sembonyo* is a coastal community activity as a form of gratitude to God for the sustenance given. In addition, it aims to commemorate the ancestors who opened the Prigi Bay area. The *Larung Sembonyo* ceremony events are a prayer, local singing attraction (*campursari*), floating procession, *wayang* and traditional ceremonies (*ruwatan)*. Thirty-eight plants used in the *Larung Sembonyo* ceremony are divided into 22 families. The ritual offerings used in the *Larung Sembonyo* ceremony are 31 pieces, each placed on a *takir*. The Karanggongso community has indirectly made conservation efforts for the ritual plants. Conservation efforts are carried out by planting plants in fields, yards, and forests (Zulia et al., 2017).

Prigi Bay is also a tourist area for beach visits, scattered in the sub-bays of Karanggongso and Ketawang and a few tourist activities on Damas Beach. Tourist visits, especially on holidays (Sunday and school holidays), New Year and one week after the first day of Eid. The sea-picking event once a year, organized by the fishing community, is also a tourism event. During the COVID-19 pandemic, *Larung Sembonyo* held a thanksgiving event at night without using loudspeakers and had to comply with health protocols. During the pandemic, the society cancelled the tradition of boat races after the offerings in the middle of the sea. However, the essence of *Larung Sembonyo* is a symbol of gratitude to the Creator.

Policy priority with the main factor of asset ownership

For household sustainability through asset ownership criteria, the most important thing to do is to separate business capital from household consumption with a value of 0.571 (*Fig. 3*). Uncertain income and financial conditions require fishing families to manage their finances as well as possible so there is no inequality during a famine, harvest waste, and economic deficits.

As the family finance manager, the wife is tasked with planning and making the best possible use of income, expenses and savings. Therefore, it is essential for a family, especially a wife, to know how to manage family finances well to maintain and improve the welfare of family life (Diyanti and Suprayogi, 2019). The behaviour of fishing households in Prigi Bay in asset ownership is quite good. The habit of fisher households buying gold jewellery during fishing or harvest time is a way for fishers' households to save. This jewellery will be sold when the household needs business financing.

The fishers face losses for two reasons: direct and indirect losses. The direct losses result from fishing operational capital loans due to the purchase of diesel,

which is more expensive than the price at the gas station, and payments are not made in cash. Meanwhile, indirect loss results from a value catch decrease due to the limited purchase of ice and lack of refrigeration rooms. The loss of decreasing catch for fishers already tied to borrowing capital is the responsibility of middlemen who receive their bounty from fishers (Lubis et al., 2012).

During the famine season, small-scale fishers meet their daily needs depending on the money borrower or the fish seller by applying for loans so that the seller will market fishers' catches to them. With this dependence, fishers do not feel disadvantaged because fishers are easily and can obtain loans and produce purchased by the fish seller at any time.

Policy priorities with the main factors of *Goplo* land availability

For the sustainability of the household through the criteria for the availability of *gopla* land, the most important thing to do is to determine the planting pattern and type of plants with a value of 0.265 (*Fig. 4*). People who planted on the Ministry of Forestry land (*Pengopla*) in Prigi Bay grew their forest land with fruit crops (durian, stinky bean, banana) and industry (cloves and coconut) as much as 23.1%. They planted secondary crops (maize, rice) and industrial crops at as much as 19.2% as well as secondary crops and fruit crops at 19.2%. The people (*Pengopla*) grow only fruit trees on their forest land (15.4%), and secondary crops (bananas and corn), fruit crops, and industrial plants (11.5%).

Furthermore, *Pengopla* only produces 7% of industrial plants, and the remaining 3.8% only grow crops on their forest land. Forest management carried out by coastal communities can directly increase their income. The existence of forest management carried out by coastal communities improves their welfare because they get arable land for free (Fuad et al., 2021). Types of *gopla* plants include cloves, durian, stinky bean, mangosteen and banana, and maize and rice as secondary crops. Culturing cloves, durians, and other perennials determines the most common cropping patterns. Its annual plant has a strong will as a forest buffer from landslides. Banana and corn plants are planted on the side-lines of annual crops and harvested every 2–3 months.

