

# Inclusive blue swimming crab fishery management initiative in Betahwalang Demak, Indonesia

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**Abstract.** There has been a growing interest in the sustainability of the blue swimming crab (*Portunus pelagicus*, BSC) fisheries in Indonesia. The fishery is operated on a small-scale basis and yet it significantly contributes to the Indonesia's fisheries as the third biggest export commodities following tuna and shrimp. The project inclusively (i) brings together coastal and fishing communities, university, the private sector, government at various levels and international agencies, (ii) bottom up approach is integrated with top-down (government policy) approach and (iii) integration of conservation into fisheries management.

This approach resulted in better understanding and participation among the coastal fishing communities on sustainable fisheries and the necessity to perform fisheries management. This led to the establishment of BSC fishery management body (legally support by Village Regulation – No.06/2013 on BSC fishery management in 2013, followed by a District Regulation No.523/0166/2014 on BSC fishery management in 2014. More recently, the Governor of Central Java issued a Governor Regulation No. 33/2017 on Crab and Lobster fisheries management and a Governor Decree No. 523/93/2017 on the establishment of the BSC fisheries management committee in Central Java. Further impacts have been raised awareness in sustainable BSC fishery management in surrounding districts in other provinces, namely East Java and Southeast Sulawesi.

There remains, further needs to strengthen fishery governance by means of integrating national and local government effort in sustaining the fisheries, including the Issuance and effective implementation of the provincial decree on BSC fishery management for Central Java, that will enable the use of province's resource to implement fisheries management and strengthen law enforcement. To help improve the stock, a plan for stock enhancement should also be developed with proper monitoring program and community commitment to avoid "put and take" practices.

**Keywords:** *inclusivity, conservation-fisheries integration, blue swimming crab, village regulation, district regulation*

## 1. Introduction

The blue swimming crab (BSC) occurs in nearly half of the Indonesian marine environment. The biggest landings are made from the north coast of Java and Madura, followed by Lampung and Southeast Sulawesi. The BSC fishery in Indonesia is a small-scale fishery employing gillnets and collapsible trap from less than 10GT fishing boats. The BSC has been the Indonesia's third biggest, most valuable export commodity following tuna and shrimp. US is the largest market to Indonesian BSC, contributing to 40% of the whole US import from all countries in 2013 (NOAA, 2014). It fetches high price, rising from IDR2,000 in 1990 to IDR20,000/kg in 2012 and nearly IDR100,000/kg



in 2014, for whole crab at fishers' level. As a result, BSC resource is currently under heavy fishing pressure. Since 2015 global BSC market was oversupplied, and pushed the price down to an average of IDR35,000. Pre-assessment by the Marine Resources Assessment Group (MRAG) in 2009 showed that there are serious issues in three areas: stock status, ecosystem impacts and fisheries governance in this fishery. Furthermore, BSC is subject to exploitation by environmentally unfriendly fishing methods such as mini-trawl '*arad*' which are small mesh-size bottom seines). Observation shows the occurrence of small sized, immature BSC (<8 cm of carapace width) in fishermen's catches. Catching BSC at the size below first maturity may lead to not only overfishing, but also, more seriously, to 1 depletion of the BSC stock. This practice should therefore be stopped, and the fishery should be managed sustainably. Some effort to trace origin of meat process in the mini plant and processor level in order to comply government regulation on minimum landing size and banned trawl (Madduppa *et al*, 2016).

Since then, there has been a collaborative effort to overcome these issues. As a result, fisheries improvement project (FIP) has been imposed following the assessment. The Marine Stewardship Council (MSC) describes a FIP as: "a deliberate, managed and sustained effort to improve the environmental performance of a fishery towards sustainability. A FIP is often a partnership effort that can involve number of players and interests" (MSC, 2012). SFP further defines FIP for BSC as a series of improvement as shown in Table 1.

Table 1. The improvement tracker for Fisheries Improvement Project (SFP, 2012b).

