

# Fisheries Industrialisation and Blue Economy Policies in Indonesia: Impacts on Tuna Fisheries in Cilacap and Seaweed Farmers in Nusa Penida

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# **Fisheries Industrialisation and Blue Economy Policies in Indonesia: Impacts on Tuna Fisheries in Cilacap and Seaweed Farmers in Nusa Penida**

**Saiful Marbun**

A thesis in fulfilment of the requirements for the degree of  
Master of Philosophy



School of Physical, Environmental and Mathematical Sciences  
The University of New South Wales  
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Canberra, ACT, 2600, Australia

November 2016



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## **Abstract**

Successive Indonesian governments have expressed their commitment to increasing food security with a major focus on increased exploitation of marine resources. In 2011, the then Indonesian Minister for Marine Affairs and Fisheries (MMAF), Syarif Cicip Sutardjo, announced plans to boost fisheries industrialisation efforts through a new policy aimed at increasing Indonesia's fisheries production in aquaculture, capture fisheries and fish processing. The government highlighted its intention to use industrialisation to improve the welfare of its poorest people, many of whom reside in coastal areas and depend on fisheries for their livelihoods. However, the policy announcement came just one year after the government's own scientific bodies (the National Committee for Fish Stock Assessment) publically acknowledged mounting evidence that the nation's waters were overfished. In order to counter the potentially negative impacts of fisheries industrialisation, the government announced plans to use the emerging concept of a Blue Economy in 2012, with its focus on value-added industries and sustainability, to balance industrialisation efforts.

However, while reports on the policies from government and media are abundant and available, they primarily focus on catch increases. Reports investigating the impacts of these policy changes on the poorest workers and communities are limited.

This research investigates the impacts of the implementation of marine and fisheries industrialisation policy and Blue Economy concepts on fishers, fish processors and seaweed farmers in Cilacap and Nusa Penida – occupational groups and locations that were explicitly targeted by government for piloting the new policies. Detailed interviews were analysed to report the socio-economic conditions and personal perspectives of tuna fishers, fish processors and seaweed farmers three years after policy introduction. The workers' knowledge of the policies, their experience and their aspirations for the future were explored using face-to-face interviews in late 2014. Findings indicate the policies have not successfully reached many of these workers and a number of performance indicators relating to their socio-economic circumstances have not yet been achieved.

Emerging from this research with frontline workers are recommendations, identified opportunities and threats from current experience. These issues have significant implications for improving the experience and performance of blue economy policies in Indonesia and elsewhere.

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## Acronyms

AC	Academics
AFD	French Development Agency
ASEAN	Association of Southeast Asian Nations
BBM	<i>Bahan Bakar Minyak</i> (petrol)
BKIPM	<i>Badan Karantina Ikan dan Pengendalian Mutu</i> (Fish Quarantine and Inspection Agency)
BPS	<i>Badan Pusat Statistik</i> (Statistics Indonesia)
Bulog	<i>Badan Urusan Logistik</i> (the bureau of logistics)
CCSBT	The Commission for the Conservation of Southern Bluefin Tuna
CPUE	Catch Per-Unit Effort
CTI-CFF	Coral Triangle Initiative on Coral Reefs Fisheries and Food Security
CTC	Coral Triangle Center
DEKIN	<i>Dewan Kelautan Indonesia</i> (Indonesian Maritime Council)
DKP	<i>Dinas Kelautan dan Perikanan</i> (Local Fisheries Office)
EEZ	The exclusive economic zone
EU	European Union
FAD	Fish Aggregating Devices
FAO	Food and Agriculture Organisation of the United Nations
FPM	Fish Processor Manager
FPO	Fish Processor Owner
FPOff	Fish Processor Officer
FPW	Fish Processor Worker
GDP	Gross Domestic Product
HACCP	Hazard Analysis and Critical Control Points
HNSI	<i>Himpunan Nelayan Seluruh Indonesia</i> (Indonesian Fishers Association)
ID	Identification
IDR	Indonesian Rupiah
IPAL	<i>Instalasi Pengolahan Air Limbah</i> (wastewater treatment plant)
INDESO	The Infrastructure Development of Space Oceanography
IOTC	The Indian Ocean Tuna Commission
IUCN	International Union for Conservation of Nature

IUU	Illegal, Unreported and Unregulated (fishing)
KUD	<i>Koperasi Unit Desa</i> (Rural Cooperatives)
LIPI	<i>Lembaga Ilmu Pengetahuan Indonesia</i> (Indonesian Institute of Science)
MMAF	Ministry of Marine Affairs and Fisheries of Republic of Indonesia
MoU	Memorandum of Understanding
MPA	Marine Protected Area
OECD	Organisation for Economic Co-operation and Development
PDPT	Strong Coastal Village Development
Pertamina	<i>Perusahaan Pertambangan Minyak dan Gas Bumi Negara</i> (Indonesia State Oil and Natural Gas Mining Company)
PKN	Fishers Livelihood Improvement Program
PLTU	<i>Pembangkit Listrik Tenaga Uap</i> (Steam-electric power station)
PNPM	National Program for Community Empowerment
PPSC	<i>Pelabuhan Perikanan Samudera Cilacap</i> (Cilacap Ocean Fishing Port)
PUGAR	Salt Business Empowerment
PUMP	Development of Village Marine Related Business
n.d.	No Data
NGO	Non-Government Organisation
NTN	<i>Nilai Tukar Nelayan</i> (Terms of Trade)
RFMO	Regional Fisheries Management Organisation
SBT	Southern Bluefin Tuna
SF	Seaweed Farmer
TBO	Tuna Boat Owner
TF	Tuna Fisher (crew)
TFC	Tuna Fisher Captain
TFE	Tuna Fisher Engineer
TKI	<i>Tenaga Kerja Indonesia</i> (Indonesian migrant workers)
TNC	The Nature Conservancy
TTC	<i>Tuna Tongkol Cakalang</i> (tuna and tuna-like species)
UN	United Nations
USA	United States of America
USAID	The United States Agency for International Development

VMS	Vessel Monitoring System
WCPFC	The Western and Central Pacific Fisheries Commission
WPP	Wilayah Pengelolaan Perikanan (Fisheries Resources Management Area)
WWF	World Wildlife Fund





## **Chapter 1 Introduction**

Demand for fish and marine products has skyrocketed globally over the last 60 years because of growing populations and increasing middle classes in many developing nations. To capitalise on this, and recognising its maritime geography and roots, the newly appointed Indonesian Minister of Marine Affairs and Fisheries, Sharif Cicip Suharto, re-announced plans in late 2011 to implement fisheries industrialisation across the archipelago. The government highlighted its intention to use industrialisation of its fisheries industry to improve the welfare of its poorest people, many of whom reside in coastal areas and depend on fisheries for their livelihoods. However, while research and government reports globally and in Indonesia have demonstrated substantial economic gains and considerable increases in production and profit as a result of fisheries industrialisation, this has not resulted in significantly increased wealth or economic gains for marginalised communities. In many cases, the industrialisation of the industry has actually had significant negative social impacts on small-scale fishers and coastal communities, for example in Zambia and Ghana (Halpern et al. 2008; Kent 1986; Overå 2011).

The government's plans for industrialisation came just a year after its own scientific bodies publically acknowledged mounting evidence that the nation's waters were vastly overfished, as the result of both legal and illegal, unreported and unregulated (IUU) fishing. As a result, the government announced plans to counter potentially negative impacts of fisheries industrialisation with the adoption of the then emerging concept of a Blue Economy. It claimed that the Blue Economy would complement industrialisation, as it emphasises the utilisation of resources for the benefit of nations and their people, while also establishing guidelines for the sustainable use of these resources.

At the outset, the government signed a Memorandum of Understanding (MoU) with one of Blue Economy's key global proponents, Gunter Pauli, to implement his concept in a pilot project based in Nusa Penida, Bali, Indonesia. They defined its Blue Economy as "the development of a marine economy using the Blue Economy model to achieve the goal of Indonesia as an archipelago nation to be self-sufficient, developed, strong, and in its national interests" (DEKIN 2012, p. 44). The government announced plans to implement the Blue Economy across the fisheries sector, including in tuna fisheries.

However, little has been reported regarding the implementation of this policy and its impact at the local level – a gap this research will attempt to fill. This research aims to:

1. Showcase the Indonesian experience in implementing Blue Economy policy.
2. Investigate the impacts of marine and fisheries industrialisation and Blue Economy policies on local communities, particularly small-scale tuna fishermen and tuna fish processors in Cilacap, Central Java; as well as seaweed farmers in Nusa Penida. Both having been identified by MMAF as exemplary sites and industries for the implementation of these policies.
3. Examine opportunities for the maximisation of benefits from the policies' implementation and mitigation or minimisation of any potential negative impacts, where identified.

The objectives of this research are to:

1. Contribute to an increased understanding of the impacts of marine and fisheries industrialisation policy with Blue Economy concepts and raise international awareness of issues relating to the impacts of the implementation of Blue Economy concepts in Indonesia.
2. Assist in promoting cooperation in implementation of Blue Economy concepts internationally, and in particular the sharing of knowledge between Australia and Indonesia in implementing fisheries policies, particularly related to sustainability, in order to enhance both countries' current and future fisheries industries.

This research will begin by examining existing literature relating to fisheries industrialisation and the Blue Economy, globally and in Indonesia. Documents included regulations, reports and statistics; and specific targets set by the Indonesian Government with regard to its own fisheries industrialisation and Blue Economy policies will then be analysed and key indicators identified and discussed. The research methodology, including site selection (Cilacap and Nusa Penida), data collection and sampling methods for tuna fishers and processors, and seaweed farmers are set out in chapter four. In the results chapter, the respondents' responses will be reported against the indicators developed during the policy analysis. The discussion chapter will further examine the results and situate them within the literature where relevant. Potential problems and opportunities will also be discussed. The research will conclude with a summary and synthesis of key recommendations for the enhancement of the policies' implementation.

## **Chapter 2 Literature Review**

### **2.1 Introduction**

The literature provides a framework for the analysis of fisheries policy, given the context of Indonesia's history, governance and current social economic conditions. Indonesia's fisheries can be seen in the context of global fisheries, ongoing fishery industrialisation and the emergence of the Blue Economy as a possible solution to problems and a source of opportunities. Specific locations identified for policy implementation and as research sites are also described.

### **2.2 Global Fisheries Industrialisation**

The fisheries industry is a global economic force, employing an estimated 58.3 million people in 2012 (FAO 2014b). Fisheries industrialisation is a dynamic and longstanding practice, taking place over hundreds of years through deliberate processes, actions and responses. Kent (1986) defines fisheries industrialisation as fisheries activities involving corporations, mass production, large capital investment, using developed fishing technology, market orientated and having clear specialised employment roles.

Fisheries industrialisation has been reported as far back as the late 16<sup>th</sup> century in Europe, when the Dutch increased whale and herring fishing and processors found a ready market in urbanising Europe. Herring busses and driftnets were introduced in the North Sea; investment increased and new techniques in shipbuilding and herring curing were developed (Smith 1999; Smith 2000). Additionally, the expansion of European fisheries following maritime exploration that result from advances in ship technology (Smith 1999). In the late 1800s, larger ships powered by fossil fuels became common (Pauly 2009).

After World War II additional technology and industrial capacity enabled fishing efforts to increase enormously driven by capital both from government and private investment (Smith 2000). Fishing capacity (size and number of boats), vessel usage (time spent at sea), and other input factors of fishing effort (FAO 2002; Council of the European Union 2007), including fishing technology, increased (Smith 2000), as did output factors, such as the value and number of fish caught and landed, generating higher profit (Pauly 2009; FAO 2002).

According to the Food and Agriculture Organisation (FAO 2014b), global fish production has grown steadily since 1950 (see Figure 2.1), reaching 158 million tonnes by 2012. Production is projected to grow further to reach 181 million tonnes by 2022, with wild caught fish expected to contribute 96 million tonnes, and aquaculture 85.1 million tonnes.

A growing global population, numbering 7.1 billion in 2012, and projected to climb further to 7.8 billion in 2022, has directly contributed to the increasing demand for fish (United States Census Bureau 2013; FAO 2014b). This has been particularly felt with the expansion of middle income populations in developing countries such as China, Indonesia and India (FAO 2014b). Increasing market demand for fish has prompted nations to increase efforts to maximise fisheries activities in order to boost revenue income and feed their own populace.

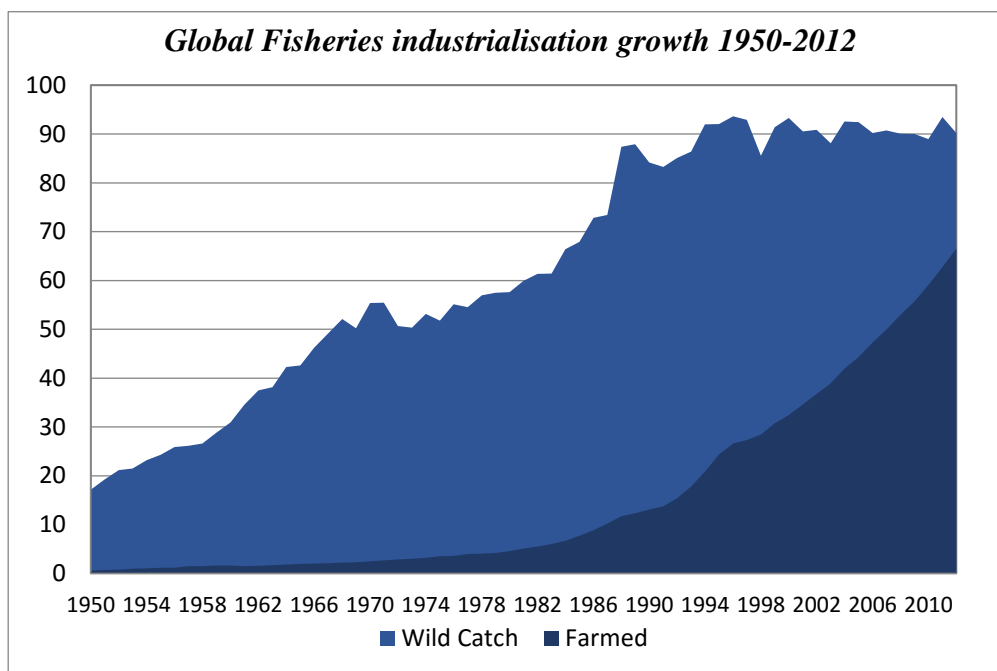


Figure 2.1 World Fish Production in Million Tonnes, 1950-2012 (EPI 2013)

Fisheries intensification and its impacts on local fish stocks, triggered expansion of Japanese and European countries' fishing activities to the deep-waters of the south, including Africa and Asia (Pauly 2009). Sumaila and Vasconcellos (2000) named these phenomena the "distant waters fleet" (DWF). Between 1970-1990, Namibia and other Western African countries were promised national economic growth, increased national income from tax and increased employment from new joint venture businesses in fisheries

from foreign businesses (Alder and Sumaila 2004; Pauly 2009). These activities increased the fish catch in Western African waters (Alder and Sumaila 2004). Fishing expansion by European and Japanese business cooperating with national governments and using joint ventures introduced new fishing techniques to additional developing countries such as Indonesia, Malaysia, and the Philippines (Alder and Sumaila 2004; Pauly et al. 2003).

Currently, Asian countries including Indonesia have increasing numbers of people involved in fishing activities. This is in contrast to the decrease in employment in capture fishing in developed countries including Japan, European countries and North America. The majority of these economies have applied regulations to protect or restore fish stocks by reducing fleets and numbers of fishers and replacing them with more efficient vessels requiring fewer human resources (FAO 2014b). While the deliberate industrialisation of fisheries is still occurring worldwide, production has plateaued caused by the depletion of global fish stocks (Pauly et al. 2005). This has led to an increased focus on the intensification of fish farming and aquaculture globally (Naylor et al. 2000).

### **2.3 Indonesian Fisheries Industrialisation**

Indonesia's fisheries industry is one of the largest in the world (see Figure 2.2). The fisheries sector is one of the most important in Indonesia's economy, employing approximately 3.8 million full-time and part-time fishers, both inland and ocean; 1.7 million full-time and part-time fish farmers; 1.4 million full-time and part-time processing labourers; and 4.9 million full-time and part-time market labourers (MMAF 2013c). According to MMAF (2013c, 2013f), Indonesia's fisheries production, including wild caught and farmed fish, amounted to approximately 11 million tonnes in 2013, or a total value of AU\$ 11 billion. The sector contributed 3.17% to Indonesia's Gross Domestic Product (GDP), and 21% of the national agriculture GDP (eclipsing forestry (4%), poultry (12%) and plantation industries (13%). The annual growth of this sector, at 6.5%, was higher than the national annual growth of 6.3% in 2013. In the same year, fisheries exports exceeded 0.8 million tonnes, worth AU\$ 2.7 billion. In 2014, according to MMAF (2014e), the marine capture fishing sector produced about 5.8 million tonnes or a total value of approximately AU\$10 billion.

The largest fisheries export commodities by weight were: prawns (11.15%) and tuna, bonito and skipjack tuna (15.41%). The primary export destinations were China

(25%), Japan (8%), the United States (11%) and the European Union (6%) (MMAF 2013c).

2012 Ranking	Country	Continent	2003	2011	2012	Variation	
						2003–2012	2011–2012
			(Tonnes)			(Percentage)	
1	China	Asia	12 212 188	13 536 409	13 869 604	13.6	2.4
2	Indonesia	Asia	4 275 115	5 332 862	5 420 247	27.0	1.7
3	United States of America	Americas	4 912 627	5 131 087	5 107 559	4.0	–0.5
4	Peru	Americas	6 053 120	8 211 716	4 807 923	–20.6	–41.5
5	Russian Federation	Asia/ Europe	3 090 798	4 005 737	4 068 850	31.6	1.6
6	Japan	Asia	4 626 904	3 741 222	3 611 384	–21.9	–3.5
7	India	Asia	2 954 796	3 250 099	3 402 405	15.1	4.7
8	Chile	Americas	3 612 048	3 063 467	2 572 881	–28.8	–16.0
9	Viet Nam	Asia	1 647 133	2 308 200	2 418 700	46.8	4.8
10	Myanmar	Asia	1 053 720	2 169 820	2 332 790	121.4	7.5
11	Norway	Europe	2 548 353	2 281 856	2 149 802	–15.6	–5.8
12	Philippines	Asia	2 033 325	2 171 327	2 127 046	4.6	–2.0
13	Republic of Korea	Asia	1 649 061	1 737 870	1 660 165	0.7	–4.5
14	Thailand	Asia	2 651 223	1 610 418	1 612 073	–39.2	0.1
15	Malaysia	Asia	1 283 256	1 373 105	1 472 239	14.7	7.2
16	Mexico	Americas	1 257 699	1 452 970	1 467 790	16.7	1.0
17	Iceland	Europe	1 986 314	1 138 274	1 449 452	–27.0	27.3
18	Morocco	Africa	916 988	949 881	1 158 474	26.3	22.0
Total 18 major countries			58 764 668	63 466 320	60 709 384	3.3	–4.3
World total			79 674 875	82 609 926	79 705 910	0.0	–3.5
Share 18 major countries (percentage)			73.8	76.8	76.2		

Figure 2.2 Marine capture fisheries: major producer countries (FAO 2014b, p. 10)

Indonesia has been industrialising its capture fishing (see Figure 2.3) since the late 1800s, both under Dutch and Japanese imperialisms, then during its independence (Butcher 2004). Industrialisation of tuna fisheries in Indonesia was initiated by Japanese tuna fishers in 1910 who introduced long line, pole and line, and later purse seine boats into Indonesia (Morgan and Staples 2006). Motorised fishing boats were introduced into the Java Sea by the Dutch government in 1911.

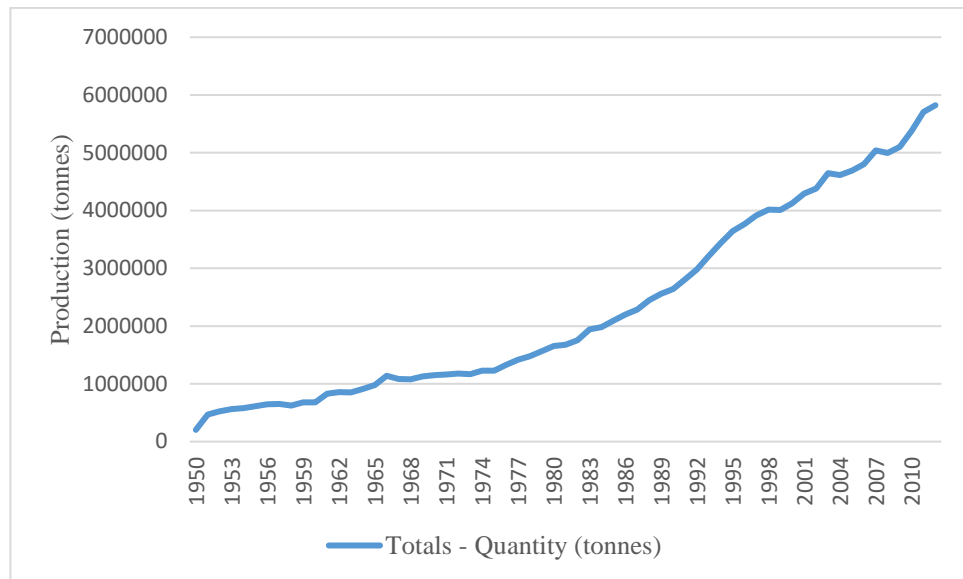


Figure 2.3 Indonesia Total Capture Fish Production

Source: FISAT (accessed 12 February 2014)

Under early Indonesian governments, fisheries industrialisation was intensified by expanding trawl fishing technology brought by Chinese fishers who were offered government incentives in 1966 in Bagan Siapi-Api on the Malacca Straits, Sumatra. The expansion of trawler use by Japanese fishing companies in Indonesia was to export shrimp back to Japan. The Indonesian government required a joint venture between Japanese finance and local companies who provided labor and connections. Initial activities in the Malacca Straits spread to the north coast of Java and other Indonesian waters, with the Indonesian Government encouraging boat owners and offering financial incentives to transition to purse seine boats around 1966. This was enthusiastically taken up by many boat owners. Purse seines were particularly popular for the targeting of high value pelagic fish, including tuna. Adoption of purse seine accelerated the development of tuna canneries and ports in Indonesia. Cold storage industries also developed rapidly at this time to support the expansion of fisheries exports (Butcher 2004; Bailey 1997; Morgan and Staples 2006).

Bailey (1988a) argues that Indonesian fisheries policy has been influenced since the 1980s by the Asian Development Bank, the World Bank, the Japanese government, the United States Agency for International Development (USAID) and the German Technical Assistance Agency (GTZ). According to Bailey, these agencies' aim has been to increase the productivity of Indonesian fisheries both from capture fishing and aquaculture (Kusumastanto 1996; Floyd 1985). Kasri (2008)'s research on Pesisir

Selatan, reported similar findings regarding the involvement of multilateral agencies, media and NGOs in fisheries programs and modernisation of the industry.

Earlier legislation regarding industrialisation efforts included Law No. 5/1984, Presidential Regulation No. 28/2008. MMAF reported that between 2010-2013, it spent about AU\$2.8 billion on fisheries programs including supporting the fisheries industrialisation policy (MMAF 2013e). In an effort to further boost fisheries industrialisation and state revenue, the newly appointed Minister of Marine Affairs and Fisheries (MMAF), Syarif Cicip Sutardjo, announced his fisheries industrialisation policy in 2011 and in 2012 issued two ministerial regulations (Ministerial Regulation No. 27/2012) in 2012, establishing a set of general guidelines for further marine and fisheries industrialisation; in 2013 establishing a marine and fisheries industrialisation road map, which included expanded capture fishing, fish processing and aquaculture (Ministerial Decree No. 7/2013).

The Ministry defined fisheries industrialisation as: “an integrated production system from upstream to downstream to increase production quality, productivity, competitiveness, and value add to marine and fisheries resources in a sustainable way”. The new strategies supported participation in the ASEAN Economic Community, nurtured free trade agreements (proposed for 2015) and garnered support from other government agencies including the Ministry of Public Works, the Ministry of Agrarian and National Land Agency, the State Electricity Company and local governments, as well as the banking industry and universities (MMAF 2013b). The main policy instruments (tools of chosen to achieve the policy objectives) were a mixture of market based approaches; research and development; and education and training; with the shared aim of increasing fisheries production and quality (MMAF 2013b).

The two central commodities that became the focus of MMAF policies are tuna and tuna-like species and seaweed, while other products to be involved include shrimp, milk fish (*Chanos chanos*), salt fish, shark-catfish (*Pangasius* sp.) and salt as stated in Ministerial Regulation No. 27/ 2012 and Ministerial Decree No. 7/2013. The large-scale ocean fishing port of Cilacap was nominated as one of the key implementation sites for the industrialisation of tuna and tuna-like species (Cabinet Secretariat of Republic of Indonesia 2014), while Nusa Penida was identified as the primary site for the industrialisation of seaweed production.



### 2.3.1 Tuna Capture Fishing

Tuna resources have a significant value in the global fisheries trade particularly for export to developed countries including Japan, USA and the EU (FAO 2014d). The industrialisation of the tuna canning industry began in the 1940s to support this export industry (FAO 2014c). The global production of tuna has increased massively from 0.6 million tonnes in 1950 to 7 million tonnes in 2012 (FAO 2014b).

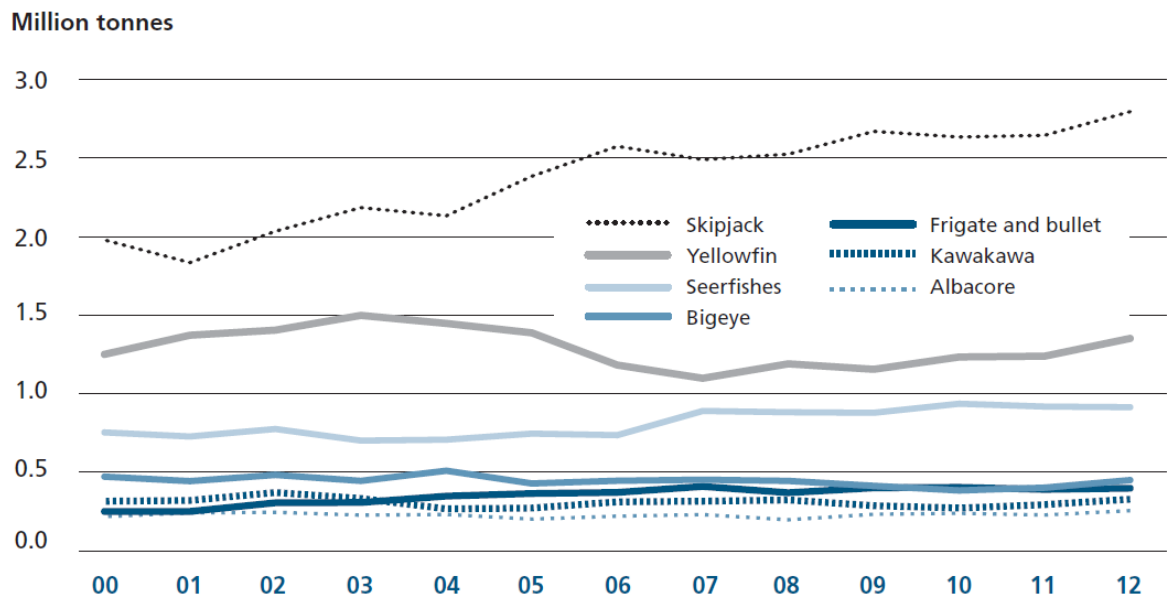


Figure 2.4 Trends in global major tuna species catch (FAO 2014b, p. 17)

This highly migratory fish resource consists of tuna (skipjack, yellow-fin, big-eye, and blue-fin), and tuna-like species such as bonito (FAO 2014d). The trend of each species capture has been increasing globally over the years (see Figure 2.4). Indonesia and Australia share southern bluefin tuna (SBT) resources in waters between these two countries in the northeast Indian Ocean, which is also the spawning ground for SBT (Proctor et al. 2003).

Skipjack and yellow-fin tuna are popular for canned products, while blue-fin (which is overfished globally) and big-eye are popular for sushi and sashimi (FAO 2014d). These fish species are caught primarily by purse seines, long-lines and pole and line methods. Floating shade platforms, called fish aggregating devices (FAD), are commonly used to enhance the catch.

Globally, Indonesia is one of the biggest tuna producers in the world (see Figure 2.5).

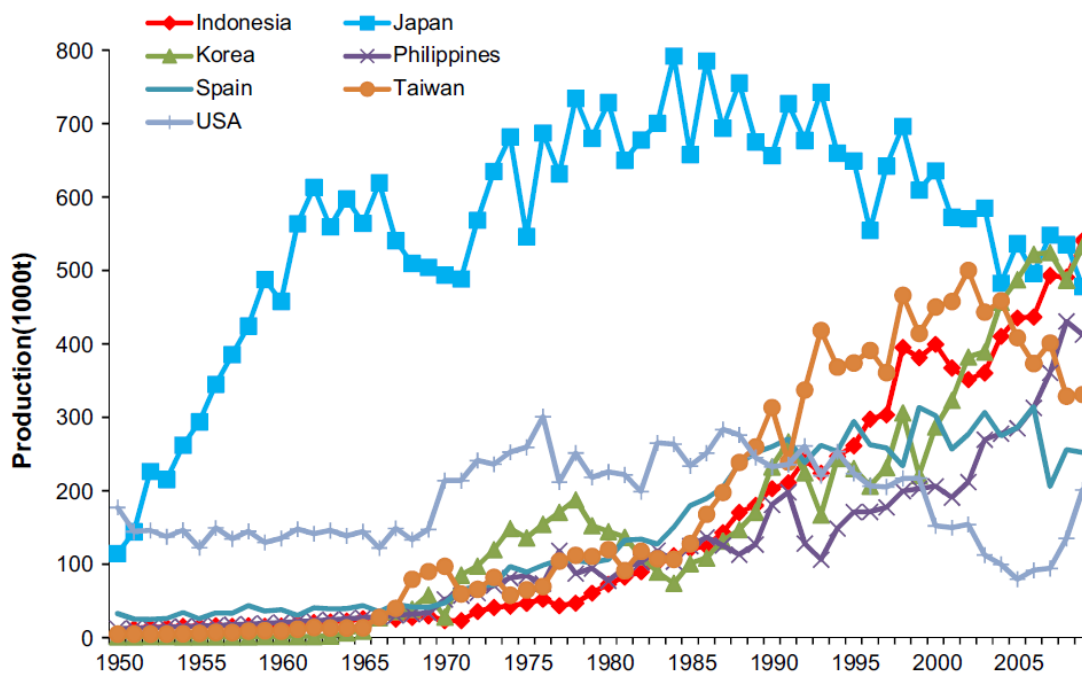


Figure 2.5 Tuna Production of Major Tuna Fishing Countries from 1950-2009 (Sunoko and Huang 2014, p. 2)

The tuna industry is the second most important fishery sector in Indonesia (after the shrimp industry), contributing AU\$580 million in 2013 to Indonesia's national income from exports (MMAF 2013c). By the second quarter of 2014, Indonesia had produced approximately 310,560 tonnes of big tuna, 484,610 skip jack tuna and 454,180 tonnes of bonito (see Figure 2.6). The Indian Ocean, including South Java, South Nusa Tenggara, Sawu Sea and the North West Sea, has the largest tuna resource potential in Indonesia (Hutagalung 2013).

In Indonesia, the tuna fisheries sector is divided into two parts: firstly, traditional/artisanal fishing that employs trolling gear, small purse seine, gillnets and Danish seine; and secondly, modern/industrial tuna fisheries that employs purse seine, trolling, long line and pole-and-line methods (Uktolseja 1996; Morgan and Staples 2006).

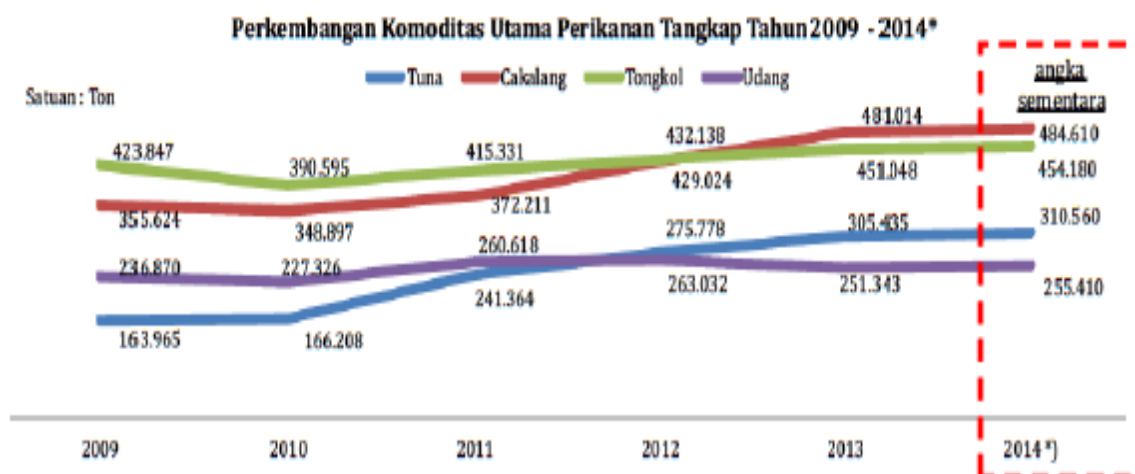


Figure 2.6 The Development of Primary Capture Fisheries 2009-2014 (MMAF 2014e, p. 22)

Figure 2.6 above shows the development of tuna (in blue), skip jack tuna (*cakalang*) in red, bonito (*tongkol*) in green, and shrimp (*udang*) in purple. The figure suggests that tuna and tuna-like species (TTC) production in Indonesia has continued its increase since 2009.

The aims of TTC industrialisation are to increase tuna production and quality for export and fulfill national demand from local tuna processors; to increase profits and value adding in tuna fisheries increasing the welfare of tuna fishers; to enhance tuna fisheries management; to increase income of tuna processors and traders; and to increase national income from tuna fisheries (MMAF 2012d; MMAF 2013b; MMAF 2013d).

Policy implementation in the TTC sector includes quality assurance management and tuna market expansion, including the enforcement of Hazard Analysis and Critical Control Points (HACCP) for tuna processing industry (MMAF 2012d; MMAF 2013b; MMAF 2013d). The government has shortened the license and permit processing times, and encouraged private sector involvement in increasing quantity and quality of product for export and national retailers and in building more fish processing units. The government has also increased meetings with stakeholders, policy promotion and communication at national and local levels and training and extension programs to fishers, processors and traders (MMAF 2013d).

No.	Outcome Performance Indicators	Current Condition	Targeted condition (output)			Increasing Rate (%)
		2011	2012	2013	2014	2012-2014
1	TTC production volume	955,515	1,002,492	1,051,884	1,104,115	4.9%
2	Monthly fishers average of income (AU\$)	199	240	230	350	
3	Total number of fishers	105 thousands	115 thousands	118 thousands	120 thousands	2.21%
4	Budget (AU\$ billion)	-	30	36	27	-4.9%

Table 2.1 Outcome Indicators of TTC Industrialisation in Indonesia (MMAF 2013d, p. 192)

In Indonesia, FADs have been very effective in increasing the productivity of purse seine boats, though their use in proximity to coastal areas including small scale fishing grounds violates Ministerial Regulation No. 26/2014. Additionally, there is little accurate data available on the actual numbers currently being used, legally or illegally (Nugroho and Atmaja 2013).

Indonesian government data regarding the tuna catch is also questionable, as the industry is plagued by poor data collection methods and management as reported by Dahuri and Dutton (2000) and Patlis (2007). Currently, MMAF personnel estimate catch numbers without robust data collection methods, largely due to a lack of resources and staff at ports. This reduces the reliability of data collected at the local level and results in poor data estimates at the national level (Proctor et al. 2003). This can result in misreported or unreported catch which influences complex management at the regional level including under the Indian Ocean Tuna Commission (IOTC) and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) (Nugroho and Atmaja 2013; Proctor et al. 2003).

Fishing businesses also deliberately flout government regulations (such as Ministerial Regulation No. 30/2012) by developing their own fishing ports (tangkahan) to speed up their unloading activities. With little to no oversight, there is a likelihood of under reporting by businesses in order to avoid paying taxes. This may be a common practice amongst purse seine fishers (Nugroho and Atmaja 2013; Proctor et al. 2003).

### 2.3.2 Indonesia's Fish Processing

In 2013, MMAF (2013c) reported total fish processing production was 4.10 million tonnes, employing about 6.2 million people. Policy implementation targets and measures include modernising the fish processing industry to maximise exported fish quality.

The fish processing industry has grown as a result of increasing fish consumption, including in developing countries such as Indonesia. However, a lack of potable water, unreliable electricity, roads, and transport vehicles has made the cost of fish processing in many developing countries very expensive. The most common methods of fish processing used in developing countries are filleting, salting, canning, drying, smoking, freezing, fish powder and fermentation. Labour-intensive processing has sustained a huge amount of employment in Indonesia's rural coastal areas (FAO 2014b; Ministry of Industry 2009). Tuna is one of the most important raw materials for canneries and most of their products are processed for export (Naamin 1995).

In 2013, MMAF issued Ministerial Regulation No. 26/2013, allowing large scale foreign tuna fishing companies to transship their catch directly overseas for processing. The regulation was criticised for jeopardising the tuna processing industry in Indonesia which has been suffering a shortage of raw materials since 2004 (KIARA 2013; Business News 2009). Processors have to compete for raw materials with fresh fish collectors (Bank of Indonesia 2012). Additionally, the cost of raw materials has grown in parallel with the increasing price of subsidised petrol and consequent operational costs for fishers (Trobos 2007).

*Pindang* (a food product made by boiling fish in salty water) is an important delicacy for Indonesian people, particularly those of middle to low income as the price is relatively low and it lasts longer than fresh fish. In 2010, there were about 66,000 *pindang* makers producing about 82,000 tonnes of product per month (MMAF 2013d). The majority of these processors are based in Java employing their own families or neighbors, and only a small number of them use outsiders (people from outside the area). These businesses are usually a home industry, with skills passed down within the family, and employ only small numbers of staff, usually women, including fishers' wives (low-skilled employees) and are often un-sustainable without family involvement (Hendratmoko et al. 2015; Soegiyono 1995; Bank of Indonesia 2012).

These processors face a number of problems including the lack of raw small TTC-skipjack tuna and bonito (the shortage is about 22.5% per month or about 22,215 tonnes). Soegiyono (1995) stated that fish processing utilises deteriorating fish (unsold fresh fish) obtained at lower prices. Pindang makers obtain little support from major financial institutions (they borrow capital from family networks, rural financial institutions and cooperatives (Hendratmoko et al. 2015; Soegiyono 1995; Bank of Indonesia 2012). They are often forced to enter into ongoing business relationships with customers or middle men who buy their entire production or order products directly from them. Technology use is low, there are poor hygiene practices, (they do not use clean water to wash the fish, and use cheaper low quality and dirty salt), and there is no standardisation of production processes. Poor packaging is also a problem (Heruwati 2002). Traditional fish processors seldom apply hazard analysis and critical control point (HACCP) standards, because of the expense involved (Trobos 2007). These quality assurance problems have led to difficulties for this sector in entering international markets (MMAF 2013d).

The aims of Indonesian fisheries industrialisation policy in the *pindang* sector are:

- a. To increase *pindang* productivity in Java
- b. To provide the raw materials needed in *pindang* industries
- c. To value add to the products
- d. To open more employment and business opportunities for fishers families to work in the processing and marketing value chain of the *pindang* industry (diversification of employment)
- e. To increase the income of processors and traders
- f. To increase industry productivity
- g. To provide financial support through financial institutions (microfinance)
- h. Create connections between small scale and large scale fish processors
- i. Provide training to increase productivity
- j. Promote investment and marketing of product (MMAF 2013d).

N o	Outcome Indicator	2011	2012	2013	2014	Total	Increasing Rate Per Year (%)
1	Volume	204,930	225,423	253,601	291,641	975,595	12.5
2	Product Price (AU\$/kg)	2	2.5	2.8	3.2	10.5	17
3	Raw Material Need (tonnes)	227,700	250,470	281,779	324,046	1,083,994	12.5
4	Employment absorption (processors and traders) from industrialisation implementation	9,100	10,440	15,460	25,940	90,940	43.5

Table 2.2 Performance against outcome indicators of *pindang* industrialisation in Indonesia (2011-2013) and performance projections for 2014 (MMAF 2013d, p. 105)

### 2.3.3 Seaweed Farming

Seaweed farming is the biggest contributor to Indonesia's aquaculture fisheries sector. In 2013, it totalled about 3.4 million tonnes (over 15% of national fisheries export product), with the trend increasing from the year 2000 (see Figure 2.7), and placing Indonesia as the second biggest seaweed producer in the world after China (MMAF 2013g). MMAF (2013c) reported the aims of marine and fisheries industrialisation in aquaculture included increasing seaweed production, to 13 million tonnes in 2014 from 9.6 million tonnes in 2012, by applying good aquaculture practices.

Globally, seaweed is used as a food source as well as for cosmetic, chemical and pharmaceutical product fertiliser and animal food. Global seaweed aquaculture production reached 90.4 million tonnes (AU\$198 billion) in 2012. Indonesia produced about 27.40% of the global harvest (China 53.97%) (FAO 2014b). The global demand for seaweed is increasing about 10% annually. Indonesia is currently the top producer of cottoni, and the second largest producer of spinosum after China (Neraca 2015).

Seaweed is harvested both from the wild and from farms. Commonly called "macro algae", seaweed is classified into three groups according to its colour pigmentation: brown (Phaeophyceae), red (Rhodophyceae) and green (Chlorophyceae). Japan, China and the Republic of Korea are the biggest importers of this product for food (McHugh 2003).

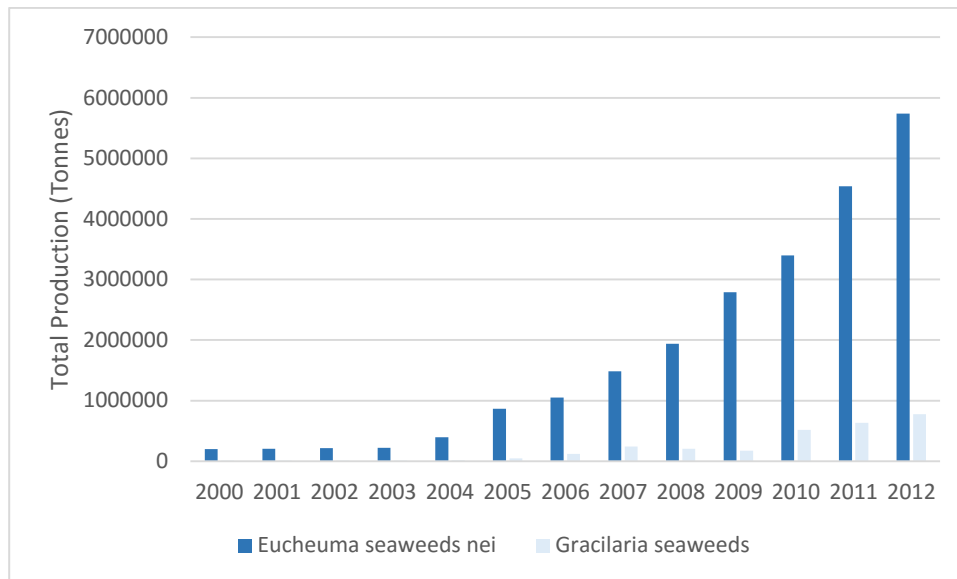


Figure 2.7 Indonesian Seaweed Production

Source: FISAT (Accessed 12 November 2014)

A major factor that influences seaweed yield is disease. The most common disease for seaweed in Indonesia is “*ice-ice*”. Besides reducing quantity this disease also impacts the growth, appearance and carrageenan content. “*Ice-ice*” is caused by a microbial pathogen and is also influenced by the environmental conditions of the farm, including temperature, salinity, light intensity and nutrient availability. Important mitigating factors are the plants’ distance from each other, avoiding extreme salinity and temperature changes, the plants’ movement in regards to light intensity, and the use of “*ice-ice*” immune seed (Largo 2001). Campbell et al. (2011) has added that climate change, particularly global warming, has resulted in increased seaweed disease.

Seaweed industrialisation policy implementation by MMAF (2013d) aims to include:

- a. Seaweed extensification including providing more land and new areas for farming, infrastructure development; good farming standardisation; and drying tool development including “para-para”.
- b. Providing better seeds (about 8 thousand tonnes in 2012) by mapping new seedling provider areas, private sectors involvement in seedling research and development, seed distribution management, and extension, training and pilot programs.



- c. Better farming practices including Good Aquaculture Practices implementation in how to tie the seaweed seeds into the ropes and better maintenance systems.
- d. Seaweed processing diversification and innovation, providing support to seaweed processors including packaging and quality assurance, and enhancing connectivity between processors and customers both national and international.
- e. Seaweed marketing including increasing competitiveness and mapping new markets for seaweed products.
- f. Research and development in disease resistant seed, and better farming systems.
- g. Human resources development including providing scholarships to poor farmers' children, and more training.
- h. Quality assurance including product certification, biosecurity management from disease transfer
- i. Better law enforcement including relating to chemical residues (MMAF 2013d).

No	Description	2011	2012	2013	2014	Annual Increase Rate (%)
1	Area coverage (Ha)	11,482	12,630	15,156	19,703	20
2	Production (tonnes)	401,861	694,645	863,886	1,182,159	44.7
3	Job absorption from farming practices and seed development	256,198	307,984	386,953	601,971	45

Table 2.3 Seaweed industrialisation targets (MMAF 2013d, p. 181)

#### 2.3.4 Existing Programs

The policy also aimed to modernise MMAF organisational structures by implementing modern management systems including the use of a “balanced score card” in monitoring and evaluating program implementation. In addition MMAF incorporated programs from previous minister Fadel Muhammad’s policies and integrated them into the current fisheries industrialisation policy.

Indonesia has several relevant poverty eradication-related policies under the National Team for Accelerating Poverty Reduction (TN2PK) management which was set out in President Decision No. 10/2011 that according to MMAF were also part of its fisheries industrialisation policy. Most of these fisheries industrialisation development programs were also initiated by the previous Minister (Fadel Muhammad). These include are briefly described in the following sections. A list of relevant regulations assessed in this thesis are attached in Appendix E.

Unlike fisheries industrialisation policy, Indonesia did not produce new regulations on Blue Economy policy. As it was an early policy, most of documents about Blue Economy were provided in scoping studies, and media releases by MMAF including Sunoto (2013); Sutardjo (n. d.); MMAF (2014) ;DEKIN (2012); Purwoseputro (2013) and MMAF (n. d.). At the time of this research, the development of Blue Economy policy was still largely conceptual, however the government already announced that they were going to have a pilot project in several places in Indonesia including in Nusa Penida. In mid-2016 there is still not any new regulations, in contrast to the Fisheries Industrialisation policy, that has been formally produced by the government to support the implementation of the Blue Economy.

#### **2.3.4.1 National Program for Community Empowerment (PNPM Mandiri) Marine and Fisheries**

This program is part of the National Program for Community Empowerment (PNPM *Mandiri*) which aims to stimulate local economic growth at village level. Program implementation includes facilitating donations to develop local coastal village economies (PNPM 2014; Suryadarma and Sumarto 2011). MMAF has been overseeing this program under the supervision of the Coordinating Ministry for People's Welfare since 2009. Key activities include Development of Village Marine Related Business (PUMP), Salt Business Empowerment (PUGAR), and Resilient Coastal Village Development (PDPT) (MMAF 2014c; PNPM 2014).

PUMP aims to increase fishers' income, enhance fishers' entrepreneurship skills and empower fishers to access capital from formal financial institutions. MMAF reported in 2013 that PUMP has successfully increased fishers' production, income and savings. MMAF expenditure was AUD\$ 3,4 million in 2011 and AU\$ 12.9million in 2012 on this program (MMAF 2013e).

#### **2.3.4.2 Fishers Livelihood Improvement Program (PKN)**

MMAF falls under the auspice of the Coordinating Ministry for Economic Affairs, which has an important role in improving Indonesian economic development through marine and fisheries resources utilisation. MMAF delivers several poverty eradication programs in coastal communities, including the Fishers Livelihood Improvement (*Peningkatan Kehidupan Nelayan*, PKN) program, which forms part of the Family Hope Program (PKH).

PKH is a social protection program providing cash assistance to the poor (Suryadarma and Sumarto 2011). It was initiated on 13 February 2011 through Presidential Decree No. 10/2011 as part of the President's "Pro Poor Policy". Program implementation includes: training for fishers (around 12,000 fishers received training in 2013, at a cost of about AU\$ 3.4 million), a capture fishing extension program (delivered to 6,141 fishers in 2013 at a cost of about AU\$ 7.3million), affordable houses for fishers, clean water, alternative and additional employment for fishers' families, microfinance, petrol station development, cold storage development, cheap public transport, school and health facilities, scholarships for fishers' children (about 1600 children at a cost of about AU\$ 1.2 million in 2013), fishers' identifications (IDs) and peoples' banks (MMAF 2014c; MMAF 2013e).

#### **2.3.4.3 Minapolitan**

This program was initiated in 2010 by the previous Minister of Marine Affairs and Fisheries, Fadel Muhammad, through Ministerial Regulation No. 12/2010. The Minapolitan programs was aimed at increasing production, productivity, and product quality; increasing the income of fishers, fish farmers and fish processors; and establishing centers of development in regions as stated in Ministerial Regulation No. 12/2010.

The program involved the identification of existing ports for development into 'Minapolitan' cities, or centres of marine-based economic activity and growth (Ministerial Regulation No. 12/2010). It was the foundation of fisheries industrialisation policy in regional areas. Sadimantara et al. (2014) reported that there was a positive impact from the *minapolitan* program on seaweed farmers' income and production (MMAF 2013e). However, several other research reports found a lack of effectiveness in *minapolitan* program implementation in several areas including Banyumas, Central Java and Lamongan, East Java. The main reasons were described as a lack of community

involvement in the pre-implementation phase, poor coordination between government organisations, and funding limitations (Harsasto and Taufiq 2013; Aswanah et al. 2014).

#### **2.3.4.4 Inka Mina**

This program was also initiated by Fadel Muhammad in 2010 to provide 1,000 30 gross tonne (GT) vessels between 2010 and 2014 through Presidential Instruction No. 1/2010. The main aim of *Inka Mina* was to increase fishers' production and income (Directorate of Fishing Boats and Fishing Gear 2014; MMAF 2014d). The cost of each boat was AU\$ 150 million. Also in 2013, MMAF built 16 cold storage facilities, 25 ice factories, provided 48 insulated vehicles (to support post-harvest distribution) and supported around 1,000 groups of fish processors (MMAF 2013e). The total cost of this program was AU\$ 150 billion (Maritime News 2014). *Inka Mina* aimed to solve the problem of over fishing in coastal areas (less than 12 miles from shore), which were the traditional fishing grounds of small scale fishers.