The government provides legal access to communities in and around forests to manage forest resources in five management schemes: community forest, village forest, community plantation forest, partnership, and customary forest (Bagaskara and Tridakusumah, 2021). In addition, the government provides access to the use of Tarakan forest land to regulate the utilization of the potential of forest areas according to the principle of sustainability by maintaining and protecting the forest as a place to depend on life (Syaprillah, 2015). As

Fig. 3. *Priority and inconsistency results on local culture criteria*

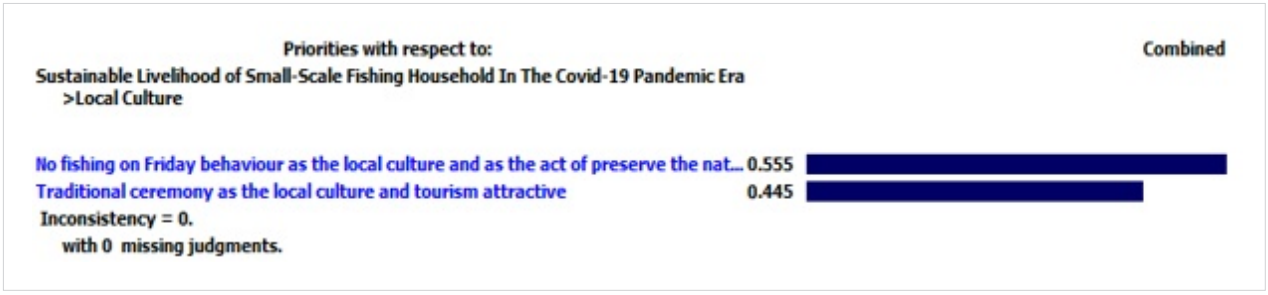


Fig. 4. *Priority and inconsistency results on asset ownership criteria*

a result, the Prigi people legally manage their forests through a social fores`try program called Community Based Forest Management (PHBM) in 2001.

The regulations for controlling and utilizing natural resources in Kololio Village are not entirely based on central and regional government policy rules. Customary rules that are not formal are still the community's reference in managing resources in forest areas. The forest area determined by the government is not different from the forest division that the people of Kololio Village believe. It is divided into protected forests and the extent that the society can manage plantation types of coconut, sugar palm, banana, durian, mango and wood-producing tree species resources (Ariani et al., 2015).

The regulations issued by the Ministry of Forestry regarding the social forestry program also include plant types, spacing and profit-sharing rules. For stand plants or forestry staples, the community is advised to plant *Albizia Chinensis Sp., Acacia Mangium Sp., Pangium Edule Sp.,* coconut and durian. Cultivators can grow horticultural crops such as coffee, cocoa, cloves and banana on the side-lines of standing plants. The agreed profit sharing between the Ministry of Forestry and the cultivators for horticultural plant types is as follows: the agreed profit sharing is 15% for the Ministry of Forestry, 5% for guidance carried out by the Ministry of Forestry, 2.5% for the district, 5% for the Regency, 5% for village communication forum, 7.5% for Forest Village Community Institution namely *Argo Lestari*, and 60% for cultivators.

Although in the social forestry program, the community is positioned as a working partner of the Ministry of Forestry in managing forest areas, the community is only cultivators of the land, not land owners, so it is forbidden to trade arable land. However, community cultivators can transfer their land management to someone else with the Ministry of Forestry's permission. The residents of Watulimo sub-district use the forest area on the mountain slopes to the mountain peaks to cultivate forest land into productive areas through the social forestry program or the Community Forest Management program (PHBM). This program is utilized by the local community, including most small-scale fishers, as an alternative to working on forest land by planting cloves, durian, banana and other crops. This condition greatly supports the sustainability of small-scale fishers' household incomes when it is not during the fishing season. Fish season lasts for four months.

Most small-scale fishers only carry out fishing activities during the fishing season. During the middle and non-fishing seasons, they work on forest land through community forest management activities (PHBM). Some fishers also become members of tourism awareness groups (*Pokdarwis* in Indonesian abbreviation), serve as marine tour guides and run tourist boats. Some fishers also raise goats, chickens and domesticated birds. The fishers can develop alternative job opportunities, breeding goats, cows, chickens, and ducks (poultry).