Stages	Indicators
1 Launch FIP	Sustainability evaluation, best practices guidance or Fisheries Improvement recommendations publicly available
2 Form FIP	FIP members are organized and are evaluating the fishery
3 Encourage improvement	Work plan with annual improvement milestones is publicly available and FIP members are engaging regulators
4 Improve policies/practices	Fishery is achieving annual improvement milestones and fishery policies or fishery practices changed or fishery management system became more precautionary or managers are following scientific advice more closely
5 Improvements in the water	Fish stock biomass increased or fishing mortality has decreased or
6 MSC certification (optional)*	

\*This refers to NFI Crab Council policy focusing on effort to sustainability and leaving the certification as a business decision

An estimated 65,000 fishermen and 13,000 pickers are directly employed in over 400 miniplants and cooking stations throughout the country (APRI, 2017; SFP, 2012a). In addition, several thousands of other people are involved in the fishery, including middlemen, operators of mini-plants (where initial processing takes place) and final exporters (processors) who export the meat products (APRI, 2017; SFP, 2012a).

In an effort to address this issue, in early 2013 an agreement was achieved between the Faculty of Fisheries and Marine Science of the Diponegoro University (UNDIP), US National and Oceanic and Atmospheric Administration (NOAA) Asia Pacific Capacity Building and the NFI Crab Council and Indonesian Blue Swimming Crab Association (APRI) to take the initiative for a collaborative fishery

management pilot program that involves BSC fisher groups as well as other key stakeholders at the local level. Betahwalang was identified as an important village in the north coast of Java, where the fishermen fish exclusively for BSC.

## 2. Approach used

The project applies an inclusivity approach throughout its processes in addressing the above issues, thus enhancing people ownership and responsibility. This means that integration should be applied, that is: (i) conservation is integrated into fisheries management; (ii) bottom up approach is integrated with top-down (government policy) approach. It also implies that in an effort to solve the existing issues, a root cause(s) is/are identified first, before other factor(s). The project brings together coastal and fishing communities, university, the private sector, government at various levels and international agencies. A baseline study on marine affairs and fisheries of Demak was started at UNDIP in the early 1980s. Trust building is the key to the success in community works, and develop partnerships and networks. Therefore it is also applied throughout the process. This approach requires that it start from the people, involving community-based process in the first instance, then introducing sustainable laws and policies, so that bottom-up and top-down approaches are synergized. It also integrates BSC conservation into fishery management by means of establishing BSC conservation zone within the fisheries management area.

In practice, it starts from people, involving community-based process, and introduce sustainable laws and policies.

## 3. Applying inclusivity: some results

The BSC fishery in Betahwalang employs 229 crab traps, 222 gillnets and 82 mini-trawls. There are a total of 743 crab fishers consisting of 447 boat owners and 296 labor fishers. In the fishing community, there are formal village leader as well as informal religious leaders. Initial assessment of the community status and perception of these 743 fishers related to BSC fishery sustainability was carried out in 2013 and revealed the following features (Table 2).

Table 2. Assessment of the community perception (N= 743 fishers) related to BSC fishery sustainability conducted in 2013

Status/Proportion	Yes	No	Do not know	Reason/Challenge
Importance of the BSC fishery for their livelihood?	100%			
Needs for fishery sustainability?	100%			
Fishery needs to be managed?	10%	70%	20%	Belief that crab is given and will be there all the time
Their dependency to crab collectors?	90%		10%	Availability for support
Role of district fishery service	40%	50%	10%	Distribution issue
Whom do you listen for advice: formal leader?	40%	60%		Only for formal purposes

Whom do you listen for advice: informal leader?	90%	10%	Availability for support
Have children at village school?	90%	10%	

In July 2013, when the project started, the understanding and awareness on long term BSC sustainability was lacking, and the fishermen were merely taking short-term economic profit from the BSC resource, without local rules that govern the fisheries. Developing a knowledge base and changing fishermen's attitude were therefore the initial key challenges faced by the project.

The BSC FIP participants think the BSC population is currently overfished. They consider this is a problem and therefore they wanted to work towards sustainability. They chose the FIP concept as a means to do this, because it provided guidelines for achieving a sustainable state.