Directorate of Fishing Boats and Fishing Gear (2014) and Simantap (n.d. ) reported that by 2014 a total of 878 boats had been provided and that this program had a positive impact on local communities, particularly on the beneficiaries' production, as well as fish quality, income and livelihoods. The report states that incomes were increased by about 150%. MMAF reports that *Inka mina* has enhanced fishers' ability to catch export grade tuna, where previously they have primarily brought in low grade tuna (MMAF 2014d). However, there is no detailed information about how these changes were achieved by these fishers. MMAF specifically noted that *Inka Mina* has been successfully implemented in Central Java (Simantap n.d. ).

However, in contrast with the government reports above, Mira (2013) highlighted several issues that have arisen from this program including difficulties changing the fishers' culture from small scale one-day fishing trips into longer multi-day trips, and a lack of knowledge transfer to small scale fishers who received the boats. Many reports in the media raised issues about the failure or ineffectiveness of this program's implementation. Kompas (2012) reported that the government was ceasing implementation of *inka mina* in Bengkulu, West Sumatra, West Papua, Papua and South Sulawesi in 2013 as a result of operational and procurement problems, which were also publically acknowledged by MMAF in their annual report MMAF (2014d). Maritime News (2014) reported that the key issues included unreached targets, failure to align boat specifications to contract requirements, and corruption and a lack of transparency in the

tender process. It recommended better engage with fishers before applying policy, working harder to implement their more specific recommendations, such as including a freezer in each boat, and matching boats and fishing gear to the fishing grounds. The People's Coalition for Fisheries Justice (KIARA) recommended that the government conduct a full audit of the program (Maritime News 2014).

## **2.4 Impact of Fisheries Industrialisation**

Reports published by MMAF highlight the success of their policies and programs. MMAF (2014a) reported strong fisheries economic growth, reaching 6.34% in late 2014 and thereby exceeding national economic growth at 5.02% in the same year according to (BPS 2015b). MMAF stated that this growth has improved fishers' welfare by increasing their income (MMAF 2013a). According to MMAF, under fisheries industrialisation, national fish production has reached 20.27 million tonnes in 2014, while exports reached AU\$ 6.4 billion (MMAF 2014a).

### **2.4.1 Policy impacts theory**

Policies are a recognition of problems by the government and positions what actions will be taken, promised and communicated to public to solve those problems (Dovers and Hussey 2013, p. 14). (Dovers and Hussey 2013, p. 14) observed four stages in policy cycle literature including:

- a. Problem framing: information gathering from the public about any environmental problems that need to be resolved through a policy.
- b. Policy framing: identifying the government's policy position to resolve the problems.
- c. Implementation: the stage when government puts the policy into effect.
- d. Monitoring and evaluation including early impact monitoring: monitoring is used to check and inform changes and results in programs and evaluation provides an overall learning opportunity to find solutions to any challenges produced by policy.

This research seeks to provide the views of key stakeholders as a contribution to the initial monitoring of the Indonesian fisheries policy impact. Looking ahead to policy evaluation that aims to assess, as credibly as possible, whether the policy objectives had been achieved effectively and efficiently at the end of its implementation (Prager et al. 2015). Policy evaluation involves an assessment of the efficacy of the policies and the plausible

alternatives. This includes a thorough evaluation of outputs and outcomes relative to costs and checking whether policy goals could have been better achieved through alternative policy implementation (Dovers and Hussey 2013, p. 14).

According to Mayne and Stern (2013, p. 13), policy impacts are “the positive and negative, primary and secondary, intended and unintended, long-term effects on beneficiaries that result from a development intervention, and are in the sphere of interest of the intervention”. Impact evaluation should include answers to the evaluation questions of policy makers including government and donor organisations. These answers are about the intent, process and impacts; measured as outputs and outcomes of the policies. It should assess whether the implementation of the policy through programs has created any differences to the beneficiaries according to the program goals (Mayne and Stern 2013). This study is an early impact evaluation of the fisheries policy in Indonesia to propose recommendations for any early interventions to solve any potential problems from the policy’s implementation (Kautto 2005).

Dovers and Hussey (2013) stated that in monitoring policy implementation, there is a need to integrate environmental, social and economics impacts. Additionally the involvement of many policy actors and interests, makes it more difficult to monitor the impact of policy implementation and adds more uncertainty into the policy. This makes the monitoring and evaluation of environmental policies very complex and it may require assessment of both quantitative and qualitative data in order to make judgements about a range of impacts.

Consultation and participation are important elements in assessing policy impacts in these complex situations. A consultation process which involves stakeholders often aims to gain understanding of acceptance levels of a new policy or program from stakeholders. The consultation process also usually involves experts in the relevant field to garner additional advice about the policy (Thiel 2009). A participatory approach, that deliberately does not further empower experts and other powerful stakeholders, but seeks to engage the other stakeholders including beneficiaries such as farmers who benefit the programs, is commonly expected in participatory policy impact assessment because it addresses power differentiation between stakeholders particularly for example donors and beneficiaries (farmers). There is a need to equalize the representativeness of all stakeholders in the policy evaluation process (Guerra-López and Hicks 2015; Helming et al. 2011; De Smedt 2010).

Social science research is an essential approach where marine policy seeks social outcomes (Director of National Parks 2012) and identifying the relevant stakeholders and having them involved in transparent and effective ways is a fundamental part of good social assessment and fundamental to monitoring unwanted impacts of a policy (Voyer et al. 2012). According to Dovers, policy impacts can be monitored through indicators such as the rate of technology or innovation adaptation at local level, and compliance with new environmental regulations (Dovers and Hussey 2013). These indicators are often based on the policy's stated objectives, goals and outcomes carried through into programs as measurement tasks to generate data to prove the measurable goals, outputs and (more rarely) outcomes of policy are achieved. Monitoring results help to optimise the likelihood that policy goals will be achieved (Dovers and Hussey 2013; Sabatella and Franquesa 2003; Helming et al. 2011). More credible monitoring frameworks and evaluation, sometimes done using independent agents with a different, often critical, perspective can in some situations provides strong evidence about unintended consequences. Independent research, from Universities, different government departments such as environmental protection agencies, and NGOs and international aid agencies have all contributed to improve monitoring and evaluation of natural resource programs and policy.

This brief discussion of the challenges of monitoring and evaluation the implementation of environmental policy stems from the dynamism of coupled human (social and economic aspects) and natural systems (Dovers and Hussey 2013; Helming et al. 2011; De Smedt 2010). In reviews of the research literature by Schirmer and Casey (2005) and Garcia et al. (2000), the social indicators in marine policy research include; income, employment, literacy, social profile/demography, consumption, quality of life or social wellbeing, social capital, values, attitudes, gender distribution and beliefs. Garcia et al. (2000) review of economic dimensions that consist of several indicators including harvest, harvest value, fisheries contribution to GDP and investment in fishing fleets and processing facilities focus at national levels. In terms of environmental or ecological impacts, indicators often used include catch structure, relative abundance of target species, exploitation rate, biodiversity, fishing pressure, water quality parameters, pollution level and the abundance of wildlife (fish stocks for example) (Garcia et al. 2000; Dovers and Hussey 2013). Additionally, in terms of governance, indicators often include;

compliance, property rights, transparency, participation and perceived capacity to manage the resources (Garcia et al. 2000).

Credible data collection is one of the most vital components of policy monitoring; secondly the data needs to become knowledge that enable decisions and actions that increases the chance of achieving the program and policy goals otherwise monitoring is not functional. The data, if collected and available, is not actionable knowledge then it is still a data record for later analysis. However, most often the constraints to robust data collection, including available funding and resources from the government, means that no data record exists (Dovers and Hussey 2013) and without policy and program learning the same problems are more likely to recur in future.

#### **2.4.2 Global Environmental Impacts**

The ocean environment has been affected by the industrialisation of the fishing industry. Environmental impacts can be both intended and unintended changes to the environment as the result of a development program or economic activity (Abaza et al. 2004). Fisheries activities, including capture fishing, fish processing and aquaculture, can potentially impact or change the environment in a way that is not desired, and which could then impact upon people's livelihoods, particularly those already living in, or on the brink of, poverty and who depend on these resources (Broad 1994).

Fish stock depletion is a global crisis. A 2011 FAO report noted that approximately 29% of fish species are classed as overfished, including: anchoveta in the Southeast Pacific, Alaska Pollock (*Theragra chalcogramma*), Atlantic herring (*Clupea harengus*), Atlantic cod (*Gadus morhua*), chub mackerel (*Scomber japonicus*) and skipjack tuna (*Katsowanus pelamis*); while a further 61% are classed as fully fished, and just 10% are classed under fished (FAO 2014b). Ye et al. (2013) has warned that 68% of global fish stocks are being exploited beyond the Maximum Sustainable Yield (MSY) and that therefore the overall condition of fisheries resources is declining. (Halpern et al. 2008) similarly argues that almost all global marine ecosystems have been fundamentally damaged by human activities. Further examples are the collapse and restructuring of fisheries in the UK (Thurstan et al. 2010), the sardine industry in California in the United States, the Atlanto-Scandian herring, and the northern cod in Newfoundland and Labrador (Pauly 2009). The activities of DWFs off Namibia has resulted in an unhealthy marine ecosystem, demonstrated by the overfished status of hake, horse mackerel and sardine stocks (Sumaila and Vasconcellos 2000). Other environmental impacts of these activities



include habitat degradation of the seabed from the use of bottom trawling and the destruction by-catch species, as well as pollution (Pauly 2009).

If fish stocks continue to be overexploited in this way, 58.3 million people will be directly impacted. The global economic impact of such an outcome has been estimated to be approximately AU\$178.3 billion (FAO 2014b).

#### **2.4.3 Indonesian Environmental Impacts**

The environmental impact of fisheries industrialisation in Indonesia has been most acutely felt in the tuna fishing, fish processing and seaweed farming industries. In 2011, the Indonesian National Committee for Fish Stock Assessment publically acknowledged the massive degradation of fish stocks in the country. The committee's Ministerial Decree No. 45/2011 reported that stocks were "fully or over exploited" in general across all species and regions. In the tuna fishing sector, the introduction of purse seine and increasing FAD use has reportedly caused the depletion of tuna fish stocks at an accelerated rate (Nugroho and Atmaja 2013; Bailey and Sumaila n. d.). The use of FADs has been globally recognised as a key factor affecting the sustainability of the tuna population (FAO 2014c). FAD elimination in the western and central Pacific Ocean could benefit the region by about AU\$248.5 million per year by increasing the catch rate of bigger tuna by purse seine, long-line and handline fisheries, according to (Bailey and Sumaila n. d.).

Purse seine boats employing FADs tend to catch large quantities of juvenile tuna (typically measuring 3-10 kg per fish) and catches indiscriminately, independent of fish size. Overexploitation of tuna juveniles, including by applying FAD technology, risks overfishing tuna species by preventing maturation to reproduction age in order to regenerate the population (Bromhead et al. 2003; Ingles et al. 2008). Purse seine boats also tend to have much larger rates of bycatch such as turtles and sharks (Nugroho and Atmaja 2013; Morgan 2011).

The expansion of the tuna fish processing industry, in particular canning activities, has substantially increased pollution and energy use across Indonesia. The primary environmental problems resulting from the industry relate to the disposal of water from the spray cooling process and floor washing, the precooking process (which adds oil and grease to the water), solid waste disposal generated from fish scales and other by-products, emissions to the air including smoke and odor, noise pollution and energy use (Nair 1990; Uttamangkabovorn et al. 2005; Duangpaseuth et al. n.d.). Wastewater can

cause eutrophication and oxygen depletion in the waterways while oils are seen on the surface of some coastal water (Duangpaseuth et al. n.d.). Traditional fish processors are seldom concerned about the environmental impact of their poor waste management practices. Most of the waste is discarded untreated into the water ways or sea (Bank of Indonesia 2012).

While seaweed farming is generally praised as an industry with a relatively low negative impact on the environment due to its low chemical use (pesticides or fertilisers) (Firdausy and Tisdell 1991; Firdausy, C and Tisdell, C 1992; Flynn 2014), adverse impacts have been identified. The negative impacts include the disturbance and destruction of native species and habitat diversity loss, water column and benthic production reduction, sedimentation or organic enrichment, predator interaction, phytoplankton reduction, introduction of new diseases and potential spread of non-native species (Zhang et al. 2009; Phillips 1990; Flynn 2014; Williams and Smith 2007). Crawford (2002) also noted changes in the pattern of water movement, erosion, depletion of nutrients and mangrove clearing as a result of seaweed farming.

#### **2.4.4 Global Social Impacts**

The impact of fisheries industrialisation has been widely reported on communities in developed countries it causes intense social change including stratification in fisheries labour (specialisation) and increased value of work (Smith 2000). The social impacts have not always been positive. Pauly (2009) argues that the depletion of fish stocks due to the rampant growth in fisheries effort since World War II has negatively impacted a huge number of dependent stakeholders both in developed and developing countries, including fishermen, fish processor workers and fish related industry workers.

Halpern et al. (2008) estimates the loss of livelihoods to number in the millions. The marginalisation of small scale fishermen from now overfished traditional fishing grounds was also described by (Bailey 1988a). Coastal communities, which include small scale fishermen, traditional fish processors, and fish farmers, have been particularly negatively affected, despite the fact that in many cases these are some of the most economically disadvantaged groups (Bailey 1988a, 1988b).

Fish stock depletion has also resulted in conflict between nations and their citizens (Pauly 2009) and created narratives of blame within and between them. Overå (2011) reported examples in Ghana and Zambia where poor and marginal fishers received no benefit from state-sponsored fisheries industrialisation. Local fishers remained poor,

despite increasing numbers of fish landed at their ports. This contradiction resulted in the emergence of conflict between large and small scale fishermen over perceived unfair resource allocation. Weak law enforcement regarding large international fleets and local government corruption also contributed to exploitation and local conflict.

Kent (1997) also noted a number of negative outcomes from industrialisation, including unequal distribution of fisheries products between developed and developing nations, displacement of small scale fishermen from their livelihoods and unfair fish market control. Kent (1986) reported that increasing fish production as the result of fisheries industrialisation has failed to increase purchasing power for fishers, who in many cases still struggle to afford to purchase fish for their own consumption. Lower-income earners are generally more dependent on fish as a protein source than middle and high income earners in developing countries, however rising fish production at the national level and a resultant boost to national income has not been followed by increases in poor people's well-being or fish consumption. Kent (1997) claimed this was in part the result of the fact that the bulk of product produced by fisheries industrialisation in developing countries has been directed to foreign export to the developed world.

#### **2.4.5 Indonesian Social Impacts**

The orientation of Indonesian fisheries policy since 1980-85 has been to increase the number of fish exported with little consideration of achieving social equity. Kusumastanto (1996) and Bailey (1988b) argue that not only did fisheries policies fail to achieve even a trickle-down effect, but in fact created widespread conflict between small and large scale fishers. Floyd (1985) further reported that the government's export-oriented fisheries policy negatively impacted on local fish supply and drove up local prices undermining poor coastal communities' ability to buy good quality fish.

The arrival of modern trawlers in the 1970s brought increased employment opportunities for trawler crew members, but also caused numerous social problems as a result of low wages, poor work safety conditions, deaths at sea, and corruption between boat owners (*tauke*), many of whom were ethnic Chinese, and local authorities (Purdey 2005). Many fishers sold their own smaller boats to join trawler crews, seeking the stable income they hoped trawlers could offer.

In Indonesia, there has been a marked rise in conflicts between large and small scale fishermen over perceived unfair resource management and income disparities exacerbated by the fisheries industrialisation policies. Bailey (1997) and Morgan and

Staples (2006) reported that the degradation of fish stocks in the early 1970s as a result of fisheries industrialisation, particularly the introduction of trawlers, was one of the main drivers behind conflict between small and large scale fishers, particular trawler owners. Frequent violence and deaths at sea due to this conflict during the 1970s and 1980s led the Indonesian government to place a ban on trawlers in the Malacca Straits (Morgan and Staples 2006).

FADs have been another source of conflict between modern large scale fishers and small scale fishers, as they target similar species. One example is the rejection by small scale fishers in Pelabuhan Ratu, West Java of FAD use in their fishing grounds by purse seine boats from Pekalongan and Juwana, Central Java (Nugroho and Atmaja 2013).

In contrast, much of the literature relating to the impact of increased seaweed farming activities has been positive. Seaweed farming has reportedly become a primary or alternative source of livelihood for many members of coastal communities, and as a relatively labour-intensive industry, provides employment for many people. Seaweed farming is time efficient because of its short farming cycle of about 45 days, and, requires little technology or capital. Seaweed farming has also often benefitted women by providing them with employment where there are otherwise few alternatives. Key social impacts of seaweed farming include increased social cohesion, social networks, and knowledge transfer (Valderrama et al. 2013; Firdausy, Carunia and Tisdell, Clem 1992; WWF 2014).

## **2.5 Other Issues Relating to Effective Management of Fisheries**

### **Resources**

#### **2.5.1 Poverty in Fisheries**

Indonesia has reported a successful reduction of poverty from 40% in 1976 to 18% in 2002 and 12% in 2014 (Howes and Davies 2014; Prawiradinata 2012; TNP2K 2015). However, inequality remains a significant issue in Indonesia, with over 28 million people still living in poverty in 2014. The government is aware of the spatial concentration of poverty in Indonesia, Ministerial Regulation Number 15 of 2010 estimated many of the country's poor live in 10,640 coastal villages.

High poverty rates in coastal areas (similar to other rural areas in Indonesia) relate to low incomes influenced by low productivity rates, poor access to capital, and low levels

of education. People in these areas also suffer from slow technology transfer and seasonal incomes, which usually do not meet continuous consumption needs (MMAF and BPS 2011; Ellis 2000).

One common practice, which often has a negative impact on income in Indonesian fishing communities, is the strengthening patron-client relationship. In fishing communities, contracts between fishers (clients) and their boat owners or fish collectors (patrons) are common. Patrons lend money to their clients with an agreement that the patron will buy all of the catch generated by their clients at a set price. This puts clients in a weak position in terms of maximising benefit from their trading activities (Humaedi 2012). Benefits that patrons provide to clients are social and financial, including access to fishing equipment and markets (Ferrol-Schulte et al. 2014).

### **2.5.2 Costs, Coordination and Capacity**

The cost of close monitoring and regulation enforcement over 81,000 km of coastline is daunting for policy implementation and resource needs are considerable. Dahuri and Dutton (2000) reported that coastal and marine management (ICCM) on Indonesia's shoreline is not fully effective. Indonesia's program of decentralisation of management from central to local government in 2004 under Law No. 32/2004 delegated responsibilities to the regional (provinces) and local (districts) governments, with the aim of enhancing effectiveness and transparency and increasing community participation in policy implementation. However, decentralisation has in some cases given rise to other challenges, including in fisheries resource management (Satria and Matsuda 2004; Wever et al. 2012). The problems of decentralisation include a lack of integration and coordination between stakeholders, including the national and local governments and the private sector, creating conflicts of interests between users. One example of this is the lack of consideration of policy and how it fits with local knowledge and beliefs, which then creates conflicts between local users and regulators as well as other stakeholders, such as NGOs. Weak coordination between national and local level government results in a lack of policy understanding at the local government level (Satria and Matsuda 2004) and also creates difficulties in attributing national level policy ineffectiveness to the policy or its implementation. Decentralisation has also created problems when local governments put a heavier focus on quick gains and pressing local problems over sustainable fishing practices. The current model of Indonesian decentralisation appears

also to have actually decreased community participation despite this being one of the policies initial objectives (Siry 2006; Wever et al. 2012).

Additionally, the capacity of local and provincial governance is challenged by the lack of transparency in reporting, corruption and collusion between officials and businesses, weak law enforcement, limited funding available for the fisheries department and poor catch data management (catch reporting) also make fisheries management difficult (Dahuri and Dutton 2000; Ferrol-Schulte et al. 2015; Patlis 2007). Weak law enforcement is acknowledged as one of the biggest problems in fisheries regulation implementation in Indonesia. Heazle and Butcher (2007) reported corruption of government officials who are responsible for enforcement of fisheries regulations. Additionally, a lack of coordination between law enforcement organisations, including police, navy, MMAF and others has created problems. Lack of funding and lack of human resources are also major issues (Novaczek et al. 2001).

### **2.5.3 Customary Law**

Implementation of Indonesian fisheries management at the local level does not acknowledge, or is sometimes in conflict with, local knowledge or customary laws. For example, *Sasi* in Maluku and Papua, *Panglima Laot* in Aceh and *Awig-awig* in Bali and Lombok have methods of managing fisheries resources including closing fishing areas in agreed seasons (usually spawning seasons) (Adrianto 2011).

*Awig-awig* in Lombok consists of fishing zonation, which separates fishing grounds for small and bigger boats. This customary ‘law’ also regulates fishing gear to be used in each zone and outright bans on the use of destructive fishing tools including bombs, cyanide, and other dangerous chemicals. The local law also encompasses mangrove and coral reef management (Solihin et al. 2011). In Lombok, in the customary law called “*sawen*”, local people believe that forests, including mangroves, play a “mother” role by providing water for the area. If forests are destroyed, the entire ecosystem could become unbalanced. In terms of coral reef conservation, the law also bans the exploitation of turtles and their eggs and the giant clam (Satria and Adhuri 2010). There is a punishment system for fishers who violate the law, which has been agreed to in accordance with cultural practices. Also, local communities have set up an organisation to police the law (Solihin et al. 2011; Adhuri 2014). Such customary laws have been successful in managing conflict on resource utilisation by providing equal opportunities for members of communities to use resources.

The Indonesian government had acknowledged these customary laws in Law No. 31/2004. However, no literature is available regarding the implementation of this law or monitoring its success or failure. Willman et al. (2009) and Adrianto (2011) found that a lack of community involvement, including the failure to recognise these customary laws as part of fisheries management regulation, has reduced the effectiveness of the new regulations. Adrianto (2011) also suggests that co-management and engagement of local communities with their local knowledge and customary laws, along with the national and local governments, education institutions, and the private sector, is the most effective way to manage fisheries resources.

## **2.6 Strategies for the Sustainable Management of Fisheries Resources**

The widespread acknowledgement that fisheries industrialisation resulting from the growing demand for marine products has impacted negatively on the environment and the socio-economic circumstances of significant coastal populations across the globe, has led many to suggest better ways to manage these resources.

### **2.6.1 Importance of Policy in Managing Fisheries Resources**

Government and multinational policy has been identified as a crucial part of the effective utilisation and management of marine resources. However, more often than not policies have been more focused on exploitation than sustainable management.

Marine policy is, amongst other things, the application of social sciences to solve problems derived from the negative impacts of human activities in exploiting marine resources (Steele 2010) and it includes actions or measures to achieve more desirable social, economic and environmental outcomes. National fisheries policies can contribute to increase (or, more rarely, decrease) the rate of global fisheries exploitation that apparently unintentionally depletes fish stocks and ecosystems (Halpern et al. 2008; Pauly et al. 2003).

There is a strong consensus that many marine policies and management strategies have been ineffective in countering environmental issues and that pressures on fish stocks have continued to mount (Khalilian et al. 2010; Heazle and Butcher 2007; Kusumastanto 1996). Therefore lessons learnt should be collected for future reference in developing better marine policies and evidence-based policy should be truly implemented. For example Willman et al. (2009) reported that the economic loss from poor global fisheries' management equates to an estimated AU\$69 billion annually. Ye et al. (2013) and

Willman et al. (2009) concluded that fishing effort reduction must be achieved to address poor fisheries management problems, including overfishing. Ye et al. (2013) estimated that a reduction of 36-43% of 2008 fishing capacity levels is needed, at a cost of about AU\$132 to 494 billion, which would require the loss of around 12-15 million fishers' livelihoods worldwide. This would ultimately result in a long-term productivity increase of 16.5 million tonnes and annual income of approximately AU\$44 billion, and improve biodiversity and marine health. Sumaila et al. (2012) similarly estimated in 2012 that the cost to rebuild global marine fisheries was about AU\$280 billion.

In spite of this intractable global problem there are lessons for developing an appropriate national marine policy if steps are taken in knowledge-based policy development including preliminary communication with stakeholders, consultation with experts, social-economic assessment and invitation for comment from the public as well as the target beneficiaries (European Commission 2006; Director of National Parks 2012; ADB 2006).

Public participation or engagement is an important part of policy development and implementation. Although there are debates on the positive correlation between public participation and policy success, public participation can also reduce conflict by involving different parties and users; and may also influence the policy itself through the contribution of local knowledge (Rydin and Pennington 2000). Public participation includes consultation, partnership with stakeholders, and delegation of decision making to the community (Voyer et al. 2012). Voyer et al. (2012) and Johannes et al. (2000) state that fishers' ecological knowledge about the seasons, lunar cycles and tides is vital in developing and implementing marine policy. He pointed out that the lack of this knowledge in a policy can increase the risk to resources as well as to fishers' welfare. This argument is also supported by Stead et al. (2006), Versleijen and Hoorweg (2006) and others ADB (2006). ADB (2006) specifically reported that one of the main reasons for their fisheries policy implementation failure is the lack of beneficiary participation.

Another important part of marine policy includes marine policy impact research or assessment. It is important to apply an evidence-based policy in order to achieve optimal positive impacts and reduce negative outcomes (OPSAG 2013). Following implementation of a policy, an evaluation or review should be conducted (European Commission 2006) to monitor the progress of the policy and evaluate its achievement of



key outcomes. This should be implemented in all natural resource management policies to confirm efficacy and to reduce any negative impacts of the policy's implementation.

### **2.6.2 Examples of Fisheries Management Strategies**

Examples of global strategies that address issues with fisheries exploitation include global fisheries management organisations and codes of conduct; the establishment of Marine Protected Areas (MPAs) and the implementation of Blue Economy concepts. Calls for international cooperation in policy development for tuna conservation to prevent further stock depletion have been made (Allen 2010; Majkowski 2007). However, a number of international bodies have already been established to manage tuna fisheries, including the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tuna (ICCAT), the Indian Ocean Tuna Commission (IOTC), and the Western and Central Pacific Fisheries Commission (WCPFC) (FAO 2014d). The effectiveness of these organisations in maintaining fish stocks has been questioned (Cullis-Suzuki and Pauly 2010), as these fisheries stocks are still declining. The FAO's Code of Conduct for Responsible Fisheries is a set of guidelines that inform stakeholders and policy makers about sustainable fisheries activities (FAO 2014b). Unfortunately, research examining the compliance of 53 countries found very poor compliance, particularly in developing countries with limited resources to enforce this code, for example through surveillance activities (Pitcher et al. 2009).

A marine protected area (MPA) is a significant fisheries management strategy in which an area of the ocean falls under a law which conserves nature and ecosystems as well as cultural values and activities related to this area (Day et al. 2012). They are believed to bring positive impacts to the environment and the economy. However, there is criticism of MPAs based on a lack of knowledge or research regarding the negative social impacts, including conflicts between users (such as tourism industries and local fishers) and the social dislocation for impacted commercial and recreational fishers (Christie 2004; Pieraccini and Cardwell 2016).

The IUCN describes protected area management as including "no take zones" with legal tools for fisheries management and conservation (FAO 2011; IUCN-WCPA 2008). Cessation of fishing activities in MPAs result in measurable positive environmental impacts, such as improvements to ecosystem health demonstrated by

increasing biomass, abundance, density number, species richness, mean fish length and organism size both in shallow and deep seas (Grafton et al. 2005; Lester et al. 2009; Sackett et al. 2013). The Indonesian government has already employed this strategy to some extent, reporting in 2014 that marine conservation areas have increased to 689,000 hectares from an initial target of 500,000 hectares (MMAF 2014f).

## **2.7 Global Blue Economy**

Ongoing fisheries industrialisation has surged amid a global crisis of fisheries resource sustainability and challenges of national wealth distribution. Among the responses to the challenges of rampant fisheries industrialisation and fisheries decline, a new concept emerged, dubbed the “Blue Economy”. The concept has been the subject of policy announcements across the globe, including in China (Liu et al. 2012; Shuguang 2011), Korea (Expo Yeosu Korea 2012), Indonesia (DEKIN 2012), Australia (OPSAG 2013), and the European Union (Hinton-Beales 2015). The Blue Economy aims to manage the utilisation of marine resources sustainably and in a socially fair manner (Anonymous 2012). However, different conceptions of the term Blue Economy have different emphases. One interpretation is that the Blue Economy is simply green economy principles applied to marine environments primarily to ensure sustainability and environment protection. A separate definition encompasses a wider application of principles including concepts such as zero waste which is mimicking natural systems and applied only to the marine environment. The UNEP (2012) takes its definition primarily from the Green Economy, as applied to the ‘blue’ ocean, with the green economy being defined as investment in economic sectors that do not damage the environment, and achieve fair social equity by creating jobs for the poor. Examples of green economy are: solar panels, wind power, and forest management. The implementation of a green economy in fisheries includes the implementation of a fisheries management system which aims to foster recovery of fish stocks in order to increase the fish catch in the long term sustainably and increase fishers’ incomes, particularly small scale fishermen (UNEP-WCMC 2011). However, Kathijotes (2013) criticises the green economy concept due to its ongoing reliance on subsidies and funding donors. He defines the Blue Economy as “the new system of an ocean-based Green Economy” emphasising the importance of preserving the ocean while utilising the resource as a new growth engine and maximising new technology to reach zero waste in economic production and integrated spatial

planning in coastal areas to manage resources. In the fisheries sector he highlighted better aquaculture practices, reduction of fishing effort and adverse fishing techniques as well as enhancing the capacity of management bodies overseeing fisheries resources to ensure sustainable use of fisheries.

This definition of the Blue Economy, as an augmented Green Economy applied to ocean resources, is supported by the Small Island Developing States (SIDS 2011a). SIDS, recognised as a pioneer of Blue Economy initiatives, redefined the ocean as a development space (SIDS 2011a) with Blue Economy principles underpinning a sustainable development framework for the utilisation of ocean resources (SIDS 2014a). Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations 1987).

Therefore, the Blue Economy promotes the utilisation of environmental capital, including fish resources, into economic capital (industry) which is then used to build social capital, reduce poverty, and enhance education, health and communities. After a community is empowered, profit should be re-invested to conserve environmental capital (UNEP 2012). FAO describes this concept as “blue growth” (FAO 2014b).

Pauli (2010), who has been identified as one of the key global proponents of the Blue Economy concept, originally did not make specific mention of a focus on the ocean in his description as reported by McIlgorm (2015). He sought to distance the Blue Economy from the green economy, which he has argued was wasteful and expensive. Pauli later extended the concept to include the utilisation of marine resources and the employment of a zero waste strategy in which waste products would be reused to produce other economic goods of value, in his view this mimicked nature. The increased activity relating to the repurposing of these waste products would create more jobs and further increase social equity without the need for extensive government subsidies. Pauli also referred to this as an ecosystem approach, in which a system could be created that did not require significant input of extra feed or other materials as the system would include natural food sources and waste recycling for the wellbeing of all of its components.

One example of his Blue Economy, is the integration of abattoir, maggot and fish farming in Songhai Centre in West Africa. Waste products from the abattoir’s activities are reused as a food source in the farming of maggots which are then repurposed as fish food for carp farming. An enzyme produced by the maggots can also be harvested and

sold to the pharmaceutical and medical industries for its wound healing properties (Pauli 2010).

Governments all over the world have attempted to implement their own Blue Economy concepts. China has announced implementation of the Blue Economy on a massive scale as one of their economic development strategies. New growth points include: Shandong Peninsula Blue Economic Zone with fishing, breeding and marine aquaculture as the key industries (Liu et al. 2012; Ling n.d. ), Dalian Blue Marine Economic Development which is developing oil, coastal tourism, modern marine fisheries and marine transportation industries (Liu and Chen 2013), and a national-level marine economic development zone in Guangdong which is developing, marine tourism, logistic and processing industries (Shuguang 2011).

The Republic of Korea has initiated the Yeosu project which aims to undertake international cooperation in Blue Economy principles. The Korean government has spent about AU\$10.6 million for pilot projects from 2009-2012 in developing countries including: Fiji, Vietnam, Indonesia and the Philippines (Expo Yeosu Korea 2012).

The Australian Government's Oceans Policy Science Advisory Group (OPSAG) released its 'Marine Nation 2025: Marine science to support Australia's Blue Economy' paper in 2013. In the paper, the OPSAG proposed the establishment of a national steering committee to coordinate marine science strategy and advice, as well as a decade plan for marine sciences that would provide clear priorities for marine science effort and infrastructure (OPSAG 2013).

The European Union (EU) is also seriously investigating opportunities to optimise implementation of Blue Economy concepts in its marine sector. The EU's commissioner for the environment, maritime affairs and fisheries has highlighted that social inclusiveness and conservation have to be considered equally alongside growth in implementing Blue Economy concepts in Europe (Hinton-Beales 2015).

Meetings and conferences highlighting the importance of Blue Economy practices have been held globally, including a meeting in 2011, in which a representative of Pacific Small Island Developing States (SIDS) promoted the Blue Economy in an Interactive Dialogue between the UN General Assembly (UNGA) and the UN Secretary-General's High-level Panel on Global Sustainability (GSP) (New York, US) (SIDS 2011b). In 2012, Yeosu Expo in Korea discussed "the living ocean and coast" as part of the Korea Blue Economy movement (Expo Yeosu Korea 2012). The Changwon Declaration in Korea

had the theme: “toward an ocean-based Blue Economy: moving ahead with the sustainable development strategy for the seas of East Asia” (PEMSEA 2012). In 2013, a conference on Mediterranean Blue Economy: enhancing marine and maritime cooperation was held in Athens (European Commission 2014). In 2014, a Blue Economy summit was held in Abu Dhabi, United Arab Emirates, with the goal of discussing the implementation of the Blue Economy in Small Island Development States (SIDS) and coastal states (SIDS 2014b).

## **2.8 Indonesian Blue Economy**

In response to the growing acceptance of its own challenges in terms of fisheries sustainability and industrialisation of the industry, then President Susilo Bambang Yudhoyono announced plans to adopt a Blue Economy policy to complement fisheries industrialisation policy. Yudhoyono made the announcement at the Rio+20 conference in Brazil in June 2012, where the president campaigned for global implementation to achieve “Sustainable Development Goals”. Despite the international announcements and promotion of the adoption of the Blue Economy, the government did not issue any laws or regulations relating to the Blue Economy policy. MMAF did publish several books about the Blue Economy and plans for its implementation in Indonesia (DEKIN 2012; MMAF 2014b; MMAF n. d.).

MMAF (n. d.)’s Blue Economy is closely aligned to Pauli’s. In 2012, the government signed a Memorandum of Understanding (MoU) with Pauli to apply his specific Blue Economy concept in a pilot project based in Nusa Penida in 2012, which involved Pauli analysing the region’s potential and producing a report of recommended actions for the government (MMAF 2012a). Pauli proposed five possible programs that identified investment opportunities in fisheries, implementation of a Blue Economy model in business and investment development, human resource development, communication of Blue Economy principles to the public, and promotion of further international cooperation in implementing Blue Economy (Purwoseputro 2013).

MMAF defined its Blue Economy as “based upon the principles of sustainable development, including optimising social capital inclusiveness, resource efficiency through innovation, and minimising waste towards achieving economic growth, social welfare, and protecting the environment”. This definition is accepted for the purposes of this research (n. d.).

Act No. 17/2007 relating to the National Long Term Development Plan is used to develop Indonesian Blue Economy principles (Purwoseputro 2013). It has 5 pillars: ocean culture, ocean governance, maritime security, ocean economy, and the marine environment. The pillars of ocean economy and marine environment contain most of the commonly agreed principles of Blue Economy. The document promotes the mimicking of natural ecosystems by providing services and products for human use without degrading the environment. Indonesia's Blue Economy aims to support a sustainable and competitive business framework based on innovation to achieve social equity and environmentally friendly goals (MMAF n. d.). The essence of the Indonesian concept is to give equal access to all stakeholders in fisheries activities to promote new business opportunities including the aquaculture sector in a sustainable manner (Haryadi and Kristanto 2013). According to MMAF (2014b), Blue Economy concepts, particularly zero waste, would be ideal for implementation in tuna fishing, tuna fish processing and seaweed farming. This is achieved by producing derivatives goods that generate further profits, and include the involvement of private sectors (MMAF 2012c). Indonesia had earlier adopted some policies compatible with Blue Economy concepts that were incorporated into the Blue Economy policy adopted in 2012. At APEC in October 2010 MMAF announced plans to establish several MPAs and to implement fisheries management through international collaborations, such as the Regional Fisheries Management Organisation (RFMO) to sustain capture fishing. This included the signing of an agreement for a Coral Triangle Initiative on Coral Reefs Fisheries and Food Security (CTI-CFF) in 2009 between Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste (the Coral Triangle 6 or 'CT6'). As part of the agreement MMAF initiated tagging, cold chain systems, monitoring and livelihood enhancement programs to sustain tuna fisheries (MMAF n. d.).

MMAF developed a Blue Economy road map 2013-2025 comprising three stages of implementation. In 2013-2014, a Blue Economy Pilot Project would be completed, in 2015-2019 an acceleration and expansion stage would extend the project to other regions in Indonesia, and lastly in 2020-2025 full implementation across the archipelago would be implemented in order to achieve resource sustainability and stable economic growth (Sutardjo n. d. ).

The National Blue Economy Strategy aimed to improve human resources; marine and fisheries food security; productivity, production and competitiveness; and value-add

through product diversification (DEKIN 2012). These aims were to be achieved through improving fisheries business and conservation practices, ensuring quality assurance mechanisms met international standards, implementing zero waste and enhancing marketing practices (DEKIN 2012).

Sunoto (2013), the manager of Blue Economy development at MMAF, reiterated these aims but included explicit commitments to community accessibility to natural resources and social equity. These commitments are reflected in MMAF's Blue Economy implementation plan as depicted in Figure 2.8 below (MMAF n. d.).

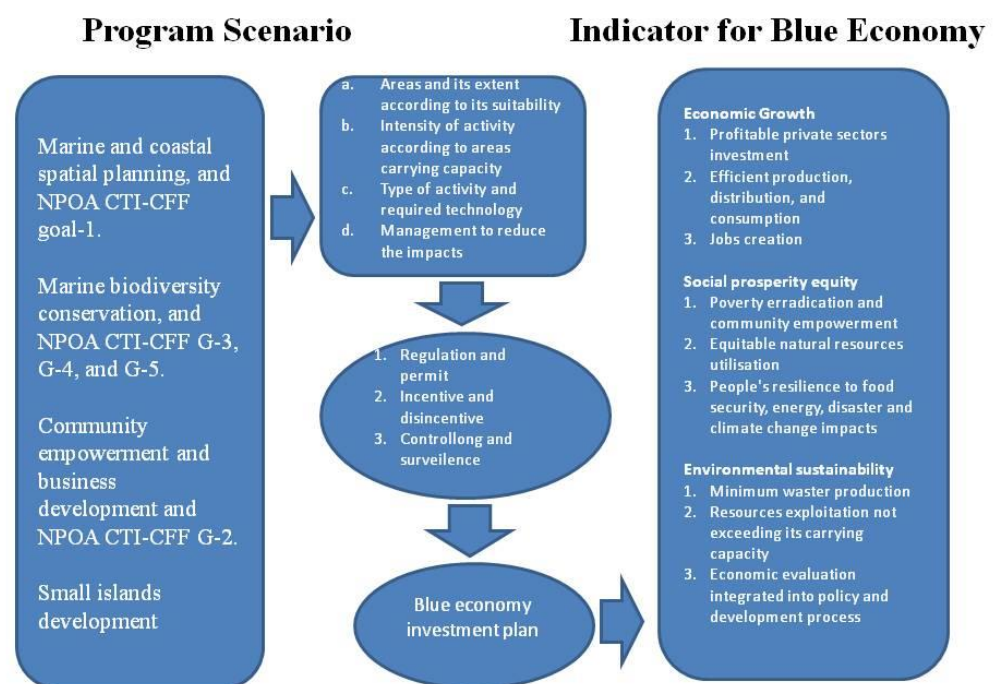


Figure 2.8 Implementation plan for Blue Economy Policies in Indonesia (MMAF n. d., p. 18)

From Figure 2.8 (above) it is clear that policy instruments being used in Blue Economy Policy implementation are; a market based approach, community engagement, and conservation. As with the government's fisheries industrialisation policy, increasing production is also the primary objective of its Blue Economy policy.

In 2012, MMAF announced a number of key locations for Blue Economy development in Indonesia, first and foremost in Nusa Penida and Cilacap, as well as in Lombok and Batam (MMAF n. d.). Nurhayati (2013) conducted a basic literature review which was very positive about the potential for Blue Economy policies in the country, including on community livelihoods, welfare, and also for its multiplier effect

economically on various fisheries actors including fishers, fish farmers, seaweed farmers, tourism industry workers, and workers in other services business related to fisheries sector.

### **2.8.1 International Links**

In addition to the major collaboration with Pauli in Nusa Penida and the French Government in Cilacap (detailed in section 2.9), the Indonesian government has signed agreements with a number of other foreign governments to establish cooperation in implementing Blue Economy practices, including with China, the United States, France, and the Netherlands. FAO has also committed to investing funds to enhance Indonesian Blue Economy programs in research cooperation, investment, and technical assistance areas.

Indonesia and China established an Indonesia-China Center for the Ocean and Climate (ICOOC) on 22 March 2012. As part of this partnership, the Chinese government has committed to contribute AU\$125.8 million for a five year program including economic research and education related to fisheries sustainability, climate change, food security and other development sectors. In one program involving deep sea exploration, China has also committed to provide research vessels to Indonesia (Antara News 2012). Yet Indonesia is also a key destination for China's distant waters fleet (DWF), which shows the strategic importance of Indonesia's marine resources for China. Currently, there are 17 Chinese fishing companies in Indonesia, and around 400 vessels – amounting to a total investment of around AU\$ 855.8 million (Hongzhou 2015). There are also a large number of cases of IUU fishing by Chinese fishermen in Indonesian waters, with 75 Chinese fishermen being detained in one incident in late June 2009 for illegally fishing in Indonesian waters (Goldstein 2009).

The United States Agency for International Development (USAID) has cooperated with MMAF to develop a 5 year joint operation under the US-Indonesia Comprehensive Partnership to address two issues: sustainable fisheries application and climate change, supporting Indonesian Blue Economy implementation (Bauer 2012; USAID IMACS 2012b). The US government has committed to spend AU\$37.2 million involving collaboration between several US organisations including the University of Rhode Island, the US National Oceanic and Atmospheric Administration, the Indonesian Marine and Climate Support Agency (IMACS) and the Marine Protected Areas Group (MPAG). The program includes human resource development, fish stock data collection,



policy development, community development, law enforcement, and technical assistance in implementing sustainable fisheries utilisation and climate change adaptation (USAID IMACS 2012a, 2012c). One of the programs highlighted is the development of the Indonesian-Climate Adaptation Tool for Coastal Habitats (I-CATCH). West Lombok, West Nusa Tenggara was the site of the project's implementation (USAID IMACS2012b). IMACS had four primary goals, including advising MMAF senior officials in international meetings, assisting officials in preparing papers and drafts for international activities, assisting coastal communities in adapting to climate change, and conducting campaigns and events to promote sustainable fisheries (USAID IMACS2012b).

In May 2014, The Netherlands, through Wageningen University and Dutch businesses, committed to support a three year Blue Economy/ blue growth project called “fish and aqua Indonesia” in both the capture fishing and the aquaculture sectors. The project is valued at AU\$6.3 million (Antara News 2014) and focuses on the availability and safety of fish products (Government of the Netherlands 2013; Wageningenur 2014).

FAO has also established a program of collaboration with MMAF for the implementation of Blue Economy concepts in the East and Central Lombok regencies in West Nusa Tenggara (NTB) from 2014-2018. The parties have agreed to implement various programs related to fisheries including capture fishing, fish farming, energy, tourism, salt and the pearl industry. It is expected that this program will create 77,000 new jobs, and generate income of about AU\$153.94 million per year (Soesilo 2014; FAO 2014a). The World Bank has also agreed to invest in this FAO-MMAF Blue Economy project in Lombok (Harian Terbit 2015).

Indonesia has promoted its commitment to implementing Blue Economy policies in international meetings such as at the Asia-Pacific Economic Cooperation (APEC), Regional Fisheries Management Organisation (RFMO), Coral Triangle Initiative on Coral Reefs Fisheries and Food Security (CTI-CFF) and the Global Oceans Action Summit for Food Security and Blue Growth in the Netherlands. In particular, Indonesia has highlighted its policy successes in the form of MPAs, international collaborations and actions against Illegal, Unreported and Unregulated (IUU) Fishing (MMAF n. d.).

However, despite a healthy global interest and Nurhayati's (2013) positive view of the potential for Blue Economy policies in Indonesia, this was not followed by any further research on whether this potential had been realised. Little research has been

published to explore the current state of implementation of Blue Economy concepts and their impact globally. Researchers in China have suggested there may actually be potential negative impacts as a result of the implementation of the Blue Economy policy in their country, including potentially increased pollution from aquaculture and infrastructure development in key Blue Economy implementation areas (Liu et al. 2012; Liu and Chen 2013; Pengfei n. d. ; Song et al. 2012). In Indonesia, anecdotal accounts indicate that Blue Economy principles have been successfully implemented in small-scale and often private industry sponsored projects, such as integrated seaweed processing and fish and rice farming in East Java (Paravino 2015). However, there is little research regarding the implementation of the principles on a national scale and this makes small - scale evaluations particularly valuable.

The small-scale projects that have been documented include Mira et al. (2014)'s description of three small examples in Brebes District, Central Java. In the first example, an integrated fisheries and poultry system was implemented, in which chicken faeces were utilised to accelerate growth of phytoplankton ponds which act as a natural feed for fish in the pond, which can then be sold or consumed. In the second example, a policulture system involving seaweed, milk fish and shrimp was implemented, with fish and shrimp faeces providing a nutrient source for seaweed farming, while the seaweed provides oxygen and a refuge for fish and shrimp from predators. In a third example, a business was created to make fish chips and shredded fish from fish waste including fish skin and bones. Zulham et al. (2013) described a similar 45-day Integrated Multi-Trophic Aquaculture (IMTA) project between crabs, milk fish and seaweed in Aceh. Problems in extending the initiative include lack of investment and lack of skills. These innovations are reported to have increased farmers' income from AU\$ 80 to AU\$ 120 a month and have reportedly generated further employment (Zulham et al. 2013).

Paravino (2015) owns a seaweed processing factory in Surabaya and described a reduction in use of chemical materials and water, utilisation of pond waste as fertiliser including mud and seaweed insoluble fiber, and re-use of treated water for rice paddy irrigation as Blue Economy initiatives but said considerable subsidies were necessary to make such practices profitable. Wijaya et al. (n. d. ) research about the implementation of Blue Economy concepts in a fishing community in Raja Ampat, Papua, Indonesia, described the use of environmentally friendly fishing gear, zero waste production and the

implementation of ecotourism. However, the study did not identify socio-economic impacts.

In a fourth example, a stakeholder analysis was used to find out the best policy option for Blue Economy implementation in tuna fisheries in Padang, West Sumatera. This research identified four important recommendations, namely to reduce the number of tuna juveniles caught, improve social cohesiveness between stakeholders to manage fisheries resources, further develop the industry and implement zero waste principles, including re-using the tuna waste from processing activities to produce fish powder (Purbani et al. 2013).

Unlike fisheries industrialisation, with its longer history and published economic successes, MMAF has not published similar reports on the implementation and impact of its Blue Economy policies. There is a clear need for further research into whether Blue Economy principles have been implemented and whether they had mitigated the negative impacts of Indonesian fisheries industrialisation and achieved their social policy successes.

## **2.9 Major Sites of Fisheries Industrialisation and Blue Economy Policy Implementation**

### **2.9.1 Cilacap, Central Java**

Indonesia and France signed cooperation agreements in 2012, due to expire in 2016, to assess the possibility of building an eco-port (an environmentally friendly fishing port) in Cilacap, and to develop a model of the tuna population in Indonesia. This was part of the Infrastructure Development of Space Oceanography (INDESCO) project funded by the French Agency for Development (AFD) (MMAF 2012b; AFD 2013; MMAF 2013e). The French government provided a soft loan for the INDESCO implementation of AU\$ 32.2 million for fisheries management activities including monitoring fish stock and IUU fishing through satellite data implementation (MMAF 2012b).

According to MMAF (2014b), Blue Economy concepts are ideal for implementation in tuna fishing and tuna fish processing and these are two of Cilacap's key industries. Kusumastanto (2012) suggested that Blue Economy concepts could be implemented in tuna capture fishing through the use of solar cells, solar refrigerators, electronic log books and electronic fish aggregating. According to Antara News (2012),

Indonesia had already begun work on the development of a prototype of an environmental friendly fishing boat using solar panels as the source of energy as part of its Blue Economy implementation.

Cilacap regency is located in Central Java, Indonesia (see Figure 4.1). Its total area is about 225,000 hectares (or roughly 6.9% of the total area of Central Java). Cilacap which consists of 24 districts, 269 villages and 15 sub-districts (*kelurahan*) (Cilacap District Government n. d. ; BPS 2014a). It faces the Indian Ocean (Cabinet Secretariat of Republic of Indonesia 2014).

Cilacap's total population in 2013 was an estimated 1.7 million people, with population growth of ~ 0.3% annually since 1993. The most densely populated area of Cilacap is in the regency's south, where the density is about 8.6 people/km<sup>2</sup> (BPS 2014b). According to data from Statistics Indonesia (BPS 2015a) the poverty rate in Cilacap has decreased from 18% in 2010 to 15% between 2010 and 2013. The total number of households living in poverty in 2013 was 255,000 people – down from 397,000 in 2010 (see Figure 2.9).

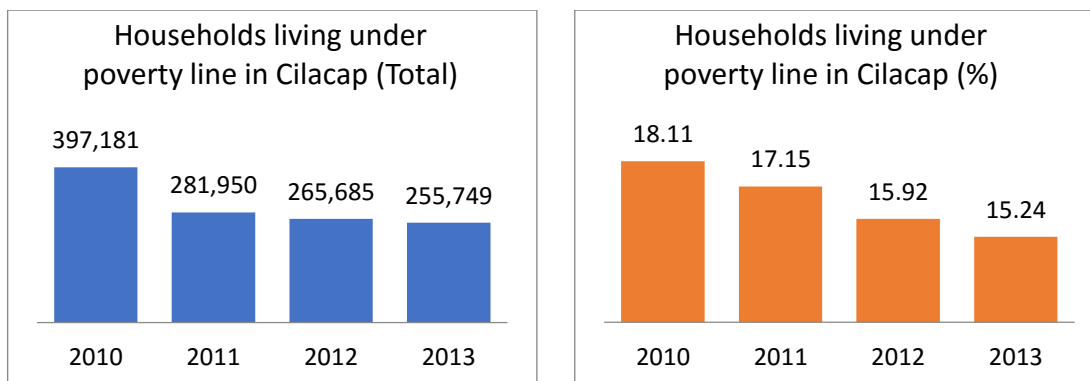


Figure 2.9 Number and percentage households living under poverty line in Cilacap (BPS 2015a)

Further data provided by Asih (2015) (see Figure 2.10) shows poverty in South Cilacap specifically has also declined in the 2009-13 period. However, Asih (2015) reported that the decline had followed a dramatic increase in poverty in the area between 2004 and 2006 from 13% to 22% which means that there has been an overall increase in poverty since 2005.

