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Marine Co-Management: Marine Governance in Improving the Welfare of Fishermen in Jembrana, Bali

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Abstract

This research is motivated by the uniqueness of marine governance for the welfare of fishermen in the perspective of co-management. An alternative model or solution to marine management problems. Implementing this model requires collaborative management by combining elements of the user community (fishermen groups, fisheries entrepreneurs and others) and the government. This research is focused on Pengambengan Village, Negara District, Jembrana Regency, Bali Province. The type of this research is qualitative with a descriptive approach. Data collection techniques used include direct observation (observation), interviews (interviews), and data collection through documents and triangulation techniques. The results of the study indicate that marine governance for the welfare of fishermen can be pursued with a co-management model. The co-management model can unite related institutions, especially fishermen and the government as well as other stakeholders in every resource management process starting from planning, implementation, utilization and supervision. Marine co-management as an effort to increase marine potential that can be utilized optimally by fishermen.

Keywords
co-management; marine governance; walfare; fishermen

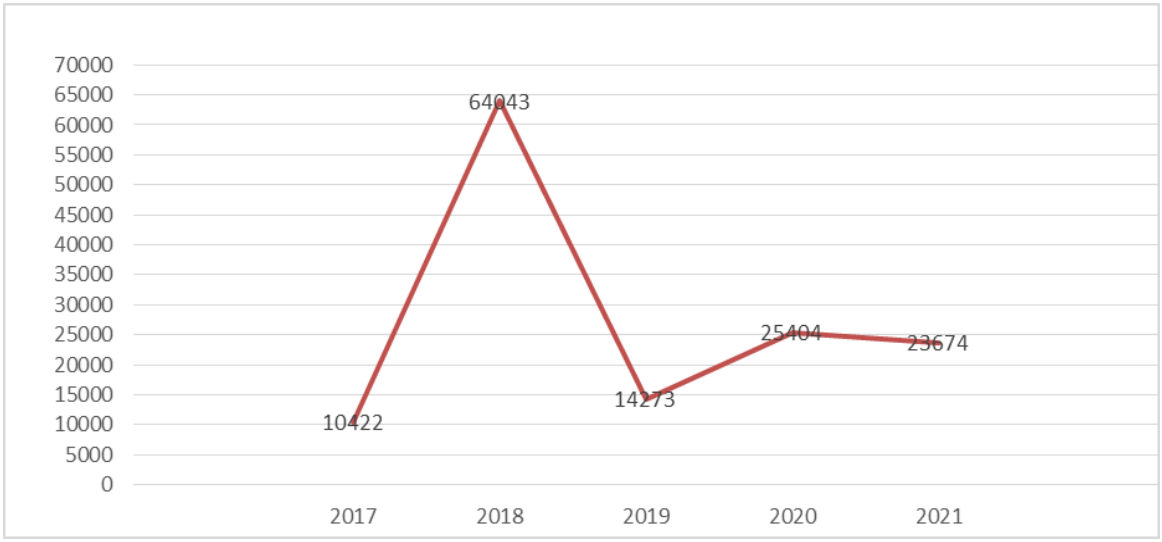
I. Introduction

This paper aims to explain marine governance to improve fishermen's welfare in a co-management perspective. Indonesia is the largest archipelagic country in the world with an area of 70% is the ocean. Consisting of 17,504 islands with marine waters of 5.8 million km2, territorial sea of 0.3 million km2, archipelagic waters area of 2.95 million km2, the area of the Indonesian Exclusive Economic Zone (EEZ) is 2.55 million km2 (Kennedy, 2018). This vast ocean is a national asset because it contains abundant economic potential, including fish, seaweed and other marine products (Sudarman et al., 2016). meet their needs. But in reality, the opposite happened. Less than 14.58 million people or about 90% of the 16.2 million fishermen in Indonesia are not economically or politically empowered (Gai et al., 2018). Even they are below the poverty line (Anwar et al., 2019). Therefore, a strategic policy of managing marine resources to increase benefits for fishermen and marine sustainability is very much needed (Sari & Muslimah, 2020), government commitment is also very important (Rasaili et al., 2021)

The choice of work as a fisherman is a profession that is synonymous with poverty or marginalized people. Fishermen are among the poorest community groups (Thorpe et al., 2007). Although fishermen go to sea every day to catch fish, their socio-economic conditions are still marginalized (Maani et al., 2018). This is what happened in Pengambengan Village. One of the eight villages and four sub-districts in the Negara District, Jembrana Regency, Bali Province, has great potential for fishing business.