Awareness raising started with enhancing the understanding and awareness of the community toward a sustainable fishery. This action involved the whole community from children, with designed games, a BSC drawing competition and intervention through school, to fishermen and their families through social and religious events. This approach resulted in increased understanding of the coastal fishing communities on sustainable fisheries and the necessity to perform fisheries management. This led to an agreement to establish a BSC fishery management body (FMB) by the fishing community, locally named "Sustainable BSC Fisheries Management Institute (LP2RL)" in December 2013, which was then legally supported by the Village Regulation *No.06/2013* on BSC fishery management. Eight months later in 2014, the district of Demak issued a District Regulation *No.523/0166/2014* on BSC fishery management. The FMB includes a Scientific Committee (ScC, whose main task is to assess BSC resource and fishery as the basis for fisheries sustainability) and a Stakeholders Committee (StC, whose main task to provide general policy and guidance).

The Diponegoro University (UNDIP) supports such assessment and community guidance. It also provides scholarships in Fisheries Studies to young students of Betahwalang Demak origin, that requires they should return back to their village/district after the completion of their studies, to take the lead in sustainable BSC fishery management. Following people's agreement on sustaining BSC fishery, village government was convinced that a village regulation is required to sustain the fishery. Further impacts has been raised awareness in sustainable BSC fishery management in surrounding districts in three provinces, namely Central Java, East Java and Southeast Sulawesi.

Establishing a BSC conservation area enhances fish and shellfish abundance in the area, in addition to providing natural barrier for the entrance of destructive fishing from outside. These results had been influencing other villages and encourages the whole district to follow the process already undertaken, and has led to the issuance of District (Bupati) Decree of Demak on sustainable BSC fishery management in 22 August 2014, which also included the establishment of a District BSC fishery management team (BSCWG) Two district meetings followed this decree in order to implement it. The first meeting was held on September 19, 2014 in the District Secretary Building, with main objective to prepare the implementation of the Decree, and to coordinate among the BSCWG members. The second meeting was held on September 25, 2014 in Demak District Hall, during which BSC fisheries management in Demak District was formally informed to public. The latter meeting was attended by BSC fishing communities and collectors from two districts (i.e. Demak and Rembang), Demak District officers, APRI, BBPPI, JICA, US-NOAA, UNDIP and press.

To sum up, this project resulted in the following outputs:

- a. Establishment of BSC FMB (legally support by Village Regulation – PERDES or *Peraturan Desa No.06/2013* on BSC fishery management, which is the first FMB established

in Indonesian fisheries), in which BSC conservation is a vital component.

- b. As part of public communication, and in order to ensure that the PERDES is understood by village people, key messages of the PERDES was made available in all mosques in Betahwalang. This was the initiatives of the Village BSC fishery management body (LP2RL);
- c. Increasing awareness and commitment on fisheries sustainability amongst the people from the village to district and an increasing willingness among the fishermen on fishing gear exchange to sustainable fishing gear – “*bubu*” (trap), to be administered through LP2RL;

Three short videos were produced by the involvement of Betahwalang community on BSC conservation education (<https://www.youtube.com/watch?v=SQPU6BU9tio>) and on BSC fishery of Betahwalang (<https://www.youtube.com/watch?v=QjnMIR7kFhs>) and subsequent visit of US Ambassador to Betahwalang (<https://youtu.be/ADFmUi-z20M>).

The BSC project has also been connected to several international events, such as the IOPAC meeting in 2013 where the project finding was presented and received positive attention, and the Marine Stewardship Council (MSC) based in London. Following a presentation on Indonesian BSC fishery in its annual meeting in Madrid in 2013, MSC approved a data-poor-stock-assessment pilot study for BSC fisheries in three Southeast Asian countries including Indonesia. In the same year, MSC also provided a scholarship to a Wageningen University of the Netherlands student, Ms Floor Bokkes, to undertake a socio-economic study on BSC fishery in Betahwalang, under joint-supervision of Dr. Simon R. Bush, Mr. Paul Zwieten (Wageningen) and Dr. Abdul Ghofar (UNDIP).

The inclusivity approach had strengthened community ownership; at the end of 2014 the village of Betahwalang built a gate at the village entrance, named BSC Fishery Management Village (“*Betahwalang Desa Pengelolaan Rajungan*”). Furthermore, a workshop is prepared for sharing the awareness and commitment with all 13 districts in the north coast of Central Java.