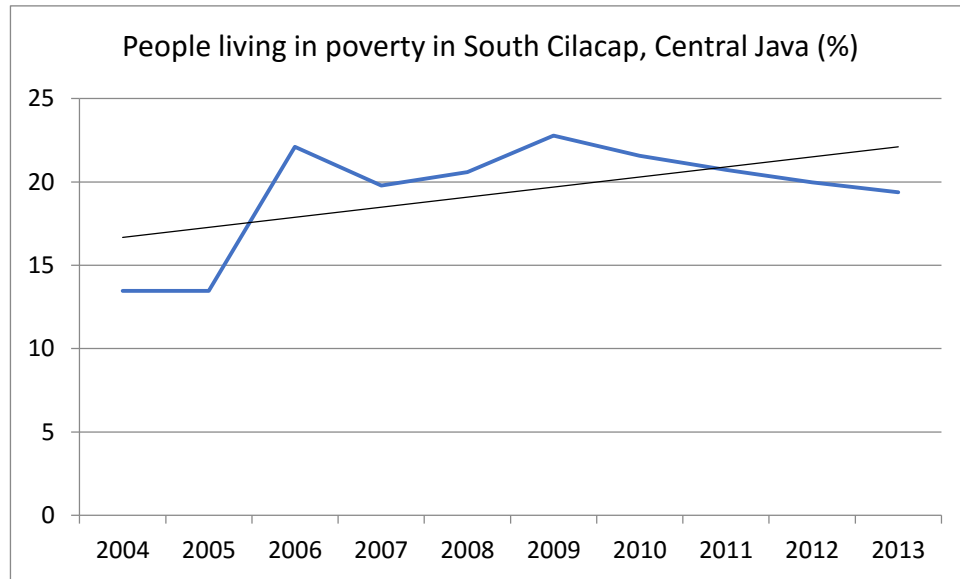


Figure 2.10 Percentage of People Living in Poverty in South Cilacap, Central Java

Source: modified from (Asih 2015, p. 79)

Javanese culture has influenced Cilacap fishers' practices. Sutyono (2014) stated that the Javanese community in Cilacap still practise their old religious and cultural ceremonies and celebrations including *nyadran* or *sedekah laut* (offering to the sea) at the beginning of Ramadhan every year. The local fishers believe in mystical powers (goddesses or ghosts), particularly the Queen of the South Sea (*Kanjeng Ratu Nyi Roro Kidul*) (Munawaroh 2012). In Pekalongan, Central Java local fishers celebrate *nyadran* (*sedekah laut*) by offering part of their harvest yield and a buffalo head to the sea as a symbol of gratitude to the mystical powers for providing opportunities for harvesting the sea's resources and influencing their safety while fishing (Sartini 2012).

Fisheries is one of the most important economic drivers for Cilacap as one of the biggest contributors to Central Java Province's fisheries production (see Figure 2.11 and Figure 2.12).

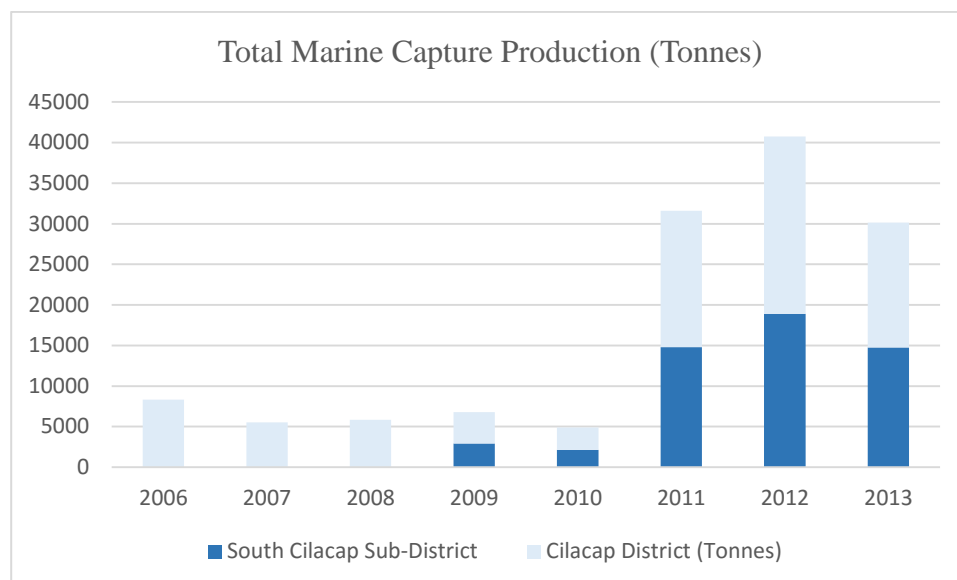


Figure 2.11 Total Marine Capture Production (Tonnes) (BPS 2014b; BPS 2014c)

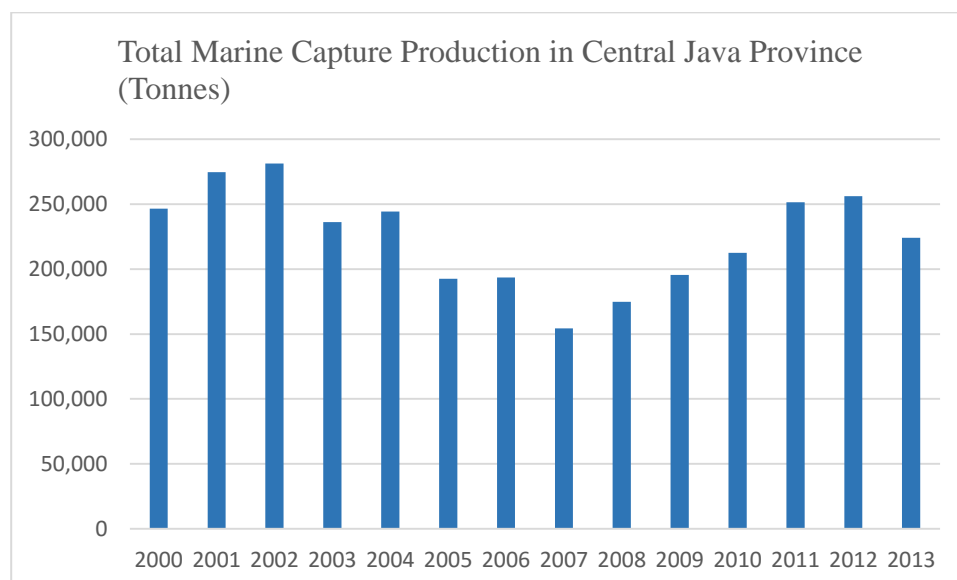


Figure 2.12 Total Marine Capture Production in Central Java Province (Tonnes) (BPS 2014c; MMAF 2013c)

The Cilacap Ocean Fishing Port is located in South Cilacap (Figure 4.1). In 2013, South Cilacap had a population of 78,175 people. The majority of residents were high school graduates, contrasting with the regency as a whole where the majority of residents had not completed a high school education. The number of people who live in poverty was 5,101 in 2008, or 6.5% of the total population (BPS 2014b).

#### 2.10.1.1 Tuna Capture Fisheries in Cilacap

Cilacap has about 5,200 km<sup>2</sup> of fishing grounds. The total number of fishermen was about 33,000, with 10,367 fishers in the South Cilacap District and 7,218 in PPSC in

2013. There were 4,500 fishing vessels. The most common types of vessels to catch tuna in PPSC are long-line, handline, gillnet (see Figure 2.13 for the total number of gill net fishers) and a small number of purse seine.

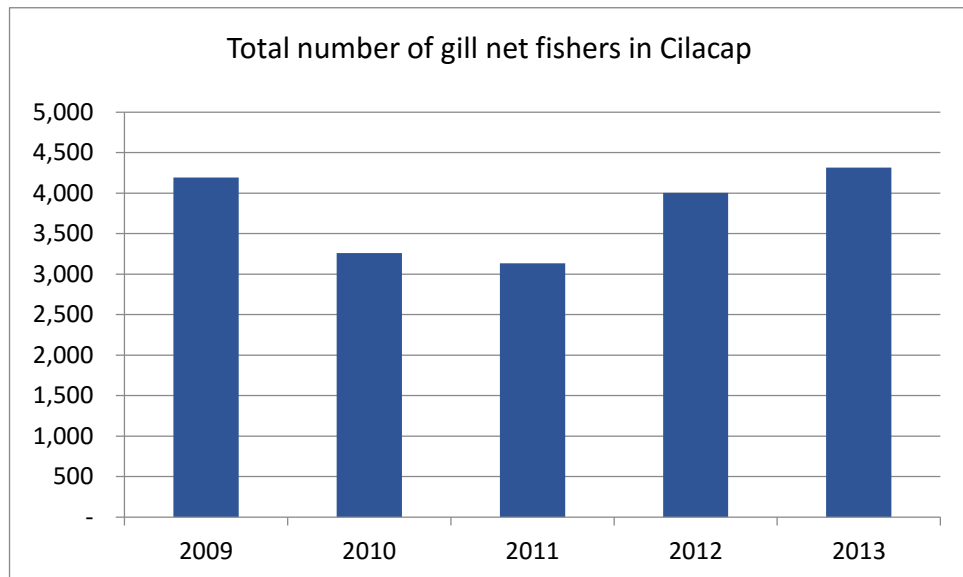


Figure 2.13 Gill Net Fishers in Cilacap (Cilacap Ocean Fishing Port 2012, 2013)

The most common species caught are: yellowfin, albacore, bigeye, southern Bluefin Tuna (SBT), skip jack tuna, and bonito (Cilacap Ocean Fishing Port 2013). Tuna fishing grounds for Cilacap fishers are in the Indian Ocean between latitude 9° and 11° south and longitude 107° and 111° east (see Figure 2.14) (Widodo et al. 2011; Proctor et al. 2003).

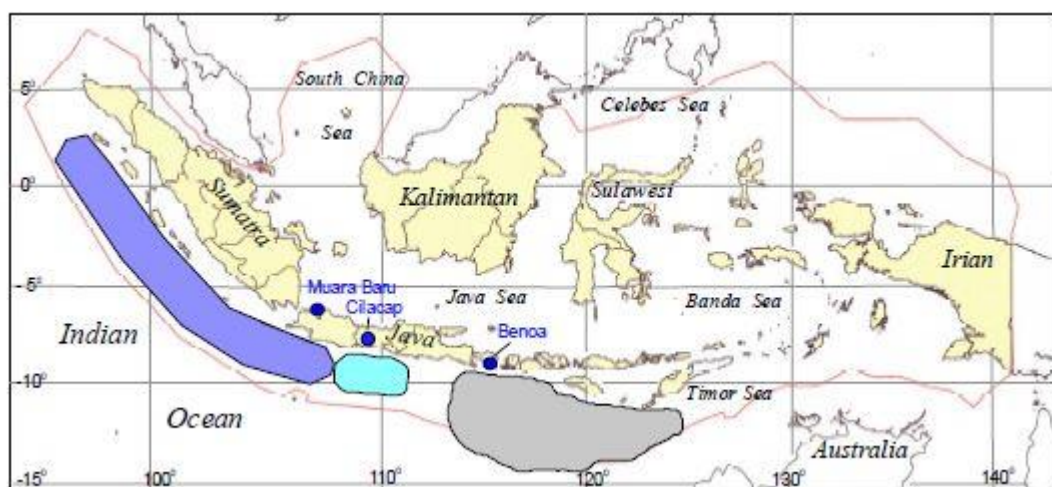


Figure 2.14 Tuna Fishing Grounds and the one used most by Cilacap Fishers (in light blue, darker blue is for Sumatran fishers including Bungus Padang, and grey is for fishers based in Bali) (Proctor et al. 2003, p. 22)

Cilacap's TTC production for the period 2005-2013 is shown in Figure 2.15. While there was a marked increase in production in 2011 after a severe dip in 2010, production has again suffered a substantial decline in 2012-13, nearing pre-2005 levels, despite the reported increase in fishing effort in the area through the use of FADs and purse seine gear. Similar statistics were also published for the Indian Ocean under the Java Sea-Regional Fisheries Management (WPP 573). According to MMAF (2014e), the total catch of large pelagic fish, including tuna, decreased in 2011-2012 from 214,039 tonnes to 154,015 tonnes in 2012. Small pelagic fish, including skipjack tuna and bonito production, has decreased drastically since 2009 to 2012, from 198,361 tonnes to 119,579 tonnes, respectively.

Skip jack tuna production in Cilacap has always exceeded big tuna production. In total, the highest production for TTC landed in PPSC was in 2006 which was 5,630 tonnes. It decreased dramatically to 1,696 tonnes in 2010 then increased again until in 2011 reaching 4,407 tonnes (lower than the highest production in 2006) and then decreased again until 2013 to 1,955 tonnes. The reasons for this variation in numbers over the specified period are not clear from the literature, as noted by Proctor et al. (2003). However, Cilacap Ocean Fishing Port reported a poor fishing season in 2010 due to bad weather (Cilacap Ocean Fishing Port 2013).

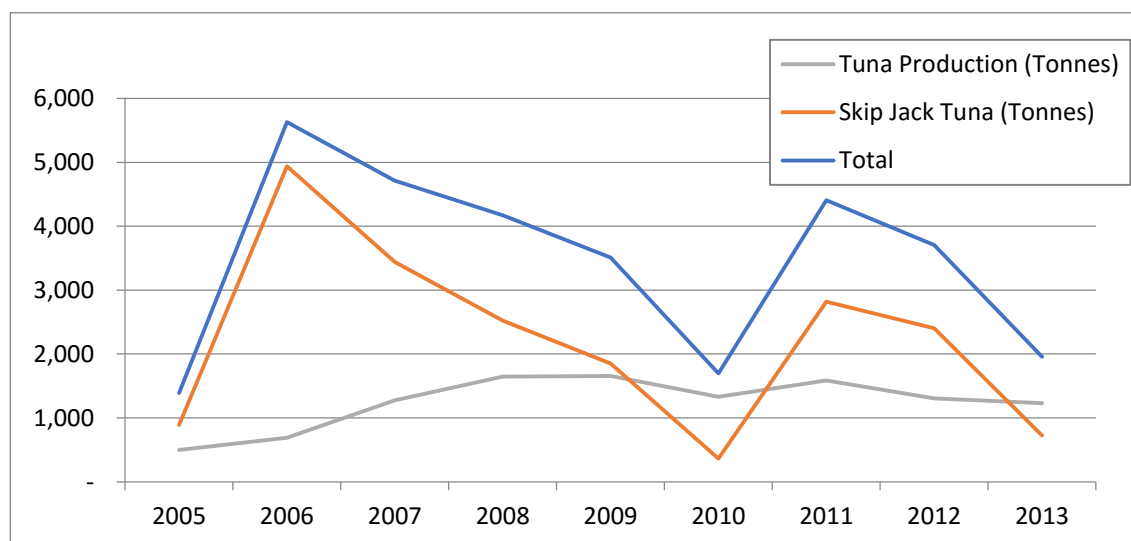


Figure 2.15 Total Tuna and Tuna-like Species Production in Tonnes in PPSC, Cilacap 2005-2013 (Cilacap Ocean Fishing Port 2013)



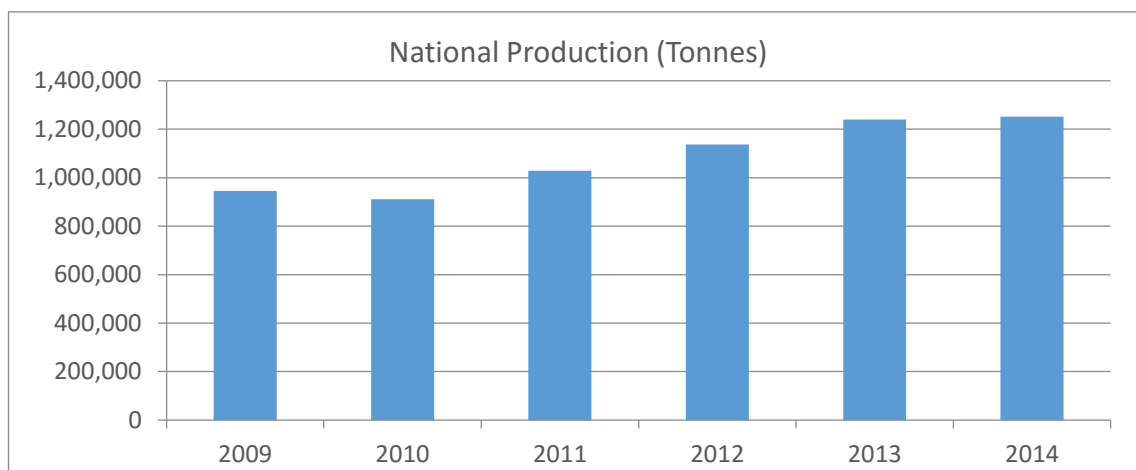


Figure 2.16 TTC National Production

Source: Pusdatin MMAF 2009-2012

PPSC's TTC declining production contrasts with the national upwards trend in TTC production, which has been increasing since 2010 (see Figure 2.16 and Figure 2.16). General marine capture production in Central Java shows an increasing trend from 358,000 tonnes (value at AU\$ 280 billion) in 2009 to 618,000 tonnes (value at AU\$ 690billion) in 2013 according to BPS 2015b). In contrast, the marine capture production in the Cilacap district has been decreasing from 16,600 tonnes in 2011 and 21,800 thousand tonnes in 2012 down to 15,400 tonnes in 2013 (BPS 2014b; BPS 2014a). Environmental degradation has been reported in Cilacap's coastal areas including over-exploitation and pollution from industries which degrade the water quality, these may have contributed to this decrease (Paw and Chua 1991).

Additionally, fishers are increasingly competing with larger vessels and increased FADs within their fishing grounds. According to Proctor et al. (2003) and Atmaja et al. (2012), the areas in which Cilacap's medium-scale fishers, purse seine and FADs operate in the Southern Indian Ocean are overlapping between latitude 9° and 11° south and longitude 110° and 111° east (see and compare Figure 2.14 and Figure 2.17).

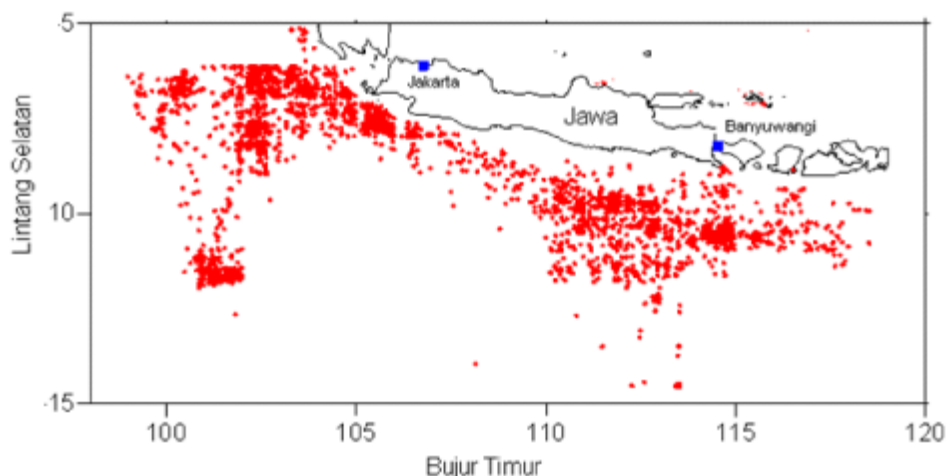


Figure 2.17 Plotted estimations of haul position of purse seiners and their FADs in Indian Ocean based on VMS data (Atmaja et al. 2012, p. 74)

Fisheries facilities in Cilacap include an Ocean Fishing Port with docks for fish catch unloading, a prawn auction, and a rural fishers' cooperative (Mino Saroyo) which manages the fish auction and pre/post-harvest services. The area also has five ice factories with a capacity of approximately 236 tonnes, and 3 cold storage facilities of 75 tonnes capacity. MMAF (2009) reported that in PPSC there were 30 factories in total involved in processing, marketing and other fisheries related business.

Cilacap is one of the primary “tuna-tongkol-cakalang” or tuna-bonito-skipjack tuna (TTC), production centres in Indonesia. This district has been identified by MMAF as the center for tuna landing along with five other exemplars for fisheries industrialisation policy implementation, including Bungus Ocean Fishing Port (Padang, West Sumatera), Nizam Zahman Ocean Fishing Port (Jakarta), Pelabuhan Ratu Archipelago Fishing Port (West Java), Bitung Ocean Fishing Port (Sulawesi), and Ambon Archipelago Fishing Port (Maluku) (MMAF 2013b).

Saputra et al. (2011) reported that the decrease in Cilacap's catch has been occurring since 1997 and may make tuna fisheries businesses unviable because overfishing requires longer travel distances to fishing grounds, while petrol prices and operational costs in general are increasing.

Several other studies raise concerns regarding status of tuna resources in Cilacap. Sibagariang et al. (2011) reported that the tuna fisheries exploitation rate in Cilacap has reached 85.1%. This exceeds the sustainable exploitation rate agreed by the Code of Conduct for Responsible Fisheries (CCRF) (about 80% maximum). This means that tuna

fisheries in Cilacap are probably overfished and Sibagariang et al. (2011) advised that there should not be any new effort in exploiting tuna resources in these fishing grounds.

Proctor et al. (2003) additionally reported that even the juvenile catch had sharply declined since the 1990s, which he argued was a concerning indication that stocks were being overfished. Cilacap Ocean Fishing Port statistics, however, show huge fluctuations in juvenile catch between 2005 and 2012 as shown in Figure 2.18 below. It is unclear whether these fluctuations were due to stock fluctuations or data inaccuracies during the period.

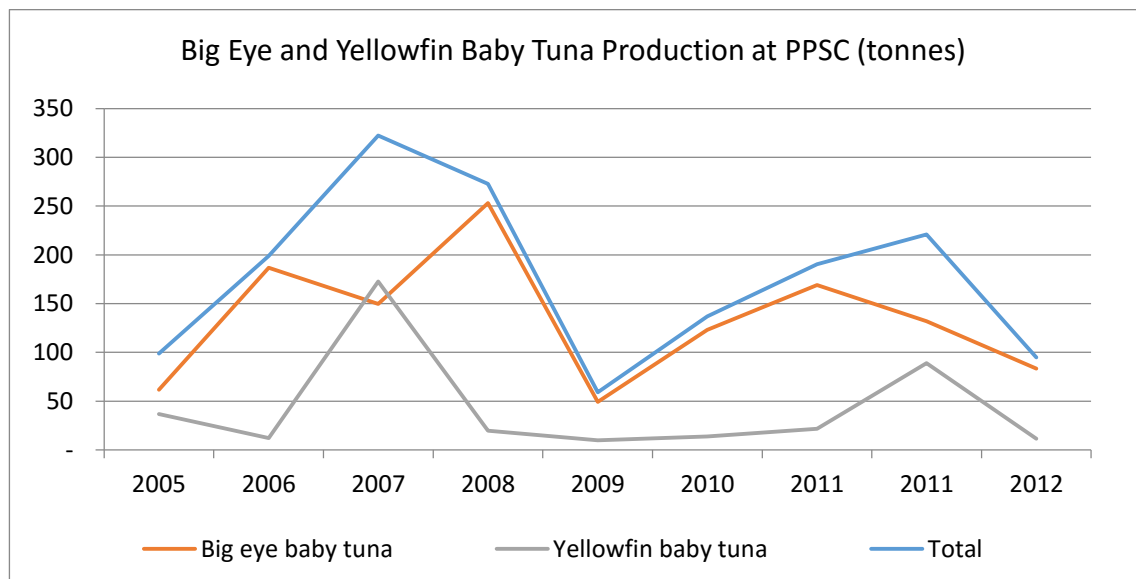


Figure 2.18 Big Eye and Yellowfin Baby Tuna Production at PPSC (Cilacap Ocean Fishing Port 2013)

Since 2001 many fishers, particularly long liners, have chosen to land their tuna in Pelabuhan Ratu fishing port in West Java as it is closer to Jakarta and the international airport (Mertha et al. 2006). The landing of fish outside the Cilacap area is an opportunity lost for additional economic growth in Cilacap from fish landing, processing and marketing processes. Other areas, for example Malang in East Java, have been experiencing similar problems Nur et al. (2015).

Southern bluefin tuna (SBT) production has increased in recent years according to statistics published by (Cilacap Ocean Fishing Port 2013) from the very small number (five individual SBT) caught in 2001-2002, as reported by Proctor et al. (2003) (see Figure 2.19).

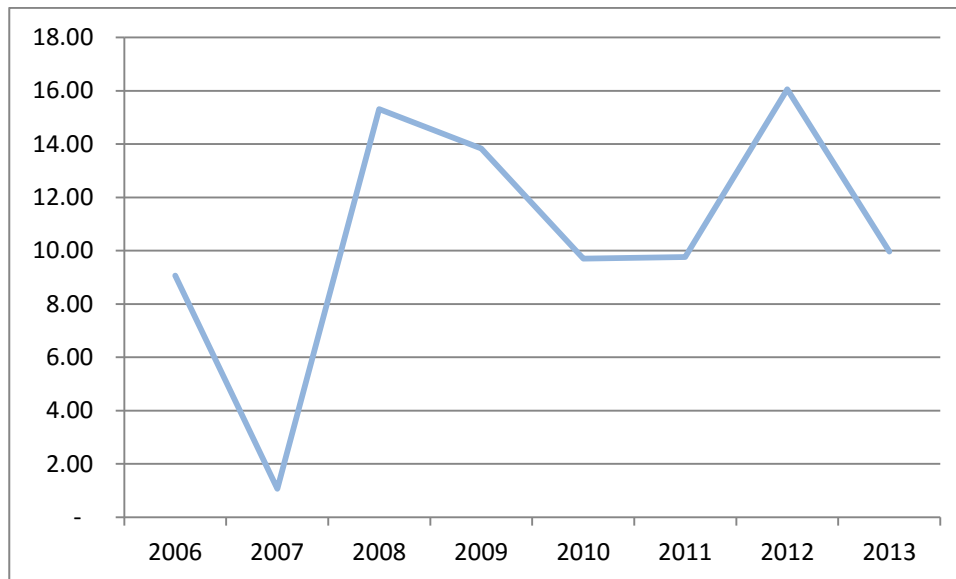


Figure 2.19 Southern Blue Fin Tuna (SBT) Production at PPSC (tonnes)

Source: modified from (Cilacap Ocean Fishing Port 2013)

Though research has been limited, some studies have revealed signs of the ineffectiveness of several of the government's fisheries policies in Cilacap. Hendratmoko and Marsudi (2011) interviewed about 80 fishers using purposive sampling and found fishers (particularly gillnet fishers) in Cilacap did not feel empowered and lacked the opportunity to access credit or soft loans; technology and extension programs; market information; or training from government. They found that most fishers had learned their skills from their parents, with few claiming to have learned through extension programs or books and that in Cilacap, private business had played a far greater role than local government in fisheries development. Hendratmoko and Marsudi (2011) found that fish processors however, were satisfied with the government's development of fisheries infrastructure in the port.

Cindy Soewarlan et al. (2005) also identified a number of handling and hygiene issues negatively affecting the quality of fish at PPSC including placing fish directly on the ground, washing using sea water taken from the jetty area causing bacterial contamination, no sorting process to separate old and fresh fish and that the unloading process was conducted at an unsafe temperature.

However, since 2012 implementation of fisheries industrialisation policies in Cilacap, have included enhancement of port facilities such as the dock, buildings, parking area, electricity improvements, a waste treatment installation, and road improvements, at a total cost about AU\$3.8 million. Beside these infrastructure projects, since 2012-13

Cilacap has also been involved in several programs, including the Development of Village Marine Related Businesses (PUMP) provided to 22 groups of fishers, land certification, 5,000 fishers identification (ID) cards, boat rehabilitation, donation of six boats (under 3GT), rice donations, subsidised petrol, training, clean water treatment and cold chain infrastructure (Cabinet Secretariat of Republic of Indonesia 2014).

Further support provided by government for Cilacap fishers include soft loans (credit with a very low interest rate) including from PUMP, a rural fisher cooperative, and access to rural business credit (*Kredit Usaha Rakyat*-KUR). Besides providing loans to fishers, the rural fisher cooperative also provides social assistance for members, including rice in hard seasons (*masa paceklik*), funeral and medical assistance and work accident compensation, training, and sponsorships for fishers' feast days. Government has also provided fishers with two low-rent apartment blocks (Cabinet Secretariat of Republic of Indonesia 2014).

#### **2.10.1.2 Tuna Fish Processing Industries**

Fish processing facilities are important to the Cilacap fisheries industry. According to DKP2SKSA (2012), in 2012 fish processing employed 1,241 people. The fish processors sector in South Cilacap consists of 1 canning factory, 1 freezer provider, 92 salt fish factories, 12 *pindang* makers, 1 smoked fish factory, 6 fermented fish, and 9 cold storage providers.

#### **2.9.2 Nusa Penida, Bali**

As part of the cooperation between Gunter Pauli and MMAF, a pilot project in Nusa Penida started in 2012. The slogan for this intervention was: “the realisation of creative and innovative economic growth and development based on a clean and sustainable marine and fisheries industry by involving community and business” (Sutardjo n. d. ; MMAF 2012a). It involved a plan to be developed by locals with multi-ministerial collaboration and the inclusion of private institutions to identify zoning issues; a master-plan for transportation infrastructure, telecommunications, clean water and energy; an environmental impact assessment by the Environment Ministry; a business plan by central and local government with investment promotion both nationally and internationally, and service improvements particularly for the gaining of investment permits. As part of the 2013 MoU, Pauli proposed 38 Blue Economy activities, and 9 project proposals to the Indonesian Government. Specific areas for activities such as

marine ecotourism, seaweed farming and fisheries were to be investigated for the development of a Blue Economy in Nusa Penida (see Figure 2.20).

In terms of marine ecotourism, plans involved further development of Nusa Penida's marine tourism attractions through development of water sports and other multiplier businesses including hotels, villas, restaurants and art shops (Sutardjo n. d. ).

Seaweed development was highlighted as one of the centerpieces of the Blue Economy pilot project's implementation in Nusa Penida. In addition to seaweed farming, the plan focussed on developing seaweed processing within the region itself, rather than sending the seaweed to external locations for processing (Sutardjo n. d. ).

To support Blue Economy development in Nusa Penida, MMAF also planned to build a carrageenan factory with a capacity of approximately one thousand tonnes powder production per month. The investment cost was assumed to be approximately AU\$3 million, including the provision of around 2 hectares of land, buildings and machines. This would provide new employment for an estimated 60 people (Sutardjo n. d. ).

Haryadi and Kristanto (2013) proposed integrated seaweed and abalone farming as well as trepang production as additional options to optimise the farm area and nutrients available. The seaweed farming ecosystem in Nusa Penida consists of coral, shells, trepang, Echinodermata, and fish, all of which are suitable for the ecosystem approach in Pauli's Blue Economy. The plan also included implementation of zero waste principles and the inclusion of Nusa Penida's seaweed farming as part of the region's marine ecotourism through visits and tours.

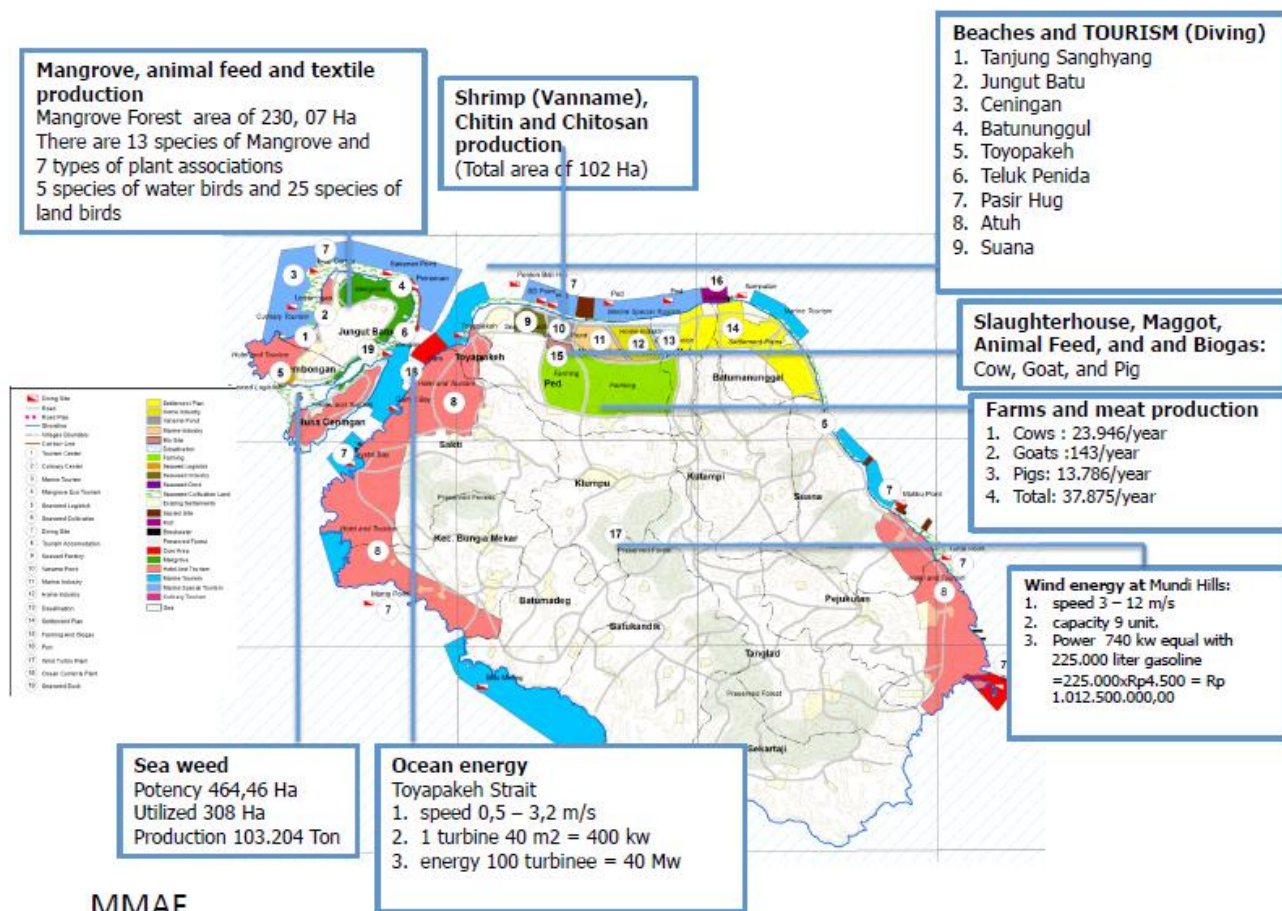


Figure 2.20 Nusa Penida: integrated regional economic development based on Blue Economy business model (Sunoto 2014)

In the fisheries sector, the government committed to the development of bonito, snapper and skipjack tuna fisheries; development of a fish processing industry, including production of fish chips and fish balls; as well as recreational fishing activities (MMAF n.d. ; DEKIN 2012). Other sectors identified as having potential for Blue Economy implementation included shrimp aquaculture; alternative new energy sources such as wind, ocean wave, and biogas; animal husbandry and agriculture (Sutardjo n. d. ).

Nusa Penida sub-district is located in Klungkung District, Bali (see Figure 4.1). It has a total area of 202,840 hectares, consisting of three islands – Nusa Lembongan, Nusa Ceningan, and Nusa Penida. Nusa Penida had a population density of 224 people per square kilometer with a total population of 45,340 people in 2013 (BPS 2014d). The majority of residents in Nusa Penida are of the Balinese ethnic group, while Hinduism is the main religion (Ruchimat et al. 2013).

The primary employment opportunities for Nusa Penida residents lay in the agriculture industry, with the key agricultural commodities being corn, cassava, peanuts,



cows and pigs. Outside of the agriculture sector, employment also exists in the services and tourism sector, particularly relating to diving, snorkelling and mangrove ecotourism. The fisheries sector is also an important source of income for local people, including capture fishing and seaweed farming (CTC 2013a; BPS 2010; BPS 2014d; Sutardjo n. d. ). Commercial seaweed production is a key source of income for local residents, with the main species being Kotoni (*Kappaphycus alvarezii*) and Spinosum (*Eucheuma dentilacum*) (BPS 2013; Sutardjo n. d. ; Welly et al. 2012).

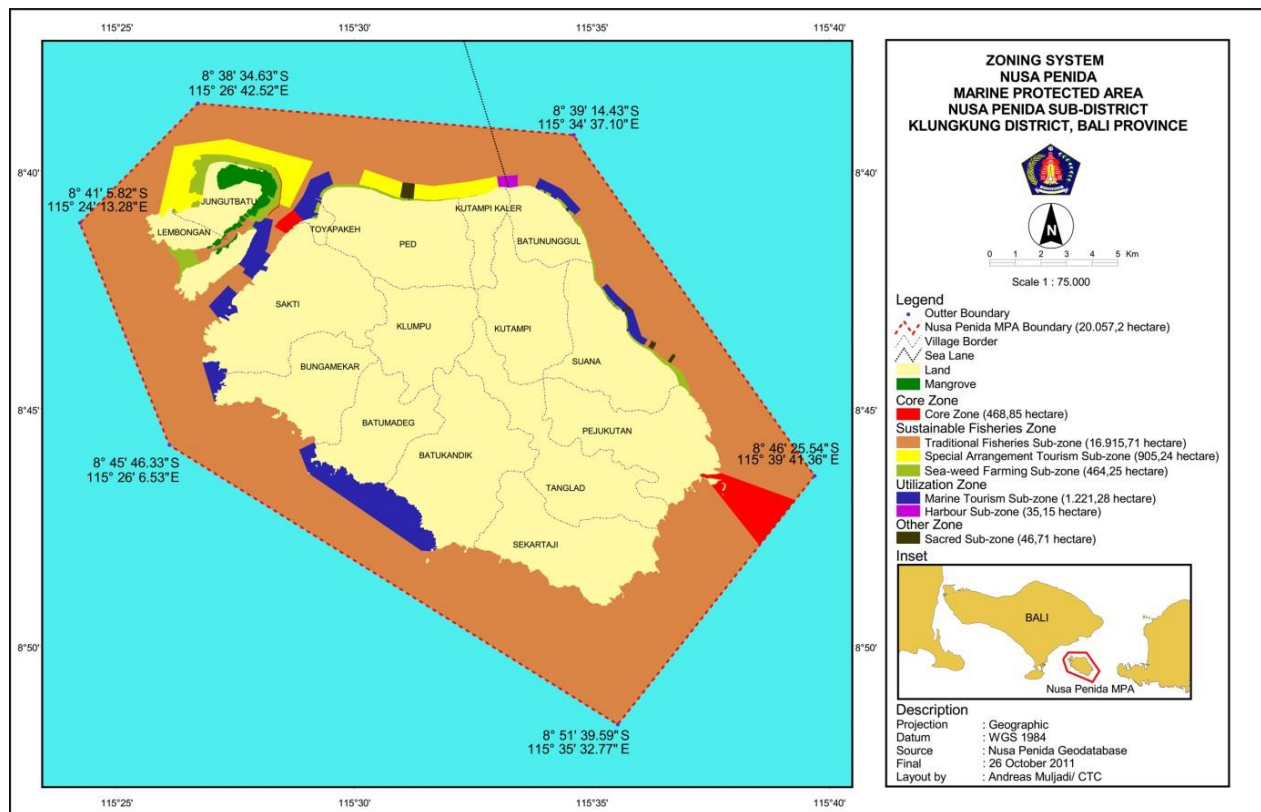


Figure 2.21 Nusa Penida Marine Protected Area (CTC 2011b) (with permission)

In 2010, the Indonesian Government declared 20,057 hectares of the waters around Nusa Penida an MPA (see Figure 2.21) (CTC 2013b). In its report, MMAF mentioned the MPA in Nusa Penida as a Blue Economy example in Indonesia (DEKIN 2012; MMAF 2014b). The MPA was supported by several international organisations, including the Nature Conservancy and Conservation International and formed a key part of the government's Coral Triangle initiative (CTC 2013a; The Nature Conservancy 2007). Each year, the MPA is visited by approximately 200,000 tourists, with diving as their major activity. The main attraction for divers is the coral reef ecosystem, which is home to the popular *mola-mola* (ocean sunfish) and manta rays (CTC 2013b).



The total number of seaweed farmers in Nusa Penida in 2013 was 2,793 and the farming areas covered approximately 144 hectares (see Table 2.4).

Village Name	Total Number of Seaweed Farmers	Total Group Number	Total Farming Area Coverage (Hectare)
Batununggul	379	16	12.8
Suana	660	26	29.3
Ped	701	19	27.2
Lembongan	1,053	35	74.9
Total	2,793	96	144.3

Table 2.4 Demography of Seaweed Farmers in Nusa Penida in 2013 (Klungkung District Fisheries Department 2013)

Seaweed production in Nusa Penida has remained relatively stable over the 2005-2014 period, with the exception of a particularly good harvest in 2013, after which production returned to normal (see Figure 2.22). One News (2015) reported that seaweed production in 2014 in Nusa Penida had decreased by 70% compared to 2013. Although this was attributed to a mass departure of seaweed farmers to the tourism industry, when seen in the context of the previous years' harvests, there was only a minor decrease from the previous decade's production. Nonetheless, farmers have reportedly complained of instability and unpredictability in the industry as a result of natural factors such as the weather.

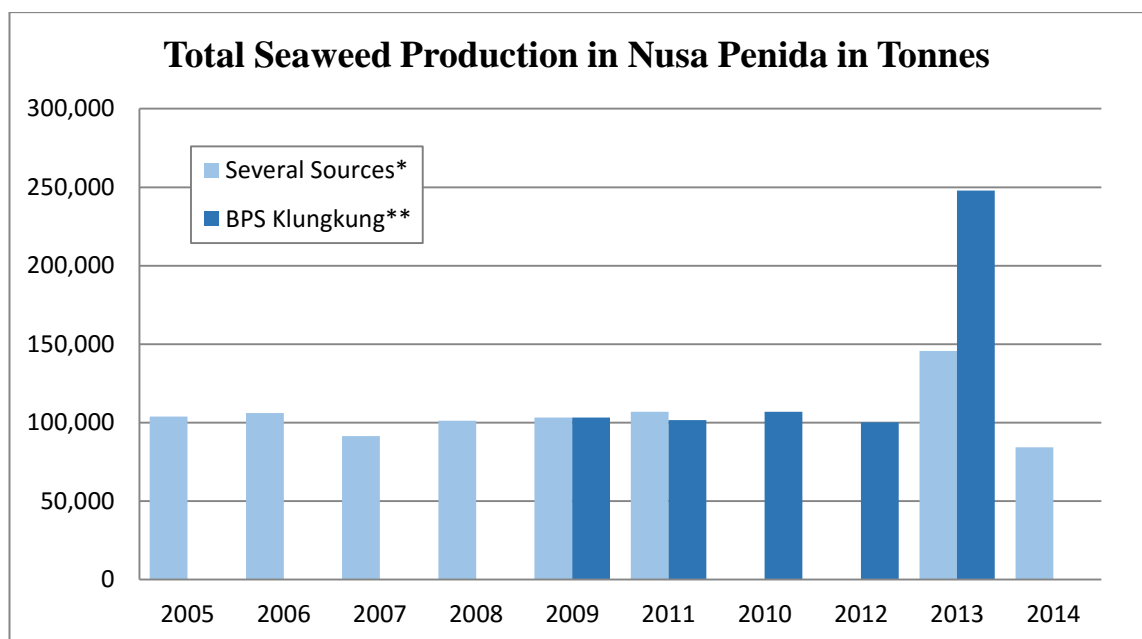


Figure 2.22 Seaweed production in Nusa Penida

Sources: \*(Sutardjo n. d. ; Suryawati and Radiarta 2013; One News 2015)

**\*\***(BPS 2014d)

Suryawati and Radiarta (2013) blamed the 2013-2014 production decrease on bad weather and the prevalence of ice-ice disease which resulted in a commensurate decrease in farmers' incomes. Suryawati and Radiarta (2013) have separately reported on the low quality of Nusa Penida seaweed, which is shown by the high water content (38%), compared to the industry standard of 35%. Drying practices were also identified as a problem, with frequent seaweed contamination from contact with soil. Suryawati and Radiarta (2013)'s research concluded that seaweed farming in Nusa Penida was not sustainable from an ecological, economic, or technical aspect; but did have positive impacts if viewed from a social and legal perspective.

Off-bottom farming techniques (the stake, rope and line method) has been commonly used in Klungkung District, Bali since the 1980's (Sutardjo n. d. ; Welly et al. 2012; Adnan and Porse 1987). Seaweed farming in Nusa Penida is influenced by environmental factors including seasons, heat from sun, wave wind strengths and water temperature. Seed availability has also been identified as a problem in Nusa Penida, as farmers get seed mostly from other farmers, so seed management is not optimal and often leads to the spread of disease. Farmers can generally harvest their seaweed every 35-45 days year round, though harvests are variable throughout. Farmers have reported losing entire crops as a result of poor environmental conditions or disease.

Sulma et al. (2010) identified approximately 363 Hectares areas in Klungkung District suitable for seaweed farming from a Geographic Information System (GIS) analysis of the physical parameters of water for seaweed farming. This indicates there are still considerable opportunities for expansion in terms of the availability of appropriate areas.

Middlemen or seaweed collectors (*cendak/pengepul/kulak/tengkulak*) play important roles in marketing seaweed in Nusa Penida (Achmad 2012; Firdausy, Carunia and Tisdell, Clem 1992). They generally buy directly from farmers during harvest seasons, and then distribute it to larger seaweed collectors in Bali. The seaweed is then transported to Surabaya or Jakarta to be processed and exported overseas. Firdausy and Tisdell (1991) and Welly et al. (2012) noted that some seaweed from Nusa Penida is also taken to Ujung Pandang through Bali, after which it is exported to China, Taiwan, Korea, Japan, Denmark, the US and Singapore.

Local farmers obtain financial capital from formal banks, credit institutions, informal rural financial entities and middle men (tengkulak) (Armiyanti and Nita 2013; Firdausy, Carunia and Tisdell, Clem 1992). In 2014, the Peoples Bank of Indonesia (BRI) provided loans valued at AU\$ 550 to each farmer. In total, BRI loaned AU\$ 450 billion to seaweed framers in Nusa Penida. In addition, BRI also spent about 357.8 million for infrastructure development through its Corporate Social Responsibility (CSR) program in Nusa Penida in that year (Inilahcom 2014).

According to Nurhayati (2009), seaweed farmers' earnings range from 1.5 to 2 million per harvest. However, Welly et al. (2012) put the estimate somewhat lower, reporting incomes in 2012 at around AU\$30 per harvest. Ownership of seaweed farming land is often informal but has commonly been passed through family lines (Suryawati and Radiarta 2013).

While the recent tourism boom in Nusa Penida has offered the potential for alternative livelihoods and other opportunities for local residents, several studies have reported that it has also had a negative impact on local environmental sustainability, particularly from irresponsible tourism activities and destructive fishing (Wardany 2008; Ruchimat et al. 2013). The Coral Triangle Center (CTC), which is fully funded by The Nature Conservancy (TNC), is an NGO that is actively involved in capacity building for local people to manage resources in Nusa Penida, including training to local people, school students, and conservation practitioners from the government. CTC was also actively involved in the Nusa Penida MPA initiation and management (CTC 2011a; CTC 2013b). CTC has started an Environmental Governance Network which involves local and national governments, local NGOs, tourism operators and local residents to support marine ecotourism (Charlie et al. 2013).

### **2.9.3 Other Indonesian Blue Economy Projects**

East Lombok is a planned, but not yet implemented, integrated fisheries-related business initiative, including a lobster aquaculture centre, a culinary centre, a farming centre, a Blue Economy school, seaweed enterprises, a Blue Economy estate, marine industry centre, ecotourism, coastal tourism, a marine bio-energy development centre, artemia production centre, and a festival arena (see Figure 2.23) (MMAF n.d. ). The plan also included the development of modern capture fishing industries for fish species including bonito, snapper, and skipjack tuna. East Lombok has fisheries resources

including lobster, grouper salt, pearl, and seaweed that would be utilised in this program (MMAF n.d. ; DEKIN 2012).



Figure 2.23 Blue Economy estate design, East Lombok, West Nusa Tenggara (MMAF n.d. )

## 2.10 Conclusion

Indonesian fisheries policy necessarily addresses international, social, economic and environmental obligations, threats and opportunities. The impact of policy is methodologically difficult to research but interviews with people who are the implementers, subjects and objects of the policy and whose experiences are considered the exemplars of the policy can provide a credible source of information for monitoring policy.

There is considerable information available about fisheries industrialisation globally and to some extent in the Indonesian context. The literature demonstrates the necessity and motivation for Indonesia's addition of the Blue Economy principles to the long standing series of fisheries industrialisation policies. There is also initial evidence of Indonesia's success in implementing fisheries industrialisation to achieve increased catch and export targets.

However, reporting against performance indicators that relate to the implementation or outcome of Blue Economy projects is missing from the government's fisheries industrialisation reports and other documentation. There is also extremely limited information available regarding the perspective of the workers in the fishery industries who are identified in the policy as targets for improved incomes and poverty reduction. There is a need to know whether Blue Economy policies have been implemented and the impact they have had in order to ensure fishing practices are sustainable and Indonesia's goal of food security in relation to this important resource is attainable. Additionally, the involvement of front line workers in research in relation to the implementation of Blue Economy Principles will provide evidence of the degree of their participation in change, and any benefits experienced by them as a result of the new policies.

## **Chapter 3 Policy Analysis**

This chapter identifies and analyses the policies that are the subject of this research. The value of early evaluation of policy during implementation is explored. The policy indicators that will be used as the basis for the development of interview questions are also identified and discussed.

### **3.1 Policy analysis**

Policy analysis is a systematic approach to gathering precise data, background information (such as time, location and name), the history of a policy (which is useful in research design and identifying questions), as well as obtaining details about processes (such as the consultation process) or changes in policy during development (Bowen 2009; Brooks et al. 2011). Policy analysis includes assessment of the process of policy development, including the political motivations, and the role of significant actors in influencing the policy making process (Dovers and Hussey 2013; Mickwitz 2003). In this situation, policy is brought into effect in places and on people by programs of action. This thesis will focus on measuring the effectiveness of Indonesian fisheries policies as they have been implemented. However, due to limitations on access to political leaders, the time, length and scope of the thesis, the political aspects of the policy will not be specifically explored. Policy effectiveness is defined as whether the objectives of policy have been met after the implementation of policy (Mickwitz 2003).