Policy priority with the main factor source of operational cost on fishing activity

For household sustainability through the criteria for the source of operational costs, the fishers must increase the role of social capital with a value of 0.671 (*Fig. 5*). The purse seine network or the respondent network in *Aertembaga* is significant regarding the sustainability of the purse seine business. The network affects the conveniences that purse seine respondents can get in *Aertembaga* when they have colleagues, co-workers, relationships with financial institutions, fishing organizations, security and the government (Louhenapessy et al., 2017).

Fig. 5. *Priority and inconsistency results on Gopla land availability criteria*

The security guarantee system in layers describes bridging social capital; lower-level fishers establish relationships with parties outside the community other than the skipper and women's small enterprise community (*pappalele* in Maluku), namely moneylenders (*bank titil* in Javanese). The fishers chose this model because moneylenders also come to collect the bills themselves in addition to the straightforward process of providing loans to fishers. Not even infrequently, one person can make debt transactions with several moneylenders to cover debts with other moneylenders.

Another advantage of this system is that when fishers have no money to pay debts on particular bills, with a guarantee of trust between the two parties, the fishers, as the borrowers, can pay the debt on the following account, and under certain conditions, they still ask for additional loans. This kind of social capital is not fulfilled by modern financial institutions (cooperatives, banks) (Anwar, 2013). The community kinship system in Prigi Bay is relatively high, which is the strength of social capital. When fishers need money, they often borrow money from relatives.

The cooperation between fishers and traders is quite good and mutually beneficial. Traders provide additional fishing capital assistance, and fishers sell their caught fish to traders at an agreed price. The interest of banking institutions in providing loans to traditional fishers is still minimal. However, based on the applicable provisions, the provision of credit for traditional fishers can be classified as giving a high-risk credit, so the government plays a vital role in increasing the interest of banking institutions (Velentina, 2018). Financial institutions that can be accessed are *Bank Rakyat Indonesia, Bank Mandiri, Bank Jatim, Bank UMKM Jawa Timur*, Credit Union (KSPP) Syariah Madani East Java, Islamic Credit Union (KJKS) Madani, and *Pantai Prigi Credit Union* (PPCU).

Policy priorities with the main factors of the fishers' households age

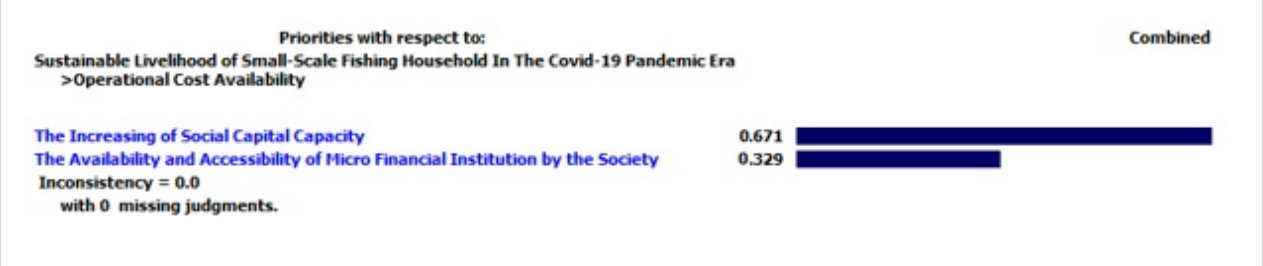
For household sustainability through the criteria of productive age of fishers' households, the most important thing is to assist fisheries and non-fishery businesses with a value of 0.786 (*Fig. 6*). Intensive mentoring activities are the right solution to overcome problems while increasing the chances of program success (Nurwidodo et al., 2018). The business assistance of fishers in Prigi Bay is carried out by establishing a Joint Business Group to facilitate guidance and assistance in project activities from the Fisheries Service. There are ten groups of fishing rods, and each group has members from 10 to 13 fishers.

Training activities for manufacturing processed product diversification can be one solution for processing fish caught in the sea. They can increase family food security, hoping to increase family income (Andajani et al., 2021). The Regional Government and Universities conduct community empowerment activities yearly in Watulimo District. The empowerment activities include product processing, product packaging, product marketing, the introduction of appropriate technology and other empowerment.