#### 4. Impacts

The approach this project developed are now followed nation-wide. In September 2014 UNDIP, in collaboration with US-NOAA held a training workshop on sustainable BSC fishery management. Participants from other north Java coastal districts, notably Semarang, Rembang, Pati, Jepara and Lamongan districts, were also involved in this meeting. There is now a general increase of commitment to sustain the BSC fishery in the three districts. Furthermore, participants are at present also preparing to deliver messages from the workshop to their surrounding communities.

As described above, the fisheries management initiative in Betahwalang village has a multiplying impacts to surrounding villages of Demak, and further move to other districts, including:

- a. District Bupati Decree on sustainable BSC fishery management (see *Surat Keputusan Bupati Demak No.523/0166/2014* on BSC fishery management), which was formally announced to public by the District Secretary during public meeting on September 25, 2015.
- b. Following engagement of four Central Java districts (Demak, Jepara, Pati, Rembang), a series of discussions has been held between UNDIP and the Provincial Marine and Fisheries Office since 2015, on the need of BSC fishery management throughout the province. In August 2017 the Governor Regulation No. 33 of 2017 on the management of crab and lobster was issued in August 2017 followed by a Governor Decree No. 523/93/2017 on the establishment of BSC fisheries management committee in November 2017.
- c. The Diponegoro University (UNDIP), in collaboration with Japan International Cooperation Agency (JICA) also organized overseas trainings for potential candidate from Demak district that can in the long term help sustain and manage their BSC fishery on their return. From September

to December 2014, Mr. Nanang Tasunar of the District Fisheries Office in Demak is participating in JICA training on sustainable fishing techniques in Yokohama, Japan. It is aimed that in the long term Mr. Tasunar and his staff will take the responsibility of sustainably managing the BSC fishery throughout the Demak District. In September 2014 UNDIP, in collaboration with US-NOAA held a training workshop on sustainable BSC fishery management. Participants from other districts, notably Rembang and Semarang, were also involved in this meeting. There is now a general increase of commitment to sustain the BSC fishery in the three districts. Furthermore, participants are at present also preparing to deliver messages from the workshop to their surrounding communities. The village of Betahwalang has built a gate at the village entrance, named BSC fishery management village (“Betahwalang Desa Pengelolaan Rajungan”). The district provided a budget for sustainable BSC fisheries management, starting from 2015.

- d. Furthermore, in November 12, 2014, UNDIP received a verbal request from the provinces Southeast Sulawesi, so that the province may learn from fisheries management model of Betahwalang Demak for their further adaptive implementation. In 2017 the Governor Decree of Southeast Sulawesi on sustainable BSC fisheries management was also issued.

These outcomes and impacts are summarized in Figure 1.