Policy analysis is also a good domain of knowledge that provides insights to the development of research and interview questions (Bowen 2009). It can also be used to investigate additional data or broader themes that can be used to support arguments from field work data (Wach and Ward 2013; Bowen 2009). Finally, policy analysis is useful in understanding the current situations, finding policy gaps, perverse or undesirable policy outcomes and anticipating future policy and program directions (Crona and Rosendo 2011; Brooks et al. 2011). As discussed data collection against identified and set indicators of policy objectives and goals is an essential part of policy analysis, particularly in monitoring the efficacy of a policy implementation (Dovers and Hussey 2013).

However, challenges that may be encountered in analysing policy include difficulties accessing restricted government documents and confirming their validity as well as any potential bias of these so called “grey literature” (Denscombe and Martyn 2010; Wach and Ward 2013); policies described in documents might be different from

the way they are implemented in programs; analyses of long or wide policy outcomes may require significant resources and time; data may be missing or require further clarification (Wach and Ward 2013); documents may carry bias; or documentation may be limited (Bowen 2009).

Grey literature, though prone to bias, has an important role in testing information for this research. Grey literature reports usually present new and innovative ideas, new perspectives, and can presenting data that academics possibly could not obtain from published research or when doing studies with limited local input or funding (Roth 2010; Corlett 2011). Haddaway and Bayliss (2015) also argues that grey literature is useful in informing conservation policy studies, particularly by providing additional information and enriching policy review studies. Grey literature also can broaden the scope of literature, and increase the amount of evidence of case studies (Mahood et al. 2014).

Policy analysis was an important foundation for this research and during the systematic search only public documents were used and so the source and purpose of the documents was carefully considered in evaluating the reliability of the content. The government policies and its performance indicators were readily available and were analysed in conjunction with other important publicly available government reports relating to results after implementation. This was an open and efficient approach (Denscombe and Martyn 2010; Brooks et al. 2011). For example, MMAF statistics were particularly useful in tracking reported changes in catch.

In this research, the data and documents collected and analysed in relation to the policy included: ministerial media releases, annual reports, key performance indicators (*Indikator Kinerja Utama-IKU*) in Ministerial Decree Number of 2014; official government documents such as the Statistics Indonesia (BPS) including reports by Cilacap and Klungkung statistics authorities, MMAF statistics including PPSC statistics; reports from local fisheries authorities in Cilacap and Klungkung, and previous research reports. An examination of MMAF (n. d.); DEKIN (2012) and two regulations including Ministerial Regulation No. 27/ 2012 and Ministerial Decree No. 7/2013 was analysed to produce a list of explicit commitments by the Indonesian government that underpinned the development of questions used in interviews. Further questions were based on social indicators identified by Schirmer and Casey (2005). Key terms used in the research such as fisheries industrialisation and Blue Economy are defined from Ministerial Regulation

No. 27/2012 about marine and fisheries industrialisation and DEKIN (2012) about Blue Economy development in Indonesia.

### **3.2 Early Evaluation**

This research is not monitoring to directly apply knowledge to make changes. It is external and aims to contribute to the initial monitoring and future evaluation of the Indonesian fisheries policies so it is described as an early impact evaluation of Indonesia's fisheries industrialisation and Blue Economy policies of 2011 including: MMAF (n. d.); Sutardjo (n. d. ) as well as several fisheries industrialisation regulations including Ministerial Regulation No. 27/ 2012 and Ministerial Decree No. 7/2013. Early evaluations can be challenging due to a lack of available information of policy outcomes at the time of research. However, though all of the potential outcomes of a policy may not be evident, an early policy impact evaluation is extremely useful in identifying and informing actions to overcome problems that may already be apparent in the early implementation phase of the policy or in programs. An early impact evaluation allows policy makers and program managers to make an early intervention to solve any potential problems (Kautto 2005). Early evaluation is also a crucial component of policy transparency (Dovers and Hussey 2013; Mickwitz 2003).

Policy evaluation is also an integral component of policy implementation. Ongoing monitoring of the progress of implementation is essential for the early identification and mitigation of any challenges or obstacles and for the expansion or incorporation of previously unforeseen opportunities. Evaluation is a crucial tool to learn what is working and what is not in the implementation of a policy (Bellamy et al. 2001; Mickwitz 2003). Evaluation of environmental or natural resource management policies are particularly complex, as they almost always require examination of scientific, economic and social components. These multidisciplinary evaluations can be difficult to coordinate and very costly. Some policies have few or easily identified short-term outcomes, others, especially social and environmental ones, have impacts that become visible in the longer term (Bellamy et al. 2001). Environmental policies are often complicated by the large number of influencing factors and variables that may potentially alter the outcome and are outside the control of the policy (Mickwitz 2003). MMAF reported its commitment to monitoring and evaluation of the two policies with the goal of ensuring good public governance including transparency, accountability, efficiency



and effectivity of policy implementation (Sutardjo n. d. ; MMAF 2012d; MMAF 2013b; MMAF 2013d). However, many scholars have questioned the quality and validity of Indonesian monitoring and evaluation (Fox et al. 1996; Heazle and Butcher 2007).

National policies relevant to fisheries development, including the fisheries industrialisation and Blue Economy policies, must be in harmony with the 1945 Indonesian Constitution (*Undang-Undang Dasar Tahun 1945*). Article No. 33 of the Constitution specifies that national resources are owned by the Indonesian government and utilised for the welfare of all Indonesian people. The state ideology of Pancasila ('five principles') is also enshrined in the constitution and its fifth point emphasises the importance of social equity. MMAF has claimed its fisheries policies are also formulated to complement the government's four national development pillars, namely pro-poor, pro-job, pro-growth and pro-environment (MMAF 2013b). It claimed its policies are aimed at re-distributing wealth to poor coastal communities, creating more jobs and increasing national economic growth (MMAF 2012d; MMAF 2013d; Sutardjo n. d. ). MMAF also stated that its first and foremost goal with regard to marine and fisheries industrialisation was to deliver positive impacts to local communities both socially and economically, specifically in terms of income, employment opportunities, partnerships between small scale fishers with medium and big business, and social transformation to modern societies.

The Ministry has also claimed that its fisheries industrialisation and Blue Economy policies are built upon plans and commitments in the National Long-Term Development Plan (RPJPN) 2005-2025 and the National Medium-Term Development Plan (RPJMN 2010-2014), both of which aim to achieve integrated and sustainable fisheries industrialisation; the Master Plan Acceleration and Expansion of Indonesian Economic Development 2011-2025 (MP3EI), which also aims to further Indonesian fisheries industrialisation including particularly in Bali-Nusa Tenggara, Sulawesi and Papua- Maluku Islands Economic Corridors (Coordinating Ministry for Economic Affairs 2011); and the Masterplan for Acceleration and Expansion of Poverty Reduction (MP3KI), which aims to provide national social protection in health and employment in order to reduce the poverty rate nationally (Prawiradinata 2012).

Fisheries industrialisation strategies resulting from these policies include:

1. Developing market oriented commodities
2. Structuring and developing production regions and centres sustainably

3. Developing connectivity and infrastructure
4. Developing businesses and investment
5. Developing science and technology as well as human resources
6. Controlling product quality and safety
7. Strengthening marine and fisheries resources surveillance (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### **3.3 Indicators used in this research**

As a result of the lack of MMAF published data on the progress of the Blue Economy aspects of the policies in particular, this research evaluates the policies' implementation according to respondents in two primary locations and three industries identified by the government as pilot implementation sites. Progress was measured against a number of indicators developed from government policy and other sources. These indicators, which will be outlined and examined in this chapter, include policy awareness, production, income, terms of trade seen from savings, social equity, job opportunities, poverty, training, quality assurance, competitiveness, investment, infrastructure, zero waste, environmental impacts and future industry issues (Sutardjo n. d. ; Phillips 1990; OECD Environment Directorate 2008; MMAF 2012d; MMAF 2013b; MMAF 2013d; MMAF 2014b; MMAF n. d.).

MMAF set out a number of clear indicators in its documents on the fisheries industrialisation policy including in Ministerial Regulation No. 27/ 2012 and Ministerial Decree No. 7/2013. However, documents on the Blue Economy policy were less clear on the primary indicators of successful implementation of the policy. As a result, indicators have been identified from information and statements on the key program areas and policy goals as they were reported.

For the purposes of this research, only indicators relating to the three different sectors earlier identified, were included. Due to the overlapping and complementary nature of the policies, a number of indicators apply to both the fisheries industrialisation and Blue Economy policies. Examples of this overlap can be seen from the heavy emphasis in both the fisheries industrialisation and Blue Economy policies on social equity, income increases and alternative livelihoods.

### 3.3.1 Policy Awareness

Policy awareness is one of the most basic indicators of the progress of a policy. Public awareness of a policy, including the introduction of a new technology or innovation (for example, the zero waste concept) is an important element influencing acceptance and adoption of the innovation by the end-users (Okaka 2010). Policy *awareness* increases public participation, while education and income influence the level of awareness (Soomai et al. 2013; Wang et al. 2016). Awareness of policies and expectations influences behaviour, for example if stakeholders are informed of environmental management regulations and policies, this increases the likelihood of positive environmental behaviour (Garla et al. 2015). Policy *adoption*, including in coastal communities is influenced by several factors including education and age (Nmadu et al. 2015; Singas and Manus 2014). The higher education and the younger and more educated the beneficiaries, would have more chance to adopt the new innovation of any policies including in agriculture (Nmadu et al. 2015).

Stakeholders may become aware of a policy through a number of different means. The earliest and most ideal means would be during the policy consultation process. This would allow stakeholders to both learn about the government's intentions or plans as well as contribute to or influence them (Director of National Parks 2012). However, members of the public may also learn about a policy by personally benefitting from its programs or knowing someone who has. (Dovers and Hussey 2013) also added that policy communication and education for stakeholders and beneficiaries is crucial for policy success.

Policy awareness in itself does not test policy involvement or impact, as individuals may also become aware of a policy by hearing about it through media or word of mouth (Soomai et al. 2013; Okaka 2010). In the case of both the fisheries industrialisation and Blue Economy policies, MMAF reported having conducted a series of meetings to promote their policy prior to implementation with local governments to communicate relevant information (MMAF 2012d; MMAF 2013b; MMAF 2014b). They tasked local governments with communicating the policy to relevant stakeholders through meetings of fisher groups, processors and seaweed farmers organised by the local government itself or industry associations (MMAF 2013d).

### 3.3.2 Production

Production is the main indicator of the success of fisheries industrialisation. MMAF identified clear targets for increased production in wild catch fisheries, aquaculture (including seaweed farming) and fish processing. MMAF planned to modernise production systems from catching or farming to processing and trading. The ministry reported that it would achieve these increases by implementing innovative new technologies to improve efficiency (MMAF 2012d; MMAF 2013b; MMAF 2013d).

In seaweed farming, increases would result from conducting research and development of better, disease-resistant seeds and cheaper, more innovative farming techniques using advanced technologies and chemicals to enhance productivity (MMAF 2012d; MMAF 2013b; MMAF 2013d). In capture fisheries, according to the Ministerial Decree No. 7/2013 and the Ministerial Regulation No. 27/ 2012, MMAF aimed to increase capture fisheries production and value from 5.467 million tonnes (AU\$ 6.8 billion) in 2013 to 5.5 million tonnes (AU\$ 7.3 billion) in 2014. Total production volume of tuna, bonito and skipjack tuna was to be increased from 103,598 tonnes to 120,493 tonnes in 2014. The value-added component of this, which in 2013 stood at AU\$ 113 billion would be increased to AU\$ 214 billion in 2014. In the aquaculture sector, MMAF targeted increases to 13 million tonnes in 2014 from 9.6 million tonnes in 2012, including: seaweed production from 6.5 million tonnes in 2012 to 7.5 million tonnes in 2014 (MMAF 2012d; MMAF 2013b; MMAF 2013d). MMAF reported that by increasing fisheries production the availability of raw materials for fish processing industries would also increase and therefore the total production of processed fish would increase from 4.1 million tonnes in 2013 to 5.2 million tonnes in 2014 (MMAF 2012d; MMAF 2013b; MMAF 2013d). The PNPM and PUMP programs were to be instrumental in this increased fish processing production (MMAF 2012d).

### 3.3.3 Income

Increased production was assumed to lead to increased incomes for all participants, including fishers, processors and farmers (Sutardjo n. d. ; MMAF 2012d; MMAF 2013d). According to the Ministerial Decree No. 7/2013 and the Ministerial Regulation No. 27/ 2012, MMAF also aimed to specifically increase incomes amongst poorer members of the community through a number of programs, including *Inka Mina*, PUMP and PKN, as well as by involving financial institutions in the provision of microfinance to relevant stakeholders in the fisheries industry (MMAF 2012d; MMAF

2013b; MMAF 2013d). MMAF aimed to increase fishers' monthly average income from AU\$ 142 in 2013 to AU\$ 153 in 2014 (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### 3.3.4 Terms of Trade (Ability to Save)

Nilai Tukar Nelayan (NTN) or Fishers' Terms of Trade is a measure of fishers' welfare, and is measured by their ability to meet their daily needs with their income. It is particularly influenced by the fishers' ability to save money after meeting their basic needs (MMAF and BPS 2011; MMAF 2012d; MMAF 2013b; MMAF 2013d). A higher Terms of Trade score corresponds to increased prosperity amongst fishers (MMAF 2012d; MMAF 2013b; MMAF 2013d).

However, limited time and resources makes it difficult for researchers to identify the real income and expenses of respondents to ascertain the terms of trade value. For this reason, this research uses fishers' reports regarding their ability to save as an indication of changes to their Terms of Trade. MMAF specifically aimed to increase the score from 110 in 2013 to 112 in 2014.

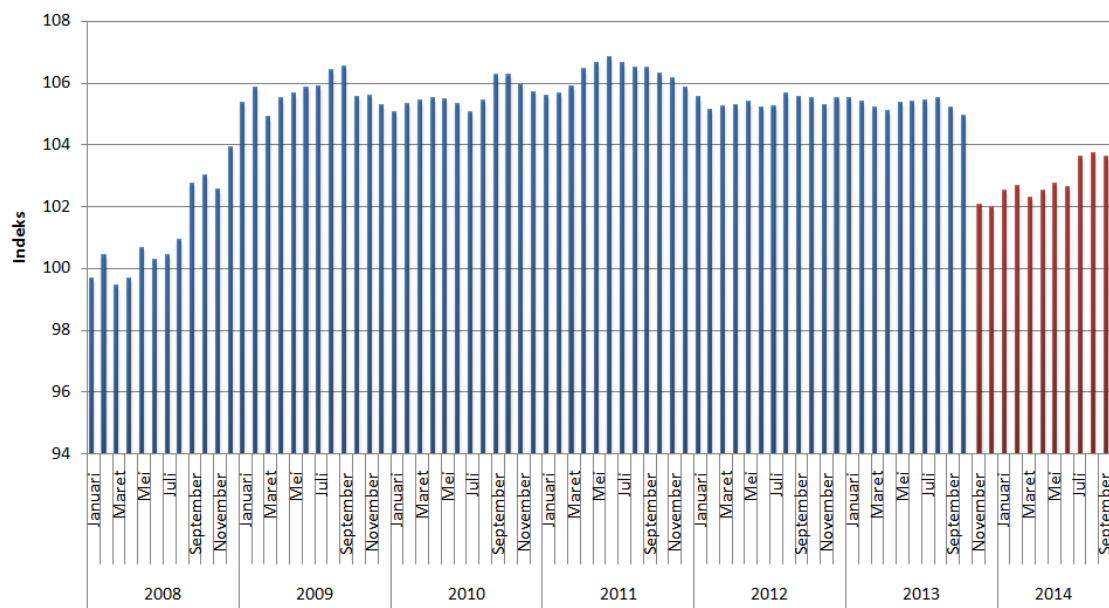


Figure 3.1 Terms of trade fishers and fish farmers from 2008-2014 (MMAF 2014e)

Figure 3.1 (above) shows that there is a decrease in terms of trade for both fishers and farmers in 2014 compared to previous years, which may have been influenced by increasing transportation and food expenses as these are particularly affected by the increase in petrol prices as a result of subsidy reductions in 2014 (MMAF 2014e). In November MMAF changed the base year value they use to measure fishers terms of trade

from 2007 to 2012 (shown in red), this is the main reason why the terms of trade since November 2014 on the figure above shows a decreasing trend. MMAF reported that these numbers were still acceptable as they were above 100, meaning fishers were still able to save some money (MMAF 2014e).

### **3.3.5 Social Equity**

Social inclusiveness and social equity are key features of both the Indonesian government's fisheries industrialisation policy and its Blue Economy. The government emphasised that the utilisation of the nation's natural resources should benefit all citizens, regardless of their wealth or social status (DEKIN 2012; MMAF 2012d; MMAF 2013b; MMAF 2013d). An aim of fisheries development is to enhance the roles of stakeholders including coastal communities through the promotion of innovation and creativity to enhance their social welfare (Sutardjo n. d. ).

Several programs support this goal, including providing capital and insurance through involvement in PNPM and PUMP. Training in the port (MMAF 2012d); small and medium fish processing industries empowerment (MMAF 2012d); and building mutual relationships between industry players including small scale, middle scale and large scale fisheries businesses in order to support the small and middle scale businesses to expand (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### **3.3.6 Job Opportunities**

Marine and fisheries economic growth is intended to increase job opportunities in capture fishing, fish processing and farming activities through new investments in the industry and increased incomes thus reducing poverty (President Regulation Number 5 of 2010)(Sutardjo n. d. ; MMAF 2014b; MMAF n. d.). Pauli (2010) and Varga et al. (2013) argue that the impact of blue economy implementation can be measured by the creation of employment and the growth of related industries.

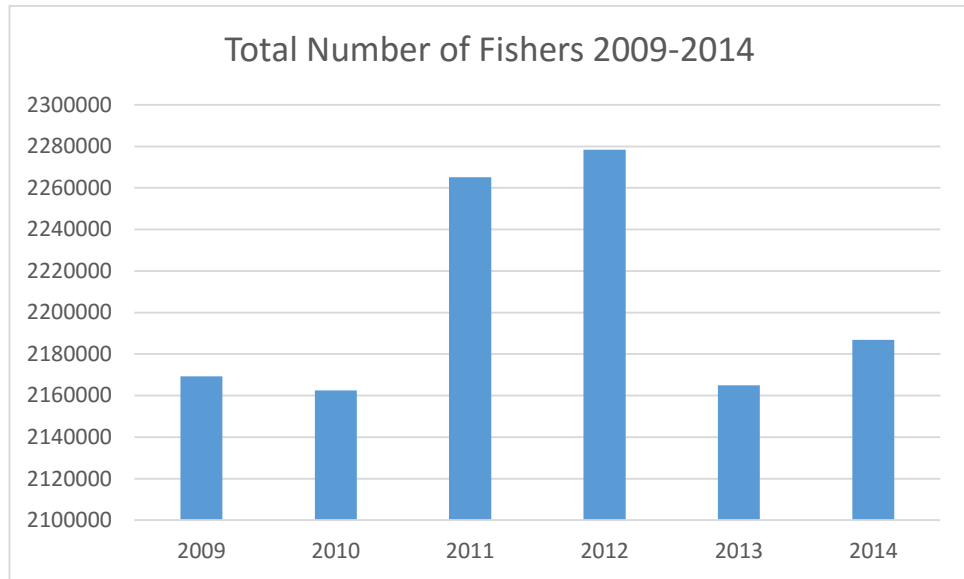


Figure 3.2 Total number of fishers in Indonesia (MMAF 2014e)

Yet Figure 3.2 (above) shows this indicator is highly variable, showing a spike in the number of fishers in 2011-12 followed by a return to pre-2011 levels in 2013, without an explanation being available. Attribution to the policy of these increases in the number of fishers is difficult although between 2013 and 2014, a slight increase was recorded by the Ministry (MMAF 2014e).

### 3.3.7 Poverty

Studies have revealed a connection between poverty and resource degradation. Poor coastal communities, where alternative economic opportunities may be scarce, will tend to degrade their resources without concern for the long term impact of their activities (Scherr 2000). Areas with a marginalised or disenfranchised population often become the target of private fishing organisations that further degrade resources and leave little for the poor fishers who rely on them (Scherr 2000). However, Scherr (2000) also argues that poor people who depend heavily on resources quite quickly understand when resource degradation begins to harm their livelihood. According to Scherr (2000) tenure systems and customary practices lead to better conservation of resources by local communities. He proposed participatory planning or bottom up approaches, directly involving poor people in environmental policy development and implementation, as the most appropriate way to maintain or improve resources.

Ellis (2000) proposed livelihood diversification to allow environments to improve while communities undertake other income generating activities. Difficulties arise because of the lack of skills of fishers to move to other sectors. Fishers often do not have

any other choice than to continue to fish although their business is no longer viable (Ningsih 2008).

One aim of the fisheries industrialisation and Blue Economy policies is to increase marine and fisheries economic growth, which was assumed would lead to poverty reduction (MMAF 2013d; MMAF 2013b; MMAF 2014b; MMAF n. d.; Sutardjo n. d. ). In the updated MMAF strategic plan in 2012, the target was to reduce the poverty rate from 14.1% in 2009 to 8-10% in 2014 (Minister Regulation Number 15 of 2012). However, this ‘trickle down’ effect is the subject of debate amongst scholars. In the Indonesian case, Bhattacharyya and Resosudarmo (2015) and Suryahadi et al. (2009) reported to have found that economic growth has a positive relationship to the poverty reduction, while Balisacan et al. (2003) reported evidence contradicting the theory.

### **3.3.8 Training**

Training is an important part of the fisheries industrialisation policy. One of the aims of the policy is to transform fishers, fish processors and seaweed farmers into a ‘modern’ community. MMAF highlighted plans to provide and facilitate training in modern techniques and technologies as an essential part of industrialisation and the Blue Economy (MMAF 2012d; MMAF 2013b; MMAF 2013d) and it noted that training would also be essential to improving quality assurance and competitiveness of stakeholders.

With regard to fishers, according to the Ministerial Decree No. 7/2013 and the Ministerial Regulation No. 27/ 2012, MMAF committed to training in work safety, on board fish handling, navigation, and other fishing related skills, as well as training in the operation of new fishing boats provided under the *Inka Mina* program (MMAF 2012d; MMAF 2013b; MMAF 2013d). MMAF also planned to provide training to fish processors in order to increase their quality assurance and diversify and value add their products, as well as providing credit to support capital expenditure. For seaweed farmers, MMAF planned to provide training in modern seaweed farming practices, particularly regarding the introduction of integrated abalone, fish and seaweed farming, and in post-harvest handling (Suryawati and Radiarta 2013; Radiarta et al. 2014; MMAF 2012d; MMAF 2013b; MMAF 2013d). MMAF also planned to enhance seaweed farmers’ human resource development and technological innovation through training and increase productivity and quality by conducting research and development of technology which would then be introduced to the farmers through training or extension programs (MMAF 2012d; MMAF 2013b; MMAF 2013d).



### **3.3.9 Quality Assurance**

Economic growth, changing societal consciousness and globalisation of food production and processing has led to increasing demand for a greater variety of food products of higher quality. Some consumers are able and willing to pay higher prices for good quality products, including fish (Wang et al. 2009). This has meant that the production of basic food stuffs such as fish as well as rice, meat, fruits, and vegetables, must be made more profitable and efficient in order to compete with more lucrative options. The involvement of farmers, fishers, and their cooperatives in ensuring the quality of their goods from production to marketing, rather than purely large-scale businesses, is essential to ensuring increased income for the producers of the product (Masajo-Manalili 2000). In terms of quality assurance, according to the Ministerial Decree No. 7/2013 and the Ministerial Regulation No. 27/ 2012, the Indonesian government aimed to introduce product standardisation and certification for fishers, processors and seaweed farmers and introduce them to the new standards through training in order to increase their competitiveness and income (MMAF 2012d; MMAF 2013b; MMAF 2013d). This would include better standardisation of systems, management and infrastructure modernisation in capture fishing and fish processing. For seaweed farmers, there would be the implementation of a certification system, improved regulation for prevention of food hazards and seaweed disease management (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### **3.3.10 Competitiveness**

Indonesia is a global fisheries producer and exporter but according to Yusuf and Torbjørn (2013), the country's industry still lags behind most of its regional counterparts in terms of competitiveness. They attribute this to Indonesia's failure to meet demand for value-added products, relying instead solely on raw, unprocessed marine exports. The flow-on effect is lower incomes for producers than the potential incomes that could be earned from the production of value-added products. Yusuf and Torbjørn (2013) also emphasised the need to involve the nation's medium and small-scale fishers, that make up the largest proportion of Indonesians working in the fishing sector, in new innovations and in the production of value-added fisheries products. However, for small scale businesses, including traditional processors, the cost to comply with international standards and compete is high. Therefore, a high level of government support may be needed to minimise direct and upfront costs for small scale businesses (Worldfish Center

2008). To increase the value of marine and fisheries and enhance quality assurance the government also planned to improve quality and diversity of products (MMAF 2012d; MMAF 2013b; MMAF 2013d). This was expected to increase the competitiveness of the industry both at local and international levels and consequently increase income (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### 3.3.11 Investment

In terms of investment, Sunoto (2013) reported that the two main strategies of a Blue Economy are: Firstly, innovative investment mobilisation including by the private sector with the Government mapping investment opportunities based on zero waste and sustainable fisheries resource utilisation and MMAF enhancing cooperation between stakeholders to apply the Blue Economy business model. Secondly, macro- economic policy management would be undertaken by mapping potential regions to be pilot projects for regional fisheries industries development and fisheries resource management (Sunoto 2013; DEKIN 2012). The government has reported that domestic and foreign investment in the marine and fisheries sector has increased since 2011 (see Figure 3.3 below), reaching its highest point in 2012.

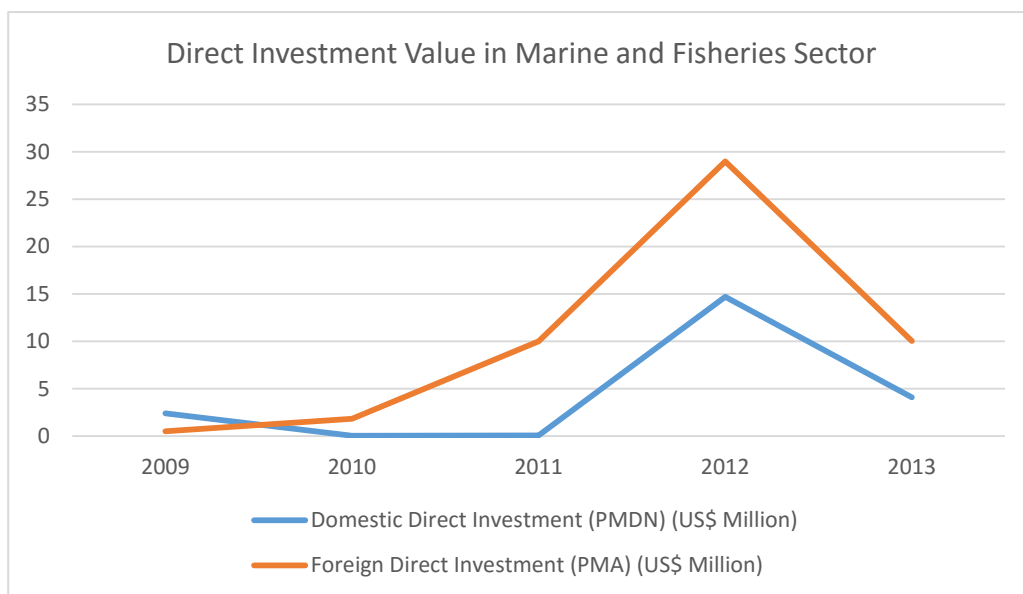


Figure 3.3 Investment realisation 2010-2015 (MMAF 2014e; MMAF 2013c)

For capture fishing, in terms of business development and investment, MMAF planned to modernise the fishing industry through provision of, and support to, purchase newer vessels and fishing gear, particularly through the *inka mina* program and other

applications of advanced fishing technology. MMAF also targeted improvements to business practices and permit services through faster permit processing, offshore capture fishing development, and law enforcement including document verification in the field. MMAF sought to improve access to capital through microcredit programs for small scale fishers, provided by both government and financial institutions (such as national banks and rural cooperatives). MMAF also planned to enhance business practices by facilitating the establishment of stronger networks between all fisheries stakeholders, particularly small scale actors, to support the national fisheries chain from capture to export and to provide business training (MMAF 2012d; MMAF 2013b; MMAF 2013d). The main indicators for both policies in the fish processing industry is to increase the total fish processing capacity from 70% in 2013 to 80% in 2014, to increase the number of fish processing centers from 37 in 2013 to 47 in 2014 and to further develop 1,200 fish processing Small and Medium Enterprises (SMEs) (MMAF 2012d; MMAF 2013b; MMAF 2013d).

For seaweed farmers, the government planned to develop business connectivity, optimisation of resource utilisation, and business investment promotion. The implementation of these plans was through providing microfinance facilities to farmers, both from government and private financial institutions and developing connectivity between farmers, buyers, and processors.

### **3.3.12 Infrastructure and Transportation Modernisation**

The government planned to modernise infrastructure including ports and fisheries product transportation and distribution related infrastructure such as roads (MMAF 2012d; MMAF 2013b; MMAF 2013d). This included infrastructure such as improvements to port buildings, cold storage facilities, other logistical items (including ice cubes, salt, petrol, and food) and installation of CCTV and hygiene maintenance equipment (MMAF 2012d; MMAF 2013b; MMAF 2013d). MMAF also planned to achieve better connectivity between regions for transportation of products of capture fish, processed fish and seaweed products (MMAF 2012d; MMAF 2013b; MMAF 2013d). In the fish processing industry market-oriented commodity development and identification of additional markets for Indonesian-processed fish products locally and globally was to be undertaken (MMAF 2012d; MMAF 2013b; MMAF 2013d). In the seaweed farming industry the aims included finding new farming areas and developing an integrated

farming region connected to related business including processing (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### **3.3.13 Zero Waste**

MMAF placed the concept of zero waste and value-added products at the centre of its Blue Economy policy. Minimum waste production through resource efficiency and reuse of all raw materials into other value-added products with high economic value was promoted as a key source of economic growth, increased employment and innovative business (Sutardjo n. d. ).

MMAF highlighted the potential for the zero waste concept to be implemented in the tuna fish processing industry, which has significant volumes of waste products such as bones, skins and oil. Value-added products suggested included meat for canning products; head, bone, skin, scales, fins, and un-used meat for fish meal/ powder; and the rest of the processing waste for fish oil, animal feed and plant fertiliser (Pauli 2010; DEKIN 2012; Soesilo 2014; MMAF 2014b; Sutardjo n. d. ).

In the seaweed industry, MMAF suggested the production of seaweed-based food products, including carrageenan, ice cream, sweets, salad, jam, syrup, wafers, milk, and jelly; pharmaceuticals including medicines, ointment, dental products, hair cream, cosmetics and medicines; and derivative industries including textile printing, ceramics, poultry feed, fertiliser, paper and paint (Sutardjo n. d. ).

### **3.3.14 Environmental Impacts**

MMAF has openly acknowledged the strain its continued utilisation of marine and fisheries resources has placed on fish stocks. In order to address this, the ministry stated that further industrialisation would have to be sustainable. Resources exploitation must not exceed its carrying capacity and there must be a balance between natural resource utilisation and conservation (Sutardjo n. d. ; MMAF 2012d; MMAF 2013b; MMAF 2013d).

In capture fishing, MMAF planned to ensure international fisheries regulations compliance in collaboration with the Regional Fisheries Management Organisation (RFMO) and introduce wild fish capture certification. Catch data management was to be improved through the application of logbooks in each vessel, placement of observers on select fishing trips and improvement of enumerator skills to support more accurate statistical modelling. Improved monitoring and evaluation of all programs, port

performance, and business development activities were included in the MMAF plan (MMAF 2012d; MMAF 2013b; MMAF 2013d). In fish processing, MMAF aimed to ensure better compliance with international standards regarding environmental practices through inspections and monitoring. For seaweed farming, improved aquaculture practices, including chemical use reduction and better waste management, were identified goals (MMAF 2012d; MMAF 2013b; MMAF 2013d).

### **3.3.15 Future Industry Issues**

Future industry issues relate to the industry's ongoing resilience, profitability and prospects for growth. Resource degradation or poor socio-economic development may have a strong impact on communities and their livelihood in the long term. Community resilience is the ability of community to cope with changes to the state of their resources (Farhan and Lim 2011) and several factors influence resilience, including education, training and alternative livelihoods (Badjeck et al. 2010). Coastal communities rely on marine resources as their main source of livelihoods so damage to the marine environment could impact a community's resilience. One of the most important strategies for ensuring improved adaptability to environmental changes is the diversification of livelihoods. For example, in Anguila, in the Caribbean, strategies adopted to improve resilience in the fishing communities included diversification of fishing gear and target species as well as identification of alternative employment opportunities outside the fishing industry (Forster et al. 2014).

### **3.3.16. Conclusion**

MMAF set out a number of clear indicators in its documents on the fisheries industrialisation policy. However, documents on the Blue Economy policy were less clear on the primary indicators of successful implementation of the policy. As a result, indicators have been identified from information and statements on the key program areas and policy goals as they were reported. These indicators were used to formulate interview questions to garner respondents' views on how their circumstances have changed since the implementation of the policies.

## **Chapter 4 Research Design**

This chapter describes the research framework appropriate for evaluating the policy outcomes, explains the reasons for the research methodology chosen and includes information about data collection, methods, interview types and site selection as well as the method of data analysis.

### **4.1 Research Framework**

The research is based on the conceptual framework used in FAO Fisheries Management Guidelines, which emphasises the interlocking and interdependent nature of fisheries policy, fisheries resources and communities. The framework also emphasises the importance of both social economic impacts and environmental impacts (FAO 2003). This research will particularly focus on the social economic impacts of the two policies identified on selected communities, with environmental impacts only discussed from the perspective of members of these communities. Communities, for the purposes of this research, include fishers and fish processors in Cilacap, and seaweed farmers in Nusa Penida. Fisheries resources as reported by participants include: fresh fish catch, products used and produced by fish processors, by-products of capture fishing, seaweed harvest and respondents' perceptions of ecosystem conditions both in tuna fisheries and seaweed farming.

Fisheries industrialisation and Blue Economy policies were identified and examined in terms of intentions and included performance indicators. As described in the previous chapter the main indicators for fisheries industrialisation policy used in this research were developed from the MMAF (MMAF 2012d; MMAF 2013b; MMAF 2013d). The indicators are: policies awareness, production, income, poverty, terms of trade seen from savings, quality assurance, competitiveness, training, infrastructure, transportation, zero waste, investment, job opportunities, social equity, environmental impacts and future industry issues.

### **4.2 Gathering Data Using Interviews**

In this qualitative research the main method used was the interview. In addition, quantitative data including government statistics were obtained wherever possible and a policy analysis was undertaken to assist in the identification of performance indicators

which formed the basis of the interview questions. The interviews were used to clarify and extend this information from the perspective of workers in these industries.

Respondents were asked a series of questions to identify if any change to these indicators had occurred since policy introduction in 2011. Questions relating to fisheries industrialisation and Blue Economy policies were also developed from the MMAF (n. d.) and the Ministerial Decree No. 7/2013's performance indicators discussed in the previous chapter. These indicators are policy awareness, production, income, terms of trade, social equity, job opportunities, poverty, training, quality assurance, competitiveness, investment, infrastructure, transport, zero waste, environmental impacts and community resilience. Respondents were asked about any changes which may have occurred to their knowledge since the policy was implemented in 2011 (Fisheries Industrialisation Policy) and 2012 (Blue Economy Policy).

Additional social, economic and environmental questions were developed from similar policies' performance indicators recommended in Schirmer and Casey (2005) (social), OECD Environment Directorate (2008) (tuna capture fishing environmental impacts), COWI Consulting (2000) (tuna processing environmental impacts), and Phillips (1990) (seaweed farming environmental impacts). Additional information about policy development and implementation were explored by interviewing experts, fishers, processors and farmers and using official reports.

#### **4.2.1 Interviews**

Interviews are commonly used in investigating impacts of marine policy planning and implementation because they efficiently collect information, opinions or beliefs from respondents. There are three kinds of interviews, namely standardised (structured), unstandardised (unstructured) and semi-standardised (semi-structured).

This study applied a semi-standardised interview that provide a plan regarding the questions to be asked with some flexibility (Berg 2009; Dunn 2010). Consistency and flexibility allowed the interviewer to stray from the set questions where the responses provided additional information (Lester et al. 2009; Dunn 2010). Semi-structured interviews were used to discuss previously identified problems or issues from the policy analysis, with in-depth discussion used to further expand on specific points (Brooks et al. 2011).

Interviews are very useful in exploring affected individuals' opinions, behaviours, perceptions, feelings of opposition or support about policy plans, or the real impacts from

existing marine policy implementation (Brooks et al. 2011; Denscombe and Martyn 2010). Voyer et al. (2012) argue that such information is important in ensuring policies have been appropriate and effective and the information gathered can help mitigate future negative impacts on the community and environment (Fidelman et al. 2014; Hauck et al. 2013; Sandström et al. 2014). However, in some cases, respondents' answers could be superficial and prone to bias (Crawford 1997). Brooks et al. (2011) added that interviews generate greater insight from respondents and do not require complex equipment, only requiring conversation and planning skills on the part of the interviewer.

Denscombe and Martyn (2010) also highlighted the benefits of the flexibility of interviews. One such example is in Hattam et al. (2014), where one of the respondents brought additional fishermen to attend the interview, and the researchers decided to involve all of them in a single interview. Hattam et al. (2014) added that interviews also engage the public in developing marine policy, which may minimise potential negative impacts and assess the impact of existing policy. Melaku Canu and Solidoro (2014) stated that in their research interviews were preferred by respondents as they were generally able to be more responsive during private interviews than in public meetings.

However, Denscombe and Martyn (2010) also identified a number of limitations to this method, including that they can be time consuming, may be expensive due to costs travelling and living in the field, and also require significant cost or effort to transcribe and analyse the data. Further limitations were identified by Bennett and Dearden (2014, p. 110) including “gender bias, cultural misunderstanding and language mistranslation” by researchers undertaking interviews.

Given the focus of this research was on the experience of individual workers in relevant industries, face to face interviews conducted individually the most appropriate method of data gathering. Written questionnaires would be inappropriate due to high levels of illiteracy amongst the target group, and the process of obtaining names and addresses in sufficient numbers would be extremely difficult. The return rate would also likely be extremely low.

The semi structured interview method (with some open and some closed-ended questions) was considered suitable for this research in consideration of the need for in-depth qualitative data as well as time and resource constraints. The interviews were conducted in Indonesian language, and a recorder was used with permission of each respondent to record the interviews for later transcription, allowing for capture of the



whole interview as well as notes taken during the conversation. With regard to fishers, processors and seaweed farmers, all interviews were conducted in person. A copy of the interview questions used with the tuna fishers/fish processors and seaweed farmers is available at Appendix B.

In order to obtain a broader picture of the policy, interviews with local and national government officials, academics, and NGO employees were conducted. These participants were identified by their government positions and relevant responsibilities, by published writing or academic interest and by local involvement and responsibilities. Phone interviews and video call interviews (Skype and Facebook messenger) were used in some cases due to these respondents' geographical spread. Other media was used, including Facebook messenger, email, short message services (SMS) to further clarify information gathered from previous interviews. Further phone interviews were necessary to clarify information from some respondents. Interviews were conducted from October to November 2014 in three different locations (see Figure 4.1) including Jakarta (academics, NGOs and national government officials); Cilacap (tuna fishers, tuna fish processors, PPSC officials, local government officials, a cooperative member, and local experts); Nusa Penida and Bali Island (seaweed farmers, NGOs, local experts and local officials). A summary table of the interviewees, including their respondent codes, locations and date of interviews, is provided in Appendix F.

This research project gained ethics approval from the Human Research Ethics Advisory Panel UNSW Canberra on 1 October 2014 (approval number HREA Panel Ref: A-14-37 (see Appendix A)). In accordance with advice from the ethics panel, respondents were informed about the research project prior to participation, including information regarding the research purpose, study procedures and risks, possible benefit from taking part, confidentiality and disclosure of information. Respondents' consent was recorded. Oral consent was necessary for tuna fishers, fish processors, and seaweed farmers as the majority of those respondents are illiterate. Written consent was used for the other stakeholders including academics, NGOs, local and national officials and local experts.

#### **4.2.2 Sampling methodology**

There are various sampling methods available to a researcher to select respondents, each with its own advantages and limitations. According to Rice (2010), sampling is the process of generating information about a whole population in a specific area from a small number of respondents with a specific method. The aim is to obtain a

sample which best represents the whole population. Bias may result if the data gathered does not accurately reflect the whole population.

Identifying participants was a challenge in this research given the time limits and unavailability of some respondents for extended periods, particularly the fishers, who may spend long periods at sea. As previously noted, three respondent groups were targeted by employment sector. Individuals within each of these groups were recruited initially by referral from third parties. The interviewer's contact details were provided to industry associations and NGOs with the request that they be passed to members to contact the interviewer or the association if they were willing to participate. Snowballing sampling was then used to recruit additional respondents. Snowball sampling allows the researcher to involve additional respondents known to the initial respondents (Noy 2008). Snowball sampling is often used when contact opportunities are few and where the referral system in snowball sampling can generate rich data because respondents know the real situation, and often respondents will refer the researcher to knowledgeable people in the occupation group (Neis et al. 1999). However this method has disadvantages, particularly the possibilities of a respondent nominating their friends or family who may have similar opinions and experiences of the topic (Sen 2011).

There is no detailed information on the fishers in the port or even in the fishers groups to list or identifying tuna and tuna-like species fishers specifically. Most of these fishers spend about one month at sea at a time. Convenience sampling was used for some tuna fishers. It is used where accessibility is an issue (Battaglia 2008; Phua). This method has previously been regarded as suitable for conducting research in fisheries communities because fishers present at fishing ports can be approached at the time when the interviewer and respondents are available when it might otherwise be difficult to locate them (Moore et al. 2010).

#### **4.2.3 Study Area Selection**

As mentioned previously Cilacap (see Figure 4.1) was identified by MMAF in 2012 as its center for fisheries industrialisation, particularly of “tuna-tongkol-cakalang”/ tuna-bonito-skipjack tuna (TTC) production. Cilacap's port has also been associated with several planned projects including the development of an eco-port project and solar panel cold storage (AFD 2012). However, there is little information relating to the progress of these projects in the available documents. For these reasons, Cilacap was identified as one of the sites for this research.

Nusa Penida was identified as the pilot project of Indonesia's Blue Economy policy implementation. It is also a major producer of seaweed, one of the primary commodities for implementation of both the Blue Economy and fisheries industrialisation policies. The establishment of the MPA around Nusa Penida was also identified as a crucial part of the Blue Economy policy, though it was announced several years earlier.

Early informal interviews with experts confirmed that while little information was available regarding the progress of policy implementation in these two areas (or any other), there was no indication that other sites were more advanced or appropriate for the purpose of this research. Lombok and the Anambas Islands had been identified by MMAF as pilot project sites, however, interviews and contact with government officials indicated no major changes had occurred in these locations.



Figure 4.1 Research Sites

Source: ArcMap 10 (Accessed 10 June 2014)

#### 4.2.4 Tuna Fishers Sample

In this research, port authority officials identified tuna fishing boats and suggested they would be willing to participate in the research. This could have resulted in respondent bias, as officials may have chosen boats of some particular classification or with crews

who held particular views – particularly those that might report positively on the government’s efforts. However, the fishing boats were those that were conveniently arriving at the time the interviewer was on site at the wharf and no obvious pro-government bias was identified in the data.

Fifteen tuna fishers were interviewed in person in their native Indonesian language. Of the fifteen, six were crew members, five were captains, three were boat owners and one was a boat engineer. The fishers came from different areas of Java to work at Cilacap Ocean Fishing Port (PPSC), a common practice in the local industry, which employs workers from across the island, particularly Jakarta, Indramayu, Pemalang, and Cilacap. BPS (2015a) reported that the total number of general fishers in Tegal Kamulyan (the location of PPSC) in 2012 was 1,802 people, however there is no data about the total number of tuna fishers.

The researcher visited boats identified by the port authority and confirmed their willingness to participate in the research. The interviews were either carried out on the boat or at respondents' homes at a pre-arranged time if they indicated they were more comfortable speaking there. Interviews with captains were carried out in the captain’s cabin while they are waiting for their boat to be unloaded. Boat owners were recruited via referral from captains. Most boat owners were interviewed on the dock while supervising the unloading of their catch. The quality of the interview recordings was at times affected by external noise for this reason.

Problems encountered in the field included hesitance from crew members to discuss the topic, preferring to refer the researcher to their captain, who they stated “knew everything”. In some cases, the researcher interviewed the boat captain then the captain would nominate one or two crew members for further interview. Some fishers did not wish to be interviewed stating that they felt too shy (three fishers).

#### **4.2.5 Tuna Fish Processor Sample**

According to the DKP2SKSA (2012), there are twelve *pindang* makers, one canning factory, and nine cold storage providers in South Cilacap. The port authority provided the addresses of a variety of fish processing facilities that were willing to participate in the research. Fourteen tuna fish processors were interviewed. These included: cold storage for fish being exported mostly to Jakarta for canning factories and the export market, as well as one modern fish canning factory. Some of the cold storages

also had an associated “*pindang*” (processing fish product using boiling techniques in salty water) factory.

Fish processor owners and workers, including *pindang* and cold storage, were recruited using snowball sampling, while the fish processing factory manager and officer were chosen because it was the only such factory in the area. Fish processor owners and workers, cold storage owners and workers, a fish processor official, and a fish canning factory manager were interviewed in their factory or office. They were very willing to be interviewed. One *pindang* maker was interviewed at PPSC while preparing the fish in the port fish market. In total three traditional “*pindang*” fish processing factory owners (one of them has a small cold storage), three *pindang* processing factory workers, two cold storage owners (one big and export oriented while the other one was a small cold storage provider), four cold storage workers, a fish processing officer employed by MMAF and a manager from the modern fish processing factory were interviewed.

#### **4.2.6 Seaweed Farmer Sample**

The seaweed farmers were referred by local NGO Coral Triangle Center (CTC) representative who had been working on the island for an extended period of time, or by other seaweed farmers. This may have resulted in a higher than average representation of seaweed farmers who have received government services facilitated by this organisation. This may mean respondents were better informed or better trained than the average seaweed farmer in the region who does not have a relationship with CTC. However, respondents who were not recipients of services from CTC but referred by other farmers did not give responses significantly different from those referred by the NGO, except with regards to training facilitated by CTC.

Sixteen seaweed farmers were interviewed individually in their native Indonesian language. According to local fisheries department data, the total number of seaweed farmers in Nusa Penida in 2013 was 2,793 people spread over the three different islands (Klungkung District Fisheries Department 2013). Two seaweed farmers did not wish to be interviewed giving similar reasons to the tuna fishers, stating that they felt too shy. Most farmers were interviewed at home during the day after they had come back from their morning activities on their farms.

#### **4.2.7 Expert Survey**

To enhance understanding of the responses from the front-line workers interviewed in the course of this research, semi-structured interviews were conducted with a number of other experts (total 25 respondents) in three different locations (Jakarta, Cilacap, and Bali). These experts consist of nine national and local government officials from the Ministry of Marine Affairs and Fisheries, and local fisheries government both in Cilacap and Bali; twelve NGOs, think tanks and international organisations [including Coral Triangle Center (CTC), World Wildlife Fund (WWF), KIARA, Indonesia and Fisheries Community Foundation (MDPI), USAID, United Nations Organisation in fisheries areas, and Cilacap Fishers Association (HNSI)]; one cooperative official (Mino Saroyo Cooperative Cilacap); and three academics from Bogor Agricultural University and the University of Indonesia; and were identified through their direct responsibilities from their government positions relating to Blue Economy implementation or through publication and academic position, referral from other experts, direct responsibility for program implementation through NGOs, or local government responsibilities. The majority of these identified experts were willing when approached for interview. Two declined citing unavailability at the time while another two declined citing concerns that participation could have detrimental effect on their career despite the researcher's assurance of confidentiality.

Interviews were conducted mostly in the individual's offices or homes. Written consent forms and research project information were given prior to the interview and signed by the respondents. While undertaking interviews, a voice recorder was operated with the permission of the respondents.

#### **4.3 Data Analysis**

In addition to data and statistics collected as part of the literature review and policy document analysis, interview records, notes, photographs, observations and other documents including reports and statistics were collected during field work in Indonesia. The interview records were transcribed into a Microsoft Word document and transferred to Microsoft Excel for analysis. The data is presented in tables, charts and graphs to assist the reader Field (2010). In order to protect the confidentiality of respondents, their names are not disclosed in this thesis. Instead the following initials are used (see Figure 4.2).

TF	Tuna Fishers
TFC	Captain (Tuna Fishing)
TBO	Boat Owner (Tuna Fishing)
FPO	Fish Processor Owner
FPOff	Fish Processor Official (MMAF Officer)
FPW	Fish Processing Factory Worker
FPM	Fish Processing Factory Manager
SF	Seaweed Farmer

Figure 4.2 List of Respondents' Identifying Codes

#### 4.4 Limitations of the Study

The research methods identify the impacts as articulated by the respondents. However, there are some limitations and lessons learned from this study which would be useful for future research in fisheries policy impact analysis.

The main limitation is the small sample size used. To generalise to all tuna fishers, all fish processors and all seaweed farmers from two place-based studies would be unwise. However, as an indication of the need for further research, the research is powerful in having found great consistency in its findings in two government policy demonstration areas. The selection of these sites should show the clearest results of the policies and other places in Indonesia are unlikely to have clearer impacts

While the use of qualitative research methods is useful in identifying potential issues or experiences amongst individuals on the frontline of policy impacts, deep and detailed quantitative research is also needed to establish how widespread these individual experiences may be, as well as to establish comprehensive figures regarding the rate of change for the aggregate income, saving, production, poverty reduction, job opportunities and investment values. Quantitative and scientific studies of the environmental impacts of the policy, particularly regarding water quality, pollution and Maximum Sustainable Yield would also greatly improve the overall picture of the impact of the policy. While some of this data is available in government reports from MMAF, Statistics Indonesia, and other government reports, there is a risk relating to the reliability of such data. Possible irregularities or inaccuracies in the government data were identified by several respondents in Cilacap, including government officials (MMAF 4 and 5) and NGO members (NGO 6, 7 and 11).

Additionally, this thesis does not cover gender analysis of the policy impacts. While a brief explanation about the importance of women in processing activities including in tuna fisheries and seaweed is provided in this thesis, further research regarding the impacts the policy on gender roles, relationships and outcomes is needed.