Fish resources are very abundant. The catches obtained by fishermen in Pengambengan Village are usually tuna (euthynnuss affinis), lemuru fish (sardinella lemuru), and kite fish (decapterus mackarellus) (Mous et al., 2021). Of these three types of fish, only lemuru is the dominant catch and the largest producer for fishermen in Pengambengan Village. In general, many lemuru fish are produced as processed canned fish or commonly known as sardines (Nur et al., 2021).

Fishermen face various challenges and unfavorable conditions. So they are still far from the word prosperous life. For example, during the 2017-2021 period, there has been a decline in the catch of lemuru fish in Pengambengan Village. Almost four years there have been very extreme changes and a decrease in lemuru production caused by overfishing or over fishing (Purwaningsih et al., 2012). As the graph below shows the decline in lemuru production in the last five years.



Source: Data from the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency 2021

Figure 1. *Number of lemuru at Pengambengan Harbor*

The graphic above illustrates the decline in lemuru (overfishing) in Pengambengan Village. In 2017 it was (10,422), then it increased in 2018 as much as (64043. In 2019 it decreased again to (14273). While in 2020 there was a slight increase to (25404). Then in 2021 it decreased again slightly to (23674).

During this period, the fishermen's income was not sufficient to meet the family's needs. Finally, the wives of the fishermen in Pengambengan Village do a lot of work to help supplement the family's income. *First*, as laborers or workers in fish factories such as fish canning factories, cold storage factories or fish storage factories, and fish flour factories. *Second*, as a laborer on the beach to take care of the canoe. *Third*, as agro-industry and industrial workers who work as cleaning workers and tempe packaging workers in home agro-industry. Fourth, as domestic workers. *Fifth*, the trade sector by opening shops or stalls on the beach. *Sixth*, sewing monte. *Seventh*, migrate or work outside the Jembrana Regency area.

The complexity described shows that there is poor marine governance. So even though Indonesia's seas have very high economic potential, they are not managed properly. In the end, fishermen groups only get their hard work without getting results that are quite profitable and bring prosperity, while as a human food chain and their economic potential

is quite high (Rahmizal, 2017). For this reason, it is not enough to manage the sea just by relying on government policies that often fail to prevent overexploitation (Angeles & Dreisbach, 2020; Purwaningsih et al., 2012). Marine governance for the welfare of fishermen requires another approach that is non-centralized that legitimizes the system and the strength of the social structure.

Then the idea to run collaboration was born as an alternative or solution to marine management problems that can be carried out by the government by involving users (Van Hoof, 2010). Collaborative management, also known as the co-management perspective, offers a form of management that requires the involvement of both parties, namely the government which divides the power and management responsibilities through decentralization of decision-making to users of marine resources that are recognized as equal to government decisions and are considered as knowledge partnerships that have a comparative advantage (Berkes, 2009). Co-management as a sustainable alternative approach to problem solving that involves extensive consideration, negotiation and shared learning in problem solving (Carlsson & Berkes, 2005). Through this model, marine governance is carried out by bringing together related institutions, especially the community and government as well as other stakeholders in every resource management process from planning, implementation, utilization and supervision (Sandström & Rova, 2010), and so that co-management is more efficient. complex also requires systematic joint evaluation (Plummer & Armitage, 2007).

The co-management model is used to avoid the dominant or excessive role of one party. Co-management can unite relevant stakeholders in the process of monitoring and controlling existing violations. There are four (4) aspects that become the substance of the regulation using the co-management model, namely: (1) the scope of supervision and control is carried out through disseminating information to traditional fishing communities about the importance of preserving fishery resources; (2) supervision and control of the activities and utilization of fishery resources carried out by traditional fishermen in the fishing and aquaculture areas; (3) supervision and control institutions consist of: Fisheries Service, PSDKP Supervision Unit, Navy Observer Post, Water and Air Police, District Resort Police, Civil Service Police Unit; and (4) the participation of indigenous peoples in the supervision and control of fishery management (Monteiro & Pello, 2021). Most importantly it also reduces grassroots level conflict and encourages public participation in management (De Pourcq et al., 2015)

The co-management model has characteristics in characterizing its methodological framework, namely. First, as a middle ground between fully centralized management by the government with the aim of efficiency and equity and full management by local communities with the aim of self-managing and self-regulating and actively participating. Second, as a process of managing resources by making adjustments or changes from time to time, which includes aspects of community empowerment, transfer of authority, power sharing and equality. Third, as a flexible management strategy, which is a vehicle for participating, making rules, resolving disputes, sharing authority, leadership, dialogue, making decisions, adding and sharing knowledge, learning and coaching among stakeholders and government resource users (Carlsson & Berkes, 2003). The use of this model is an effort to encourage more effective management (Hamzah et al., 2020).