Priority of overall Household Sustainability Policy

The policy priority that can be carried out as a whole from the results of the AHP (*Fig. 7*) is to maintain the Friday culture of not going to sea, which is a local culture that can improve the relationship between humans to humans and humans to nature. With off-fishing on Fridays, the sea is preserved due to not overfishing. These priority results are not only for local culture but also support government programs implementing Presidential Decree No. 83 of 2018 concerning Marine Waste Management. This government policy aligns with the habit of fishers' in Prigi Beach who do not go

Fig. 6. *Results of priority and inconsistency in criteria for sources of operational costs on fishing activity*



to sea on Fridays. We can state this habit in regional policies by making Regional Regulations regarding the clean sea program on Fridays that all coastal communities must follow. The ultimate goal of this program is to maintain the cleanliness of the sea and reduce excessive pressure on the use of natural resources so that the sea is preserved.

In addition, fishers need to carry out good financial management by separating finance for business from meeting daily needs and making savings or investments so that they do not become dependent on moneylenders. Ownership of fishers' assets in producing fishery and non-fishery business products sometimes requires capital from other parties, so applying the rental system in production and marketing at least benefits both parties. The non-fishery plantation process (*gopla*) regulates cropping patterns and types of plants so that forest areas are not damaged or can cause disasters if they are mismanaged in forest management. Furthermore, the fisheries must have good economic literation. Thus, they could be capable of managing their income. Therefore, the government could help them by implementing economic literation and management training for the fishers in the local fisher community (KUB).

The last priority is a traditional ceremony as local culture and tourism attraction. The fishers are grateful for the product obtained from the traditional ceremony called *larung sembonyo*. This expression of gratitude gives positive results to fishers to be more enthusiastic in seeking sustenance and reminds us that humans should not be greedy. To increase fishermen's income through local culture, the government needs to pay more attention to the activities of Larung Sembonyo. This activity can be a national or international event to attract local and international tourists. Promotion of this activity can be done through social media and included in the annual agenda of the Ministry of Creative Economy.

Fig. 7. *Results of Priority and Inconsistency in Criteria Fishers' Households Age*

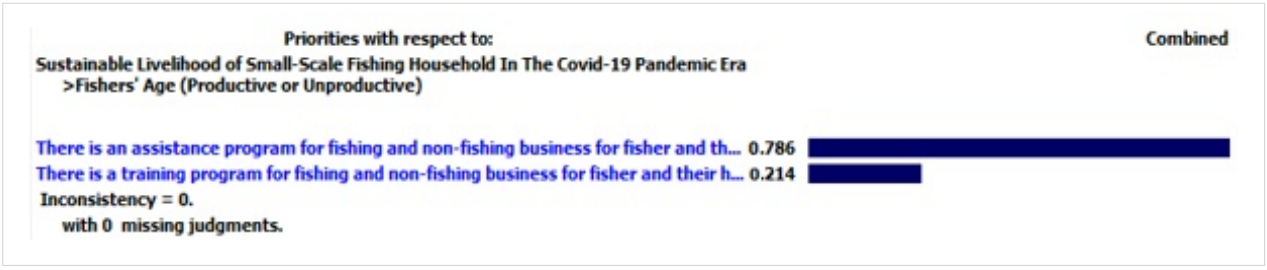
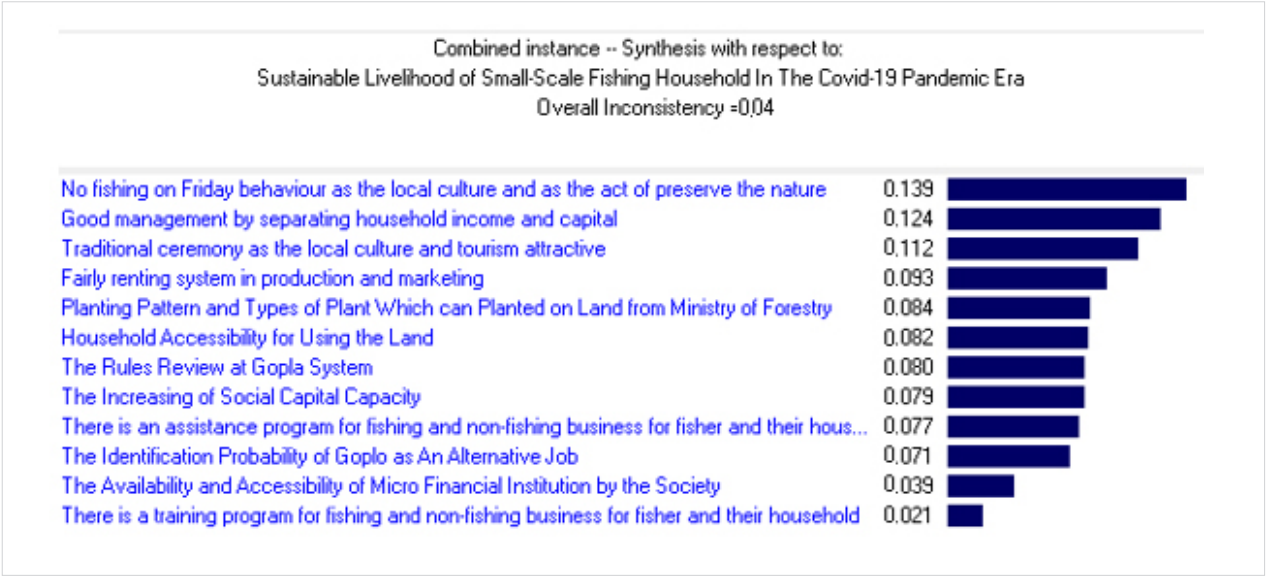