## **4.5 Conclusion**

The combination of techniques described here provide a useful and novel in-depth analysis of the current experience of the impacts of recent fisheries industrialisation and Blue Economy policy implementation in Indonesia on these occupational groups. The research draws heavily on qualitative methods including semi-structured interviews and policy document analysis. At two sites, described as the implementation leaders, snowball sampling was used to recruit respondents. While the small number of sites and respondents involved in the study prevents it from full generalisation to the wider population, attempts were made to avoid overt bias in the respondent pool by seeking participants from both government and non-government organisations. Qualitative methods are extremely useful in exploring the experience of selected individuals, however, further research using a larger respondent group would be useful in establishing the scale and spread of the findings of this research.



## Chapter 5 Results

### 5.1 Introduction

This chapter will outline the demographic data relating to the respondents interviewed and key findings from the interviews against the indicators identified and analysed in the policy chapter. Respondents' responses against the indicators, their perceptions, predictions and recommendations to overcome problems with the policy are reported graphically, while their individual responses are detailed in depth. Expert's views are also discussed under each indicator in order to provide supporting information or context.

### 5.2 Respondent Demographic Data

Demographic Variables	Frequency
<b>Occupations</b>	
<b>Tuna Fishers</b>	15
Boat Crews	6
Boat Captains	5
Boat Engineer	1
Boat Owners	3
<b>Tuna Fish Processors</b>	14
Workers	7
MMAF Official	1
Manager	1
Owner	5
<b>Seaweed Farmers</b>	15
<b>Residential Address</b>	
Cilacap, Central Java	24
Banyumas, Central Java	1
Pemalang, Central Java	3
Indramayu, West Java	1
Nusa Ceningan, Bali	2
Nusa Lembongan, Bali	10
Nusa Penida, Bali	3
<b>Gender</b>	
Male	36
Female	8
<b>Age Group</b>	
25-34	15
35-44	16
45-54	10
>55	2
No Data	1

<b>Ethnicity</b>	
Javanese	23
Balinese	15
Chinese	3
Sundanese	2
Maccasan	1
<b>Education</b>	
Completed Primary School	12
Did not Complete Primary School	2
Completed Junior High School	11
Completed Senior High School	11
Vocational College	3
University	2
No Education	2
No Data	1
<b>Occupation</b>	
<b>Tuna Fishers</b>	
Gill net	12
Hand Line	3
<b>Tuna Fish Processors</b>	
Cold Storage	5
<i>Pindang</i>	7
Canning Factory	1
Processed food	1
<b>Seaweed Farmers</b>	15
<b>Duration of Main Employment (years)</b>	
1-10	12
11-20	18
21-30	10
31-40	3
No Data	1
<b>Duration of Stay in Research Site (years)</b>	
1-10	4
11-20	4
21-30	6
31-40	13
41-50	9
51-60	3
No Data	5
<b>Dependents</b>	
0-3	28
4-7	13
8-10	1
No Data	2

Table 5.1 Demographic Data

Table 5.1 shows demographic information relating to respondents for this research. Of the 15 tuna fishers, 14 tuna fish processors in Cilacap and 15 seaweed farmers in Nusa Penida interviewed between October and November 2014, the majority are male (36 respondents). 100% of the tuna fishers were male, while four of the respondents in each of the tuna fish processors and seaweed farmer groups were female. The majority of fishers in Indonesia are male, as the job is considered to require substantial physical exertion and lengthy time at sea. Women more commonly work in the processing and marketing of fisheries products, as well as in seaweed farming activities, as these jobs are considered lighter and more flexible, with work taking up only a few hours per day.

Most respondents were aged from 15-54 years, with two over 55. According to Law No. 13/2003, this puts all of the respondents in the so-called ‘productive’ age range – denoting their ability to contribute maximally to the state’s economy. The maximum working age according to this law is 64 years old. The majority of the respondents are in what the law calls their ‘prime’ age (25-54) according to BPS (2007), while the 2 over 55 years fall into the category of ‘old’.

The ethnic group most heavily represented in the respondent group is Javanese (23 persons) and they largely hail from either Cilacap or Bali (15 persons). The majority of the seaweed farmers in the respondent group are from Nusa Penida, Bali. The remainder of respondents are ethnic Chinese, Sundanese and Maccasan.

The majority of respondents have graduated from Senior High School, with most others having either finished Primary School or Junior High School. Most respondents have been working in the industry for 11-20 years, and have resided in the research site for about 31-40 years. Most have between 0 and 3 dependents.

### **5.3 Fisheries Industrialisation Policy Awareness**

Awareness of the government’s fisheries industrialisation policy which was announced in 2011 (including existing programs: PNPM *Mandiri*, PKN, *Minapolitan* and *Inka Mina*) was very low amongst the fishers and fish processors interviewed. Only one of the tuna fishers and three of the fish processors interviewed had heard of the existence of the policy. Awareness was higher amongst the seaweed farmers interviewed, with almost half indicating that they had heard of the government’s policy (see Figure 5.1).

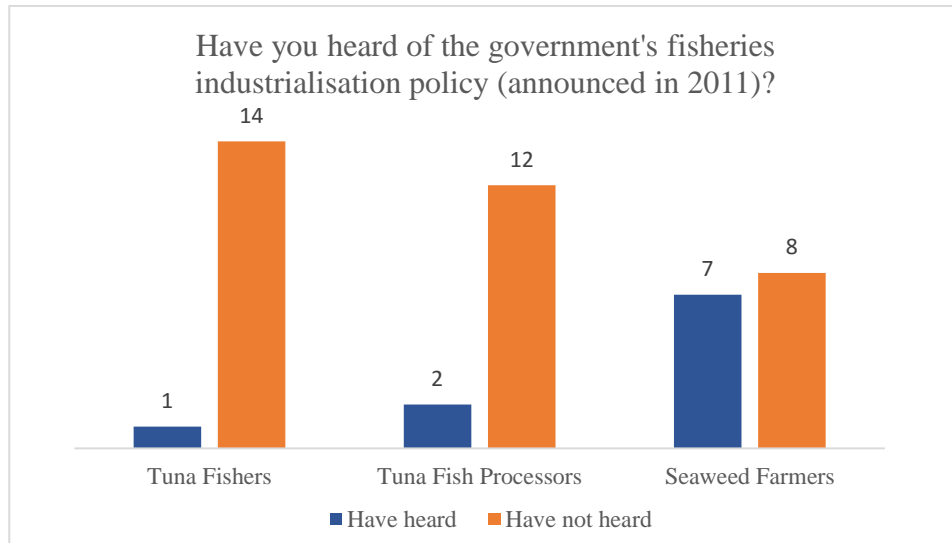


Figure 5.1 Respondents' awareness of Fisheries Industrialisation Policy

### Tuna Fishers

All but one of the fishers reported that they had never heard of the 2011 fisheries industrialisation policy. Respondents were also asked regarding their awareness of specific program initiatives within the fisheries industrialisation policy, including *inka mina* (specific for fishers only), and some sub-programs of PKN including: fishers identification (ID), micro-credit, and training. The majority of respondents had no knowledge or experience of any of these programs. Three fishers stated they had heard of at least one of the programs, though none reported having personally benefitted or participated. One fisher said,

*Inka mina, yes, but I have only heard of it in passing (TFE).*

Awareness of fisheries industrialisation programs in general was higher amongst the boat owners and captains interviewed than their crew. Boat owners in particular reported that they had on occasion been invited, through their participation in the Indonesian Fishers Association (HNSI), to meetings relating to new regulations by government officials both local and from Jakarta. However not one of them remembered participating in any meeting on fisheries industrialisation. Furthermore, no boat owners reported benefitting from any government programs beyond their attendance at the meetings. Boat owners added that besides organised meetings, government officials often visited their offices to inspect their fishing licences or inform them about new regulations.

*If it is about fisher's assistance, we have heard of it. However we have not benefitted from that. Sometimes the government has provided training, but we have never attended (TBO1).*

Unlike boat owners and captains, crew members reported that they have never been invited to participate in such meetings. One captain (TFC4) specifically highlighted the lack of consultation or promotion of new regulations to fishers and crew saying;

*Maybe there are (government programs), but they have never tried to promote them to the captains. Maybe to our bosses. These boat donations probably only benefitted existing boat owners, not captains (TFC4).*

However, one fisher (TFE) claimed to have heard of *inka mina*, but raised concerns regarding corruption in the implementation of the program. TFE believed that some beneficiaries received boats because of corrupt or nepotistic connections. He also suspected that there was insufficient research carried out prior to the rolling out of the program regarding the real needs of fishers and the condition of their fishing grounds.

### **Tuna Fish Processors**

Just two of the fish processors had heard of the policy, one of whom was a MMAF official (FPOff) and the other a fish processor worker (FPW3). FPW3 said he believed that his boss may have benefitted from the policy, but was unable to provide any specific details of the possible benefit. When fish processors were asked about specific programs, one fish processor factory owner (FPO4) said he knew of boat owners who may have received boats (as part of *inka mina* program);

*[A named boat owner] seems to have got one, ... several boats were given out. Not to me though. (FPO4).*

FPW6 reported that he had heard about work safety training held by the port authority, but had never attended any training himself. A fish processing company manager (FPM) said that although he had heard of the policies, the private company where he works was not a beneficiary. In his opinion his company had not been significantly impacted by the policy. However he did note some changes to government services provided to his company, including steps to achieve a one day service target to reduce time needed for business to obtain official documentation, such as health certificates for export.

Some fish processors reported that they had been involved in meetings with government to talk about fish production and new regulations regarding fish exporting activities and optimising quality of fish products. Only one fish processor (FPOff) stated that he was involved in the policy implementation but this was in his role as a MMAF employee.

### **Seaweed Farmers**

Awareness and direct experience of the programs was much higher amongst seaweed farmers. While over half of the seaweed farmers (8 out of 15 people) said they had never heard of the new policies, eleven claimed to have benefitted from programs associated with the policies and its programs: PNPM *Mandiri* and PUMP, including receiving seeds, training, small boats, ropes, drying tools and micro credit from Peoples Bank of Indonesia (Bank Rakyat Indonesia-BRI). All of those who benefitted reported that they had become aware of the policy and accessed services through NGO, the Coral Triangle Center (CTC), or were members of seaweed farmer associations. SF7 had particularly extensive knowledge of the policy through his position as the head of a seaweed farmer group and as a representative of CTC in the village. Some respondents also reported hearing of meetings with the village government to discuss new government programs.

The farmers who had not benefitted from the programs were not affiliated with NGOs or Associations. As one said;

*No, [I have not heard of the policies]. I am not a member of any farmer groups. It is difficult to join those groups (SF1).*

They indicated they were keen to join such groups they claimed it could be difficult to join or access the associated privileges.

### **Experts' Survey Comments**

All of the experts had heard of the policy, though all reported that they had not been invited to participate in any consultation or research activities by the government. MMAF1 stated that Nusa Penida is a suitable site to implement seaweed industrialisation because it has an established market chain and the seaweed fetches relatively high prices compared to other places. However, in his opinion, industrialisation in Nusa Penida was

not fully successful because it did not have processing factories and therefore local residents did not benefit from a value added product. He said,

*If we look closely, the implementation [seaweed industrialisation] in the field [Nusa Penida] is not 100%, successful in my opinion, because of what? If we try to connect between production, processing etc, there are no appropriate links available (MMAFI).*

Two academics (AC1 and 3) and two NGO officials (NGO1 and 5), also raised issues about the lack of stakeholder involvement in Indonesian fisheries policy planning and development.

*I have not been directly involved or seldom involved in fisheries policy, I do not know whether they [MMAF] read my research reports (AC1).*

## 5.4 Production

A majority of respondents across all three categories reported that their production had actually decreased since the implementation of the policies.

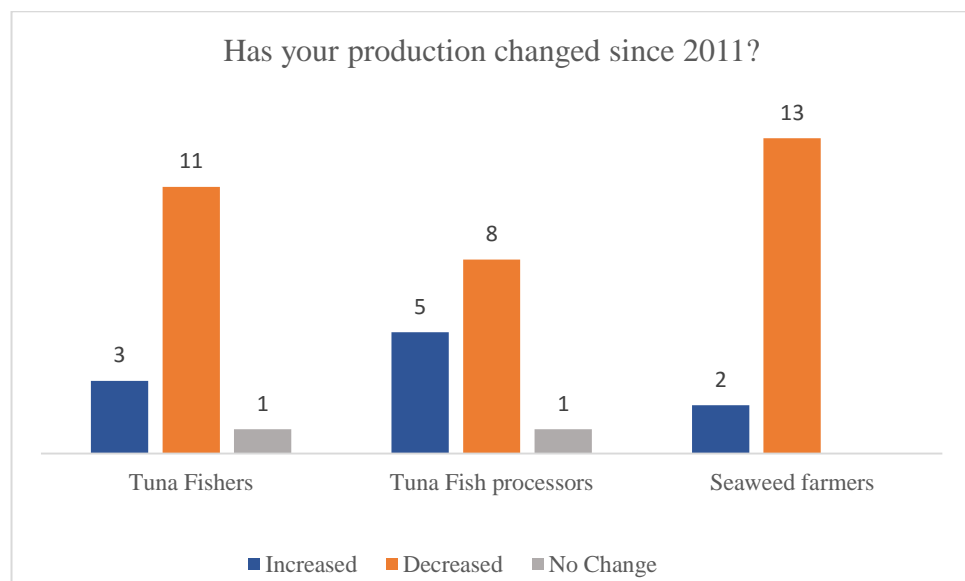


Figure 5.2 Respondents' views regarding changes in production

### Tuna Fishers

Eleven of the tuna fishers interviewed reported that their production had decreased by around 30-60% since 2011. The fishers said that in 2006-2007 their catch was around 7-10 tonnes of bonito and skipjack tuna, whereas now it was only around 1.5 tonnes. Most blamed increasing numbers of purse seine boats operating in the area from Pekalongan

(Central Java), Pacitan (East Java) and Jakarta; as well as the increasingly common utilisation of fish aggregating devices (FAD) or 'rumpon' since 2008. Most gillnet fishers indicated that they believed that both purse seine and FADs were jeopardising their livelihood.

*[Production] is decreasing, particularly since the purse seine vessels have come. In 2006-2007 I could catch around 7-10 tonnes of tuna, but now it is around 1.5 tonnes.(TFC1).*

TFC1 said that gillnet fishers have been competing with purse seine users in similar fishing grounds between latitude 107° and 109° east. Tuna fishers noted that purse seine boats using FADS had a particularly negative impact on their business as they catch all kinds of fish regardless of their size;

*Purse seine boats employ FAD (rumpon), the idea is to make fish gather around the FAD and then they catch all of the fish regardless their size (TFC5).*

In contrast, a small number of tuna fishers reported that their production had increased since 2011. Two of these fishers work on handline fishing boats which have in the last few years obtained FADs, which they believe was the reason for their increased catch. The fishers also reported that they did not have to travel as far to find fish, as they simply had to travel to their FAD to find ample supply.

*[Our catch] is increasing. In the past we did not employ any FADs, so we caught about 3-4 tonnes. Since we have started utilising FADs, we can catch almost 7 tonnes [in a trip] (TF5).*

*It is a lot better now, because we have FADs. The FADs are owned by our boss, who is ethnically Chinese (TF6).*

Handline fishers claim that the quality of the catch using handlines is better than using gillnets and far more environmentally friendly than purse seine. When using handline, the majority of the fish can be retrieved still alive, unlike gillnet fishing in which the fish are mostly dead after being trapped in the net for hours. According to tuna fishers, there is a significant quality difference between tuna caught alive and dead, which also translates to a higher price at market.

Though FADs are often blamed for overfishing, these fishers claimed that their use of handlines means they are able to be very selective in catching their target fish, and



therefore blamed purse seine boats for stock depletion as purse seine is more indiscriminate in catch regardless of size.

*If there weren't any purse seine vessels I think there would be no problem. Purse seine vessels are able to scoop up a huge catch in a single go – hundreds of tonnes. There are no restrictions regarding the size of their catch. And they take everything, over 1 kilo, they will take anything (TF6).*

There is no conflict reported between handline and gillnet fishers although some handline fishers are operating FADs. Gillnet fishers acknowledge the selectivity of handline fishers in catching tuna, unlike purse seine boats. Another problem identified by fishers is pollution from an electric steam power plant (PLTU) which has been operating for several years. Fishers believe this contributes to the reduction in catch.

Interestingly, one captain (TFC5) noted that fishers in the area benefitted from what he perceived to be better fisheries management in Australia, which was spilling over into Indonesian waters. He said;

*We catch our fish under Java island... it is lucky that it is near Australian waters if not, maybe [the fish] would be extinct (TFC5).*

In general, the experts, officials and NGO workers agreed that the Indonesian government had so far been very successful in increasing production of fisheries and aquaculture products. They also raised concerns regarding the sustainability and social inclusiveness of the methods used to achieve an increase. One local fisheries official (DKP1) agreed with the fishers that decreasing fish stocks resulted from the increased use of purse seine in fishing grounds traditionally used by smaller scale fishers as well as their violation of mesh size regulations. This opinion was shared by AC2, who added that the low selectivity of purse-seine had jeopardised resources.

Depletion of stocks overall was described by MMAF4 who noted that fishers now needed to travel further to find available stocks and thereby the Catch Per-Unit Effort (CPUE) had decreased. The government official said he believed that over the next 10 years, the tuna population would continue to decline. MMAF5, though more optimistic than MMAF4, also noted that fish stocks were low in many areas and within certain species, but claimed there were still opportunities for some tuna species, particularly skip jack tuna, which he said was still in moderate supply in some areas of Indonesia. A ministry official (MMAF6) in Cilacap recounted that TTC production had been

decreasing for at least 10 years. He also believed that this trend would continue or even worsen as tuna fishers were driven to catch smaller and smaller tuna in order to continue making a profit. MMAF6 voiced concerns that this would make it even more unlikely that fisheries resources would replenish.

While all of the respondents acknowledged that production was declining, many argued that this was not necessarily the result of a depletion of fish stocks and instead questioned the validity of the government fish production data. One of the common reasons highlighted by the experts respondents surveyed was illegal transshipment and export of fish. MMAF3 pointed directly to Ministerial Regulation No. 26/2013, which allows transshipment at sea, saying this transshipment fosters IUU fishing and poor data management. Tuna that is transhipped at sea often goes unreported and may be sent directly overseas to the Philippines and China, said MMAF3. NGO3 echoed MMAF3's comments, noting that illegal transshipment for direct export is commonly carried out to avoid paying taxes and circumvent a government requirement that all foreign-owned fishing companies own fish processing factories in Indonesia, a policy aimed at ensuring some benefit is passed onto local communities. NGO3 blamed these criminal practices for the decrease in local tuna production, claiming that stocks were actually still abundant. NGO5 took this theory further, arguing that foreign plundering of Indonesia's fisheries resources has supported industrialisation in neighbouring countries, while Indonesia has been left out in the cold. NGO3 meanwhile, called for reform to the licensing system and fish auction organisation systems to maximise data management.

A commonly cited reason for poor production data in Cilacap was the practice of unloading catches at unregistered or alternative ports. According to NGO3, fishers often land their catch at their own private ports (*tangkahan/ pelabuhan siluman*) rather than a formal fishing port provided by government. However, interviews in Cilacap with fishers did not raise this issue. This leads to unreported fishing activities and therefore inaccurate statistics, he said. According to MMAF6, there are other problems in data collection regarding fishing gear and boat types. The official claimed that handline fishers commonly use gillnet type boats to catch fish, but the statistics do not differentiate between gillnets and gillnet boats operating handlines only.

Another reason given for the decreasing catch numbers in Cilacap is the lack of petrol availability and its increasing cost. This was noted by both TB1 and TFC3. Respondents indicated that increased petrol costs had led many fishers to land their catch

directly at Pelabuhan Ratu Port, which is closer to Jakarta, rather than at Cilacap, and thereby leading to an overall decline in numbers landed at Cilacap.

### **Tuna Fish Processors**

Most of the fish processors interviewed – eight out of fourteen – reported that their production had decreased since 2011 (see Figure 5.2). Fish processors explained their decreased production as the result of a decrease in availability of raw materials in Cilacap – including tuna and tuna-like species. Most *pindang* and cold storage industry respondents said this was the result of the increasing number of purse seine boats operating FADs and landing their fish outside Cilacap, including in Jakarta and Pelabuhan Ratu. These respondents said that as a result they were forced to purchase fish for processing from other cities including Jakarta, Yogyakarta and Denpasar.

One *pindang* factory owner (FPO3) reported that his production had decreased by approximately 50% since 2011. A *pindang* worker (FPW1) reported that in 2002 he processed around 18 tonnes of fish per day, whereas now he only processes around 1 tonne per day maximum. A cold storage worker (FPW7) reported that before 2011 the facility stored 30 tonnes of fish on average in a month, now this is down to 20 tonnes. A fish canning factory manager (FPM) reported a decrease of approximately 25% since 2011. FPM also stated that because of the lack of raw materials in Cilacap, his company now procures 90% of its fish from Denpasar.

In contrast, five out of 14 fish processors (FPO1, FPOff, and FPW4) reported that their production had increased since 2011 and one (FPW5) claimed that there had been no change. FPO1 and FPW4 claimed the increases were the result of investment in the business to increase their processing capacity. FPW4 said reinvestment in the company had enabled a production increase of around 30-40%. A fisheries official working in a processing factory (FPOff) claimed that government investment in staff training had enabled the factory to increase production.

### **Seaweed Farmers**

The majority of seaweed farmers (13 out of 15) reported that their production had decreased since 2011, one said;

*[The production] It has been decreasing, in the past the monthly harvest was about 500 kg, now it is a maximum of 200 kg (SF1)*

SF2 reported similar figures, claiming that in 2011 he had produced about 1 tonne per month, but now only produces about 500-600 kg per month. SF7 also reported a production decrease of around 50%. Several respondents stated that unlike in the past, they now experience occasional failed harvests in which they do not produce any seaweed at all. Fish such as black jack (*ikan tabasan/naso*), leatherjacket (*ikan pogot*), surgeonfish (*Acanthurus* sp.) and rabbitfish (*Siganus* sp.) eat the seaweed. Other pests or ‘gulma’, particularly other endemic seaweeds such as *Sargassum* sp. and *Ulva* sp. (WWF 2014) that are parasitic on the farmed seaweed, affect crops.

*There are more fish that eat our seaweed now. We have to cover our seaweed with nets, if not we will not get any harvest (SF1).*

*Fish pests are flourishing... they even eat the ropes (SF15).*

Another reason for declining production given by respondents was increased disease, particularly “ice-ice” or locally named “busuk batang” (rotten stem). This was highlighted as an increasingly common problem for farmers in Nusa Penida, one said;

*When ice-ice comes, it is a disaster (SF4).*

One farmer (SF6) also noted that the quality of their seed has been degrading over time. Others blamed poor production on bad weather particularly heavy rain and extreme heat.

*If the weather does not support the crop, it will destroy our yield... for example now, it is too hot, which is not good for our seaweed... it makes the seaweed rotten (SF12).*

Too much rain, and high waves impact badly on crops according to two respondents (SF6 and SF8). A USAID staff member (NGO2) stated that these events may be the result of climate change, an argument previously put forward by Nurhayati (2009) who stated that climate change is causing a rise in sea temperatures and contributing to outbreaks of ice-ice disease.

Finally, farmers also blamed adverse crops on environmental degradation resulting from the development of hotels, villas, and boats in Nusa Penida.

*It [production] is decreasing because there are so many hotels here, those hotels possibly pollute the sea from chlorinated water pools (SF2).*

In contrast, two seaweed farmers reported increased production. SF9 reported that his production has increased from 500-600 kg in 2011 to about 1 tonne. He attributed this increase to good weather. However, even these two respondents noted that production was unpredictable and irregular.

## 5.5 Income

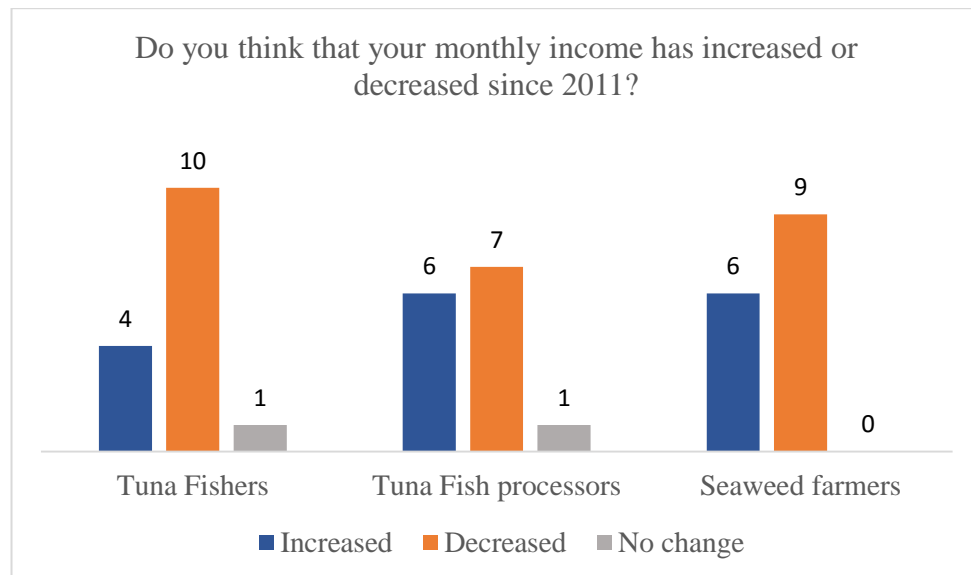


Figure 5.3 Respondents's reports regarding income changes since 2011

### Tuna Fishers

Most tuna fishers (10 out of 15) reported that their income had been decreasing even before the implementation of policies in 2011. The main reasons given for the decreasing trend included a drop in production and the increased number of purse seines using FADs, the increase in fishing and other operational costs from petrol and electricity price increases, the decline in the price of fish, poor fish quality, poor weather, instability in the foreign exchange rate and inflation.

One fisher reported an extreme decrease of around 80% (TFC5). He said that in 2008-2009 he took home around 50-80 drums of skip jack and bonito from each trip, but since 2011 the catch has reduced, he now only takes around 5 drums home;

*Year after year the stocks have been decreasing. Since purse seine operators arrived, our income has been decreasing... since then the skipjack tuna catch has been reducing or [it seems] it does not even exist anymore. Bonito has also been reduced, as well as tuna, because even the juveniles have been caught by them (TBO1).*

One boat owner (FPM) said that the increased price of petrol, as a result of government budget cuts to petrol (BBM) subsidies in 2013, had resulted in higher costs for fishers. TB1 also stated that increasing operational costs, mainly the increased cost of diesel, had made a 30% decrease to his net income from fishing trips. He believes that this has contributed to the decrease in the fish catch in Cilacap. Another boat owner (TBO1) complained that regulations in some cases increased operating costs, particularly the requirement for a Vessel Monitoring System (VMS) which operators had to purchase themselves without any support from the government.

However, four fishers stated that their income had actually increased since 2011. These fishers explained that their income from by-catch caught on their own time had improved their personal overall earnings, while FAD use had increased the number of fish they were able to catch in the same time period. This was particularly the case for handline fishers, namely TF5 and 6.

### **Tuna Fish Processors**

Increases were more common amongst the fish processors interviewed, with six respondents reporting that their income had increased since 2011. The increases of around 30-50% were either due to promotions, wage rises or due to respondents having joined the industry from less well paid employment since 2011. These increases were only reported by modern factory and cold storage workers. No *pindang* worker reported an increase. A total of seven fish processors, including both *pindang* makers and cold storage providers, stated that their income had decreased since 2011. These processors estimated their income had decreased by around 40-60% and attributed the decrease to growing competition, lack of raw materials, lack of capital, inflation and petrol price hikes. FPO3, FPO4, FPM and FPW2 all identified increasing operational costs as the cause of their income decline.

*It is getting harder, if the price of subsidised petrol is further increased it will be very bad, our sales will be the same but the operational costs will increase (FPO4).*

*If the petrol price is increased, the price of all goods and services will follow. However, [we are not able] to increase our prices [if we want to sell], that is the hardest part (FPO3).*

*Our operational costs have been increasing (membengkak) because the diesel price has increased (TBO1).*

### **Seaweed Farmers**

Of all of the respondent groups, seaweed farmers were the most positive with regards to income trend. Seaweed farmers were generally happy with their incomes, which were relatively high compared to the time before seaweed farming was introduced. According to SF12, who also works in the village office, his seaweed farming income usually exceeds his public service salary.

However, nine of the fifteen farmers reported decreases in their income over the last year (of between 25-75%). Several noted that this decrease was relative given that some had experienced unprecedented bumper harvests the year before. The remaining six farmers reported that they had experienced income increases of around 20-25%. These farmers attributed this to an increase in the price they were able to obtain for their seaweed (4 farmers). As a result of the growing market price for their product, in some cases, farmers reported having an increased income despite a decrease in production. SF7 explained that decreasing production over the last year had been experienced across the board, for both cottoni and spinosum farmers. However, while the price of cottoni has decreased in the period 2011-14 the price of spinosum increased significantly. This meant that spinosum farmers were in many cases able to make improved profits despite their poor harvests.

### **5.6 Poverty**

Responses to questions regarding changes to the poverty rate in the area were mixed although more positive in both the fish processing and seaweed farmer groups. The largest number of respondents in both of these groups indicated that in their opinion the

number of people living in poverty in their area had decreased. The fishers were somewhat less positive with just three believing there had been improvement.

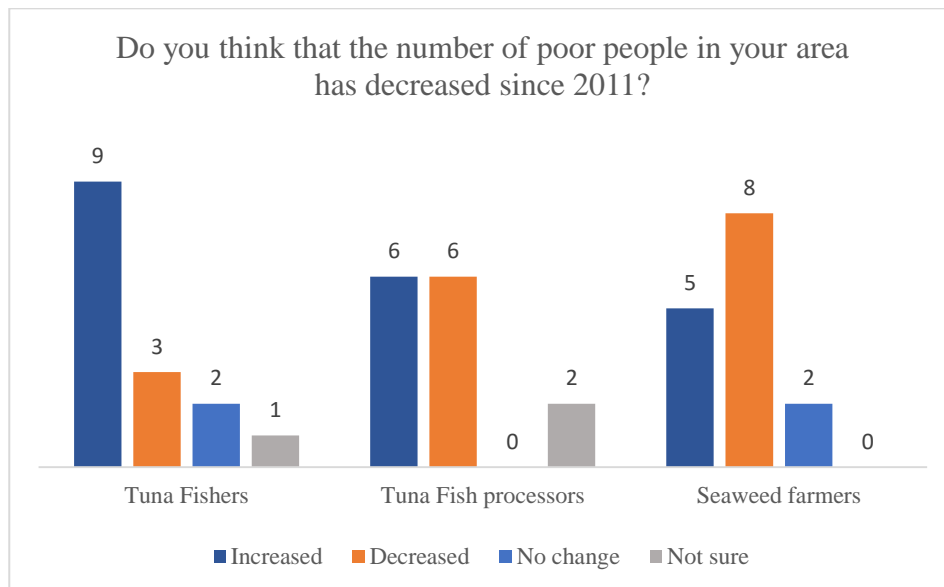


Figure 5.4 Respondents' views about changes in the poverty rate in their area

### Tuna Fishers

Almost two-thirds of the tuna fishers interviewed reported that based on their observation, the poverty rate in their area had increased since 2011, which contrasted with poverty data from the Cilacap Administration (see Figure 2.9). Respondents claimed the primary reasons for increased numbers of people living in poverty were income reductions resulting from lower fish production and inflation.

*There are more people facing difficult times now (TFC2).*

*The number of poor people is increasing because our earnings have fallen (TF1).*

Only three respondents reported that the poverty rate had decreased while a further two respondents believed there had been no change. Those reporting a decrease in poverty attributed this to a perceived increase in alternative job opportunities, particularly in infrastructure development and the oil refinery industry (Pertamina). This is supported by the local government data which indicates there was an increase in the number of workers in industrial areas. In 2011, industrial workers in Cilacap numbered 39,000 people, increasing to 40,410 people in 2012 but slightly decreasing to 40,333 people in 2013 (BPS 2014b; BPS 2014c; BPS 2014a).



### **Tuna Fish Processors**

Within this group, equal numbers of respondents reported that poverty had increased as those who said it had decreased. The remaining respondents either did not know or did not respond. Those who believed poverty had decreased believed this was likely the result of increased alternative job opportunities in infrastructure development, including roads and building construction. FPO4 pointed to an increase in seasonal work and said for example, at the time of the research, it was jellyfish season so 100-200 additional positions were available in processing for a temporary period. FPM said increased prosperity was evident from the increasing number of motorbikes on the roads having replaced the cheaper alternative of bicycles which were more common a few years previously. Those that believed poverty was increasing claimed that job opportunities were actually decreasing due to declining fish catches and increasing unemployment.

### **Seaweed Farmers**

Seaweed farmers were far more positive in their reports regarding the level of poverty in their area. The majority of respondents (eight out of fifteen) reported that there had been a significant decrease in poverty in Nusa Penida. One farmer (SF12) noted that he had been able to afford to send his children to university – the first in his family to achieve higher education – as a result of increases in income from seaweed farming.

*[The poverty rate] has decreased since seaweed jobs are available to fulfil our daily needs (SF7).*

A local Klungkung Fisheries official (DKP2) reported that poverty had been essentially disappeared from Nusa Penida's coastline saying;

*It is very different [the poverty rate] between coastal and mountain communities (who rely on agricultural crops). Seaweed farmers have greatly benefitted... the contrast is very visible compared to the past (DKP2).*

Respondents also highlighted the role of the development of the tourism industry in the area in improving local's economic situation and reducing poverty;

*It has decreased because there are more alternative livelihoods including in the tourism industry (SF4).*

They noted that increased alternative job opportunities in the tourism industry meant that locals were able to supplement their income from seaweed or even earn a comfortable

living from these jobs when crops were unsatisfactory. However, a smaller proportion of the seaweed farmers said they believed poverty had increased over the last year – most claiming that this was the result of a decrease in income as a result of the poor seaweed production over the last year.

## 5.7 Terms of Trade (Nilai Tukar)

Responses regarding changes to fishers, processors and farmers' Terms of Trade were generally negative – with just one fisher and three seaweed farmers indicating there had been change for the better. The most positive group were the processors, however, even within this group just five respondents noted improvement in their ability to save money.

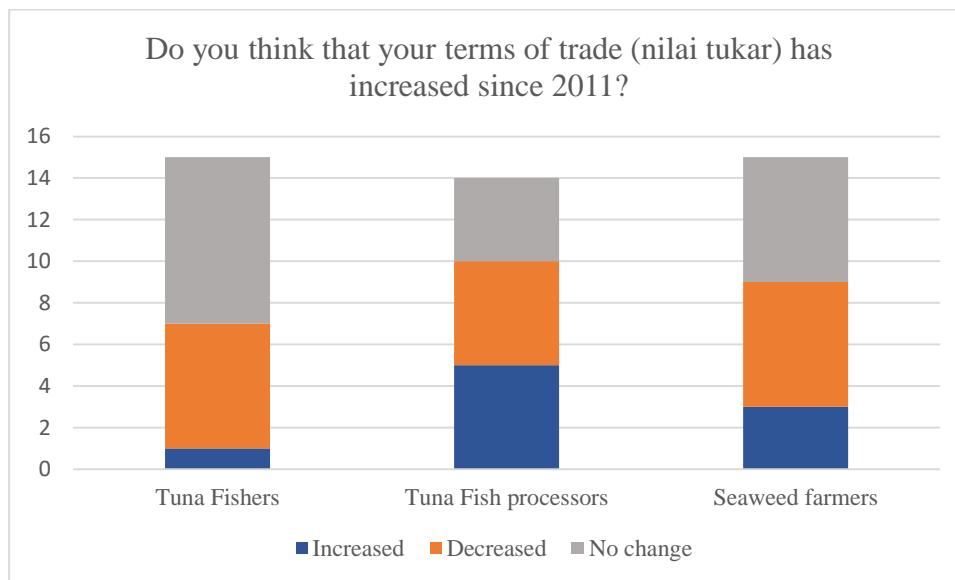


Figure 5.5 Respondents' views regarding changes in their ability to save

### Tuna Fishers

Tuna fishers were overwhelmingly negative on the issue of their ability to save. Only one fisher reported an increase in his ability to save in the period after the announcement of the industrialisation and blue economy policies and he (TFC3) noted that the change was very minor. In the case of those who claimed there had been no change (eight respondents), several noted that they had no ability to save prior to 2011 (since fisheries industrialisation policy was implemented), and had seen no improvement since then. The rest – six respondents – indicated that their ability to save had slowly

decreased over time. These respondents all indicated that as their catch had declined and costs had increased, they were less and less able to put any money aside into savings.

A number of the fishers indicated that they were increasingly reliant on loans from money lenders, including from their patrons – the fish collectors:

*I have never been able to save money – I am constantly repaying debt – often by borrowing additional funds. You dig a hole and then fill it again (gali lobang tutup lobang). It is like that proverb, money earnt on the water runs out of your hands just like water (TF1).*

*Honestly, there has not been any [increase of saving], in the past I could save every month, but now even buying food to eat is more difficult (TFC3).*

TFC3 added that his household spending had increased due to increases in the price of daily essentials, food and education for his four children. He noted that his income has not risen in line with these increases, but rather has decreased as a result of production decreases, making it almost impossible to put anything aside into savings. Increases to the cost of living were noted by all of the respondents in the discussion on terms of trade, including TF6 (a handline fisher) who had experienced an income increase. TF6 said that, despite his income increase, he was even less able to save money than before due to increasing costs.

### **Tuna Fish Processors**

While improvements in their ability to save were somewhat more often mentioned by tuna fish processors, the majority (nine respondents) stated that their ability to save had decreased. Like the fishers, many processors noted that in fact their debt was increasing. Some reported that their businesses only occasionally made a profit and that they were sometimes running at a loss.

FPW1 pointed to increases to the price of rice that had not been accompanied by an increase in income. He noted that the situation had been better a few years ago, at which point he had comfortably met his living costs with a little extra leftover to save. Another said;

*[my ability to save] has decreased, the amount of money coming in is greater but it has a lower value than it used to. IDR 100 [AU\$10] is worth nothing nowadays (FPW2).*

Many respondents noted that while their businesses were no longer viable they continued to run them due to a lack of other alternatives.

However, there were some indications of improvement amongst the fish processors, with over a third of the group indicating that their ability to save had actually increased since 2011. Some of these explained that they had been able to save more money due to increases in their incomes as the result of promotions in their factories (FPW4, FPW6 and FPM). One of the fish processing business owners (FPO4), stated that though he had no savings, this was because he had decided to reinvest all of his profits back into his business, allowing him to grow his income further.

### **Seaweed Farmers**

The picture was somewhat more concerning amongst the seaweed farmers, with just three of the fifteen farmers reporting that their ability to save had increased. Six respondents stated that their ability to save had decreased as the result of production and income decreases, while the other six stated that there is no change in their ability to save, or they have not been able to save money even before 2011.

Several of these farmers reported that they were accumulating debt to buy seed, ropes and other seaweed farming tools. Like the fishers and processors, several farmers also discussed the negative effects of inflation, and noted that decreases to their production and therefore income had made saving more difficult. However, it is unclear whether a particularly bad season immediately preceding the interviews and following a bumper crop the year before had resulted in especially negative sentiment among the respondent group. Another factor could be rising costs due to an overall rise in socio-economic standing. For example, SF12 noted that his expenses had significantly increased, and he pointed to the high cost of tertiary education for his son – the first in the family to complete higher education.

## **5.8 Quality Assurance**

Few of the respondents reported there being any changes to their quality assurance processes or product handling since the announcement of the policy in 2011. The seaweed

farmers were the most likely to identify several improvements to their handling processes, though several noted that they were not sure improvements were valued by their buyers.

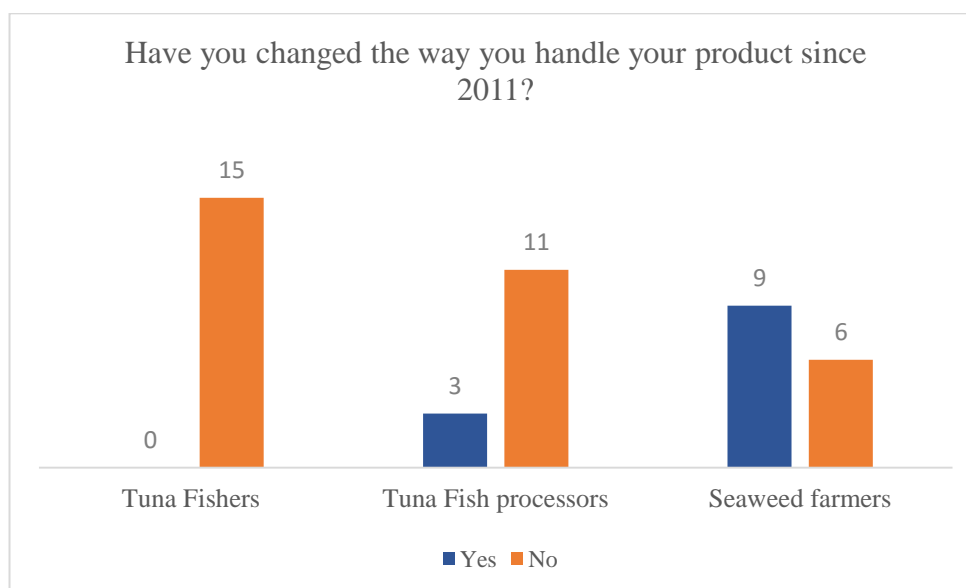


Figure 5.6 Respondents' views regarding changes in handling procedures

### Tuna Fishers

Not one of the tuna fishers interviewed noted a change in the way they handled their fish since 2011. According to the fishers, any changes, particularly the utilisation of freezers and water freezers, occurred in 2006 – well before the new policies were introduced.

*There has been no change, we do it the same way we have always done... Since I started work at sea, the practices are the same (TFC1).*

*Everything is still the same, there has been no change whatsoever, the crew know how to handle the fish. I think it is similar in other regions (TBO2).*

Most crew members showed no interest in the way they handle the fish, generally noting that only quantity and weight would affect their income. However, eight respondents, primarily captains and owners, did put an emphasis on quality, explaining that higher quality fish could be sold at a higher price, particularly for export oriented fish.

*Fish quality is very important. Because good fish quality will increase its price (TFC4).*

Boat owners indicated that they rely on the captains to practice good post-harvest handling. In terms of quality assurance, TBO2 identified his key concern was the long delay between tuna being caught, landed and finally exported.

### **Tuna Fish Processors**

Similarly, the vast majority of tuna fish processors (eleven out of fourteen) reported that there has been no change in their quality assurance practices. Fish processors noted that their methods had been passed down family lines, essentially unchanged for decades. This was particularly the case for *pindang* makers.

*It is similar, there is no change since 1960s (FPO2).*

However, unlike fishing crews, there was greater awareness of the importance of quality assurance amongst almost all fish processors, with most noting that better quality products could fetch higher prices at market. One staff member (FPM) noted that his factory no longer accepted raw materials from PPSC because the quantity and quality did not fulfil their requirements. As a result, they had to buy raw materials from Bali (approximately 90% of their raw product) and the rest from Jakarta. However, interestingly, many of the fishers and processors noted that the majority of Cilacap's higher quality fish was sent directly to Jakarta. It is unclear whether the raw material imported from Jakarta by this factory is the same that is originally landed in Cilacap.

Nonetheless, a number of concerning practices relating to quality assurance and food safety were observed during the fieldwork (see Figure 5.7) such as the use of used cement bags to cover cooked fish, which violates Law No. 7/1996 on Food Safety. This also shows how complex the enablers of policy implementation and impact can be; it is a truly daunting prospect for policy analysis, evaluation and researcher.



Figure 5.7 Cement bag used in *Pindang* making process (the cement bags are indicated with blue arrows)

In contrast, the modern factory manager (FPM) reported that their practices often changed in accordance with the demands of the international market and the government. He noted that increasing international competition meant the factory needed to constantly ensure it was producing the highest quality product in accordance with international quality assurance guidelines.

### **Seaweed Farmers**

Awareness of the importance of quality assurance was also very high amongst seaweed farmers, many of whom noted that the higher the quality of their seaweed, the higher the price. However, this did not necessarily translate to improved handling and processing of their product, as one seaweed farmer said:

*[Quality assurance] is very important. In the beginning the price of our seaweed was high, but after several years the price dropped drastically because the quality was very bad, it was even reported in the news that our seaweed quality was not good because it was mixed with sand ...I urge the farmers to be more aware about the quality of our seaweed so seaweed price can be more stable. But in general farmers do not realise, they only have short term high profit in their mind and mix their seaweed with sand so it will be heavier when measured... of course that would be bad for the middle man but eventually it will have a negative impact back on the farmers (SF12).*

Nine seaweed farmers reported that there had been changes to the way they handle their product since 2011. One example, given by a number of respondents, was the practice of drying seaweed on mats rather than directly on the sand as had been done previously. Others noted that the government had provided special purpose mats called “para-para” for drying the seaweed, though most indicated that they rarely used them for seaweed, often choosing to dry their clothes on them instead.

One MMAF official (MMAF1) reported that the government had provided extensive training and seminars about better post-harvest handling, but noted difficulties in changing farmers’ long established habits. Several respondents also noted that motivation to follow quality assurance guidelines were sometimes undermined by seaweed collectors who did not discriminate between low and high quality product. This sometimes resulted in lower quality product fetching higher prices due to the added weight from sand and other contaminants.

## 5.9 Competitiveness

Most of the respondents were generally quite positive about their business's ability to compete, though a number noted that this was becoming somewhat more difficult due to increased competition, production problems and a shrinking profit margin.

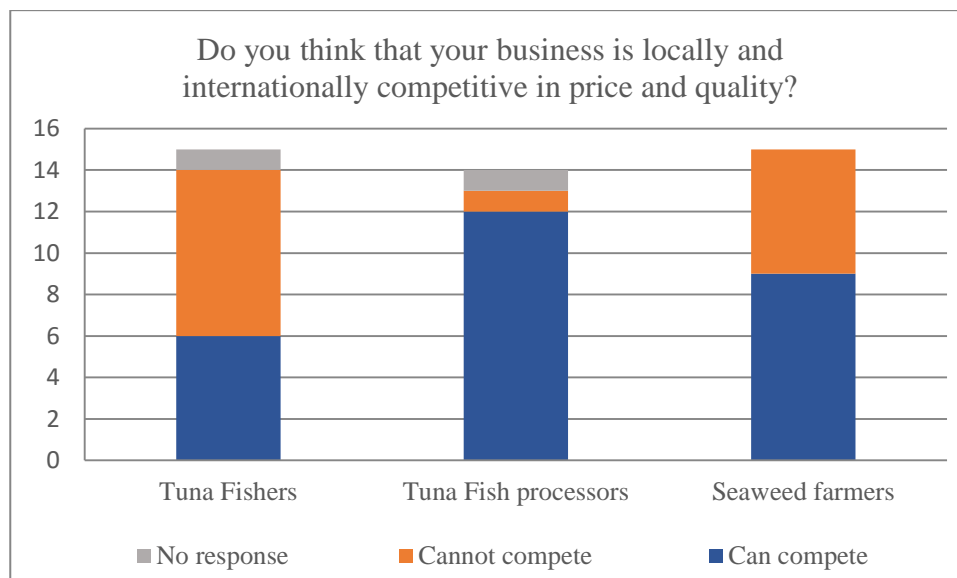


Figure 5.8 Respondents' views regarding competitiveness

### Tuna Fishers

Tuna fishers were the least positive about their business's ability to compete. Over half of the fishers reported that they were facing tougher competition domestically than prior to 2011. The fishers complained that they were unable to compete with large purse seine boats, which usually also employed more advanced technologies such as GPS, fish finders, and better bait. Many claimed that competition had directly resulted in a decreased catch. As a result, some noted an increase in conflict between fishers, particularly evident in the vandalism of FADs operated by purse seine boats.

Two other stakeholders, including a local government official (DKP1) and a member of a fishers' association (NGO9), also acknowledged a rise in conflict between fishers as a result of increased competition. These respondents noted that purse seine boats often violated fishing zone regulations by catching fish too close to the coastline where smaller fishers usually operated. They also noted that the majority of these purse seine boats came from big cities outside Cilacap. They also said that FADs disturbed fishing boat lines, and got caught up in fishing nets, further aggravating the already tense relationship between large, medium and small fishers. NGO9 noted that most Cilacap



fishers had no issue with the use of FADs as long as the fishers used hand lines to catch the fish. According to NGO9, fishers accepted this as a means to increase the catch, without taking away from others operating in the same area, which explains why conflict between fishers employing gill nets and handlines is rare. Some handline fishers interviewed stated that they used FADs to increase their catch, while one of the boat owners (TBO1) said he plans to purchase a FAD for his handline boat for the same reason.

Although the fishers said that competition was becoming tougher, boat owners were generally satisfied with their ability to compete internationally – exemplified by their success in exporting their catch to Japan. Another positive policy measure mentioned by the fishers was the implementation of government regulations that banned foreign fishers from operating in their fishing grounds. Boat owner TBO2 noted that domestic vessels were utterly unable to compete with the large international fleets previously prevalent in the area due to their size and more advanced technology.

### **Tuna Fish Processors**

More than two-thirds of tuna fish processors (twelve out of fourteen) reported that their businesses were still competitive. However, many noted that they were concerned regarding their ability to remain competitive, noting the exponential growth in the number of *pindang* businesses that they believed was not matched by a growth in demand for their products. The respondents noted that almost every resident in the neighbouring village of Jatilawang had started a *pindang* businesses.

The *pindang* makers voiced a desire to improve their skills, techniques or facilities in order to remain competitive in the long term but were at a loss as to how to go about this, this could be an opportunity for innovation;

*We have to be somehow more innovative if we want to face increased competition (FPO2).*

*Now the competition is harder, especially regarding quality... We always have to enhance our product quality (FPM).*

One (FPO2) stated that where there used to be two cold storage facilities, there are now ten. FPO4 claimed that the increased competition has necessitated a reduction in price to remain competitive. One cold storage facility owner noted that while the number of cold storage facilities had increased, he felt his business was still competitive due to its size. However, he admitted that because he owns his own boats, he can self-supply his

cold storage from his own catch without any need to obtain raw material elsewhere. The modern factory workers noted the growth in international competition, with more and more factories operating in neighbouring countries.

### Seaweed Farming

The seaweed farmers interviewed were generally very satisfied with their ability to compete. Just six of the fifteen farmers voiced concerns about competition. The farmers all noted that they had no trouble whatsoever in selling their products through middlemen or seaweed collectors. The farmers reported that in many cases seaweed collectors approached them before harvest time to pre-purchase their product. Farmers also believed their product was higher in quality than other seaweed products in the region as it is generally free of chemical contaminants and this was preferred by buyers. Of those farmers who said they believed they could not compete most stated that their seaweed was of poor quality, including due to its high moisture content.