The role of various actors in co-management is enormous and the quality of the actors is also decisive (Petursson & Kristofersson, 2021). The government's role in co-management includes; 1) provide regulations/policies such as decentralization of power/authority; 2) encourage participation and dialogue with the community; 3) recognize/legitimize the rights of the community; 4) take the initiative; 5) Carry out law

enforcement; 6) solve problems that are beyond the community's authority; 7) integrating activities at various levels of government; and 8) Provide technical, administrative and financial assistance and services to support local community institutions (Akamani & Hall, 2019).

Based on this view, it can be said that marine management with a co-management model requires the existence of two large groups of stakeholders to jointly share roles, namely the government and user groups. Each manager has determinants which include user aspirations, type of approach, difficulty in making decisions, types of management tasks, stages in the management process, boundaries, types of groups using political culture and social norms (Sen & Raakjaer Nielsen, 1996). stakeholder groups who directly feel the impact of marine management in Pengambengan Village. Meanwhile, the government agency is the holder of the mandate to manage the existing marine resources in order to benefit and improve the welfare of the community. The two groups basically can work in synergy, because they have the same interests. However, if there is a lack of understanding and lack of communication between the two, it can lead to different conflicting roles so that the hope of improving the welfare of fishermen is difficult to obtain.

II. Research Method

This type of research includes qualitative research. The approach used is descriptive. According to Sugiyono (Sugiyono, 2008) it is often referred to as a naturalistic research method because the research is carried out in natural conditions or objects (natural settings). Data collection techniques used in the study were direct observation (observation), interviews (interviews), and supporting data in the form of documents. Then added with triangulation technique.

The data analysis technique used in this research refers to the model developed by Matthew B. Miles and Michael A. Huberman (1992). They say that in data analysis qualitative research is carried out interactively and continues until it is complete (until the data is saturated). Activities in this data analysis consist of collection, reduction, display and conclusions.

III. Results and Discussion

3.1 Matine Governance in Co-Management Perspective

Marine governance requires a co-management model. A collaborative management model by combining elements of the user community (fishermen groups, fisheries entrepreneurs, and the government, which is believed to be appropriate to lead to sustainable development (Carlsson & Berkes, 2003). Implementation of the minimal co-management model involves the support of human resource development, support for technology development, and availability of capital (Sutomo et al., 2012). The involvement and participation of elements of the user community will create incentives to work together in formulating and implementing policy schemes for the use of natural resources that are more efficient, more oriented to the interests of the community. This co-management can provide benefits to all parties.

Co-management avoids the excessive dominant role of one party, especially in marine management. Through this model, marine resource management is carried out by bringing together related institutions, especially the community and government as well as stakeholders (Voorberg & Van der Veer, 2020). The success of management with the co-management model is strongly influenced by the government's willingness to decentralize

responsibility and authority in management to fishermen and other stakeholders (Hamzah et al., 2020). Therefore, co-management requires legal and financial support such as the formulation of policies that support the direction of co-management, allowing and supporting fishermen to manage and restructure the roles of marine management actors (Muhtarom, 2017) which is supported by two factors, namely: ; 1) the relationship between actors and protected parties, 2) the economic relevance of the region for them (Fedreheim & Blanco, 2017).

Marine management with a co-management model in Pengambengan Village is based on three main parts. First, all stakeholders are given the opportunity to be actively involved in marine management. Apart from ensuring their commitment and participation, it is also intended to accommodate their knowledge and aspirations as well as their experience in marine management. Second, the division of roles and responsibilities in different marine management according to their respective portions. Third, the marine management framework in Pengambengan Village is not limited to ecological conservation purposes. However, it includes economic, social and cultural goals. That is, there is attention given to their needs that depend on resources, balance and participation. So co-management has a positive impact on marine management and environmental conservation (Chowdhury et al., 2020).