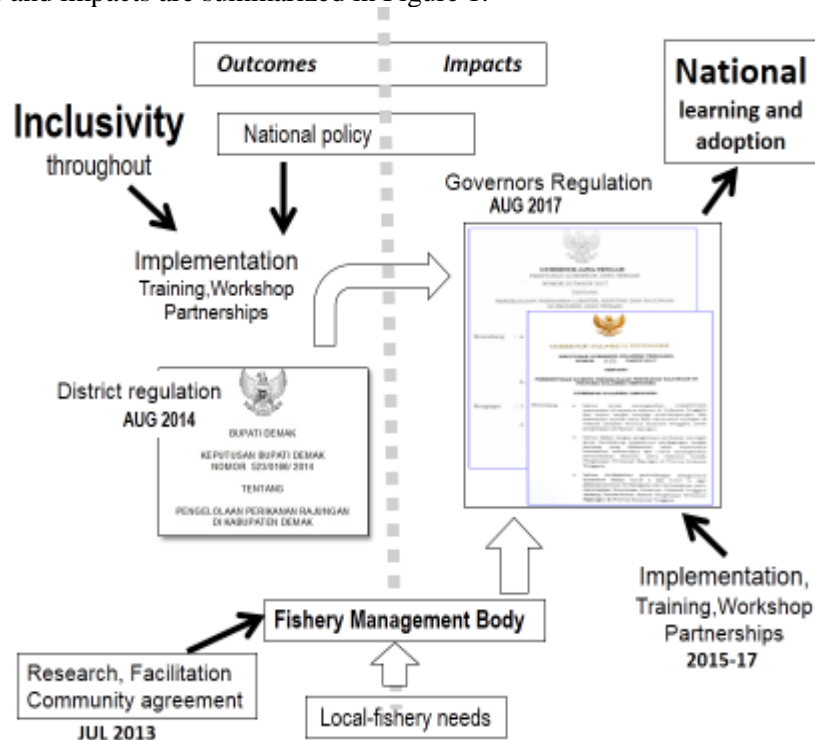


Figure 1. A summary chart showing the inclusivity approach, activities, outcomes and impacts of the BSC fishery development in Betahwalang Demak from 2013-2017

There are challenges toward sustainable BSC fishery management in the study area that may apply for the whole country, including:

- a. Effective law enforcement. Ministerial Decrees No.01/2015 on banning the use of trawl and seine, and No. 02/2015 and No. 56/2016 on minimum size of captured BSC, mangrove crab and lobster were issued in 2015 but have not been effective, due to lack of law enforcement. In late 2014, interviews were carried out to fishers in Betahwalang (Bokkes, 2014), revealing that the regulations, has not been fully implemented until January 2015, which makes it still a quasi-

an open-access system and at risk of overexploitation, following Hardin's argumentation about the tragedy of the commons (Hardin, 1968; Feeny *et al.*, 1990). On the one hand the nature of the resource is such that it is difficult to exclude people from using it and therefore it can be commonly accessed. On the other hand, one person or actor group using the resource will always have a negative effect on another actor's ability to exploit the resource (Feeny *et al.*, 1990). The BSC FIP participants think the BSC population is being overfished at the moment. They consider this a problem and therefore they wanted to work towards sustainability. They chose the FIP concept as a means to do this, because it provided guidelines for achieving a sustainable state.

- b. More recently in March 2016, several interviews with BSC fishers in the north coast of Java clearly indicate this. More depressingly is the fact, that fishers who has been engaged in sustainable practice by obeying the rules until the end of 2015, accidentally follow those who break the rules in favour of more immediate income. The respond such as "we do obey as rules say, but why are others allowed to break them?" is quite common.
- c. More coordinated partnership. There has been an increasing interests in BSC fisheries as indicated by international as well as in-country's partnership. Lessons learnt from Betahwalang strongly suggests that such involvement can cause overexposure to outsiders, which may further lead to unnecessary confusion, apatism and dependence to outside support (Ghofar *et al.*, 2008).
- d. As in many part of the developing world, stock enhancement is not usually followed by sufficient monitoring program. To help improve the stock, a plan for BSC stock enhancement is also developed, from already stalled BSC conservation area, with proper monitoring program and community engagement to avoid "put and take" practices. With that, distribution and dispersal of young BSC may be traced and analysed for fishery management purpose.
- e. Synchronizing the Fisheries Law: In Article 1, fisheries is defined as a comprehensive business sector including fish (including BSC) resources, aquaculture, post harvest part, trade, markets and social factors. However, fisheries management as defined in Article 7 tends to limit the fisheries to merely fish resources. Fisheries management, and FIP, should therefore be put in a broader fisheries context that connects to business sector reality.

### [1] Conclusion and way forward

Implementing inclusivity in BSC fishery management in Betahwalang provides positive impacts in enhancing participation and commitment among the fishing community and fisheries stakeholders, both locally in the study area and extended areas including other villages, districts and provinces. Apart from the local and central government of Indonesia, there are international agencies, which have been involved later, including US National Oceanic and Atmospheric Administration (NOAA), National Fisheries Institute's (NFI) Crab Council, Sustainable Fisheries Partnership (SFP), Environmental Defense Fund (EDF) and Japan International Cooperation Agency (JICA).

The issuance of Ministerial Decree on BSC minimum size limit of 10 cm carapace length and non-berried females has not been effectively enforced locally, due mainly to the absence of provincial regulation that provide the basis for support for such enforcement and resource for implementing the fisheries management.