### 5.10 Training

Few of the respondents reported having received any formal training since 2011, with the exception of the seaweed farmers, over two-thirds of whom reported having attended one or more training sessions from the government or local NGOs. The fishers and processors noted that all of their training had been informal and on the job.

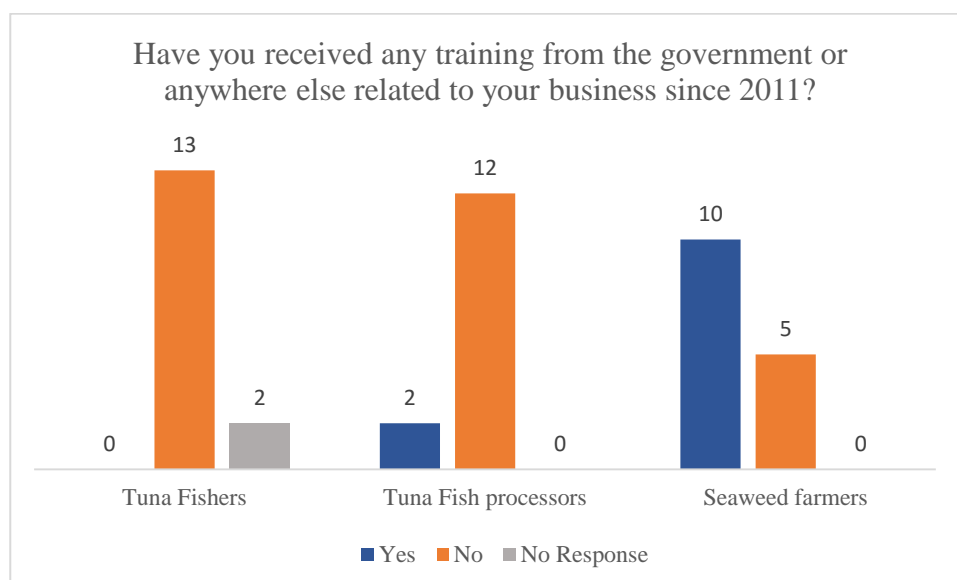


Figure 5.9 Respondents' experiences of training

## **Tuna Fishers**

Most tuna fishers (13 out of 15) reported that they have not received any formal training since 2011. Not one reported to have participated in formal training, though several were not sure. The fishers mainly reported to have obtained their skills from 'learning by doing' or from family members in the business. One summed up his experience this way;

*Yeah, [I learned fishing skills] by taking a job on a boat, I joined as a crew member in 1987, I learnt from experience not theory, from experience. About [training] fishers like us are small scale fishers so we are not able to access it. There is no training from government. I learnt from my previous captain that is all (TFC5).*

A board member of a fishing cooperative (KUD) reported that there was an attempt at training specifically for tuna fishers organised by the port authority, however at the time there was a problem in assembling tuna fishers who mainly live outside Cilacap, and additionally spent weeks or months at sea. The training was reportedly for prawn fishers, who make up the largest proportion of fishers in Cilacap. A government official (MMAF7), however, claimed there had been some benefits to local fishers in Cilacap, particularly through the PUMP program. He cited personal knowledge of government-run training for small scale fishers about business management, and production data recording. However, he said that training for tuna fishers was not available as they were generally defined as medium scale fishers, not small scale fishers.

## **Tuna Fish Processors**

Formal training was also a rarity amongst the processors interviewed. Twelve out of fourteen fish processors stated that they have never participated in any formal training provided by government or other institutions. They explained that they had learned their skills on the job, from their parents, other family members, or special workers (especially among “*pindang*” makers) hired to train workers. FPW1 stated that he was trained by a fish processor from West Java who was employed by the factory owner to train local workers how to process *pindang*. FPW3 reported that these special trainers also work in vocational schools or tertiary education facilities.

The two respondents that had received training were an official in a government-owned small fish processing factory and one cold storage worker (FPW6) who said he had attended training conducted by the port authority about grading fish quality. Additionally, one manager of an export oriented canning company (FPM), stated that his company had

in the past provided training to employees and facilitated their participation in training held by the Fish Quarantine and Inspection Agency (BKIPM). However, such opportunities were generally reserved for higher level employees such as managers rather than the workers, with hope that they would share the information and skills to their colleagues or subordinates at work.

### **Seaweed Farmers**

In contrast to fishers and fish processors, participation in formal training was very high amongst seaweed farmers. The farmers reported that they received significant support in accessing training from the international NGO called CTC. The CTC has a close relationship with other national and international organisations, giving it the ability to aid local seaweed farmers in accessing services provided by government programs as well as international organisations. Two-thirds of the respondents reported that they had received training from government or other institutions including the CTC and *Kalimajari* (a local community development NGO). However, farmers who were not members of any such groups reported that they had not been able to access any training and had instead learnt their skills from their parents or other family members.

The group training included new planting techniques and seaweed processing into food products (mostly attended by female farmers). They said training was usually conducted through the farmers' groups (*kelompok*). SF4 stated that he had received a number of training opportunities, reporting that he had on occasion had the opportunity to participate in more than two different training sessions in a single month.

Implementation of an integrated seaweed and abalone farming program was provided by respondents as an example of a new practice in which they were trained. They reported that while production of abalone using the methods taught was initially successful, it ultimately failed due to a lack of marketing support. Therefore, the farmers found that they were not able to sell the abalone at a reasonable price and discontinued the practice. MMAF1 noted this issue, saying;

*I was involved in the initial abalone project. Honestly, the abalone grew well, but in business we need to make a profit. Although the abalone grew very well and the weight increased rapidly, we were not able to get a good price for it. The highest price we could get was IDR 60,000 (AU\$6) a kilo, though I heard somewhere that its price should be hundreds of thousands [of rupiah] (SF15).*

Another seaweed farmer said,

*We hoped that abalone pilot project would be successful by integration with the seaweed... however the problem was finding the market (SF7).*

The respondents were clearly pointing out the importance of linking production, processing and marketing in the implementation of programs.

### 5.11 Infrastructure

There were very positive responses about the improvements in infrastructure in the area according to all of the groups, particularly the tuna fishers and processors.

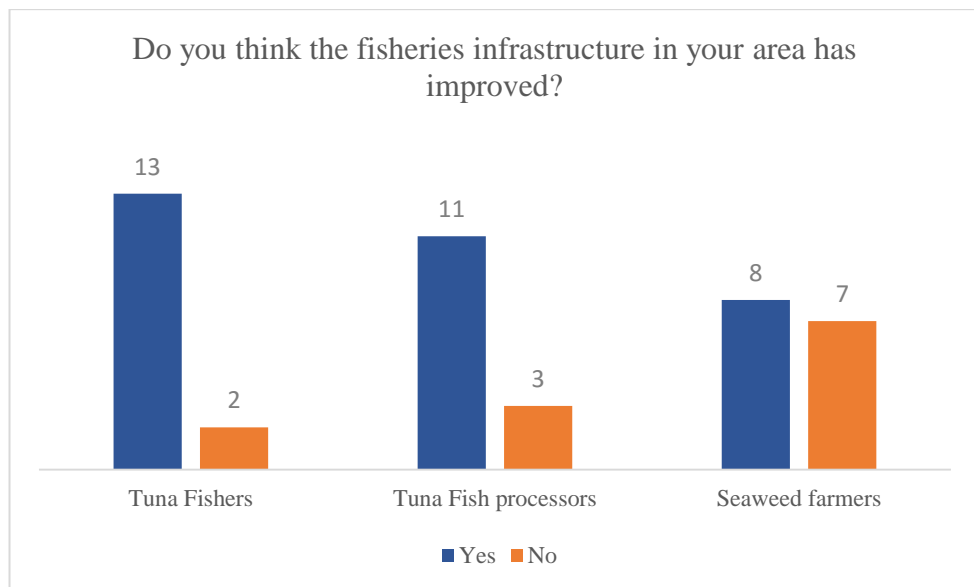


Figure 5.10 Respondents' views of changes to infrastructure in their area

#### Tuna Fishers and Tuna Fish Processors

Almost all of the fishers (thirteen) and tuna fish processors (eleven) interviewed reported that there had been major improvements to local infrastructure since 2011. The main improvements noted by these respondents were the development of port facilities and the paving of roads around the port. Both the fishers and processors noted that these developments had significantly affected the industry, particularly in terms of transportation.

Other developments observed around the port included the installation of closed-circuit television (CCTV) cameras connected to the national online surveillance system, solar panel powered night lights, and improvements to the port's parking area (see Figure 5.11) as part of the infrastructure improvement.



Figure 5.11 Solar Panel and CCTV at PPSC

However, one fish processor (FPW6) did note a number of concerns relating to the quality of infrastructure and particularly complained about the unreliable electricity supply. He said blackouts were very common and frequent loss of power was bad for cold storage businesses that relied on electricity to maintain temperatures. When blackouts occur, they have to use generators which are very expensive and polluting and therefore reduce profits.

### **Seaweed Farmers**

In contrast to their strongly positive responses on previous indicators, the seaweed farmers' responses were the least positive of the three respondent groups regarding infrastructure improvements in their area. Nonetheless, a slim majority did report improvements and these included improvements to roads and the utilisation of high-speed boats to connect the area to the mainland. They noted that these had improved their ability to market their seaweed with ease. These findings supported local government data that show asphalt roads in Nusa Penida have increased from 111 km in 2009 to 129 km in 2013, while the number of boats used in transport has increased from 8 in 2009 to 59 in 2013/2014 (BPS 2014d).

Respondents noted that infrastructure had often been brought in to support the tourism industry, allowing them to benefit also. This was particularly the case in the increase in boats traversing between Nusa Penida and the mainland which has developed entirely for the tourism industry but has also benefited local industry. However, one MMAF official (MMAF1), claimed that there was no evidence of infrastructure enhancement in Nusa Penida related to seaweed farming activities. He said though there were some improvements some years ago, he had not seen any newly built infrastructure in recent years. He noted that in northern Java, the government usually carried out regular

maintenance activities for drainage and water channels to provide water for aquaculture, but complained that little attention has ever been paid to such needs in Nusa Penida.

Other respondents noted that Nusa Penida had benefitted from several infrastructure initiatives prior to 2011, including a Dutch financed wind farm, a solar panel installation, and an underwater cable from Bali. However, several reported that these initiatives had ultimately failed due to a lack of ongoing maintenance. MMAF1 made similar comments, noting that there was little coordination or ongoing support for programs in the region. Despite the installation of a variety of alternative energy sources, the lack of maintenance and consequent dysfunction resulted in the farmers all reporting a heavy reliance on expensive and polluting diesel powered generators for their electricity needs.

## 5.12 Transportation

There were indications of improvement in the distribution and transportation of products amongst all of the groups, with the seaweed farmers again being the most positive. Most of the respondents pointed to improvements in infrastructure as the key factor in improving their distribution processes.

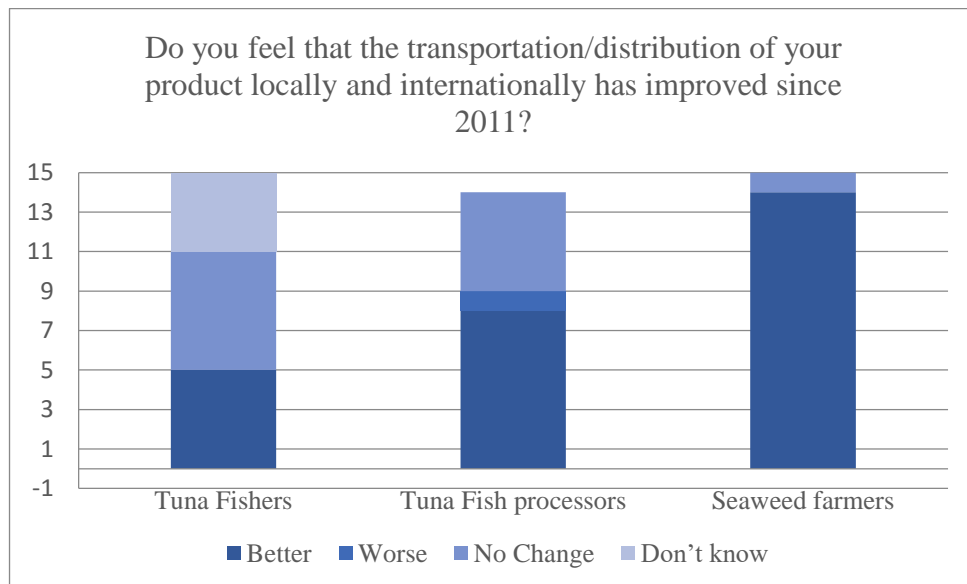


Figure 5.12 Respondents' views regarding changes to product transportation/distribution

### Tuna Fishers

Five fishers reported that they believed that the transportation of their product had improved, with most highlighting improvements in local infrastructure as the primary influencer. However, one boat owner (TBO3) noted that it was very easy to sell fish as

the fish collectors are always at the port ready to purchase their catch as it was landed. As a result, he said, boat owners, captains and crew members rarely gave any thought to the distribution of their product beyond the port. This was evident in the interviews, with almost a third of fishers reporting that they had no idea what happened to the fish after it was unloaded. Many fishers were unaware that their catch, particularly sashimi grade tuna, is exported to Japan where it is sold for a very high price. Almost all of the crew members interviewed reported that any further processes following unloading the fish was up to the boat owner. Their words show the focus of their work does not include land-based distribution or logistics:

*I don't know [about transportation], I only know how to fish (TF1).*

*I don't know anything [about transportation], the matter is handled by the bosses (TF6).*

*I don't know anything about transportation or distribution, anytime I land my fish, my boss would organise it straight away. I don't know anything about what my boss does with those fish after I land them (TFC1).*

The remaining six fishers reported that they had not observed any changes to the distribution processes in recent years.

### **Tuna Fish Processors**

Eight out of the fourteen tuna fish processors interviewed reported that the transportation or distribution of their product had improved, including “*pindang*” makers, cold storage providers and modern canning factories. These respondents noted that the primary factors influencing their product transportation are the condition of the roads and the ease with which they were able to apply for Government permits for export. Respondents reported that it was now relatively easy to get these permits. A further five processors stated that they had not observed any major changes to transportation or distribution since 2011. One reported that transportation conditions are getting worse.

### **Seaweed Farmers**

Changes to distribution were by far the most evident amongst the seaweed farmers, with all by one reporting the process was easier now. The farmers attributed this to the number of seaweed collectors in the area, allowing the farmers to easily sell their entire harvest without having to leave their doorstep.



### 5.13 Blue Economy Policy Awareness

Awareness of the government's Blue Economy policy was extremely low amongst both the fishers and fish processors. Awareness was somewhat higher amongst seaweed farmers, many of whom reported that they had heard of the program through local NGOs and the media and had directly benefitted from some of the related programs.

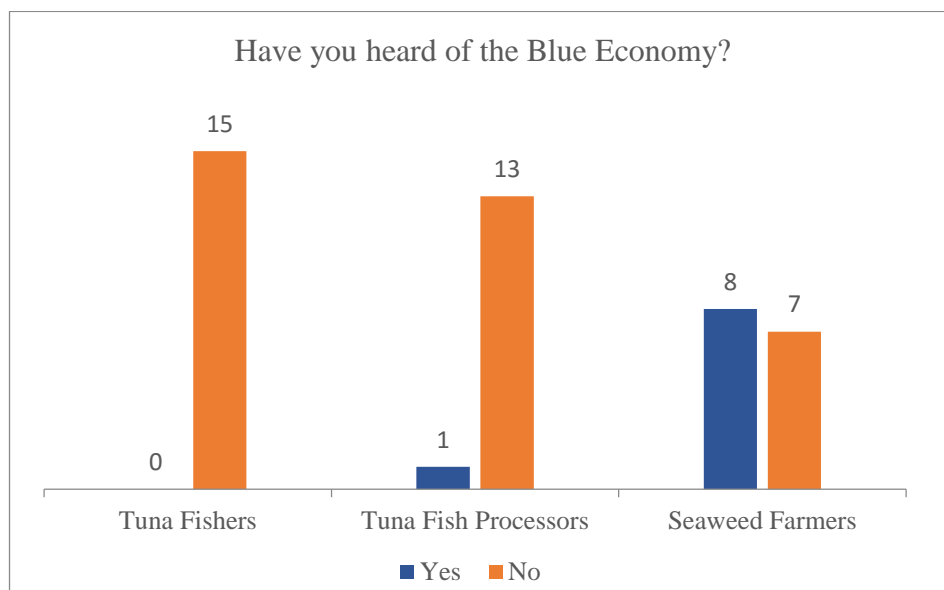


Figure 5.13 Respondents' awareness of the Blue Economy policy

#### Tuna Fishers and Processors

Not one of the tuna fishers reported to have heard of the Blue Economy policy. The fishers were not able to identify any related programs, nor did they recognise any examples provided. Just one of the tuna fish processors (FPOff) reported to have heard of the policies, though he had only heard of it through his employment in the fish processing office of a government factory.

#### Seaweed Farmers

In contrast with the low awareness of the policy amongst Cilacap respondents, over half of the seaweed farmers in Nusa Penida reported that they had heard of the policy from reporting in local media or via NGOs or other organisations. However, many were not able to identify any particular program or action relating to the policy nor were they aware of its implementation in Nusa Penida. The gap between awareness and meaning is clear in the responses like this;

*I have heard a lot [about the Blue Economy], but I do not really understand what it is (SF6).*

The exceptions were two farmers (SF7 and 15) who were involved in the integrated farming of seaweed and abalone discussed earlier. These respondents were the most knowledgeable regarding the policy but, given their unsuccessful experience of the program, they were pessimistic regarding the prospects of future programs.

### **Expert Survey Comment**

The ‘frontline’ respondents' lack of awareness is unsurprising given the extremely pessimistic views of the experts surveyed, all of whom had heard of the policy and the majority of whom believed there had been little or no headway in implementing it since its announcement. While all of the experts were well aware of the policy only four were aware of any specific initiatives, and all of these stated that they were still at such an early stage that impacts were unlikely to be evident. With regard to the implementation of the Blue Economy in Cilacap, MMAF7 noted that a French delegation had conducted a feasibility study in early 2014 for the development of an eco-port at PPSC, but he had heard nothing of it since. Two said they believed initiatives in Nusa Penida had commenced, while another two (MMAF1 and MMAF3) reported that while initiatives had been planned for Nusa Penida, after a long period of inactivity the location had suddenly been changed to Lombok in 2014. These experts noted that to their knowledge programs had not yet commenced there. Of two local government officials, one had not heard of Blue Economy policies, and the other had heard of them but was unable to describe any concrete progress towards implementation. MMAF1 noted that based on his observations, there was no evidence whatsoever of blue economy implementation at the local level in Nusa Penida or Lombok. Similar comments were made by AC1, NGO2 and NGO5. AC2 argued that it would be difficult to see any evidence of the implementation of the Blue Economy in Nusa Penida as this policy has remained in the initiation stage.

Of the three academics with an interest in Blue Economy policies none were aware of any progress in any other locations besides Nusa Penida. Two expressed disappointment at the lack of progress in the implementation of the Blue Economy in Indonesia. The other was more positive but was unable to provide any specific examples of progress.

The twelve NGO staff interviewed voiced a common interest in sustainability and environmental protection and disappointment at the lack of movement on the Blue Economy, which they had hoped would contribute to progress in these areas.

#### **5.14 Zero Waste**

Almost all of the individuals interviewed across all three respondent groups noted a lack of zero waste implementation in their working areas and practices, with the exception of a small group of fish processors.

##### **Tuna Fishers**

All fifteen tuna fishers reported no implementation of zero waste in their industry, adding that there had been no changes to their handling any waste products not immediately marketable for sale. The fishers noted that gills, internal organs and other waste from the cleaning of the fish, usually done at sea, were immediately thrown overboard. One said;

*We throw away tuna gills, sometimes people want fish guts, the fishers would keep it for cooking (TFC1).*

In terms of by-catch, fishermen reported that in many cases if the by-catch had any economic value, they would keep it and sell it to supplement their formal income. However, where the by-catch was not immediately saleable, they would throw it away. Bigger size tuna was classified as by-catch for most gillnet and handline fishers, who usually target skipjack tuna and bonito. The fishers said that shark and sting rays were also a common by-catch, and while illegal, these were often landed at Cilacap, though in some cases they were also disposed of at sea;

*Our by-catch is sharks and “sleweran” (*Decapterus* sp.). For sharks, we throw away the meat, but we keep the fins. We throw away sting rays, and “layur” (*Trichiurus lepturus*) (TF1).*

*If we catch dolphins we usually just throw them away (TF4).*

##### **Tuna Fish Processors**

While the majority of fish processors (eight) reported that they did not re-use waste products, around a third reported that some waste was re-used as fish feed by fish

farmers. However, as fish processors see this waste as rubbish, it was usually given away for free or otherwise thrown into nearby waterways.

Oily saline water from the boiling process in *pindang* making and the water used to clean fish was usually discarded, according to respondents. Processors reported that in the past by-products were used to make *petis* (a *pindang* by-product similar to concentrated fish stock), however, this practice has been discontinued.

*I don't think we produce any waste, only the waste from the washing process. There is no dangerous waste or hazardous chemicals. It is just like waste from a household kitchen. We dispose of the waste into the river (FPO2).*

*We throw away the gills, but we can sell the gut. Usually we throw the waste into the sea (FPO4).*

Respondents from the modern canning company indicated that waste products were re-processed via a wastewater treatment plant (*IPAL*) but were then discarded into the sewerage system. The company previously made fish powder on site from waste, but this had been discontinued. Instead the company sells fish bones on to a company in Surabaya that makes fish powder.

### **Seaweed Farmers**

Seaweed farmers were similarly convinced that their industry had few by-products or waste, noting that all of their seaweed is sold and no other products or waste were produced. A number of the farmers noted that because no seaweed processing was taking place on the island, there were no by-products from their industry in Nusa Penida. One exception was one respondent (SF3) who stated that sometimes farmers use pest algae which congregated around their seaweed plants as compost or fertiliser for coconut trees. SF3 also noted that some consideration was being given to developing this into a commercial fertiliser product.

Two of the experts interviewed believed there had been any effort to implement zero waste practices in Indonesia. NGO3 said that there were small and scattered examples of zero waste implementation all over Indonesia, such as a fish factory in Bogor that processed all parts of the fish into different products and a prawn processing company owned by fisheries magnate and current Fisheries Minister Susi Pudjiastuti that processes prawn shells into chitosan. NGO8 identified a tilapia farm in North Sumatera that has been working towards minimum waste practices by re-purposing waste products from the

processing of tilapia – such as heads, bones and skin – into value-added goods such as fertiliser and wallets. However, the impact of this on the local environment, and particularly native species, is not clear. Not one of the experts were able to describe the implementation of zero waste projects in Nusa Penida. AC1 reported that from his own observations in the area, zero waste concepts had not been implemented in Nusa Penida.

One East Java-based seaweed processing factory owner, speaking at the World Congress on Blue Economy in Surabaya in 2015, noted that while many waste products could be reprocessed or reused while still making a profit, many could not. He suggested that in order for a true and complete zero waste policy to be implemented, the government would need to subsidise at least a part of this process. He said this was a ‘hidden cost’ of Blue Economy implementation which private enterprises would not bear.

### 5.15 Investment

Results regarding new investments were mixed amongst the respondent groups. However, while four tuna fishers and ten fish processors reported to have observed increased business investments in their respective areas, they were negative about the impact of this investment on their own businesses.

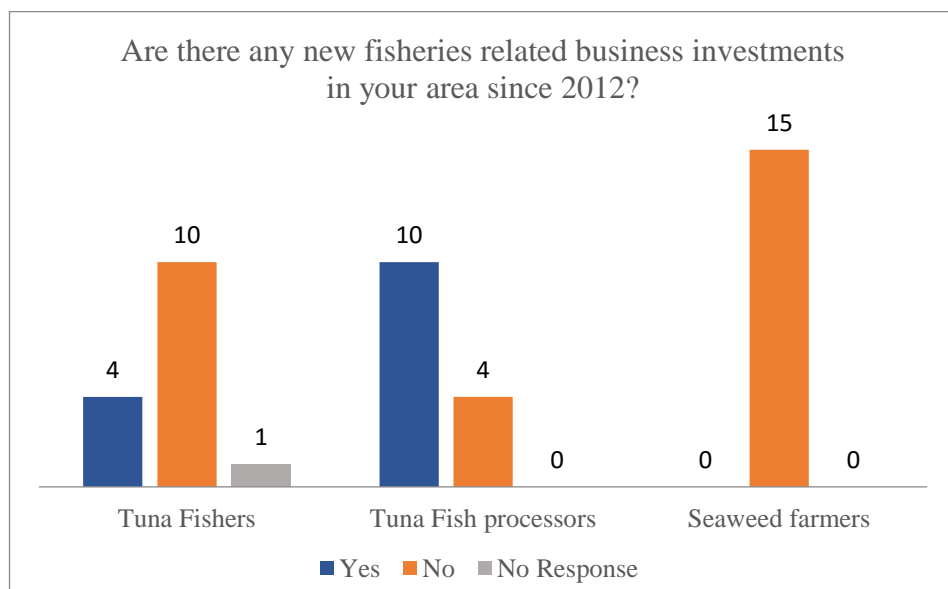


Figure 5.14 Respondents knowledge of new investments related to their business

#### Tuna Fishers

The majority of tuna fishers reported that there had been no new investment related to capture tuna fisheries in Cilacap since 2012. As an example, several noted the absence of any new fishing corporations opening for business around the port. However, though they

were unaware of where the money had come from, a number noted that there were more fishing boats using gillnets (see Figure 2.13), handlines and purse-seine in Cilacap's fishing grounds and reported that the number of FADs had increased.

### **Tuna Fish Processors**

As previously noted, tuna fish processors reported that the number of *pindang* makers and cold storage facilities had exploded over the last three years. The processors noted that they were aware that some of these had been built by MMAF using the national budget but were not sure if they were associated with any policy or program.

### **Seaweed Farmers**

All fifteen seaweed farmers responded that there had been no major new investments in the seaweed industry in Nusa Penida since 2011. Three respondents – a farmer, a local and a national fisheries officer (SF6, DKP2 and MMAF1) – particularly highlighted the MMAF's plan to build a seaweed processing factory on the island, but reported that this had not eventuated. The respondents thought the planned factory may have been cancelled due to the small land holdings, a lack of supporting infrastructure, a perceived trend of decreasing production, a lack of funding from government or policy change as a result of ministerial changes. DKP2 also mentioned that there was an investor from Malaysia who had a plan to invest in a processing factory, however after visiting the location and seeing the post-harvest handling, including the lack of a sorting system, had withdrawn.

NGO10 particularly noted poor electricity infrastructure as an obstacle to the smooth running of a potential processing facility in Nusa Penida. He also raised concerns that the establishment of a seaweed processing factory would intensify seaweed farming activities on the island and create further conflict with tourism development. However, NGO10 did note positive local investment from organisations, such as farmer cooperatives sponsoring small scale seaweed processing industries entirely operated by women in Nusa Penida.

## **5.16 Job Opportunities**

Although the majority of respondents across all three groups indicated they believed job prospects had decreased within their industry, further questioning revealed indications that there had been an increase in 'alternative livelihoods' and opportunities

for side income, though respondents still raised concerns regarding the transience of these opportunities and their potential to threaten the sustainability of their fishing industries.

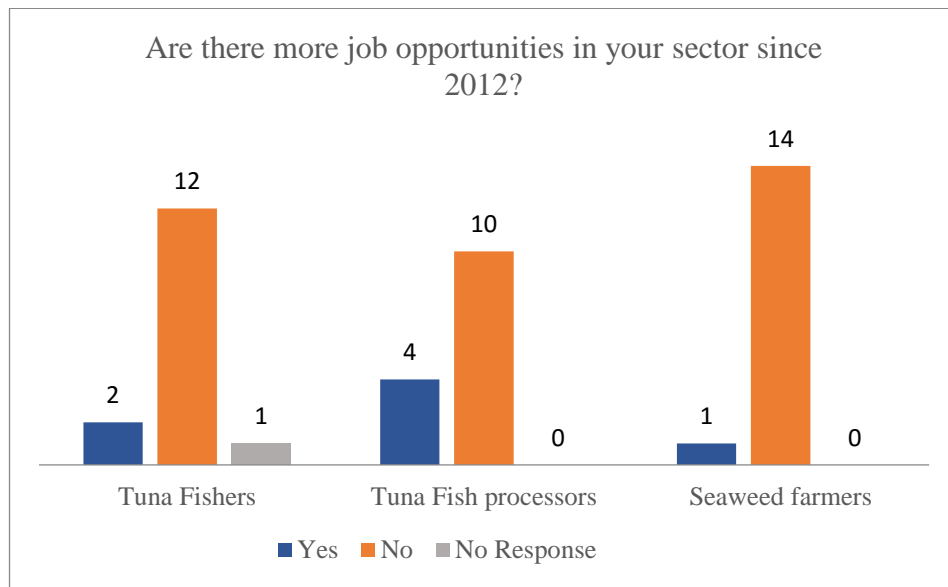


Figure 5.15 Respondents' views regarding job opportunities in their industry

### Tuna Fishers and Tuna Fish Processors

The majority of tuna fishers and tuna fish processors reported that no new job opportunities in their sectors had appeared since the policies were announced in 2011. However, some noted that there were increased job opportunities for residents of Cilacap in alternative sectors, particularly infrastructure development and overseas domestic or labour work (“*Tenaga Kerja Indonesia*” or Indonesian Migrant Workers (TKI)). Others stated that job opportunities in fisheries were unstable and transient and incomes were unreliable, one summed this up clearly saying:

*There is more employment here, but mostly it is from infrastructure projects by the government, such as roads, or with [state-owned oil and gas firm] Pertamina. There are no job opportunities in the fisheries sector, only us. The number of fishing boats is increasing, but because of the seasonal difference, this is not stable or ongoing work. Everything depends on the season. In a bad season, the catch is very little (TFC1).*

### Seaweed Farmers

All but one of the seaweed farmers claimed that there had been no growth in job opportunities in their industry since 2011. They said that decreasing income and production meant less people were interested in seaweed farming. However, they also reported that many locals, particularly young people, had sought out work in the growing tourism industry nearby. One said;

*[The number of people in seaweed farming] has decreased, because they moved to tourism industries (SF4).*

Some noted that this was a bonus, providing alternative livelihoods when their harvest was bad. However, most viewed this as a threat to the sustainability of their industry, as their children – the next generation of seaweed farmers – believed tourism was more exciting, modern and provided greater promise of riches.

## **5.17 Social Equity**

The majority of respondents, particularly fishermen, indicated that they believed the system was inequitable and unfair towards them. They highlighted their belief that their share of income from the resources available was lessening, and that big industries were the greatest beneficiaries of government programs. As previously reported, they also reported that in their experience poverty was growing in their respective areas.

### **Tuna Fishers**

Tuna fishers were particularly vocal about perceived inequity in their industry and the consequences this had on their community. One of the main concerns fishers discussed was the perceived unfair financial situation in which boat owners were able to benefit from fluctuating international market prices, while fishers were trapped in a set price.

*I think [my monthly income has] decreased. The sale price of the fish has decreased. We get around IDR 4,000 (AU\$0.40) for a kilo of squid and around IDR 7,500 (AU\$0.75) for a kilo of tuna. The price is not good. And the boss gets around 10 times what we get (TF2).*

The fishers and captains interviewed reported that they are paid per kilogram of fish that they catch, including their by-catch. Previously, they sold their catch directly to the fish collectors who funded their fishing trips on the condition that the fishers would sell their catch to them at a set price. By-catch was considered a 'bonus' for fishers, who were able to sell this as they pleased for additional income. However, the fishers now report that boat owners demand they sell their by-catch directly to them at the set price. The boat owners then on sell the catch to fish collectors. Tuna fishers are paid approximately AU\$0.45-1 per kg for skip jack tuna and bonito, while for the other by-catch such as squid, they are paid around AU\$4 per kg. The captain is paid about AU\$10 per tuna caught on the vessel.



Nonetheless, a number of fishers said that they were accepting of their situation, as their catch and income was influenced only by luck, fate or the will of God.

Perceived unfairness in the fish market system in Cilacap was also discussed by one of the academics interviewed (AC1), who claimed local small-scale fishers were disadvantaged by their lack of involvement in marketing. AC1 pointed out that fishers in Cilacap have the smallest profit margin when compared to other members of the market chain. AC1 argued that marketing is not controlled by small scale fishers or other small scale actors such as fish collectors and sellers, but by big traders leading to inequitable distribution of profit.

NGO2 and 3 also supported the fishers' accounts of growing social inequity, raising concerns that Indonesian fisheries development programs, including the current fisheries industrialisation and Blue Economy policies, had been utterly unsuccessful at distributing welfare to fishers. NGO5 said that the beneficiaries of the fisheries industrialisation policy were not small scale fishers, but big businesses that have close connections to the government. The NGO worker also claimed that since the policy was announced, many small fishers had become low wage labourers within big business. MMAF7 supported these reports, acknowledging that fisheries industrialisation was not of any benefit to small scale fishers, instead focusing on large scale businesses.

### **Tuna Fish Processors**

The tuna fish processors were generally more positive about social equity in their industry. Many cited increased incomes, perceived shrinking poverty and improved terms of trade in discussions on social equity. Although a number of *pindang* makers reported a decline in income amid increasing competition and rising costs, they did not believe any other group was receiving a greater benefit from either their loss or unfair government attention. They believed the situation was worsening across the board, and therefore there had been no great change to social equity overall since the policies were introduced.

### **Seaweed Farmers**

In discussions on social equity with respondents in Nusa Penida, seaweed farmers particularly noted the divide between poorer inland residents and more affluent coastal residents. They acknowledged that access to seaweed farming land is limited to those whose families held informal rights to a coastal plot appropriate for seaweed farming. One respondent (SF2) reported that a five *are* plot for seaweed farming could cost around

AU\$1,000 – a sum large enough to prevent most of the islands residents from entering the industry. However, respondents noted that even these high prices would not guarantee legal ownership of the farming space as the land in these shallow ocean waters is technically owned by government. Rights over the land are informal and frequent conflicts between families with respect to ownership and land boundaries were reported by one respondent (SF12). A similar concern was raised by NGO3 regarding conflict with the tourism industry regarding zonation and land ownership. In many cases seaweed farming land had been conceded to tourism developments such as hotels and villas. No clear zonation regulations have been implemented, particularly at local government levels of province, district and sub-district.

### 5.18 Environmental Impacts

Despite the high number of respondents reporting a decline in production and catch, particularly amongst the fisher and processor groups, few believed their activities posed any threat to the environment or saw reason to be concerned regarding any future impact.

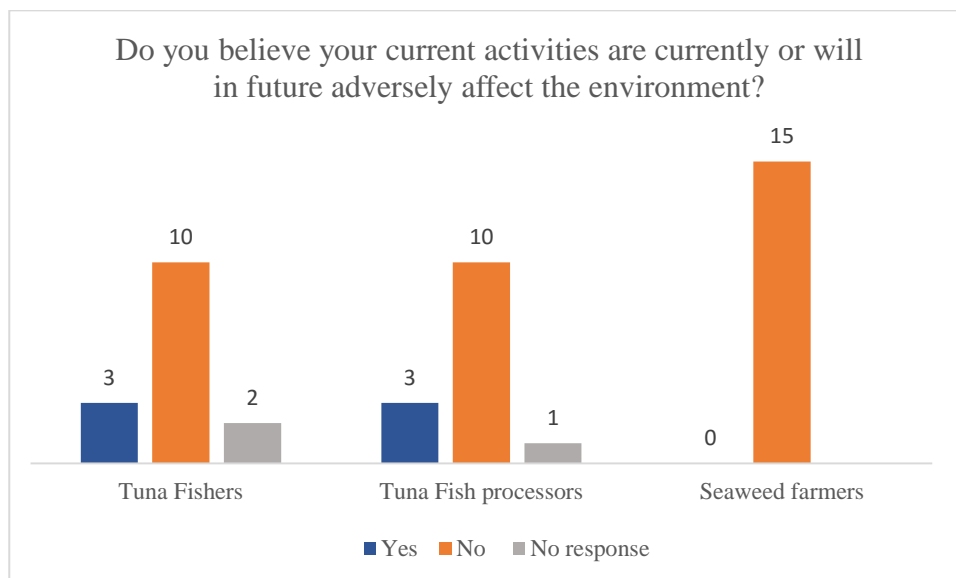


Figure 5.16 Respondents' views regarding the environmental impact of their activities

#### Tuna Fishers

Of the fifteen tuna fishers interviewed, just three voiced concerns regarding the impact of a growing tuna fisheries industry on tuna stocks. The vast majority claimed that stocks were still abundant.

*It seems that it would be impossible to catch all the fish in the sea. Fish stocks are still good (TF6).*

*There is no effect, because there are so many different species in the sea, so there will be no effect to the ocean ecosystem (TBO2).*

While many earlier reported that their catch has been decreasing over time, they reported that they believed fish populations were still high. Cultural influences were cited by some in the way they understand fish stock fluctuations. Rather than the idea that fish stocks may be depleted or regenerated, they indicated that they believe that any variation in catch is purely a matter of luck.

*It's the luck of the draw. Sometimes we fall on hard times, sometimes there are good times, it's up to the sea (TFC2).*

Some blamed the increasing use of purse seine and FADs for the depletion of fish stocks in their usual fishing grounds, but in most cases they indicated that while this could happen on a local scale, fish stocks overall were still abundant. Some fishers did express an understanding of the potential for stock depletion, raising concerns that as fishers caught more and more tuna juveniles, populations would be less and less able to regenerate. Most blamed this on the increasing use of purse seine in their area, though many gillnet fishers admitted that they have also been forced to bring in smaller and smaller fish themselves, including juvenile tuna. They claimed there were no regulations regarding fish size in Cilacap and that juvenile tuna are often landed at the port.

TFC1, TBO1 and TBO2 noted that they were aware of a ban on catching turtles, whales, shark and sting rays at Cilacap, but the fishers reported that they still commonly land these species at the port, particularly sharks and stingrays (see Figure 5.17).



Figure 5.17 A shark and a threatened species manta ray landed at PPSC

Source: Researcher photographs

The fishers' views contrasted with concerns raised by the experts, academics and even government officials regarding the impact of further industrialisation of the industry on fish stocks. An official of the fishers' association (NGO9) said according to reports from members of his association, tuna resources seemed to have been greatly overfished as there were too many fishermen. MMAF7 criticised the further industrialisation of capture fishing, claiming the degradation of resources was ongoing and visible. He said that industrialisation should now be focused on the aquaculture, fish processing, and salt industries.

### **Tuna Fish Processors**

Similarly, the vast majority of tuna fish processors also believed their activities were environmentally neutral. Three noted they did have concerns regarding the impact of their activities, particularly the discharge of effluent from *pindang* industries into the ocean or waste water from washing fish in cold storage. However, these concerns were uniformly denied by the rest of the group. All ten of those who believed their activities were not harmful noted that they were aware of and compliant with all relevant government regulations (including the use of IPAL).

*There is no impact, because it [the waste] goes directly into the river and then to the sea. We have never had any complaints from our neighbours (FPW3).*

### **Seaweed Farmers**

Not one of the seaweed farmers believed their activities had any negative impacts on the environment. The farmers reported that in their opinion their activities seemed to be good for the ecosystem, as demonstrated by the large numbers of fish in their farming areas. They noted that their farms were being used as nursery grounds for small fish. On respondent (SF7) in particular noted that since the introduction of the Nusa Penida marine area, the government had banned seaweed farmers from damaging and clearing coral areas to make space for seaweed farms. SF7 indicated that local residents had generally been compliant with the new regulation, even though they had routinely engaged in the practice previously. Several seaweed farmers noted that they were now aware that the

protection of the coral reefs was important for the continued growth of the tourism industry and the alternative livelihoods it provided them.

Furthermore, all of the farmers had a keen interest in ensuring that their coastline was free of pollution or contaminants that would impact negatively on their seaweed. They also noted that because the seaweed is processed elsewhere, there was little pollution or effluent disposal in the area. However, respondents did almost unanimously indicate they were disappointed the government had not followed through with plans to construct seaweed processing plant on the island.

### 5.19 Future Industry Issues

Respondents were asked about their expectations for the sustainability of their industries over the next ten years. The majority of respondents across the three groups indicated they had major concerns for the viability of their industries.

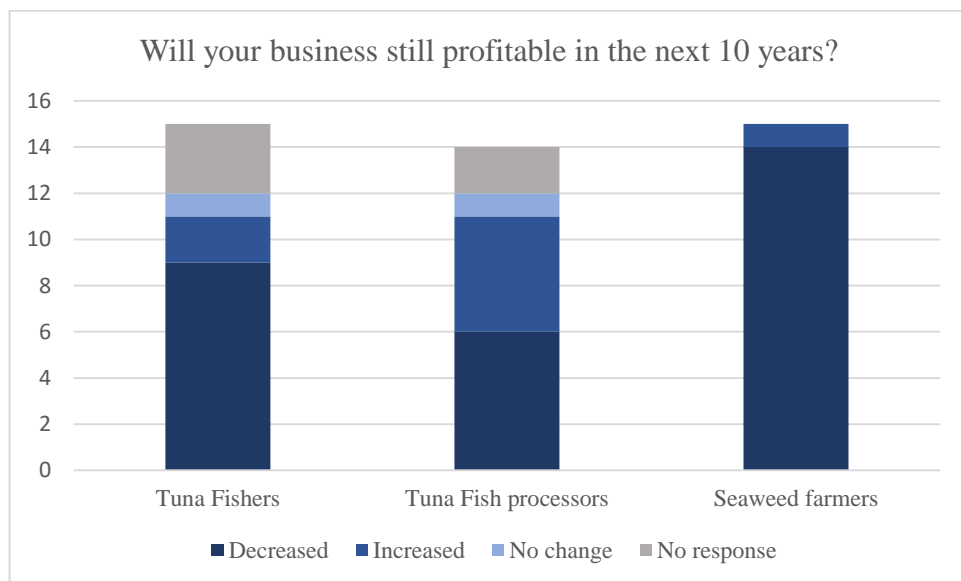


Figure 5.18 Respondents' views on ongoing profitability of their industry

#### Tuna Fishers

Tuna fisheries were generally pessimistic about the future of their industry. Nine fishers said they believe their catch will continue to decline over the next ten years due to pollution, over use of purse seine and FADs, and increasingly bad seasons as the result of climate change. One respondent, TFC5 said that in the next 10 years he expects to see the resource reach complete collapse.

One government official (MMAF4) voiced similar concerns for the future of the industry, noting that in his meetings with members of the fishing industry, most voiced

concerns that tuna production will continue to fall over the next ten years irrespective of increased fishing effort. MMAF4 also reported that tuna landed at Indonesian ports were getting smaller and the fishing grounds further away, which he believed supported the fisher's reports.

MMAF6 was also concerned about the growing numbers of juvenile tuna landed and the decreased overall catch, which he said also indicated that current activities were not sustainable.

*In Cilacap, TTC [production] has decreased by around 50% based on the available data. For the next 10 years, if we look at catch trends including the high numbers of juvenile tuna being caught, I feel it [the production] will further decrease (MMAF6).*

When asked specifically whether any steps could be taken by the government to improve the industry and prospects for its future, the fishers suggested that the government make increased efforts to ensure conservation of resources, enforce a complete ban on purse seine and FAD's operated by purse seine fishers, better regulate pollution from the local Steam-electric Power Station (*Pembangkit Listrik Tenaga Uap-PLTU*), support fishers to access micro credit, issue more handline fishing licenses, reform the fish auction centre so fishers can sell their by-catch in a bidding system for a better price, increase involvement of the community in policy formulation, and support the purchase and maintenance of government required equipment such as VMS.

A small minority of fishers were optimistic that their industry would remain the same or even improve with better management over the next ten years. All three of these individuals reiterated earlier statements regarding the infinite nature of fish stocks and even voiced hopes to increase their catch through the use of more and more FADs.

### **Tuna Fish Processors**

Most tuna fish processors were similarly pessimistic regarding the viability of their industry, voicing concerns regarding increasing competition. Many also noted their belief that costs would inevitably continue to rise, particularly the price of fuel. Several also reiterated concerns regarding decreasing availability of raw materials and therefore the viability of tuna fish processing in Cilacap. When asked what could be done to improve prospects for the next ten years, fish processors also requested that government better regulate purse seine and FADs, improve infrastructure, explore and address the causes of the decrease in raw materials, facilitate access to micro credit, provide training

in new techniques of fish processing, enforce a cap on increases in the petrol price, improve pollution management, provide more advanced processing tools, eradicate corruption, facilitate alternative livelihoods in off seasons through training or public works, provide better health systems and minimum salary rates, improve regulation and services, and finally improve fishers' compliance with international regulations.

### **Seaweed Farmers**

The seaweed farmers were the most concerned for the future of their industry. Although they were the most positive across almost all of the indicators, they were the most pessimistic regarding the ongoing resilience of their industry. They noted the high levels of uncertainty regarding the informal nature of their ownership of the farming areas, the exodus of younger generations to the tourism industry, and the lack of investment and processing opportunities in the area as key reasons for their pessimism. Seaweed farmers also made a number of recommendations based on their experience of the policies. The farmers wanted more programs specifically related to the seaweed industry, including the development of new resistant seaweed seed with immunity to diseases such as 'ice-ice'. (Lampung Center for Mariculture 2015) reported that this center has developed a plant tissue isolation method to produce better quality seaweed seeds, which are disease resistant, with higher growth rates, and more resistance to environmental changes. Unfortunately, Bali is not one of the sites for implementation of this new strain.

They also recommended the development of processing activities on the island, and the enhancement of ecotourism in the seaweed industry to the benefit of seaweed farmers. They would like water quality improvement by controlling waste and pollution from hotels, boats and households, and the development of more areas specifically for seaweed farming and drying. In the case of the abalone project the farmers identified the need for government to facilitate improved marketing to enable them to sell the product. They would like to enhance seaweed quality to ensure they could get better and more stable prices including developing a logistics organisation like the Bureau of Logistics (BULOG) for seaweed harvest and marketing.

They indicated they would like more micro-credit or loans to develop their businesses, and more training in better seaweed management. They asked for better coral reef management because they believed this would contribute positively towards their farm health. Good governance was also seen to be important to mitigate future possible

conflict between seaweed farmers and other stakeholders in Nusa Penida including the tourism industries and fishers. Additionally, they also hoped for formalisation of ownership of their farms and a better zonation system, especially for drying areas.

## **5.20 Other issues**

A number of other issues regarding the policies were raised by the experts during the interviews. One of the most frequently noted issues was a lack of coordination. One academic (AC3) claimed that implementation of fisheries industrialisation and Blue Economy programs had suffered due to a lack of clarity regarding authority and responsibility. AC3 highlighted problems of poor management and overlapping interests between the Ministry of Industry and MMAF. One example provided by AC3 was that both of these ministries were making their own separate seaweed industry master plans. AC3 also noted a lack of coordination between ministries with regards to aquaculture, citing the existence of 23 different steps from spatial planning to marketing products and processing activities. In the 23 steps, 17 are not operated by MMAF but by other ministries including the Ministry of Industry, the Ministry of Public Works, and the Ministry of Energy and Mineral Resources. This lack of coordination, according to respondents, is caused by sectoral competition between ministries to secure budgets. AC3 suggested that there is a need for more coordination from a leading ministry in each program. For example, fisheries industrialisation programs could be managed by MMAF with supervision from Ministry of Industry and support from other ministries to avoid expensive and inefficient overlap programs.

Both MMAF1 and 4 claimed that in their opinion the current policies were nothing new, but rather a continuation of the previous minister's minapolitan program with different 'packaging'. So the lack of long term planning and impact, noted by a number of expert respondents, was surprising if the new policy was continuance of old ones.. MMAF3 expressed concern that the whole policy could be scrapped or changed with yet another ministerial change. NGO3 claimed that there were no long term goals or indicators apparent in either of the MMAF's policies and the direction of fisheries policy was constantly changing with each new ministerial appointment. There was also a lack of comprehensive attention to the next stage of the policy after initial implementation, said NGO3.



Expert respondents were particularly critical and vocal about the government's *inka mina* program. According to NGO3 MMAF simply handed over boats to groups of fishers without first providing training in the skills needed to operate the boat and changing their culture from small scale to industrial fishers. Both NGO3 and AC1 suggested that MMAF should have facilitated work experience or training for small scale fishers for at least three months prior to giving them the boats. Additionally, NGO3 stated that the government should have conducted feasibility studies for the type of boats to be given to fishers in different areas, as in many cases the boats were not suitable for the fishing grounds or the environment where they were placed. AC1 further added that in his opinion the *inka mina* program was only aimed at increasing national income by increasing fishing, without considering the already over-exploited state of resources.

Nonetheless, NGO3 and AC1 did acknowledge *inka mina*'s success in reducing the number of small scale fishers operating in over-crowded shallow coastal areas and increasing the number of bigger boats to catch more fish further offshore. However, AC1 stated:

*People see that to increase production, small scale fishers are encouraged to fish in high seas by donating boats, the problem is this is not as easy as flipping a hand (membalik tangan). As fishers have received these tools, have the problems been solved? (AC1).*

He went on to say that operating boats in the exclusive economic zone (EEZ) is very different to operating boats in coastal areas. This was supported by reports from respondents who noted several problems related to the program including that beneficiaries of the program had encountered difficulties in adjusting to the longer trips required by deeper sea fishing.

NGO3 reported that there were a lot of cases where small fishers rejected the boats donated to them because they were not suitable for their fishing grounds or the specifications were different from what they expected or had previously used. NGO3 said that these problems had undermined the program to the point that it had made no significant impact on fishers' practices or incomes.

Another problem identified by respondents was the failure to take into account fishers' financial situations when giving them boats. A Cilacap-based cooperative board member (KUD) recounted his observations regarding the implementation of the *inka mina* program in three locations, Sentolo Kawat, Sidakaya and PPSC. Several long line

boats were donated originally for catching bonito and skip jack tuna. However, because of the high cost of initiating expeditions and a lack of financial backing, these boats were lent to bigger boat owners (*tauke*) who had more experience and a stronger financial backing. The original beneficiaries (poor fishers) had not gained profit as planned from the program. In other cases, these boats were transformed into gillnet “*nilon*” boats as this fishing gear is much cheaper and requires fewer days at sea. MMAF6 stated that the unreported transformation of fishing gear has caused misreporting of the real number of net boats and long line boats which will have implications in the management of boats, fishing efforts and fishers’ resources.

Finally, many of the academics, NGOs and government officials interviewed highlighted a need for better law enforcement, claiming that while the regulations were sufficient and appropriate, they were rarely enforced. They claimed that weak law enforcement was the result of a lack of resources, personnel, capability and funding. They also believed that poor coordination between MMAF, police, local governments, the Navy and local fisheries departments regarding division of responsibilities caused problems with enforcement.