Thus, marine governance with a co-management model in Pengambengan Village has quite significant benefits. First, for socio-economic development that relies on the initiatives and capabilities of the local community. Second, to transfer authority in determining marine resource management decisions. Third, as an effort to reduce the occurrence of disputes through the participation of the community, government, and democratically involved stakeholders. The co-management model is one of the government's formal strategies in marine management (Voorberg & Van der Veer, 2020).

3.2 Marine Governance for Fishermen's Welfare

a. Development of Human Resources

The development of human resources is a process of changing the human resources who belong to an organization, from one situation to another, which is better to prepare a future responsibility in achieving organizational goals (Werdhiastutie et al, 2020). The development of good human resources can help establish communication, cooperation, consultation, exchange of information, and community control in any marine governance. Improving the quality of human resources, especially in the marine sector, is carried out through education (Rasaili, 2021), training, comparative studies, field practice and research. The development of human resources is the spearhead of empowerment. This empowerment is carried out to create independence, increase business productivity and fishermen's welfare. Of course it can have an impact on increasing family income.

To create the welfare of fishermen, it is necessary to involve state stakeholders to manage the sea. The involvement of state stakeholders in this case is the Institute for Research and Marine Observation (BROL). This center, which is one of the forums for implementing the activities of the Southeast Asia Center for Ocean Research and Monitoring (SEACORM), provided training to 1,300 fishermen in Java, Bali and Lombok. Socialization regarding the application of XL Laut Nusantara in 2018-2019.

Meanwhile, the Archipelago Fisheries Port (PPN) of Pengambengan Regency, Jembrana Regency, aims to improve the welfare of fishermen through several aspects. First, providing skipper training for 6 GT to 30 GT vessels with the aim of fishermen being able to read weather forecast maps and fishing areas. Second, training on how to use environmentally friendly fishing gear especially for small fishermen (bubuh, basic rawe

and millennium gillnet). It is hoped that the results of the training will provide fishermen with fishing gear as well as education regarding the use of fishing gear. Third, the PPN Pengambengan Regency of Jembrana in 2019 provided training for apprenticeship competency certification (competency testing) for fishermen on boats measuring 5 GT as many as 90 small fishermen.

b. Modernization of Capture Technology

The welfare of fishermen is one of the main concerns for fisheries sector policies. In the government's perspective, many fishermen are less prosperous because the catch is very small while the fish in Indonesian seas are still very abundant. One of the factors is the small catch is due to the use of inadequate fishing facilities. The majority of fishermen use simple technology that can only reach coastal areas with limited fish populations (Hamzah et al., 2020). Because the standard of living of fishermen needs to be improved, it is necessary to modernize fishing technology.

One of the modernizations carried out by the fishermen in Pengambengan Village is the use of more sophisticated fleets and fishing gear, such as nets and purse seines with a size of 20-30 GT, car axle, power block, winch and capstan. In an effort to modernize fishing technology, the local government, in this case the Department of Transportation, Maritime Affairs and Fisheries, Jembrana Regency, Bali Province, provides fishing gear assistance grants to fishing groups. Assistance provided to 25 fishing groups in 2019 was in the form of fiber jukung (including machines), multifilament netting and life jackets. This process cannot be separated from the nature of national development which aims to create and shape a complete human being, to create a just and prosperous society, and to promote the welfare of society.

c. Capital Strengthening

Fishing business for small-scale fishermen is considered a speculative or uncertain business. This is what causes the low income of fishermen. The low and uncertain income of fishermen has resulted in banking institutions in general not or less interested in channeling credit to fishermen in the capture fisheries sub-sector. Banking institutions consider that the fishermen are not able to repay loans regularly even at low interest rates.