Implementation of inclusive fisheries management is relatively recent to give impacts to the improvement of the BSC stocks. The following approach is suggested for further improvement:

- Reconcile legal definition of fisheries. Indonesia's Fisheries Law defines fisheries as "all activities relating to the cultivation and utilization of fish resources and the environment thereof, starting from pre-production, production, cultivation, up to marketing, implemented in a system of fishery business" (Article 1:1), whereas fisheries management as focusing more on biological fish resources (Article 1:7).

- Further develop in-country partnership to make sure that this project will be financially sustainable in the long run. This includes further engaging government at all levels as above mentioned. The District of Demak had provided a budget for the implementation of sustainable BSC fishery management, followed by an interest to follow the BSC sustainability program by some Districts of Rembang, Jepara, Pati of Central Java Province and Lamongan of the East Java Province. The involvement of the government is vital, as they are the authority which by law is responsible to sustain the fisheries.
- Further develop an integrated partnership with international agencies and NGOs which are concerned about marine and fisheries sustainability. Discussion on an international training-workshop is ongoing between JICA, US-NOAA, SFP and UNDIP to further advance sustainable BSC fishery management which also involved BSC fishery stakeholders working in Demak. Particular attention is given on avoiding overlaps in partners programs, which in turn can damage community's participation already built. Fatigue and confusion among the community members usually are the intermediate indicators to such avoidable consequence.
- Existing partnership should also support the plan for BSC stock enhancement following the already stalled BSC conservation area, with proper monitoring program and community engagement to avoid "put and take" practices. With that, distribution and dispersal of young BSC may be traced and analysed for fishery management purpose.

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### References

- [1] APRI 2017. Asosiasi Pengelolaan Rajungan Indonesia Fisheries Improvement Project (FIP). website: [www.apri.or.id](http://www.apri.or.id)
- [2] Bokkes F 2013. MSc Thesis on BSC fishery of Bethahwalang (Wageningen University, The Netherlands), visit <http://edepot.wur.nl/292820>
- [3] Feeny D, Berkes F, McCay B J, Acheson J M 1990. The Tragedy of the Commons: Twenty-Two Years Later. *Human Ecology* 18, (1): 1-19.
- [4] Ghofar, A, Schorr D K and Halim A 2008. Selected Indonesian Fisheries Subsidies: Quantitative and Qualitative Assessment of policy coherence and effectiveness. The Nature Conservancy. 89p.
- [5] Hardin G 1968. The Tragedy of the Commons. *Science* 162: 1243-1248.
- [6] MSC 2011. Kroger, Costco, Supervalu and Walmart include MSC in seafood sustainability commitments (<http://www.msc.org/newsroom/news/kroger-costco-supervalu-and-walmart-include-msc-in-seafood-sustainability-commitments>. Last update: May 12, 2011. Date of access: 19 September 2013).
- [7] MSC 2012. Next Steps / Project Plan – Fisheries in Transition and MSC's Strategic Plan. April 1, 2012.
- [8] Madduppa H, Zairion, Nuraini S, Nugroho K, Nugraha B 2016. Setting Up Traceability Tools for the Indonesian Blue Swimming Crab Fishery: A Case Study in Southeast Sulawesi. *Fisheries and Aquaculture in the Modern World*, 09/2016; , ISBN: 978-953-51-2686-7, DOI:10.5772/64252
- [9] NOAA 2014. Ecosystem approach to managing blue swimming crab in Indonesia: developing a fisheries management framework. 26p.
- [10] Pauly D, Watson R, Alder J 2005. Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society B* 360: 5-12.

- [11] SFP 2011. Sustainable Fisheries Partnership Discussion Paper SE Asia Blue Swimming Crab Minimum Size Implementation plan. Date of access: 30 October 2012.
- [12] SFP 2012a. [Online on] <http://www.sustainablefish.org/fisheries-improvement/crabs/indonesian-blue-swimming-crab>. Last update: December 2012. Date of access: 16 January 2013.
- [13] SFP 2012b. Fishery Improvement Projects. <http://www.sustainablefish.org/fisheries-improvement>. Last update: January 2012.
- [14] SFP 2013. About SFP. <http://www.sustainablefish.org/about-us>. Last update: 2013.