## **5.21. Conclusion**

These results show that variations in the indicators of policy implementation and impact between and within the three respondents’ groups and places existed. These have been described briefly and will be discussed. The results can be used with confidence because multiple lines of evidence indicate the results apply in these places and with these people. The conclusions that awareness of both industrialisation and the blue economy was generally extremely low and the detailed reports from people form a strong body of evidence for the discussion that follows.

This synthesis of results includes reports from respondents indicated that not only had conditions not improved across a number of areas, including production, income, terms of trade, poverty, quality assurance, training, competitiveness, social equity, investment; in many cases conditions had actually worsened in these areas. However, there were also smaller groups of respondents who reported changes for the better across these indicators, particularly evident in terms of income, poverty, competitiveness, investment and social equity. There were also signs of positive change across the three groups in terms of infrastructure, transportation, and training.

The fishers were generally the most negative regarding their circumstances, though they often claimed they believed this was the result of poor luck or the will of God. The seaweed farmers were generally the most positive across all of the indicators, however, interestingly they were the most pessimistic regarding the future of their industry. Concerns regarding the resilience of their industries if current trends continued were shared to a slightly lesser extent by the fishers and fish processors.

The respondents' views were generally supported by expert reports from members of the academic, government and non-government communities across almost all of the indicators, with the exception of perceptions of the environmental impact of the respondents' activities. Overall, these results provide evidence for increasing concern regarding the state of implementation of both of the policies and their impacts on communities and the environment. However, there are also positive indications that some of the programs may have affected positive change for at least some members of the communities involved.

## **Chapter 6 Discussion**

### **6.1 Introduction**

Although the fisheries industrialisation and Blue Economy policies were only announced three years prior to this research, the government had already claimed a number of successes at the national and local level, particularly with regards to increased production through the industrialisation policy (2014a, 2013a) and BPS (2015b). Nationally, according to government statistics, Indonesia has seen an increase in production, value of exports and other economic benefits from the fisheries industrialisation policy of 2011. Seaweed fisheries industrialisation, also an important priority for the Indonesian government has been reported as successfully putting Indonesia in place as the second biggest seaweed producer globally after China by 2012 (Directorate General of Aquaculture 2012; FAO 2014b). The government's own stated timeframes for goal achievements meant that progress should have been evident by the time research was conducted in 2014. However, while there are some small and scattered signs of improvements across a handful of indicators, there are strong indications that little has changed, or in some cases, change has not been for the better. Feedback on policy implementation experience taken in this preliminary stage of a larger restructuring of Indonesia's fisheries may inform future policy and program decisions

In this chapter the central achievements of both policies will be explored and significant themes in the evidence gathered in this research are identified and discussed. Key recommendations with regard to future policy development and implementation will then be explored.

### **6.2 Stakeholder Engagement**

One of the most prominent themes emerging from the results was a lack of stakeholder engagement and the use of a top-down approach to policy development and implementation. Stakeholder involvement or public participation including preliminary communication with stakeholders, consultation with experts, social-economic assessment and invitation of comment from the public is one of the first and most central steps in the policy cycle to gain policy success and effectiveness (Dovers and Hussey 2013; Garla et al. 2015; Mickwitz 2003; European Commission 2006; Director of National Parks 2012). In almost all cases, including in fisheries industrialisation and blue economy policies,

these steps are spelt out in policy documents as essential to the process. This is included because a lack of engagement of main actors in the planning, implementation and evaluation strongly correlates with a reduction in the effectiveness of policy implementation (Adrianto 2011; Voyer et al. 2012; Johannes et al. 2000; Thiel 2009; Helming et al. 2011; De Smedt 2010). Stakeholders, such as the fishers, fish processors and seaweed farmers involved in this research, often have invaluable local knowledge relating to their industries, current conditions, potential solutions and the environment (Adrianto 2011; Voyer et al. 2012; Johannes et al. 2000).

The research findings indicate a remarkable lack of awareness about policy implementation in Cilacap and Nusa Penida amongst the respondents involved in the industries including local fisheries office officials. Very few respondents across all three groups had heard of either fisheries industrialisation or the Blue Economy or any associated programs. Where in some cases respondents were aware of government engagement with their community, they reported that this was primarily focused on only the more affluent members of the community, such as boat owners. As a result, many respondents reported feeling left out of all stages of the process, from consultation, policy communication and as beneficiaries. A lack of stakeholder engagement or communication with frontline workers in the targeted industries for the policy was also mentioned by most of the experts interviewed. Furthermore, engagement with these relevant experts, such as the academics and non-government stakeholders involved in this research was also notably absent.

The lack of knowledge of Blue Economy policy implementation at the local level in Nusa Penida as reported by the local officials suggests a lack of coordination between central and local government. Decentralisation, including in resource management, has been identified as a contributing factor to coordination problems as reported by Siry (2006) and Wever et al. (2012). In many cases local level governments are not coordinated with or consulted on national level policy implementation. Local governments may also not fully support the implementation of national policies, particularly as they face their own problems with a lack of resources, funding, and expertise in the policy area.

In contrast with the low levels of engagement noted by the respondents relating to the 2011 policies, almost all indicated interest in participating in any policy formulation and engaging with government programs. The few with knowledge of the policies or

programs expressed cautious hope for potential impacts they could have on their industries if fully and appropriately implemented.

In the case of this research, a number of issues and opportunities were identified with relation to the lack of engagement. One prime example was raised by a number of experts with regards to the government's *Inka Mina* program. According to the experts, as a direct result of lack of engagement, the program had failed in its aims and reinforced existing social hierarchies. Though the government was well-intentioned in intending to grant fishing vessels to fishers' groups, a lack of consultation resulted in lack of supporting programs to ensure the efficient running of the vessels. An inability to fund initial fishing ventures and a lack of training in the vessels' operation resulted in many being handed over for very small fees to larger operators.

Another missed opportunity relates to the local cultural beliefs surrounding the preservation and management of the environment and natural resources (e.g. *awig-awig*). *Awig-awig* informally sets out guidelines for management of mangroves, and coral reefs, and prohibits the killing or catching of local birds. Many of these beliefs appear to align directly with environmental sustainability principles, but have not been optimally incorporated into programs to promote environmentally sound practices. Based on the interviews, the strongest emphasis appeared to be on the individual's powerlessness in the face of natural events and resources. However, there could be substantial benefit from a shift in emphasis away from potentially damaging beliefs, such as the idea of an inexhaustible fish supply, towards those that protect the environment such as guidelines regarding appropriate times in the life cycle of fish species for harvest to prevent overfishing of spawning or juvenile fish.

Another opportunity that has emerged from this research is the use of non-government organisations to support engagement and promote increased participation. In contrast with the majority of fishers and fish processes, a large number of seaweed farmers in Nusa Penida were aware of the policies, and an even larger number reported having directly benefitted from the policies. As previously noted, these respondents unanimously attributed their participation to the CTC, an NGO initiated by TNC. The benefits they reportedly gained from programs associated with the policies included opportunities to gain more capital from financial providers, enhanced skills in farming from training, and business enhancement (cost saving) from government grants of boats, ropes and drying tools. The CTC played a key role in the success of local farmers in

maximising their involvement in government programs. The potential for the use of NGOs to increase engagement in Cilacap and other areas of Indonesia is worth investigating.

While there are advantages to involving captains, boat owners, factory managers and other industry and social leaders, the additional involvement of frontline workers in policy development, implementation and monitoring may have enabled better outcomes in terms of environmental indicators. There was a marked lack of awareness amongst respondents regarding the environmental impact of their activities, which could have been acknowledged and addressed early if they had been involved in the process. Feedback during the monitoring stage may have also been useful in ensuring better reporting regarding the impact of purse seine boats on smaller fishers and the environment and potential solutions to the resultant conflict.

### **6.3 Production, Income and Saving**

Production, income and terms of trade were inextricably linked in this research. Production decreases inevitably lead to income decreases, which negatively affect respondents' ability to save. The majority of respondents across all three groups reported decreased production due to overfishing, pollution and climate changes. Interviews with tuna fishers confirmed independent and government reports (see Figure 2.15) regarding an overall decline in production since early fisheries industrialisation in the mid-1900s at Cilacap (Bailey 1997; Morgan and Staples 2006). Flow on effects from decreasing production appear to have also impacted on opportunities for local economic growth in Cilacap related to landing the fish, processing and marketing activities, evident from concerns raised by Cilacap's fish processors regarding the ongoing viability of fish processing industries in the area due to a lack of raw materials.

Seaweed farmers also reported decreased production, though the process was not as linear as in Cilacap, with the results likely being slightly skewed as the result of a particularly good harvest followed by a very poor harvest immediately prior to the research. Seaweed farmers repeatedly emphasised the uncertainty surrounding their industry, as a number of factors outside of their control could affect their harvest.

Production decreases were experienced by respondents in all sectors and this provides evidence that these policies have not achieved their stated objectives to increase fisheries production including tuna, fish processing products and seaweed. Market based

approaches being used as one of the instruments including giving away over 10GT boats to fishers including to tuna fishers in Cilacap relatively did not increase tuna production in Cilacap (see Figure 2.15) which then influence the fish processing industry. Additionally, the committee's Ministerial Decree No. 45/2011 has clearly reported that fisheries resources in most Indonesian waters including tuna have been overfished. It is clear that giving away boats (*inka mina*) program is not a good choice to be implemented considering tuna resource depletion problems.

Following on from their decreased production, the tuna fishers and tuna fish processors interviewed also reported decreasing income and inability to save money in recent years. Other factors were significant, with many noting the impact of inflation and increasing costs. Although a large group of fish processors reported income increases these were all attributed to promotions or to having only recently joined the industry from lower paying work. While it is possible these income improvements could be linked to the government's policies through increased opportunities, the greater number of processors reporting a decline in income cautions against such a conclusion.

## **6.4 Social Equity, Poverty and Sustainability**

Social equity was a key feature of both fisheries industrialisation and the blue economy policies. The government demonstrated a clear intent to increase production, policy documents indicated this was in part meant to improve the incomes and livelihoods of some of the industries' poorest participants. However, while government statistics have shown overall improvement in the poverty rate, almost all the respondents indicated that their incomes had declined and that poverty in their area had increased. A majority of fishers suggested that they believed that poverty had increased in Cilacap. This may be explained by looking at longer term statistics than the latest government reports that show that poverty is still slightly elevated over a ten-year period, despite a slight decline in the past four to five years. In 2004, Asih (2015) reported that poverty in Cilacap was 13.4% while by 2011 the poverty rate had increased to 20.7%. Although the poverty rate between 2011 and 2013 has decreased according to BPS (2015a), this decrease still leaves the rate much higher than in 2004. Alternatively, this may also indicate irregularities in government data. Another explanation is that this may indicate growing poverty within fishing communities in contrast to overall improvement in the economic circumstances of Cilacap's population as a whole. Further study is needed to examine the incidence of



poverty in the region to ensure fishers and their communities are not becoming increasingly economically disadvantaged.

According to Kent (1986); Bailey (1988b); Kusumastanto (1996); Kent (1997); Bailey (1997); Alder and Sumaila (2004); Butcher (2004); Morgan and Staples (2006); Kasri (2008); Pauly (2009) and Overå (2011), there is a tendency for fisheries industrialisation to support overall economic growth at the expense of well-intentioned targets regarding re-distribution of wealth, including in Indonesia and Cilacap specifically. The experiences of the respondents suggests that their production, income and ability to save has decreased, despite overall national gains, which may indicate this is a problem in the current implementation of the policies.

Although most tuna fishers and tuna fish processors interviewed believed that it was relatively easy for them to enter the industry and benefit from the resources available around them, this does not mean that pro-poor targets or fair welfare distribution of income in Cilacap as a result of fisheries industrialisation or blue economy policies have been achieved based on the evidence above. One specific example raised by respondents related to the *inka mina* program. Though the vessels were originally meant to be granted to small scale and poor fishers and fishing associations, many were quickly handed over for management to existing boat owners who have the capital and skills to run the boats. In some cases, the boats never reached the target groups at all.

Another example can be seen in respondents' comments regarding wealth disparities between Chinese boat owners and local small scale fishers. According to respondents, this has caused ethnic conflicts in Cilacap. Most of the biggest boat and cold storage owners in Cilacap are ethnic Chinese Indonesians (Bagan Siapi-API). They are commonly called "*tauke*" or "*boss*". Jealousy was noted in the interviews with crew stating that only rich Chinese boat owners benefit from government programs. Similar ethnic tensions were reported by Purdey (2005), particularly in 1998 when local fishers burnt trawlers, homes and fishing supply shops owned by Chinese Indonesians in Cilacap. Respondents' reports indicate such tensions could be exacerbated by the current policies and that such conflict could reoccur in Cilacap.

Reports regarding poverty were far more positive amongst Nusa Penida residents, who reported having experienced huge improvement in their socio-economic circumstances. This was largely attributed to the introduction of seaweed farming several decades earlier, and to some extent supported by the alternative livelihoods provided by

the nearby tourism industry. However, of particular concern is the clear economic disparity between inland and coastal communities in the area.

## **6.5 Training, Quality Assurance, Competitiveness and Zero Waste**

Although a mental revolution through training in new, modern techniques was identified as a central part of the two policies, this was strikingly absent from the accounts of both the fishers and the fish processors. Both the fishers and fish processors noted that all of their training was either on the job or passed down through family. A lack of training was also evident in poor results on questions relating to quality assurance, competitiveness and zero waste, particularly amongst the fishers and fish processors. These three indicators should have been the obvious areas in which change could have been demonstrated.

In terms of quality assurance, most fishers showed little awareness or interest in improving the quality of their product, as they did not believe this would have any impact on their income. There was some awareness amongst captains and boat owners that better quality fish would fetch higher prices, but none reported any plans to try to improve handling practices. Though many fishers voiced the belief that the bounty of their catch was a matter of chance, most acknowledged that their livelihoods were threatened by increasing number of large, modern vessels utilising purse seine and FADs. However, the government's efforts to include them in the modern large-scale fishing industry through the *Inka Mina* boat grant scheme were reportedly a failure.

There was a higher awareness of quality assurance amongst the fish processors, particularly those in modern canning factories. Though reports of training participation were still low, even amongst these respondents, it appears that some training may have been extended to modern canning factories at some point. One factory worker confirmed that some staff had participated in training, even reporting that the factory had been able to improve productivity as a result. This may also explain the greater awareness regarding quality assurance and international standards amongst this sub-group. However, *pindang* makers noted that such training had not extended to them, though their interest in upgrading their skills was high. Most noted that they were aware their businesses were no longer competitive and that they would need to implement different practices and techniques in order to stay in business. However, these respondents openly acknowledged that they did not know how to go about this.

The tuna fishers and tuna fish processors also reported that they had made almost no changes to their handling of waste products, and had not heard of the zero waste concept. Tuna fishers reported that they still throw the waste from cleaning the tuna overboard, as well as any by-catch of low economic value. Fish processors reported that they saw no problem with flushing massive amounts of waste water from boiling and cleaning fish straight out into waterways and oceans. While there were some indications that in the past waste products from *pindang* processing, for example, were used for fish feed, or the use of the boiling water for the production of *petis*, these practices had reportedly ceased. The reasons for the cessation of this were not clear and require further examination.

The seaweed farmers were an interesting example of the potential success of government or NGO training and the impact training may have across a number of indicators. Two thirds of the farmers involved reported having participated in training on quality assurance topics, as well as new planting techniques, drying techniques and processing seaweed into food products. Of those who had attended, almost all reported that they had changed the way they handled their product. Although just over a third of the respondents reported income increases, many of these attributed this to their improved handling practices. Interestingly, these respondents noted that they had achieved these increases despite a particularly poor harvest immediately prior to the interview.

All seaweed farmers who reported participating in training indicated that they had been made aware of the training and assisted in participating in it by the CTC. All of those who had not, stated they had no association with the CTC. This demonstrates that non-government organisations can play a key role in ensuring policies and programs are widely promoted and accessed.

Training provided by the Indonesian Institute of Science (LIPI) in traditional seaweed processing techniques had also enabled the formation of local processing collectives, usually run and staffed by local women. The collectives processed seaweed into a number of products, such as chips and sweets, which were sold to tourists or marketed locally for additional income.

The success of training in new techniques in raising seaweed farmers' incomes even amidst a particularly bad harvest, demonstrates the value of such training and may offer potential for replication across other industries in other areas of Indonesia. Such training would include the rationale for change and thus educate workers about their

environment and possibly reduce the impact of superstition on fishing practices. Additionally, it could provide a further opportunity to gather local information relevant to the development of further policy with specific focus on local conditions. Where necessary this training could provide an opportunity for transition to work in other industries where a reduction or moratorium on present practice seems necessary. Such training resulted in increased understanding of the need for a pristine environment for securing growth in Nusa Penida.

## **6.6 Investment, Infrastructure, Transportation and Job Opportunities**

While there was some evidence of new investments in Cilacap and Nusa Penida, most appeared to have failed due to a lack of ongoing maintenance or supporting programs. Respondents noted an increase in alternative sources of employment and income, in many cases as a result of these developments, however, most also stressed the transient and unreliable nature of these. Nonetheless, the respondents were more positive against the indicators addressing infrastructure improvement and transportation than almost any other area.

In Cilacap, respondents reported that there had been a slight increase in employment opportunities in construction – particularly roadworks – and seasonal work. However, the fishers and fish processors claimed they were often concerned by the temporary nature of the work compared to their traditional employment in fishing or fish processing. With regards to their respective industries, the fishers and fish processors indicated that far from intensifying, industry appeared to be drifting away from Cilacap, including due to fish being landed at ports closer to Jakarta. Most of the fish processors indicated that raw materials were harder and harder to come by, making them pessimistic regarding prospects for future employment in their industry.

However, some responses against the infrastructure and transportation indicators, suggest that there have been some positive developments around the port, particularly in roads and transportation related infrastructure. Almost all of the fish processors and fishers reported improvements in roads and other infrastructure in Cilacap. Almost all also reported that the transportation of their products was now much easier as a result.

Interestingly, in Nusa Penida, though there were a number of physical developments that suggested expensive investment had taken place, such as wind farms and underwater cables, not a single one of the seaweed farmers interviewed reported any

new investments in their area relating to implementation of Blue Economy policy. When specifically asked about these developments, most indicated that they were no longer active, having broken down and never been fixed. With regards to the seaweed farming industry, most noted reports that a seaweed processing plant was to be built in the area and indicated that in almost two years they had seen no progress on the plan.

Though a number of farmers noted that the tourism industry provided alternative sources of employment, they also raised concerns regarding the future of the seaweed processing industry as their children drifted toward the perceived excitement of tourism and away from seaweed farming. However, based on the seaweed farmers' reports, they were generally better off than the tuna fishers and processors, due in part to their alternative sources of income and to their level of poverty prior the introduction of seaweed farming in their community.

## **6.7 Environmental Impact**

One of the most potentially concerning issues to emerge from the interviews was the paradox between respondents' reports of declining production and increased fishing effort and their denial that fishing activities could have a negative impact on the health of global fish stocks. Seaweed farmers demonstrated a keen interest in maintaining the health of their ocean environment, but like the fishers, they were adamant that the clearing of marine land had no negative impact on the ocean ecosystem.

Tuna fishers stated that they did not see any relationship between decreased production and income and the depletion of fish stocks despite a well-documented global trend of tuna fish depletion according to FAO (2014b) that is likely to be reflected in Indonesia as reported in Ministerial Decree No. 45 /2011. Instead they attributed their declining catch in their local area to the activities of purse seine boats that employ FADs. Almost all of the fishers stated their belief that there was an inexhaustible supply of fish in the sea, with many attributing the steady decline to 'bad luck'. This may be influenced by the reality that many fishers face, which is a lack of promising alternatives outside of the fishing industry, as suggested by Ningsih (2008).

A substantial increase in fishing effort with little or no gain in catch would strongly suggest fish stock depletion. The respondents' reports regarding this situation confirm reports by (Cilacap Ocean Fishing Port 2013; Nugroho and Atmaja 2013; Morgan 2011; Proctor et al. 2003; Atmaja et al. 2012); Bromhead et al. (2003); Ingles et

al. (2008). Furthermore, the increasing commonality of catching juvenile tuna (see Figure 2.18) reported by respondents regarding their own activities and those of the purse seine boats further raises concerns about the sustainability of tuna fisheries in Cilacap and Indonesia in general, as reported by (Widodo et al. 2011; Proctor et al. 2003; Atmaja et al. 2012).

Continued fishing at this rate may result in the collapse of future global tuna population. If spawning of tuna is compromised in Indonesia, the future livelihood of other communities who rely on tuna resources may be jeopardised. Willman et al. (2009) suggested that the government needs to ensure that it is making both environmentally and socially appropriate fisheries policy choices. The mounting evidence of major tuna stock depletion may indicate that increased fishing effort targeting tuna may not be the appropriate policy choice. Fishing effort may actually need to be decreased or a moratorium imposed to enable the fish population to recover and ensure the ongoing sustainability of the industry. Other suggestions proposed in the literature include size limit regulation, a reduction in subsidies, regulation of FADs, and the removal of open access Willman et al. (2009). Reducing fishing effort to improve the population would cost money in the short term, and the question is always who would pay. Poor fishers are the least able to bear the costs through loss of livelihood without proper alternatives, however in the long term it will improve the sustainability of the industry. This option at a global scale was modelled by Ye et al. (2013) who found reducing 12-15 million fishers would cost about AU\$132-494 billion to increase long term productivity by about 16.5 million tonnes and annual income increase by about AU\$44 billion.

Seaweed farmers voiced greater conviction toward protection of the environment than the fishers or fish processors. The farmers were vocal on the importance of maintaining pristine and unpolluted waters for the ongoing viability of their crops. They noted concerns regarding effluent discharge by tourism operators which they said was significantly affecting their seaweed production. The farmers noted that they believed there were existing regulations regarding this, but that they were usually ignored or poorly enforced. With regard to their own activities, they also voiced clear understanding and acceptance of regulations against the clearing and destruction of coral. Their emphasis on the importance of the health of the environment on their productivity may be the result of local and learned knowledge, but is also likely to be connected to the widespread education and training they have participated in through the CTC, local government and

other organisations. Nonetheless, the farmers still expressed the belief that the clearing of land for seaweed farms was not in any way detrimental to the environment, despite acknowledging that the monoculture and destruction of the natural ecosystem appeared to support a huge population increase of particular fish species over others.

Unfortunately, Nusa Penida's seaweed farmers were unable to comment on the success of the local MPA, though many were aware of it. Further research on the existing MPA may reveal potential benefits of creating additional MPAs across Indonesia to protect fish stocks. The literature suggests that this would improve fish resources and result in a spillover effect in surrounding areas if sufficient enforcement of such regulation took place (Grafton et al. 2005; Grafton et al. 2006; Lester et al. 2009; Sackett et al. 2013; McClanahan and Mangi 2000). There is doubt that Indonesia currently devotes sufficient resources to this effort.

## **6.8 Future Industry Issues**

One of the most concerning findings from the interviews was the pessimism amongst almost all respondents regarding their future and the future of their industries. This was unsurprising, particularly amongst the fishers and fish processors, considering the generally negative results across almost all the indicators. Tuna fishers are facing reductions in their catch, which in turn influences the availability of raw materials for tuna fish processors and thereby resulting in a drop in income. Many were aware of the need to innovate or make changes in order to compete with an increasingly modern, industrialised industry, but were unable to change their situation. Most indicated that they were getting little support from the government to improve their circumstances, and indicated that they believed conditions would continue to worsen if the current approach were to continue.

The seaweed farmers, were the most pessimistic regarding their future. In addition to high levels of uncertainty regarding the informal nature of their ownership of the farming areas and the exodus of younger generations to the tourism industry, the farmers noted the lack of new investment and processing opportunities in the area as key reasons for their pessimism. Alternative livelihoods for seaweed farmers in Nusa Penida in tourism is in contrast to Cilacap fishers and fish processors who perceive little possibility of any alternative livelihood. The availability of alternative employment increases the resilience of communities that are dependent on natural resource exploitation.

There is a need to conduct further investigation of alternative livelihoods for Cilacap tuna fishers, considering growing evidence from independent, government and grassroots groups that tuna resources are depleting. Some success was noted in this area, with some Tuna fishers and tuna fish processors reporting increased alternative incomes from infrastructure developments and Pertamina, particularly in Cilacap. Investigations on how to develop more opportunities in this area could be beneficial as fishers are forced out of the industry.

## **6.9 Zonation, Competition and Conflict**

Another emergent theme from the interviews was the issue of area use and zoning areas for specific uses has potential for managing conflict and separating scales of industry. Although the fisheries industrialisation policy emphasises the need for inter-connection between small and large businesses for the mutual benefit of both there was little evidence that cooperative interactions were taking place. Instead, the respondents emphasised the increasing pressure of competition between large and small scale industry. Despite the geographical distance and technical differences between the three industry groups researched, all of the respondents across the three groups highlighted unaddressed issues of zonation and increased competition. The collision of large, medium and small scale fisheries and the resultant potential for conflict locally and globally has been well documented in the literature. One example is conflicts between small scale fishers and larger trawlers in Bagan Siapi-API, Malacca Straits, North Sumatera in 1970s, which resulted in frequent torching attacks on trawlers perpetrated by small scale fishermen (Bailey 1997; Morgan and Staples 2006).

These issues were raised by many of the fishers and fish processors who indicated there was a high potential for both horizontal and vertical conflict over zonation issues, particularly related to the increased operation of large-scale fishers, purse seine and FADs in their traditional fishing grounds. Adding further to the unrest is that most of these purse seine boats are originally from outside the Cilacap area, including from Pekalongan, Central Java; Pacitan, East Java and Jakarta. Atmaja et al. (2012) observed that the purse seine also come from Tegal, and Juwana in Central Java.

A number of experts indicated that in many cases these large scale fishers were entering their fishing grounds in coastal areas illegally, indicating that regulations regarding zonation may be in place but based on the fishers' reports, frequently violated.



The fishers also noted that many purse seine boats frequently violated regulations regarding FAD zonation, anchoring them in small scale fishers' fishing grounds. Several were even able to identify recent examples of small-scale violence and vandalism involving FADs. Local government officials interviewed noted that they did not have appropriate funding or resources to enforce the regulations.

Traditional *pindang* makers and small cold storage providers also discussed rapidly growing competition both from inside and outside Cilacap. The development of the *pindang* industry was described as being unregulated and uncoordinated. Unsurprisingly, a number of potentially hazardous practices were identified during the interviews, with some *pindang* makers being observed using untreated cement bags in their processing. In addition to potentially reducing conflict, better regulation of this industry for the safety of domestic consumers is needed.

Informal land ownership arrangements were also highlighted by the majority of seaweed farmers, with one recounting several examples of resultant conflicts between farmers. A lack of formal rights to use the land was also highlighted by farmers in considering the resilience of their industry. Though the land has been handed down through families, as well as bought and sold, the informal nature of these arrangements left farmers concerned that their income source could be suddenly taken from them. A lack of regulation or formal arrangements was cited as a cause for horizontal conflict between farmers, as official borders were not well recorded resulting in frequent disagreements. Another issue raised by seaweed farmers was a lack of zonation between the tourism and seaweed industry. Many raised concerns regarding ongoing encroachment by the tourism industry on their farming land. However, due to a lack of formal rights to farm these areas, they had few options available to them to prevent this or to receive compensation.

While there is awareness of the importance of zonation within the policies, evident from the existence of regulations regarding fishing areas, formalisation and enforcement of these is necessary to prevent conflict and promote a sense of security for those engaged in these industries.

## **6.10 Data collection and management**

The lack of accurate data collection and management is a major issue raised by the respondents, and particularly academics, NGOs and government officials. This issue

was also very well documented in the literature. The experts in particular saw a strong need for fishers to be forced to meet their obligations in completing log books of catch in an accurate manner. This obligation is currently poorly enforced and makes data concerning catch numbers extremely unreliable. In addition, the lack of enforcement concerning trans-shipment of catches at sea and the use by major fishing organisations of unregulated private ports mean data received by government is suspect and likely to be a considerable underestimate.

This means overfishing could be rampant and result in species and industry collapse sooner than would be forecast by official statistics. Increases in the price of food and daily essentials historically and in contemporary times have had significant political repercussions. As one of the primary protein sources for the Indonesian populace, increases to the price of fish due to a dwindling supply, could potentially have major social and political consequences.

## **6.11 Summary**

Implementation of both the fisheries industrialisation and blue economy policies has been varied. Overall, the results of this research indicate that there are only scant examples of policy successes. Responses were generally negative across almost all of the indicators for both policies, with particularly poor results being recorded against production and income. The results indicated a number of areas of concern, including the potential for conflict over zonation issues and violations, a lack of stakeholder engagement, poor environmental understanding and behaviour, deep pessimism regarding the resilience of the industries and a lack of accurate data collection and management.

However, despite a lack of evident progress in many areas, there were isolated success stories identified by the research, most of which emerged from the seaweed farmers in Nusa Penida. The seaweed farmers reported better outcomes across almost all indicators. Almost all had participated in training, and were able to report improved incomes, social outcomes, handling practices, quality assurance and environmental awareness. These successes support the policies' potential and opportunities for improvement in implementation across all of the industries, should the current Indonesian government have commitment to these policies.

It is impossible, in studies of complex systems and of this size, to precisely attribute results in all indicators directly to the implementation of the policies as many other social and economic factors might have also had an impact on stakeholders' responses. However, as Cilacap and Nusa Penida were identified as the two 'gold standard' locations for the implementation of the two policies in Indonesia, and the interview questions used were focused very specifically on the identified objectives of these two policies, the outcomes of this thesis provide clear preliminary evaluation results and build a strong foundation of knowledge for further evaluation of Indonesia's Blue Economy policy and implementation programs.

## **Chapter 7 Conclusion**

This research aimed to explore the Indonesian Ministry of Marine Affairs and Fisheries' (MMAF) experience in implementing fisheries industrialisation and the Blue Economy policies both in Cilacap and Nusa Penida. Interviews across three major fisheries sectors were conducted with 44 participants in two different regions. Other interviews took place with academics, fisheries officers at local and national levels and NGO workers which deepened understanding of the issues and added to the recommendations for policy improvement.

An analysis of the policies and the early media releases established the major goal as increasing marine product. However, recognition of the instability of global and domestic fish stocks, as well as a commitment to economic and social development within Indonesia pushed the government to emphasise the importance of multiple objectives in the policies. The government optimistically aimed to achieve a number of dramatic improvement targets within just two years – by 2014. Unfortunately, this research found little evidence of progress across any of the stated policy goals. Though the government reported promising improvements in production and a decline in poverty, the respondents' reports in the two areas most likely to benefit from the policy did not support this.

In these two areas very few respondents had heard of the policies or their implementation. Not one reported involvement in policy consultation or monitoring on fisheries industrialisation or the blue economy policies. Despite this, almost all demonstrated an eagerness to be involved and discussed their own ideas and strategies to improve the program for themselves and their communities.

Far from people reporting having benefitted from being the focus of new policies and implementation programs, many respondents reported a deterioration in their socio-economic status. This was particularly evident in the case of the fishers, who reported declining production, income, terms of trade and growing poverty. Many of the respondents reported that social inequity, competition and conflicts were increasing. The fishers were particularly focused on the increasing numbers of large-scale fishers using purse seine vessels in coastal areas and impacting negatively on their catch. Fish processors complained of increasing competition and shrinking profit margins, while seaweed farmers highlighted horizontal conflict over informal land rights and conflict with tourism operators.

Both the respondents and the experts surveyed discussed the failure of many of the programs to reach the targeted groups, often due to a lack of support. The research findings revealed major concerns regarding government data collection and management. While respondents' accounts may have differed from government statistics for a variety of reasons, the experts surveyed also reported inaccurate and questionable data collection.

The experts also raised concerns regarding poor enforcement of regulations, which was supported by the fishers' accounts of the prevalence of undersized fish and illegal species being landed in Cilacap, as well as poor regulation of FAD use, fishing zones and transshipping. Respondents indicated the policies had done little to address these issues, with poor enforcement and increased fishing effort having a direct impact on fish stocks and therefore their livelihoods.

Though this research was only able to view the environmental impacts of the policy through the reports of respondents, there were a number of worrying issues raised. Particularly evident was a poor understanding across almost all of the three groups regarding sustainable utilisation of natural resources. Reports regarding the increased fishing effort and a declining catch suggest the state of fish stocks may be worsening. Tuna resources are highly migratory and global includes Australia, Pacific nations, and other Asian nations who rely on these resources will all be impacted if this resource collapses. Indonesian oceans play a significant part in these global ocean ecosystems.

While there were promising indications of improvement in infrastructure around Cilacap's port and in Nusa Penida, a lack of monitoring and resources had resulted in many falling into disrepair. Wind farms had ceased, undersea cables for delivery of electricity were of poor quality and not repaired after breaking, tourism development had started to impact on seaweed farms because of sewerage and chlorine discharges and conflicts were developing about zonation issues. Respondents in both Nusa Penida and Cilacap were very pessimistic about their future and the future of their industries.

The findings of this research challenge the information in the current publications of the MMAF relating to continuing improvement in fishers' social-economic status and may also raise questions regarding the validity of similar claims of successful Blue Economy implementation from governments globally. The research findings demonstrate a need for further action if the stated goals of the policies are to be achieved in Indonesia. To maximise the benefits and mitigate any potential negative impacts from the implementation of the policies, it is recommended that there should be:

1. Increased consultation with frontline worker and other stakeholders in policy development and delivery, with particular focus on ensuring program benefits reach targeted groups rather than being diverted to wealthier population segments.
2. Increased coordination and harmonisation between relevant Ministries so the responsibilities associated with policy formulation and delivery reduce potential conflicts and gaps. Conflict reduction strategies should be considered in all program strategies.
3. Regular monitoring of program implementation and the addressing of gaps and negative consequences.
4. Better data collection and management - fishers log books, prohibition of transshipment or abolition or monitoring of private ports.
5. Increased training for frontline workers, particularly for fishers and fish processors. Identified areas of particular need or demand include modern techniques, quality assurance, zero waste, environmental awareness.
  - a. Inclusion of supportive local cultural beliefs in any training.
  - b. Provision of alternative livelihood training, particularly where fish stock depletion jeopardises future employment in fishing industry.
6. Involvement of NGOs where possible in policy development and program delivery (consultation, training facilitation and promotion of the policies).
7. Adequate resources to enforce legislation supporting policy goals (FAD numbers, MPAs, other coastal commercial zones) and for maintenance of essential infrastructure.
8. Further research in response to reports of increased fishing effort and decreased catch and appropriate action should fish stocks be found to be depleted. E.g. moratoriums, MPAs, reduction of fishing effort.
9. Further research about the impact of Blue Economy implementation nationally particularly from the macroeconomic perspective (such as national incentives to fisheries businesses as part of the policy) is also needed.

The Blue Economy policy in theory aligns seamlessly with the Indonesian government's aims for sustainable and equitable fisheries industrialisation. However, poor or early implementation reported globally and in this specific Indonesian situation

makes it difficult to categorically evaluate the policy's appropriateness and effectiveness in achieving its stated outcomes.

Scattered examples of successful implementation identified in this research indicate that it also holds great promise in practice, should the government be able to commit to real action on its implementation. The last words, from one seaweed farmer in Nusa Penida are particularly insightful about the high expectations Indonesians have for policy implementation:

*I have heard a lot about it, but I have not seen the implementation... We were really hoping for a lot from this policy because if it were truly implemented, we believe it would have been of major benefit to us. (SF7).*

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# **Appendix A: Participant Information Statement and Consent Form**

**School of Physical, Environmental and Mathematical Sciences**

HREC Approval No: A-14-37

**THE UNIVERSITY OF NEW SOUTH WALES**

## **PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM**

### **Impacts of the Marine and Fisheries Industrialisation Policy and the Blue Economy Concept on Local Communities and the Environment in Indonesia**

Saiful Marbun

#### **Introduction**

You are invited to take part in this research project, which will investigate the changes in local communities and the environment in Indonesia. You have been invited because of your involvement in Indonesia's fisheries. This Participant Information Sheet/Consent Form tells you about the research project. It explains the processes involved with taking part. Knowing what is involved will help you decide if you want to take part in the research.

#### **What is the purpose of this research?**

This research will investigate the changes in the tuna capture fisheries sector as well as tuna fish processing sector in Cilacap, and seaweed farming sector in Nusa Penida, Bali. In particular, the research will evaluate the social, fiscal and environmental changes with the aim of understanding the issues and inform decisions.

#### **Description of study procedures and risks**

If you decide to participate, I will talk with you and discuss your experience. The risk of your views and opinions being known to others is protected by keep you anonymous in any publications. Your statements and comments are kept confidential.

#### **What are the possible benefits of taking part?**

We cannot and do not guarantee or promise that you will receive any benefits from this study. But I will appreciate your help.

#### **What are the alternatives to participation?**

Participation in this research is voluntary. If you do not wish to take part, you do not have to. Your decision not to participate will not affect your future relations with me or the University of New South Wales.

#### **Confidentiality and disclosure of information**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to discuss/publish the anonymous overall results in scientific journals and that information will be provided in such a way that you cannot be identified.

#### **Complaints**

Complaints may be directed to Dr. Stephen Coleman; Convenor, Human Research Ethics Advisory Panel, The University of New South Wales at ADFA, Canberra, 2600, AUSTRALIA (phone (+612) 6268 8812, fax (+612)62688899, email [s.coleman@adfa.edu.au](mailto:s.coleman@adfa.edu.au)). Any complaint you make will be investigated promptly and you will be informed of the outcome.

**Your consent**

Your decision whether or not to participate will not prejudice your future relations with the University of New South Wales Canberra. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

If you have any questions, please feel free to ask us. If you have any additional questions later, Saiful Marbun (Student), mobile phone number: +61451525306, email address: [Saiful.marbun@student.adfa.edu.au](mailto:Saiful.marbun@student.adfa.edu.au), A/Prof. Stuart Pearson (Supervisor), phone number: +612 6268 8305, email address: [stuart.pearson@adfa.edu.au](mailto:stuart.pearson@adfa.edu.au), and Dr Nicolaas Warouw (Co-Supervisor) phone number: +612 6268 8914, email address: [n.warouw@adfa.edu.au](mailto:n.warouw@adfa.edu.au). We will be happy to discuss any questions or concerns you may have.

You will be given a copy of this form to keep.

## Appendix B: Interview Questions

### List of Questions for Tuna Fishers in English

Interview Code :

Number

Date :

Name :

Position :

Address :

Age :

Ethnicity :

Sex : Male ☐ Female ☐

#### Fisheries industrialisation

1. Have you heard about the fisheries industrialisation policy that was announced in 2011? Yes ☐ No ☐
2. Did the government involve you in the formulation of the policy?
3. How many years have you been a fisherman? Have you seen any changes as a result of the introduction of this policy? What do you think are the biggest changes? (probe twice)
4. Do you think that your production has increased since 2011? How different is it from previous years? What factors caused this change? How sure are you that these are the factors?
5. Do you feel that the transportation of tuna fish locally and internationally has improved since 2011?

#### Social transformation to modern society

6. How many generations of your family have been involved in fishing industry?
7. What are your fishing methods/ do you have any fishing licences / do you own your own equipment?
8. What is your highest education level?

Completed Primary School	Completed Junior High School	Completed Senior High School	University
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9. Have you received any training from the government or anywhere else related to tuna fishing since 2011?
10. If trends continue what do you expect Indonesian tuna fishing will look like in 10 years?
11. How long have you been living here?
12. How many people are dependent on you and your work?
13. Do you think that your monthly income has increased or decreased since 2011? What factors caused this?

14. Your exchange value (nilai tukar) (which means your ability to save money after spending it on your daily basic needs) has increased since 2011.

Yes ☐ No ☐

How significant is the difference?

15. In your opinion, how do you define poverty? The number of poor people in your area has decreased since 2011.

Yes ☐ No ☐

16. Do you know of any government programs such as microfinance, skill training, extensions, and other community empowerment programs run by the government or other organisations funded by the government in your area since 2011?

### **Competitiveness**

17. People talk about the effect of foreign fisheries - but I am interested in your experience. In your experience have foreign fishers had any effect on you? (Prompt for a narrative example about this & carefully clarify if it is talk or experience).

18. Do you think that your fishing is locally and internationally competitive in price and quality?

### **Quality assurance**

19. Are you aware of quality assurance (if not explain, FAO definition of quality assurance is “the assembly of all planned and systematic actions necessary to provide adequate confidence that a product, process, or service will satisfy given quality requirements”). If yes, what does it mean to you?
20. Have you changed the way you handle fish since 2011, if yes how? If yes, why did this change? (Probe twice)
21. How important is quality assurance to your work and or customers? Thinking ahead, how will (or might) quality assurance change what you do in future?
22. Do you know of any way that fish handling has changed for others?

### **Modernisation of fisheries infrastructure**

23. Fisheries infrastructure such as roads, fish processors and ports have improved.

Yes ☐ No ☐

If agree please give examples.

24. Have there been any negative outcomes of this development?

### **Blue Economy**

25. Have you heard of the Blue Economy? Yes ☐ No ☐
26. I am interested in what you think about it. So I have been asking people to describe what it is. (Prompt twice)
27. How do you think it has/will (in 3 years) impact you/this community/this industry/Indonesia?
28. What do you think the blue economy will be like in your village in the next 10 years?

**The Blue Economy has three big issues; economic growth, social equity and environmental sustainability I would like to hear your views on these in the following questions?**

### **Economic growth**

29. There are new fisheries related business investments in your area since 2012.

Yes ☐ No ☐

Do you think they are or will be benefiting you?

30. Are there more job opportunities in the tuna fisheries industry in your area since 2012? If yes in what area?

### **Social Equity**

31. You have benefitted from the available resources around you, particularly from the ocean.

Yes ☐ No ☐

Please explain.

### **Environment sustainability**

32. Fish stocks will still be as productive/profitable in 10 years' time. To what extent do you agree with this statement?

Yes ☐ No ☐

33. What would you recommend to improve fish stocks?

34. How large is your by-catch and what species is it made up of?

35. Have you reduced the waste products or by-catch from your activities? If yes, by what percent has your waste product been reduced? Did you get any training from the government about this? Do you think it is possible to achieve zero waste? If so please give details.

36. Your current activity will adversely affect fish stocks in the future.

Yes ☐ No ☐

Please explain

### **Recommendations**

37. I am interested in what you think is the most important issue to be addressed by the government in order to improve its fisheries policy.

[If necessary read this definition of government fisheries policy]

Fisheries industrialisation is defined as: "an integrated production system from upstream to downstream to increase scales and production quality, productivity, competitiveness, and value added of marine and fisheries resources in sustainable way".

The definition of blue economy proposed by MMAF: "based upon the principles of sustainable development, including optimising social capital inclusiveness, resource efficiency through innovation, and minimising waste towards achieving economic growth, people welfare, and protecting the environment".



## List of Questions for Tuna Fish Processors in English

Interview Code :

Number

Date :

Name :

Position :

Address :

Age :

Ethnicity :

Sex : Male ☐ Female ☐

Telephone :

Number

### Fisheries industrialisation

1. Have you heard about the fisheries industrialisation policy that was announced in 2011? Yes ☐ No ☐
2. Did the government involve you in the formulation of the policy?
3. How many years have you been a fish processor? Have you seen any changes as a result of the introduction of this policy? What do you think are the biggest changes in Indonesian fisheries? (probe twice)
4. Do you think that your production has increased since 2011? How different is it from previous years? What factors caused this change? How sure are you that these are the factors?
5. Do you feel that the distribution of processed fish has improved since 2011?

### Social transformation to modern society

6. How many generations of your family have been involved in fishing industry?
7. What methods of fish processing do you use? Do you own your own equipment?
8. What is your highest education level?

Completed Primary School	Completed Junior High School	Completed Senior High School	University
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9. Have you received training from the government or anywhere else related to fish processing since 2011?
10. If trends continue what do you think Indonesian fish processing will be like in 10 years?
11. How long have you been living here?
12. How many people are dependent on you and your work?
13. Do you think that your monthly income has increased or decrease since 2011? What factors caused this?
14. Your exchange value (nilai tukar) (which means your ability to save money after spending it on your daily basic needs) has increased since 2011.

Yes ☐ No ☐

How significant is the difference?

15. In your opinion, how do you define poverty? The number of poor people in your area has decreased since 2011.

Yes ☐ No ☐

16. Do you know of any government programs such as microfinance, skill training, extensions, and other community empowerment programs run by the government or other organisations funded by the government in your area since 2011?

### **Competitiveness**

17. Do you think that your fish processing is locally and internationally competitive in price and quality?

### **Quality assurance**

18. Are you aware of quality assurance (if no explain, FAO definition of quality assurance is “the assembly of all planned and systematic actions necessary to provide adequate confidence that a product, process, or service will satisfy given quality requirements”), if yes, what does it mean to you?
19. Have you changed the way you handle fish since 2011, if yes how? If yes, why did this change? (Probe twice)
20. How important is quality assurance to your work and or customers? Thinking ahead, how will (or might) quality assurance change what you do in future?
21. Do you know of any way that fish handling has changed for others?

### **Modernisation of fisheries infrastructure**

22. The fisheries infrastructure such as roads, refrigeration, and ports have improved.

Yes ☐ No ☐

If agree please give examples.

23. Have there been any negative outcomes of this development?

### **Blue Economy**

24. Have you heard of the Blue Economy? Yes/No/Undecided
25. I am interested in what you think about it. So I have been asking people to describe what it is. (prompt twice)
26. How do you think it has/will (in 3 years) impact you/this community/this industry/Indonesia?
27. What do you think the blue economy will be like in your village in the next 10 years?

**The Blue Economy has three big issues; economic growth, social equity and environmental sustainability I wanted to get your views on these in the following questions.**

### **Economic growth**

28. There are new fisheries related business investments in your area since 2012.

Yes ☐ No ☐

Do you think they are or will be benefiting you?

29. Are there more job opportunities in the fisheries industry in your area since 2012? If yes in what area?

### **Social Equity**

30. You have benefitted from the available resources around you, particularly from the ocean.

Yes ☐ No ☐

Please explain

#### **Environment sustainability**

31. Fish processing business will still be as productive/profitable in 10 years' time. To what extent do you agree with this statement?

Yes ☐ No ☐

32. What would you recommend to improve the productivity of the fish processing industry?

33. How do you treat effluent from your processing business?

34. Do you think the treatment of the effluent could be improved?

35. Have you reduced the waste products from your work? If yes, by what percent has your waste product been reduced? Did you get any training from the government about this? Do you think it is possible to achieve zero waste? If so please give details.

36. Do you make any use of waste products from the fish processing?

37. Your current activity will adversely affect water quality in the future.

Yes ☐ No ☐

Please explain

#### **Recommendations**

38. I am interested in what you think is the number one issue for the government to do to improve its fisheries policy.

[if necessary read this definition of government fisheries policy]

Fisheries industrialisation is defined as: "an integrated production system from upstream to downstream to increase scales and production quality, productivity, competitiveness, and value added of marine and fisheries resources in sustainable way".

The definition of blue economy proposed by MMAF: "based upon the principles of sustainable development, including optimising social capital inclusiveness, resource efficiency through innovation, and minimising waste towards achieving economic growth, people welfare, and protecting the environment".

## List of Questions for Seaweed Farmers in English

Interview Code :

Number

Date :

Name :

Position :

Address :

Age :

Ethnicity :

Sex : Male ☐ Female ☐

### Fisheries industrialisation

1. Have you heard about the fisheries industrialisation policy that was announced in 2011? Yes ☐ No ☐
2. Did the government involve you in the formulation of the policy?
3. How many years have you work in seaweed production? Have seen any changes as a result of the introduction of this policy? What do you think are the biggest changes? (probe twice).
4. Do you think that your production has increased since 2011? How different is it from previous years? What factors caused this change? How sure are you that these are the factors?
5. Do you think that the distribution of seaweed locally and internationally has improved since 2011?

### Social transformation to modern society

6. How many generations of your family have been involved in seaweed production?
7. What are your production methods/ do you have any licences / do you own your own equipment?
8. What is your highest education level?

Completed Primary School	Completed Junior High School	Completed Senior High School	University
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9. Have you have received any training from the government or anywhere else related to seaweed farming since 2011?
10. If trends continue what do you think Indonesian seaweed production will look like in 10 years?
11. How long have you been living here?
12. How many people are dependent on you and your work?
13. Do you think that your monthly income has increased or decreased since 2011? What factors caused this?
14. Your exchange value (nilai tukar) (which means your ability to save money after spending it on your daily basic needs) has increased since 2011.

Yes ☐ No ☐

How significant is the difference?

15. In your opinion, how do you define poverty? The number of poor people in your area has decreased since 2011.

Yes ☐ No ☐

16. Do you know of any government programs such as microfinance, skill training, extensions, and other community empowerment programs run by the government or other organisations funded by the government in your area since 2011?

### **Competitiveness**

17. Do you think that your seaweed product is locally and internationally competitive in price and quality?

### **Quality assurance**

18. Are you aware of quality assurance (if no explain: FAO definition of quality assurance is “the assembly of all planned and systematic actions necessary to provide adequate confidence that a product, process, or service will satisfy given quality requirements”), if yes, what does it mean to you?
19. Have you changed the way you handle seaweed since 2011, if yes how? If yes, why did this change? (Probe twice)
20. How important is quality assurance to your work and customers? Thinking ahead, how will (or might) quality assurance change what you do in the future?
21. Do you know of any way that seaweed handling has changed for others?

### **Modernisation of fisheries infrastructure**

22. Fisheries infrastructure such as roads, fish processors and ports have improved.  
Yes ☐ No ☐  
If agree please give examples.
23. Have there been any negative outcomes of this development?

### **Blue Economy**

24. Have you heard of the Blue Economy? Yes ☐ No ☐
25. I am interested in what you think about it. So I have been asking people to describe what it is. (prompt twice)
26. How do you think it has/will (in 3 years) impact you/this community/this industry/Indonesia?
27. What do you think the blue economy will be like in your village in the next 10 years?

**The Blue Economy has three big issues; economic growth, social equity and environmental sustainability I wanted to get your views on these in the following questions.**

### **Economic growth**

28. There are new seaweed related business investment in your area since 2011.  
Yes ☐ No ☐  
Do you think it is or will benefit you?
29. Are there more job opportunities in the seaweed industry in your area since 2011? If yes in what area?

### **Social Equity**

30. You have benefitted from the available resources around you, particularly from the ocean.

Yes ☐ No ☐

Please explain.

### **Environment Sustainability**

31. Seaweed production will still be as productive/profitable in 10 years' time. To what extent do you agree with this statement?

Yes ☐ No ☐

32. What would you recommend to improve the productivity of seaweed harvesting?

33. Have you reduced the waste products and environmental harm resulting from your work? If yes, by what % has your waste products been reduced? Did you get any training from the government about this? Do you think it is possible to achieve zero waste? If so please give details.

34. Your current activity adversely affects future seaweed production and coastal environment?

Yes ☐ No ☐

Please explain

35. Are you aware of any loss of native species and habitat diversity in the cleaning preparation and routine management of culture areas?