Fig. 8. *Overall priority results of policy alternatives and overall inconsistency*



Conclusions

The first hierarchy in the AHP uses leverage to study the sustainability of fishers' households from each capital in the SLA. From the five main factors, each capital shows that local culture is a consideration for household sustainability. Overall, in the AHP, the priority policy for the sustainability of fishers' households is to maintain the culture of not going to the sea on Fridays, which is part of local culture. During the pandemic until these days, the fisher will take off-fishing on Fridays to honour the culture. However, when they have off-fishing on Friday, their wife will become the breadwinner by becoming the labourer at the fish smokehouse. The pandemic had a bad influence on the dependence of fishers on money borrowers or fish sellers. Their habits are getting worse, affecting the household's sustainability. It is due to their habit of making loans to a money borrower or a fish seller and their poor financial management. The fishing community of Prigi Bay should maintain local culture related to religious activities and improve the ability of fishers to manage finances by utilizing financial institutions in the Prigi Bay area. According to the findings, we could give several recommendations to the government.

1 To answer the first highest policy priority, the no fishing culture as a policy priority, the local government should draft regional regulations regarding the clean sea program on Fridays that all coastal communities must follow. The ultimate goal of this program is to maintain the cleanliness of the sea and reduce excessive pressure on the use of natural resources so that the sea is preserved.
2 The second highest policy priority is the issue of good management. Therefore, the government and universities should provide facilities or community empowerment to improve the fishers' ability through technology, product diversification, alternative jobs and other types of empowerments. It concerns not only the policy already mentioned before, but the government could also help them by implementing economic literation and management training for the fishers in the local fisher community.
3 Finally, to answer the last highest policy priority, the government needs to pay more attention to the activities of *Larung Sembonyo* and promote it in national or international events. The local government could also join the Ministry of Creative Economy to introduce the local culture.

Last, this research has limitations. Therefore, it has to be improved in this research area to better explore society's behavior, specifically, community behaviour and concern for the surrounding environment, especially in processing marine waste. The results of this further research suggestion are expected to strengthen the implementation of regional regulations. In addition, research on the impact of traditional ceremonies on the community's economy must also be carried out.

Acknowledgements

This publication is funded by Associate Professor Doctoral Grant in 2022. We would like to thank Universitas Brawijaya supported this research and publication. We would also like to thank Universiti Malaysia Terengganu, Malaysia, for the excellent collaboration. In addition, the authors would like to thank Prigi Bay fishers' community, local government, and the Ministry of Forestry for assistance in constructing indicators.

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