In addition, fishermen also do not have strong capital for business development. This condition causes fishermen to be unable to increase their production in terms of quantity and quality. So that there is a low level of productivity of income received by fishermen. Fishermen in Pengambengan Village in an effort to strengthen capital through loans in cooperatives. They generally borrow Rp. 5 million at a low interest rate and without any collateral. In addition, the private sector, in this case, is accommodated by PT Fisheries, providing access to soft revolving loan capital assistance to fishermen in Pengambengan Village. Maximum capital assistance is IDR 500 million. To get the revolving loan capital assistance, fishermen in Pengambengan Village must make a proposal. It is hoped that this kind of loan assistance can revive the continuity of the fishermen's work so that they get maximum results that they can be independent, especially during the famine season. That the purpose of fisheries management is to maximize net economic benefits that are mutually beneficial between the community and the government (Pascoe et al., 2017).

d. Integrated Facility Development

The Fish Auction Place (or *Tempat Pelelangan Ikan* (TPI)) in Pengambengan Village is one step in developing integrated facilities that can boost the welfare of fishermen. TPI becomes a meeting place between sellers (fishermen or ship owners) and buyers (traders or

company agents) for fish auction activities. Fish auction is one of the links in fishing business activities. So it needs to be a common concern to manage TPI for the better so that the quality of fish prices becomes quality. TPI also encourages a fair market mechanism by determining the upper and lower limits of fish prices.

The development of the Pengambengan TPI underwent several periods, namely in 1976, 1988, 2000, 2007, 2009 and 2015. The construction of operational facilities for the fishing port began to be carried out in stages until it was able to run until it is in its current state. The facilities and infrastructure available at Pengambengan TPI include; 1) Pengambengan TPI building with an area of 320 m2 which is equipped with facilities for weighing, fish weighing, administrative office and public toilets; 2) Stairs that serve to facilitate fishermen in loading and unloading fish and supplies. The construction of the stairway started from 2007 to 2009 with a length of 60 meters which is located in front of the Pengambengan TPI building. In 2015, the stairway was rebuilt to the south of the Pengmbengan TPI building with a length of ± 20 meters; and 3) TPI warehouse with a building area of 60 m2 which was budgeted by the Jembrana Regency Government in 2009. This building is used to store the operational facilities of Pengambengan TPI such as tables, chairs, scales and so on.

e. Management of Fush Resources

Management of fish resources is an integrated process starting from information gathering, analysis, planning, consultation, decision making, resource allocation and implementation, in order to ensure the continuity of productivity and the achievement of management objectives (Sulaiman, 2010). Management of fish resources in general aims to; 1) Maintaining the sustainability of production through various regulations and corrective actions (enhancement); 2) Improving the economic and social welfare of fishermen and; and 3) Meeting the needs of the industry that utilizes the production (Thaliya et al., 2021).

The government has a very important role in managing fish resources as mandated by the 1945 Constitution article 33 and the Fisheries Law no. 9 of 1985. The essence of the law is to give the government a mandate in managing natural resources, in this case fish resources for the welfare of the people. The involvement of the local government in the management of fish resources in Pengambengan Village is realized in at least three three functions; allocation, distribution, and stabilization.

3.3 The Role of Stakeholders in Marine Governance

a. The Role of the Marine Research and Observation Center

The Marine Research and Observation Center (or *balai riset dan observasi laut* (BROL)) is located in Perancak, Jembrana Regency, Bali. The BROL is a Technical Implementation Unit (UPT) of the Marine and Fisheries Research Agency, Ministry of Marine Affairs and Fisheries which has a mandate to develop strategic research and applications for national marine observations to support the creation of sustainable marine resource management. BROL is also a forum for the activities of the Southeast Asia Center for Ocean Research and Monitoring (SEACORM) in collaboration with national and international research institutions in developing research and observation programs.

The role of BROL is very important for fishermen in Pengambengan Village. To make it easier for fishermen to catch fish and improve fishermen's welfare, BROL collaborates with PT XL Axiata. This collaboration presents an innovation in fishing technology in the form of an Android-based application called Laut Nusantara. The Laut Nusantara application is another derivative of the results of BROL's research products,

which so far have been based on the web. The presence of this application is intended as a driving force for the transformation of fishermen's culture from "finding fish" to "catching fish" through the use of information technology. In this one application, a variety of information is presented in a simple way to help fishermen so that fishing activities can be carried out effectively, efficiently, and safely. Fishermen can plan their fishing activities better, start independently determining the nearest fishing location, estimate fuel requirements, estimate selling prices, while taking into account weather and wave conditions when working at sea.

b. The Role of the Archipelago Fishery Port Pengambengan

The Archipelago Fishery Port (or *Pelabuhan perikanan nusantara* (PPN)) of Pengambengan has a strategic role in the development of marine governance. The Pengmbengan VAT functions well and is a beneficial terminal point between economic activities at sea and economic activities on land. PPN Pengambengan is the largest community fishing activity center in Bali Province and one of the Outerring Fishing Ports that is not only used by fishermen from the island of Bali, but also fishermen from the island of East Java. This status is supported by the existence of a people's industry in the form of salting/drying fish as many as 10 units located in the port area. In addition, outside the port complex there is a fish canning industry and fish meal, which amounts to 14 units.

The activities of Pengambengan PPN play a role in the aspects of production, processing and marketing. Then provide services, supervision, control and monitoring to fishermen in Pengambengan Village who will catch fish. In addition, it also provides guidance to the fishing community. For example, in 2018, to be exact, in June, PPN Pengambengan held training for fishermen, especially skippers with boat sizes of 6-30 GT. This training concerns when fishermen should go to sea, weather forecasts, and how to read a map issued by BROL (Map of Estimated Fishing Areas).

Based on the results of the study, the identification of the implementation of the function of the fishing port as a manifestation of the role of the existence of the Pengambengan PPN is relatively good. The functions of the Pengmbengan VAT are as follows; 1) Fisherman community development center; 2) Fishing boat berths; 3) Landing places for caught fish; 4) A place to facilitate the activities of fishing vessels; 5) Center for marketing and distribution of caught fish; 6) Center for the implementation of quality development of fishery products; 7) Center for fishery counseling and data collection; 8) Center for the implementation of supervision of fish resources.

c. The role of the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency

The Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency establishes a program that has the aim of realizing the welfare of fishermen in Pengambengan Village. The welfare of fishermen is carried out through empowerment efforts. Then the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency provided counseling and guidance to groups of small fishermen operating boats under 10 GT in Pengambengan Village. This training is held annually in September and October. The types of counseling that have been carried out include:

Table 1. Types of Extension for Fishermen in Pengambengan Village

No	Year	Type of Extension	Total
1	2017	Group growth	45 fishing group
2	2017	Group assessment	45 fishing group
3	2017	Group class promotion	45 fishing group
4	2018	IUMK growth and assistance	45 fishing group
5	2017-2021	Facilitate access to capital	45 fishing group
6	2019	Facilitate market access	45 fishing group
7	2019	Access to information and technology	45 fishing group
8	2019	KP regulation socialization	45 fishing group
9	2020	Assistance in applying for assistance	45 fishing group
10	2021	Fisherman card making	45 fishing group
11	2021	Production data	45 fishing group

Source: Data from the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency in 2021)

In addition to counseling and mentoring fishermen, the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency provides assistance to improve the welfare of fishermen in Pengambengan Village. The assistance referred to in the following table:

Table 2. Types of Assistance for Pengambengan Village Fishermen

No	Year	Help Type	Total
1	2017	Yamaha brand NGV engine	327 fisherman
2	2017	Fisherman Insurance	160 jt
3	2017	Jukung	2 groups
4	2018	Death insurance	160 jt
5	2017-2021	Access capital	25 jt/ fisherman
6	2019	Longline	10 group
7	2019	Honda brand NGV engine	224 fishermen
8	2019	Bubu	3 group
9	2020	Multifilament Net	1 group
10	2021	Monofilament Net	4 goup
11	2021	Honda brand NGV engine	165 fisherman

Source: Data from the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency in 2021

The table above describes the role of the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency for small fishermen who operate vessels of less than 10 GT. The next role is to provide assistance, monitoring, and evaluation.

IV. Conclusion

The problem of poor marine governance is not enough with nomative government policies. Marine governance for the welfare of fishermen requires another approach that is non-centralized that legitimizes the system and the strength of the social structure. Marine governance requires a co-management model. A collaborative management model by combining elements of the user community (fishermen groups, fisheries entrepreneurs, and the government, which is believed to be appropriate to lead to sustainable development.

To realize the welfare of fishermen in Pengambengan Village, several important policies were formulated, including the development of human resources, modernization of fishing technology, strengthening of capital, development of integrated facilities, and management of fish resources. Implementation of the policy which aims for the welfare of fishermen with a co-management model, then every stakeholder has an important role. Starting from the Marine Research and Observation Center, the Archipelago Fishery Port (PPN) of Pengambengan, as well as the Department of Transportation, Maritime Affairs and Fisheries of Jembrana Regency, they have their respective roles, but are interrelated and have one goal, namely towards the welfare of fishermen.

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