36. Do you think that the shade from the seaweed reduces water column and benthic production?

37. Is there increased sedimentation or other ecosystem changes from the seaweed production? Do you think that the water quality has decreased?

38. Are you aware of any conflicts for example with fishermen or tourist activities involved with your business?

### **Recommendations**

39. I am interested in what you think is the number one issue for the government to improve its fisheries policy.

[if necessary read this definition of government fisheries policy]

Fisheries industrialisation is defined as: "an integrated production system from upstream to downstream to increase scales and production quality, productivity, competitiveness, and value added of marine and fisheries resources in sustainable way".

The definition of blue economy proposed by MMAF: "based upon the principles of sustainable development, including optimising social capital inclusiveness, resource efficiency through innovation, and minimising waste towards achieving economic growth, people welfare, and protecting the environment".

## List questions for other stakeholders (officials, NGOs, academics) in

### English

Interview Number	Code	
Name	:	
Position	:	
Specialisation	:	
Role in policy	:	
Phone number	:	Work Mobile
Email address	:	
Mail Address	:	
Date	:	
Gender	:	

I am particularly interested in the blue economy aspect of Indonesian fisheries policy. I know of your interest in this area and your knowledge of current practice and hope you can assist in this research

### Policy Implementation

1. Could you please give me your opinion of the 2011 fisheries policy in Indonesia? Did the government involve you in the policy planning?
2. For the first time Indonesia has mentioned blue economy principles in its fisheries policy, do have any opinion about the inclusion of blue economy principles in the fisheries policy?
3. If trends continue what will Indonesian fishing be like in 10 years?
4. Would you rate the following: fish production, social equity and sustainability according to their importance? Why have you ordered them this way?
5. Do you think that foreign fishing vessels have impacted the Indonesian fish catch?
6. Has the handling of fish or fish products changed since 2011? Why did this happen?
7. Thinking ahead, how will (or might) quality assurance change what is done in future?
8. Would you like to see further change with regards to quality assurance in the future? Where? Why?
9. Are you aware of any modernisation of fisheries infrastructure resulting from the 2011 policy?
10. To what extent do you agree/ disagree with the following statement. There has been major modernisation of fisheries infrastructure as the result of 2011 policy?  
Yes ☐ No ☐  
Please explain your answer?
11. Please give examples of improvements made to fisheries infrastructure (Only if agree or strongly agree to question 10).
12. Are you aware of any negative outcomes from the modernisation of fisheries infrastructure? (Only if agree or strongly agree to previous question).
13. Do you know of any SMEs in the fisheries sector that have been assisted by the government? In what way?

14. MMAF 2012 stated that the main aim of marine and fisheries industrialisation is to bring positive impacts to local communities socially and economically, it specifically mentioned a social transformation to modern society, what do you think this means socially to fish industry workers? Do you have any examples? Do you know of any relevant publications?
15. Here is a copy of the indicators for the implementation of a blue economy in Indonesia, could you comment on your knowledge of the achievement of these goals?

<p><b>Economic Growth</b></p> <ol style="list-style-type: none"> <li>1. Profitable private sectors investment</li> <li>2. Efficient production, distribution, and consumption</li> <li>3. Jobs creation</li> </ol> <p><b>Social prosperity equity</b></p> <ol style="list-style-type: none"> <li>1. Poverty eradication and community empowerment</li> <li>2. Equitable natural resources utilisation</li> <li>3. People's resilience to food security, energy, disaster and climate change impacts</li> </ol> <p><b>Environmental sustainability</b></p> <ol style="list-style-type: none"> <li>1. Minimum waster production</li> <li>2. Resources exploitation not exceeding its carrying capacity</li> </ol>
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### **Regulation**

16. Regulation is an essential part of the implementation of the 2011 fisheries policy particularly with regard to the blue economy principles. Are there sufficient resources to enforce the regulation (ensuring Marine Protected Areas are respected, polluting waste is handled appropriately, resources capacity is not exceeding the carrying capacity, unreported catch is minimised and chemicals used are controlled)? Is there sufficient regulation of fishing methods, overfishing, protection of breeding and spawning grounds, and other environmental threats?

### **Your Recommendation**

17. Do you have any recommendations or ideas about how this government could improve its fisheries policy? What do you think the government should do to better support Indonesia's fisheries industry?  
(Explain the fisheries policy if necessary).

Fisheries industrialisation is defined as: "an integrated production system from upstream to downstream to increase scales and production quality, productivity, competitiveness, and value added of marine and fisheries resources in sustainable way".

The definition of blue economy proposed by MMAF: "based upon the principles of sustainable development, including optimising social capital inclusiveness, resource efficiency through innovation, and minimising waste towards achieving economic growth, people welfare, and protecting the environment".



## List of Questions for Tuna Fishers in Indonesian

Kode Interview :  
Tanggal :  
Nama :  
Posisi :  
Alamat :

### Industrialisasi perikanan

1. Apakah anda sudah mendengar tentang kebijakan industrialisasi perikanan yang diumumkan tahun 2011 (untuk mengingat: tahun 2011 terjadi kebakaran besar di kilang minyak Pertamina)? Ya ☐ Tidak ☐
2. Apakah pemerintah melibatkan anda dalam pembentukan kebijakan tersebut?
3. Sudah berapa tahun anda bekerja sebagai nelayan? Apakah anda melihat perubahan sebagai akibat dari pelaksanaan kebijakan tersebut? Menurut anda, apa perubahan terbesar? (Tanya dua kali).
4. Apakah hasil produksi anda meningkat sejak tahun 2011? Bagaimana perbedaannya dibandingkan dengan tahun-tahun sebelumnya? Faktor apa yang menyebabkan perubahan tersebut? Seberapa yakinkah anda bahwa hal tersebut yang menjadi factor penyebabnya?
5. Apakah anda merasa bahwa transportasi ikan tuna baik di tingkat local dan internasional sudah lebih baik sejak tahun 2011?

### Transformasi social menjadi komunitas modern

6. Sudah berapa generasi dari keluarga anda terlibat di industry perikanan?
7. Apakah metode atau alat tangkap anda? Apakah anda memiliki surat ijin menangkap ikan? Apakah alat tersebut milik anda?
8. Apa pendidikan terakhir anda?

Tamat SD	Tamat SMP	Tamat SMA	Universitas
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9. Sudahkah anda menerima pelatihan dari pemerintah atau organisasi lain terkait perikanan tuna sejak tahun 2011?
10. Menurut pengalaman anda bagaimana kondisi perikanan tuna 10 tahun dari sekarang?
11. Sudah berapa lama anda tinggal di sini?
12. Berapa orang yang tergantung terhadap anda atau pekerjaan anda?
13. Apakah pendapatan anda telah meningkat atau menurun sejak 2011? Faktor apa yang menyebabkannya?
14. Nilai tukar atau kemampuan anda untuk menabung setelah semua pengeluaran anda perbulan meningkat sejak tahun 2011.  
Ya ☐ Tidak ☐  
Seberapa signifikan perubahan tersebut?
15. Menurut anda, apakah kemiskinan itu?
16. Apakah anda tahu program pemerintah seperti pinjaman lunak, pelatihan, penyuluhan dan program pemberdayaan masyarakat lainnya yang dijalankan

oleh pemerintah atau organisasi lain yang dibiayai oleh pemerintah di daerah anda sejak tahun 2011?

#### **Daya saing**

17. Orang-orang sering berbicara mengenai dampak kapal ikan asing, saya sangat tertarik dengan pengalaman anda. Menurut pengalaman anda apakah kapal ikan asing berdampak terhadap anda? (Telaah untuk contoh narasi dan klarifikasi lebih jauh bahwa beliau berbicara mengenai pengalamannya).
18. Apakah menurut anda bahwa usaha anda memiliki daya saing tinggi baik di tingkat local dan internasional dari segi harga dan kualitas?

#### **Jaminan Mutu**

19. Apakah anda tahu tentang istilah jaminan mutu (jika tidak jelaskan, menurut FAO jaminan mutu adalah “penyusunan rencana dan aksi sistematis yang dibutuhkan untuk meyakinkan bahwa sebuah produk, proses atau pelayanan akan memuaskan dari sisi kualitas yang dikehendaki”). Jika ya, seberapa pentingkah hal itu bagi anda?
20. Sudahkah anda merubah cara anda menangani ikan sejak 2011, jika ya bagaimana? Jika jawaban anda iya, mengapa anda merubahnya? (Tanya lebih dalam 2 kali).
21. Seberapa pentingkah jaminan mutu terhadap pekerjaan dan konsumen anda? Pikir jauh ke depan, mungkinkah jaminan mutu merubah cara kerja anda di masa yang akan datang?
22. Apakah anda tahu mengenai perubahan cara menangani ikan buat orang di sekitar anda?

#### **Modernisasi infrastruktur perikanan**

23. Infrastruktur perikanan seperti jalan raya, pabrik pengolahan ikan dan pelabuhan sudah lebih baik.  
Ya ☐ Tidak ☐  
Jika setuju, tolong beri contoh.
24. Apakah ada dampak negative dari pembangunan infrastruktur tersebut?

#### **Ekonomi Biru**

25. Apakah anda pernah mendengar konsep ekonomi biru? Ya ☐ Tidak ☐
26. Saya sangat tertarik dengan opini anda. Saya telah tanya orang lain untuk menjelaskan konsep ini. (Tanya dua kali).
27. Bagaimana konsep ini akan berdampak (dalam 3 tahun) terhadap anda/ komunitas anda/ industry perikanan tuna/ Indonesia?
28. Seperti apa menurut anda ekonomi biru di desa anda 10 tahun ke depan?

**Ekonomi biru memiliki tiga isu besar: pertumbuhan ekonomi, pemerataan kesejahteraan dan keberlanjutan sumberdaya. Saya ingin mendengar pandangan anda mengenai pertanyaan di bawa ini.**

#### **Pertumbuhan ekonomi**

29. Ada investasi baru terkait perikanan tangkap tuna di daerah anda sejak 2011.  
Ya ☐ Tidak ☐  
Apakah hal tersebut menguntungkan anda?
30. Apakah ada lapangan kerja baru di bidang industry perikanan tuna di daerah anda sejak tahun 2012? Jika ada di bidang apa?

#### **Pemerataan Kesejahteraan**

31. Apakah telah diuntungkan oleh tersedianya sumberdaya perikanan di sekitar anda, khususnya dari laut.

Ya ☐ Tidak ☐

Tolong dijelaskan.

**Keberlanjutan Sumberdaya**

32. Stok ikan akan tetap produktif/ menguntungkan dalam 10 tahun ke depan. Seberapa setuju anda dengan pertanyaan di atas?

Ya ☐ Tidak ☐

33. Apa rekomendasi anda terkait bagaimana cara memperbaiki kondisi stok ikan tuna?

34. Seberapa besar hasil tangkapan sampingan anda (yang dibuang) dan apa saja jenisnya?

35. Sudahkah anda mengurangi limbah produksi anda atau hasil sampingan dari aktifitas anda? Jika ya, berapa persen pengurangannya? Apakah mungkin anda memanfaatkan semua limbah hasil produksi anda? Jika ya tolong beri penjelasan. Apakah anda mendapat pelatihan dari pemerintah mengenai hal ini?

36. Aktifitas anda saat ini akan berefek buruk terhadap ketersediaan stok ikan di masa yang akan datang.

Ya ☐ Tidak ☐

Tolong jelaskan.

**Rekomendasi**

37. Saya tertarik untuk mengetahui apa isu yang paling penting untuk ditangani oleh pemerintah guna memperbaiki kebijakan perikanan yang ada.

(Jika perlu baca definisi kenijakan pemerintah)

Industrialisasi perikanan adalah: “integrasi system produksi hulu dan hilir untuk meningkatkan skala dan kualitas produksi, produktifitas, daya saing, dan nilai tambah sumberdaya kelautan dan perikanan secara berkelanjutan).

Ekonomi biru adalah: konsep ekonomi berbasis kepada pembangunan yang berkelanjutan, termasuk mengoptimalkan modal-modal sosial, efisiensi penggunaan sumberdaya dari inovasi, dan meminimalkan limbah guna mencapai pertumbuhan ekonomi, kesejahteraan masyarakat, dan perlindungan terhadap lingkungan”.

## List of Questions for Tuna Fish Processors in Indonesia

Kode Interview :

Tanggal :

Nama :

Posisi :

Alamat :

Umur :

Suku :

Jenis Kelamin : Laki-laki ☐ Perempuan ☐

### Industrialisasi perikanan

1. Apakah anda sudah mendengar tentang kebijakan industrialisasi perikanan yang diumumkan tahun 2011 (untuk mengingat: tahun 2011 terjadi kebakaran besar di kilang minyak Pertamina)? Ya ☐ Tidak ☐
2. Apakah pemerintah melibatkan anda dalam pembentukan kebijakan tersebut?
3. Sudah berapa tahun anda bekerja sebagai pengolah ikan? Apakah anda melihat perubahan sebagai akibat dari pelaksanaan kebijakan tersebut? Menurut anda, apa perubahan terbesar? (Tanya dua kali).
4. Apakah hasil produksi anda meningkat sejak tahun 2011? Bagaimana perbedaannya dibandingkan dengan tahun-tahun sebelumnya? Faktor apa yang menyebabkan perubahan tersebut? Seberapa yakinkah anda bahwa hal tersebut yang menjadi factor penyebabnya?
5. Apakah anda merasa bahwa distribusi olahan tuna baik di tingkat local dan internasional sudah lebih baik sejak tahun 2011?

### Transformasi social menjadi komunitas modern

6. Sudah berapa generasi dari keluarga anda terlibat di industry perikanan?
7. Apakah metode pengolahan yang anda gunakan? Apakah alat tersebut milik anda?
8. Apa pendidikan terakhir anda?

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9. Sudahkah anda menerima pelatihan dari pemerintah atau organisasi lain terkait pngolahan tuna sejak tahun 2011?
10. Menurut pengalaman anda bagaimana kondisi pengolahan ikan tuna 10 tahun dari sekarang?
11. Sudah berapa lama anda tinggal di sini?
12. Berapa orang yang tergantung terhadap anda atau pekerjaan anda?
13. Apakah pendapatan anda telah meningkat atau menurun sejak 2011? Faktor apa yang menyebabkannya?
14. Nilai tukar atau kemampuan anda untuk menabung setelah semua pengeluaran anda perbulan meningkat sejak tahun 2011.

Ya ☐ Tidak ☐

Seberapa signifikan perubahan tersebut?

15. Menurut anda, apakah kemiskinan itu? Jumlah keluarga miskin di daerah anda sudah menurun sejak 2011.

Ya ☐ Tidak ☐

16. Apakah anda tahu program pemerintah seperti pinjaman lunak, pelatihan, penyuluhan dan program pemberdayaan masyarakat lainnya yang dijalankan oleh pemerintah atau organisasi lain yang dibiayai oleh pemerintah di daerah anda sejak tahun 2011?

#### **Daya saing**

17. Apakah menurut anda bahwa usaha pengolahan ikan tuna anda memiliki daya saing tinggi baik di tingkat local dan internasional dari segi harga dan kualitas?

#### **Jaminan Mutu**

18. Apakah anda tahu tentang istilah jaminan mutu (jika tidak jelaskan, menurut FAO jaminan mutu adalah “penyusunan rencana dan aksi sistematis yang dibutuhkan untuk meyakinkan bahwa sebuah produk, proses atau pelayanan akan memuaskan dari sisi kualitas yang dikehendaki”). Jika ya, seberapa pentingkah hal itu bagi anda?
19. Sudahkah anda merubah cara anda menangani ikan sejak 2011, jika ya bagaimana? Jika jawaban anda iya, mengapa anda merubahnya? (Tanya lebih dalam 2 kali).
20. Seberapa pentingkah jaminan mutu terhadap pekerjaan dan konsumen anda? Pikir jauh ke depan, mungkinkah jaminan mutu merubah cara kerja anda di masa yang akan datang?
21. Apakah anda tahu mengenai perubahan cara menangani ikan buat orang di sekitar anda?

#### **Modernisasi infrastruktur perikanan**

22. Infrastruktur perikanan seperti jalan raya, pabrik pengolahan ikan dan pelabuhan sudah lebih baik.  
Ya ☐ Tidak ☐  
Jika setuju, tolong beri contoh.
23. Apakah ada dampak negative dari pembangunan infrastruktur tersebut?

#### **Ekonomi Biru**

24. Apakah anda pernah mendengar konsep ekonomi biru? Ya ☐ Tidak ☐
25. Saya sangat tertarik dengan opini anda. Saya telah tanya orang lain untuk menjelaskan konsep ini. (Tanya dua kali).
26. Bagaimana konsep ini akan berdampak (dalam 3 tahun) terhadap anda/ komunitas anda/ industry perikanan tuna/ Indonesia?
27. Seperti apa menurut anda ekonomi biru di desa anda 10 tahun ke depan?

**Ekonomi biru memiliki tiga isu besar: pertumbuhan ekonomi, pemerataan kesejahteraan dan keberlanjutan sumberdaya. Saya ingin mendengar pandangan anda mengenai pertanyaan di bawa ini.**

#### **Pertumbuhan ekonomi**

28. Ada investasi baru terkait pengolahan ikan tuna di daerah anda sejak 2011.  
Ya ☐ Tidak ☐  
Apakah hal tersebut menguntungkan anda?

29. Apakah ada lapangan kerja baru di bidang industry pengolahan tuna di daerah anda sejak tahun 2012? Jika ada di bidang apa?

**Pemerataan Kesejahteraan**

30. Apakah telah diuntungkan oleh tersedianya sumberdaya perikanan di sekitar anda, khususnya dari laut.

Ya ☐ Tidak ☐

Tolong dijelaskan.

**Keberlanjutan Sumberdaya**

31. Industri pengolahan ikan tuna akan tetap produktif/ menguntungkan dalam 10 tahun ke depan. Seberapa setuju anda dengan pertanyaan di atas?

Ya ☐ Tidak ☐

32. Apa rekomendasi anda terkait bagaimana cara memperbaiki produktifitas pengolahan ikan tuna?

33. Bagaimana cara anda men-treatment buangan dari proses pengolahan anda?

34. Menurut anda apakah sistem pengolahan limbah anda dapat diperbaiki?

35. Sudahkah anda mengurangi limbah produksi anda? Jika ya, berapa persen pengurangannya? Apakah mungkin anda memanfaatkan semua limbah hasil produksi anda? Jika ya tolong beri penjelasan. Apakah anda mendapat pelatihan dari pemerintah mengenai hal ini?

36. Apakah anda memanfaatkan lebih lanjut limbah hasil produksi anda?

37. Aktifitas anda saat ini akan berefek buruk terhadap kualitas air di lingkungan anda di masa yang akan datang.

Ya ☐ Tidak ☐

Tolong jelaskan.

**Rekomendasi**

38. Saya tertarik untuk mengetahui apa isu yang paling penting untuk ditangani oleh pemerintah guna memperbaiki kebijakan perikanan yang ada.

(Jika perlu baca definisi kenijakan pemerintah)

Industrialisasi perikanan adalah: “integrasi system produski hulu dan hilir untuk meningkatkan skala dan kualitas produksi, produktifitas, daya saing, dan nilai tambah sumberdaya kelautan dan perikanan secara berkelanjutan).

Ekonomi biru adalah: konsep ekonomi berbasis kepada pembangunan yang berkelanjutan, termasuk mengoptimalkan modal-modal sosial, efisiensi penggunaan sumberdaya dari inovasi, dan meminimalkan limbah guna mencapai pertumbuhan ekonomi, kesejahteraan masyarakat, dan perlingungan terhadap lingkungan”.

(Jika perlu baca definisi kenijakan pemerintah)

## List of Questions for Seaweed Farmers in Indonesian

Kode Interview :  
Tanggal :  
Nama :  
Posisi :  
Alamat :  
  
Umur :  
Suku :  
Jenis Kelamin : Laki-laki ☐ Perempuan ☐

### Industrialisasi perikanan

1. Apakah anda sudah mendengar tentang kebijakan industrialisasi perikanan yang diumumkan tahun 2011 (untuk mengingat: tahun 2011 terjadi gempa bumi di Bali)? Ya ☐ Tidak ☐
2. Apakah pemerintah melibatkan anda dalam pembentukan kebijakan tersebut?
3. Sudah berapa tahun anda bekerja di bidang budidaya rumput laut? Apakah anda melihat perubahan sebagai akibat dari pelaksanaan kebijakan tersebut? Menurut anda, apa perubahan terbesar? (Tanya dua kali).
4. Apakah hasil produksi anda meningkat sejak tahun 2011? Bagaimana perbedaannya dibandingkan dengan tahun-tahun sebelumnya? Faktor apa yang menyebabkan perubahan tersebut? Seberapa yakinkah anda bahwa hal tersebut yang menjadi factor penyebabnya?
5. Apakah anda merasa bahwa distribusi rumput laut baik di tingkat local dan internasional sudah lebih baik sejak tahun 2011?

### Transformasi social menjadi komunitas modern

6. Sudah berapa generasi dari keluarga anda terlibat di industry budidaya rumput laut?
7. Apakah metode produksi anda? Apakah anda memiliki surat ijin? Apakah alat tersebut milik anda?
8. Apa pendidikan terakhir anda?

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9. Sudahkah anda menerima pelatihan dari pemerintah atau organisasi lain terkait pembudidayaan rumput laut sejak tahun 2011?
10. Menurut pengalaman anda bagaimana kondisi budidaya rumput laut 10 tahun dari sekarang?
11. Sudah berapa lama anda tinggal di sini?
12. Berapa orang yang tergantung terhadap anda atau pekerjaan anda?
13. Apakah pendapatan anda telah meningkat atau menurun sejak 2011? Faktor apa yang menyebabkannya?

14. Nilai tukar atau kemampuan anda untuk menabung setelah semua pengeluaran anda perbulan meningkat sejak tahun 2011.

Ya ☐ Tidak ☐

Seberapa signifikan perubahan tersebut?

15. Menurut anda, apakah kemiskinan itu?

Jumlah keluarga miskin di daerah anda sudah menurun sejak 2011.

Ya ☐ Tidak ☐

16. Apakah anda tahu program pemerintah seperti pinjaman lunak, pelatihan, penyuluhan dan program pemberdayaan masyarakat lainnya yang dijalankan oleh pemerintah atau organisasi lain yang dibiayai oleh pemerintah di daerah anda sejak tahun 2011?

#### **Daya saing**

17. Apakah menurut anda bahwa usaha anda memiliki daya saing tinggi baik di tingkat local dan internasional dari segi harga dan kualitas?

#### **Jaminan Mutu**

18. Apakah anda tahu tentang istilah jaminan mutu (jika tidak jelaskan, menurut FAO jaminan mutu adalah “penyusunan rencana dan aksi sistematis yang dibutuhkan untuk meyakinkan bahwa sebuah produk, proses atau pelayanan akan memuaskan dari sisi kualitas yang dikehendaki”). Jika ya, seberapa pentingkah hal itu bagi anda?
19. Sudahkah anda merubah cara anda menangani rumput laut sejak 2011, jika ya bagaimana? Jika jawaban anda iya, mengapa anda merubahnya? (Tanya lebih dalam 2 kali).
20. Seberapa pentingkah jaminan mutu terhadap pekerjaan dan konsumen anda? Pikir jauh ke depan, mungkinkah jaminan mutu merubah cara kerja anda di masa yang akan datang?
21. Apakah anda tahu mengenai perubahan cara menangani rumput laut buat orang di sekitar anda?

#### **Modernisasi infrastruktur perikanan**

22. Infrastruktur perikanan seperti jalan raya, pabrik pengolahan dan pelabuhan sudah lebih baik.  
Ya ☐ Tidak ☐  
Jika setuju, tolong beri contoh.
23. Apakah ada dampak negative dari pembangunan infrastruktur tersebut?

#### **Ekonomi Biru**

24. Apakah anda pernah mendengar konsep ekonomi biru? Ya ☐ Tidak ☐
25. Saya sangat tertarik dengan opini anda. Saya telah tanya orang lain untuk menjelaskan konsep ini. (Tanya dua kali).
26. Bagaimana konsep ini akan berdampak (dalam 3 tahun) terhadap anda/ komunitas anda/ industry perikanan tuna/ Indonesia?
27. Seperti apa menurut anda ekonomi biru di desa anda 10 tahun ke depan?

**Ekonomi biru memiliki tiga isu besar: pertumbuhan ekonomi, pemerataan kesejahteraan dan keberlanjutan sumberdaya. Saya ingin mendengar pandangan anda mengenai pertanyaan di bawa ini.**

#### **Pertumbuhan ekonomi**

28. Ada investasi baru industry rumput laut di daerah anda sejak 2011.  
Ya ☐ Tidak ☐



Apakah hal tersebut menguntungkan anda?

29. Apakah ada lapangan kerja baru di bidang industry rumput laut di daerah anda sejak tahun 2012? Jika ada di bidang apa?

**Pemerataan Kesejahteraan**

30. Apakah telah diuntungkan oleh tersedianya sumberdaya di sekitar anda, khususnya dari laut.  
Ya ☐ Tidak ☐  
Tolong dijelaskan.

**Keberlanjutan Sumberdaya**

31. Produksi rumput laut akan tetap produktif/ menguntungkan dalam 10 tahun ke depan. Seberapa setuju anda dengan pertanyaan di atas?  
Ya ☐ Tidak ☐
32. Apa rekomendasi anda terkait bagaimana cara memperbaiki hasil panen rumput laut?
33. Sudahkah anda mengurangi limbah produksi dan polusi yang berbahaya bagi lingkungan dari kegiatan anda? Jika ya, berapa persen pengurangannya? Apakah mungkin anda memanfaatkan semua hasil produksi anda tanpa ada limbah sedikitpun? Jika ya tolong beri penjelasan. Apakah anda mendapat pelatihan dari pemerintah mengenai hal ini?
34. Aktifitas anda saat ini akan berefek buruk terhadap keberlangsungan produksi rumput laut di masa yang akan datang.  
Ya ☐ Tidak ☐  
Tolong jelaskan.
35. Apakah anda tahu penurunan jumlah spesies ikan local dan perubahan habitat dari proses pembersihan dan penanganan sehari-hari kegiatan budidaya rumput laut anda?
36. Apakah rumput laut anda mengurangi colom air dan produksi biota laut kecil?
37. Apakah ada peningkatan sedimentasi atau perubahan ekosistem lain dari produksi rumput laut anda? Apakah menurut anda kualitas air menurun?
38. Apakah anda tahu konflik kepemilikan area misalnya antara anda dengan nelayan, atau industry turis disekitar anda?

**Rekomendasi**

39. Saya tertarik untuk mengetahui apa isu yang paling penting untuk ditangani oleh pemerintah guna memperbaiki kebijakan perikanan yang ada.  
(Jika perlu baca definisi kenijakan pemerintah)

Industrialisasi perikanan adalah: “integrasi system produksi hulu dan hilir untuk meningkatkan skala dan kualitas produksi, produktifitas, daya saing, dan nilai tambah sumberdaya kelautan dan perikanan secara berkelanjutan).

Ekonomi biru adalah: konsep ekonomi berbasis kepada pembangunan yang berkelanjutan, termasuk mengoptimalkan modal-modal sosial, efisiensi penggunaan sumberdaya dari inovasi, dan meminimalkan limbah guna mencapai pertumbuhan ekonomi, kesejahteraan masyarakat, dan perlindungan terhadap lingkungan”.

## List questions for other stakeholders (officials, NGOs, academics) in Indonesian

Interview      Code  
Number  
Name :  
Position :  
Specialisation :  
Role in policy :

Saya sangat tertarik untuk memahami konsep ekonomi biru sebagai bagian dari kebijakan industrialisasi perikanan di Indonesia. Saya mengerti bahwa anda berkecimpung di bidang tersebut dan pengalaman serta pengetahuan anda di bidang ini akan sangat membantu dalam penelitian ini.

### Penerapan Kebijakan

1. Apa opini anda tentang kebijakan industrialisasi perikanan di Indonesia tahun 2011? Apakah pemerintah melibatkan anda dalam pembentukan kebijakan tersebut?
2. Untuk pertama kalinya Indonesia menyebutkan konsep ekonomi biru dalam kebijakan perikannya, apa opini anda tentang penerapan konsep ekonomi biru ini dalam kebijakan perikanan di Indonesia?
3. Jika trend perikanan masih berlanjut seperti sekarang, seperti apa kondisi perikanan 10 tahun mendatang menurut anda?
4. Apa yang paling penting menurut anda di antara: produksi ikan, pemerataan kesejahteraan dan keberlanjutan? Bolehkah anda menyusunnya sesuai rankingnya? Mengapa anda memilih demikian?
5. Menurut anda apakah kapal ikan asing dan industry asing seperti rumput laut dan pengolahan ikan berdampak terhadap stok ikan dan produksi perikanan di Indonesia?
6. Menurut anda apakah cara penanganan produksi perikanan telah berubah sejak tahun 2011? Mengapa ini terjadi?
7. Jika anda berfikir jauh ke depan, seperti apa perubahan jaminan mutu berubah di masa yang akan datang?
8. Apakah anda setuju atau suka dengan perubahan jaminan mutu tersebut di masa yang akan datang? Dimana dan kapan?
9. Apakah anda tahu kegiatan modernisasi infrastruktur perikanan terkait kebijakan tahun 2011 tersebut?
10. Seberapa setuju anda dengan pernyataan berikut. Telah terjadi modernisasi infrastruktur perikanan sebagai bagian dari kebijakan tahun 2011.  
Ya ☐ Tidak ☐  
Tolong jelaskan jawaban anda.
11. Tolong beri contoh perbaikan infrastruktur perikanan (jika setuju).
12. Apakah anda tahu dampak negative dari modernisasi infrastruktur perikanan? (Jika setuju).
13. Apakah anda tahu tentang Usaha Kecil Menengah (UKM) yang telah diberdayakan oleh pemerintah? Bagaimana pemberdayaannya?

14. KKP 2012 menyebutkan bahwa tujuan utama industrialisasi perikanan dan kelautan adalah untuk membawa dampak positif terhadap komunitas local baik secara social dan ekonomi, secara spesifik disebutkan tentang: transformasi social menjadi komunitas modern, menurut anda apa artinya secara social terhadap pekerja di sector perikanan? Apakah anda punya pengalaman atau contoh kegiatannya? Apakah anda tahu publikasi terkait hal tersebut?
15. Berikut susunan indicator implementasi ekonomi biru di Indonesia, dapatkah anda memberi komentar berdasarkan pengalaman dan pengetahuan anda mengenai pencapaian tujuan tersebut?

**Pertumbuhan ekonomi**

1. Investasi sector swasta yang menguntungkan
2. Produksi, distribusi dan konsumsi yang efisien
3. Penciptaan lapangan kerja

**Penyetaraan kesejahteraan**

1. Pemberantasan kemiskinan dan pemberdayaan masyarakat
2. Pemanfaatan sumberdaya yang adil
3. Resiliens masyarakat terhadap dampak ketahanan pangan, energy, bencana dan perubahan iklim

**Keberlanjutan Lingkungan**

1. Produksi limbah minimal
2. Eksploitasi sumberdaya alam yang tidak melebihi daya dukung lingkungan

**Regulasi**

16. Regulasi adalah bagian penting dalam penerapan kebijakan perikanan tahun 2011 terutama terkait dengan prinsip ekonomi biru. Menurut anda apakah sumberdaya yang tersedia guna menerapkan regulasi (regulation enforcement) contohnya: memastikan daerah konservasi terlindungi, polusi dan limbah ditangani dengan benar, sumberdaya alam yang dimanfaatkan tidak melebihi daya dukung lingkungan, penangkapan ikan illegal dan penggunaan bahan kimia sudah terkontrol)? Apakah sudah ada regulasi yang mumpuni terhadap metode penangkapan, alat tangkap, perlindungan terhadap daerah ikan bertelur dan spawning grounds, serta bahaya terhadap lingkungan lainnya?

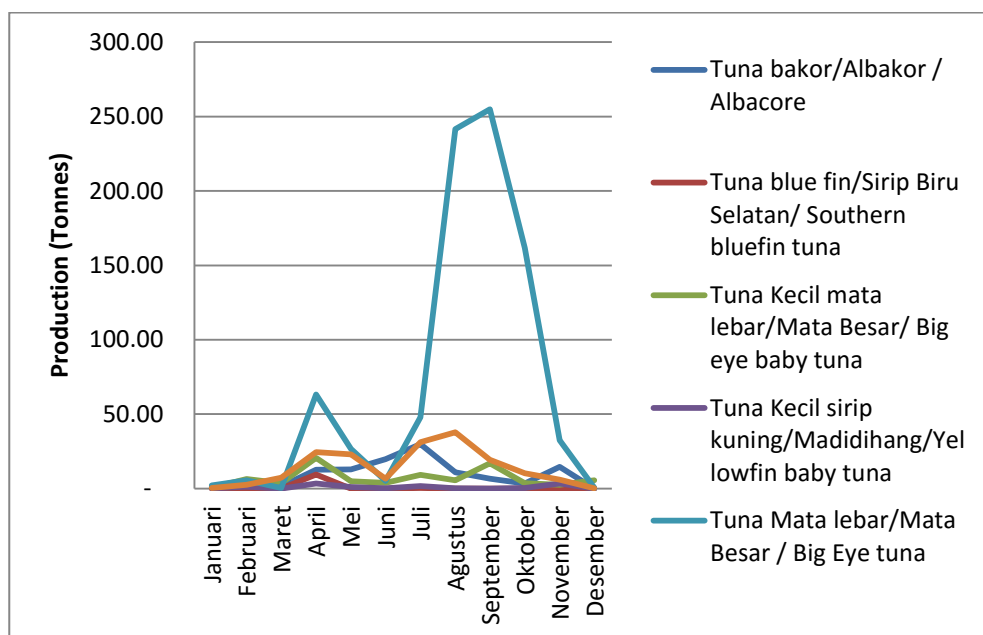
**Rekomendasi**

17. Apakah anda punya rekomendasi atau opini tentang bagaimana pemerintah dapat memperbaiki kebijakan perikanannya? Apakah yang seharusnya pemerintah lakukan guna mensupport industry perikanannya? (Jika perlu baca definisi kebijakan pemerintah)

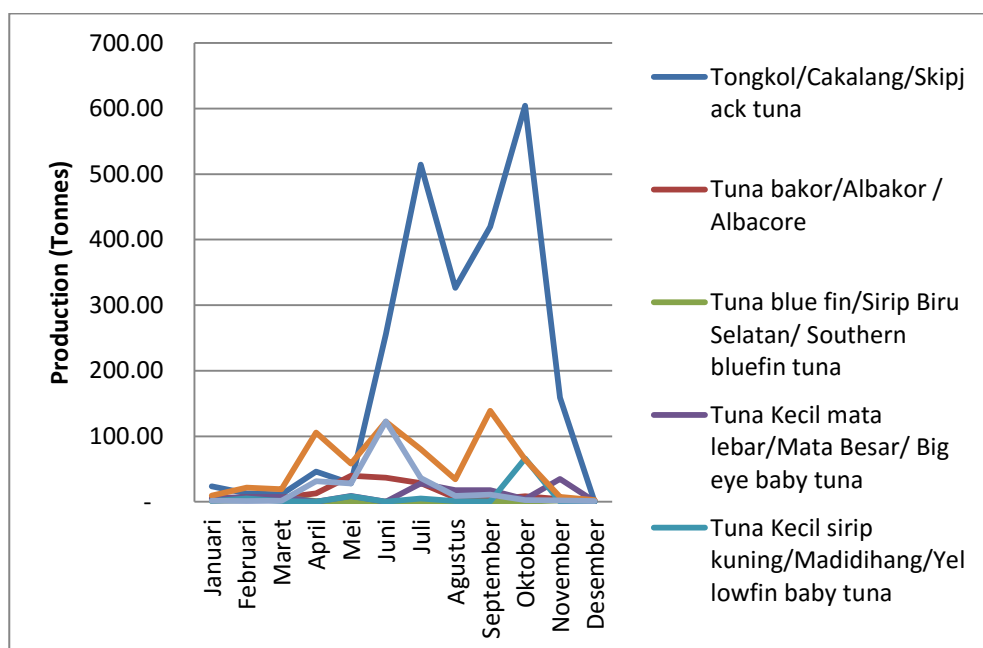
Industrialisasi perikanan adalah: “integrasi system produksi hulu dan hilir untuk meningkatkan skala dan kualitas produksi, produktifitas, daya saing, dan nilai tambah sumberdaya kelautan dan perikanan secara berkelanjutan).

Ekonomi biru adalah: konsep ekonomi berbasis kepada pembangunan yang berkelanjutan, termasuk mengoptimalkan modal-modal sosial, efisiensi penggunaan sumberdaya dari inovasi, dan meminimalkan limbah guna mencapai pertumbuhan ekonomi, kesejahteraan masyarakat, dan perlindungan terhadap lingkungan”.

## Appendix C: Monthly Tuna Production at PPSC in 2012-2013



Monthly Tuna Production at PPSC in 2012. Source: (Cilacap Ocean Fishing Port 2012)



Monthly Tuna Production at PPSC in 2013. Source: (Cilacap Ocean Fishing Port 2013)

## **Appendix D. Description of Tuna Fisheries and Practices in Cilacap, Central Java and Seaweed Farmers and Practices in Nusa Penida**

### **Tuna Fisheries and Practices in Cilacap, Central Java**

The most common boats used for catching tuna in the PPSC are: long-line, handline, gillnet and a small number of purse seine. Tuna fishers interviewed in this research were mostly using gillnets and handlines. Gillnet and handline fishers spent less time at sea (less than a month) compared to the long-line fishers (months at sea) so they were more accessible for interview particularly when they are landing their catch in the port. At PPSC, the tuna fishers include boat owners (bosses/ *tauke*), captains, crew and engineers.

#### **Boat Owners**

Boat owners (including TBO1 and TBO2) at PPSC were mostly of Chinese ethnicity and live in the fishing port area. They were interviewed while they were supervising crews unloaded catch at the port. Two Chinese boat owners migrated to Cilacap from Bagan Siapi-API (North Sumatera). TBO1 reported that he moved to Cilacap in 1982 from Bagan Siapi-API while TBO2 stated that he moved to Cilacap in 1994. TBO1 and 2 own a number of long-line and gillnet boats. TBO1 and FPO4 (a cold storage owner who was also a boat owner) stated that some boats including theirs are using a “joint venture” system, where he and several other boat owners invest their money in several boats and share the profit generated.

In this research one male boat owner (TBO3) (Javanese) was interviewed. He owned a gillnet boat and was assisted by his son to operate his business. At the time of interview, he was supervising his son to unload catch at PPSC. He stated that most of his fish (skip jack tuna) are sold to fish collectors in Cilacap. He reported that there are about four other Javanese boat owners in the PPSC.

Similar to FPO4, the majority of boat owners (particularly those of Chinese descent) at PPSC also own cold storage facilities to store their low grade (non-export) tuna and other catch such as billfish, mackerels, squid and snapper prior to marketing them to the local fish collectors or fish sellers around Cilacap. These boat owners often have connections with or own exporting companies, in Muara Baru, Jakarta through their

families (such as TBO2) or friends who manage and sell their sashimi grade big tuna including yellow fin to international markets in Japan. For local markets, boat owners stated that they have their own loyal customers who regularly buy their fish catch, including “*pindang*” processors.

Boat owners usually have more than one boat which employ different fishing gear types including long line, gillnet and handline, as well as transshipment boats. This is supported by findings in Proctor et al. (2003, p. 20)’s report, which also stated that most boat owners in Cilacap have one or two boats. The transshipping vessels provide additional supplies for fishers on a venture, including fuel. Returning, these boats bring the fish catch from the operating boats, and other boats (from different boat owners) who wish to land their fish at the port before returning. Proctor et al. (2003, p. 21) pointed out that to differentiate catch between different boats, fishers tag fish with colored plastic ribbon.

### **Gillnet Fishers**

The majority of captains and crew in PPSC are of Javanese ethnicity and are Muslim. Three originate from Pemalang, Central Java and one from Indramayu, West Java while the rest are from the Cilacap area.

Gillnet fishers in PPSC target bonito (*tongkol*) and skip jack (*cakalang*). They catch bigger sized tuna as a by-catch along with other fish species including: bill fish, shark (*hiu*), snapper (*kakap*), and squid (*cumi-cumi*). These fishers usually spend about 15-16 days at sea, with about 10 fishers in a gillnet boat. Some of these gillnet fishers used to work in long-line fishing boats, and a number of them also own or work part time or full time in smaller boats to catch shrimp or squid particularly when the tuna and tuna-like species season is over, and shrimp or squid are relatively more abundant in the sea.

Fishers reported that catching tuna and tuna-like species (TTC) depends on the weather. It is usually harder to catch TTC during the season when the wind blows from the west (*musim baratan*). According to BMKG (2015) the west season (west monsoon) falls in October to April, while the east monsoon falls in May to September. The west monsoon is the difficult season or “*masa paceklik*” for gillnet fishers. The best season to catch TTC according to fishers is in September each year. This is supported by a report of monthly tuna production at PPSC from 2012 to 2013 (see Appendix C), which shows that tuna production is best in March to December and worst in January to February (Cilacap Ocean Fishing Port 2013, 2012).



Figure 1 Gillnet Boat at PPSC

Fish targeted by gillnet boats are bonito and skip jack tuna. After they catch fish, they are placed directly into blue plastic barrels (see Figure ) located in the freezer if they have one. If they do not have a freezer they will fill the barrels with ice cubes to maintain fish quality. One blue plastic barrel can hold about 60 kg of bonito or skip jack tuna.



Figure 2 Fish labourers holding blue plastic barrels full of skip jack tuna at PPSC



Bigger sized tuna including yellow fin, big eye, and albacore are usually caught during leisure time which is mostly at night (outside their hours spent unloading and pulling the nets). These fish are not their main target, and therefore are termed “by-catch” although sometimes the biggest part of fishers’ income arises from selling this fish to boat owners. They catch these bigger tuna using squid as bait and they keep them individually as side income, referred to by the fishers as a ‘bonus’. Gillnet fishers reported that they usually catch surface tuna, which is of lower quality than tuna caught in deep water.



Figure 3 Handline to catch tuna





Figure 4 Hook to catch tuna with a handline

### **Handline Fishers (*Pancing Ulur*)**

Only two handline fishers (TF5 and TF6) were interviewed for this research, the rest were gillnet fishers. Handline fishers spend around 25 days at sea, and use a gillnet boat, which is licensed to catch similar fish to gillnet fishers, usually bonito, skipjack and larger tuna. According to PPSC data, the port authority group records handline boats as gillnet boats. In each boat there are about 10 fishers using handlines.

Handline fishers usually employ FADs in their fishing grounds to attract TTC. Each handline boat has one FAD in its fishing ground. One boat crew member (TF6) reported that according to his boss (the boat owner) one FAD costs about AU\$6000. He added that his boss has 5 vessels and operates 5 FADs.

### **Fish Handling and Quality Assurance**

#### **Handling Fresh Big Tuna**

Gillnet and handline fishers handle bigger tuna post-harvest in a similar fashion. They stab the tuna in the head with a tool which they call “*injeksi*” (pictured below) to kill the fish immediately to prevent fish moving or jumping around the boat, which may reduce meat quality.

They then clean the fish and store it in a “water freezer” to keep it fresh. The water freezer chiller has a temperature of between -1.5°C and -2° C, and is filled with water. The fishers stated that the waste is generally thrown overboard into the ocean. According

to the respondents, this practice has remained the same since before the industrialisation and blue economy policies were introduced.



Figure 5 Tool used to kill tuna (*injeksi*)

Source: Author's Photograph

In some cases, tuna fishers keep the waste products from cleaning the fish for their own consumption while at sea, or bring it home to be sold to collectors or to consume with their family.

### **Handling Skip Jack Tuna and Bonito**

Fish such as bonito, skip jack tuna and other by-catch are stored intact in the blue drums (tong) in the freezer, if the boat has a freezer, otherwise the drum is filled with fish then stored inside the ships hatch and filled with ice cubes.

### **Tuna Marketing**

At the end of their fishing trip, tuna fishers unload their catch at PPSC or in other fishing ports such as Jakarta, Pelabuhan Ratu, West Java, or any port close to their fishing ground. They work together with port based fish labourers to unload their catch from the boat hatch after they seek permission from the port authority. Sometimes they have to queue with other boats before entering the dock. The catch is then transported to trucks by the labourers.

Some of the catch is transferred to Jakarta by these trucks to be exported as fresh sashimi grade tuna, while the rest is processed by export-oriented tuna and tuna-like

species canning factories prior to being exported overseas or sold in the local markets in Jakarta and other big cities in Indonesia. A cold storage and boat owner (FPO4) stated that less than 50% of local fish can be exported and the rest is reject product sold on the local market. This mainly consists of bonito, low grade skip jack tuna, and juvenile tuna. A small amount of low grade fish is collected by the boat owners who also own cold storages facilities to be sold to local fish sellers or traditional processors (*pindang* makers). Skip jack tuna is marketed to canning industries in Jakarta.

A better price is obtained for fresh compared to frozen tuna in export markets. This is why boats usually have a water freezer to keep the tuna fresh without having to freeze them. According to Proctor et al. (2003, p. 24) fish of weight lower than 20kg are classified as “non-exportable”. Grade classifications for exported tuna are: “A grade” for the best quality, followed by “B” or “C grade”. The grade depends on the flesh quality including colour, fat content and carcass condition. Tuna with grading of less than C is classified as a reject product and usually marketed locally.

Originally, tuna was auctioned at the port. However, because of the lack of infrastructure needed to keep the fish fresh and clean, the auction process often further degraded the quality of the fish and was for this reason discontinued. Cindy Soewarlan, Sya'rani, and Nur Bambang (2005) reported their concern about the cleanliness, hygienity and the cold chain implementation in PPSC. This was supported by respondents' statements and the researcher's observations while in the field.

### **Tuna Fish Processors**

Fish processing is one of the most important employment opportunities in Cilacap, employing mostly women. After tuna and TTC are landed, the lower grade tuna is stored in cold storage to be sold locally to fish collectors or fish processors including *pindang* makers. Most of the bonito and skip jack tuna are sent to Jakarta to export-oriented fish processing companies, however there are also modern fish processor companies in Cilacap processing tuna and tuna-like species for export. This research investigates these three types of processing factories, namely *pindang* makers, a modern canning factory and cold storage providers, to identify any perceived impact of fisheries industrialisation and Blue Economy policy implementation on this sector of the fisheries industry in Cilacap.

### **Canning Factory**

Cilacap has several modern shrimp, tuna and tuna-like fish and crab processing factories. Modern tuna canning factories use high temperatures and high pressure sterilisation systems in the canning process. The factory in this research processes albacore, yellow fin, skip jack, and bonito into canned products. The products are exported overseas including to the United States of America and the European Union.

### **Cold Storage Provider**

Cold storage providers store any kind of highly valued fish including tuna and tuna-like species, squid, snapper and mackerel. A number of cold storage providers own their own boats. They also store the catch for local customers including fish collectors, fish sellers and *pindang* makers. One cold storage owner (FPO4) stated that he owns two handline boats, and shares six boats with other boat owners. He also owns an FAD (locally known as *rumpon*) which is located in the fishing grounds for his handline boats. A number of cold storage providers also own *pindang* factories as a side business. Their business practices include storing frozen fish caught in good seasons and selling them at a higher price in low seasons (*masa paceklik*).

Cold storage providers usually sell their lower grade quality, fish including tuna and tuna-like species to local customers in Cilacap, while their best quality fish are sent to Jakarta for the export market including to Japan (tuna). Smaller cold storage owners also sell their fish locally as well as to other cities in Jakarta, West Java and Central Java. Sometimes they sell their fish to bigger cold storage owners and vice versa. A cold storage worker (FPW6) stated that although the capacity of their cold storage is about 200 tonnes, they usually only store around 10 tonnes of fish each season. The temperature of the cold storage facilities is approximately -18°C.

Juvenile tuna are usually stored for the *pindang* market. Juvenile tuna cannot be exported with boat and cold storage owners stating the reason is that this fish is not considered appropriate for sashimi (*kurang matang*). Respondents stated that the best price for exporting tuna particularly to Japan is in December, however that month is usually not the best season for catching tuna (FPO4).

### **Traditional Fish Processors (*Pindang* Makers)**

According to the (DKP2SKSA 2012) there are 17 traditional fish processing factories (*pindang*) in Cilacap, and most of these are located in the PPSC area. Some of these traditional processors also own a cold storage facility, to store their raw material for *pindang* as well as selling other kinds of fish to small fish sellers.

*Pindang* is a preserved fish product generally made using juvenile tuna (*jabrik*), bonito and skip jack tuna. It uses a boiling technique in salty water until the water almost evaporates. The preservation process starts by placing about 35 fish in a big pan in layers (*sarangan*), if the fish is too big for the pan, the head is removed. Each layer of fish is covered with a layer of salt. Then the pans are filled in with water and boiled for about 7-8 hours. Work starts at 5am and finishes boiling at around 2pm. 30kg of fish uses about 3kg of salt and 3 liters of water, and at the end of the process, produces about 26 kg of preserved fish (*pindang*). This preserved fish can last for approximately one month.



Figure 6 "*Pindang*" Product

Source: Author Photograph

The product will then be taken to market, usually in Kebumen, Kutoarjo, Purwokerto and Purbalingga in Central Java, as well as Cianjur, Cipanas and Bandung in West Java. The product has a price range of about AU\$1.1-1.3per kg.

#### **Description of Seaweed Farmers and Practices in Nusa Penida**

According to one respondent, SFE, seaweed farming in Nusa Penida was introduced by Bambang Cipto Rahadi in Nusa Lembongan in November 1983. Rahadi was a staff member of a seaweed processing company in Copenhagen, Denmark. In 1984, seaweed farming in Nusa Lembongan was very successful, and spread to other areas including Nusa Ceningan and the Nusa Penida Islands. The seaweed processing company was Copenhagen Pectin Factory Ltd (Adnan and Porse 1987) and an agreement was

developed between Rahadi, on behalf of the company, and seaweed farmers in Nusa Penida that he would buy all seaweed harvested from Nusa Penida. SFE also stated that Rahadi introduced seed from Denpasar and Nusa Dua, Bali as these locations already had developed seaweed farms.

Common types of seaweed in Nusa Penida are: kotoni (*Kappaphycus alvarezii*), and Spinosum (*Eucheuma dentilacum*). The major method is off bottom is still in practice. It takes about 30-40 days from planting to harvest kotoni, while spinosum takes about 30-45 days. The tasks include preparing the wooden stakes (*patok*), tying ropes onto the wooden stakes with seaweed seed (150g) attached to the ropes and then placing them under sea water. They employ bottles as buoyance, to combat the very high tides often occurring, particularly in Nusa Lembongan. The area for seaweed farming is usually rectangular, about 20 metres in length and 5 metres in width. Farmers keep the seaweed almost 30-50 cm away from the sea bed, which usually is sand.

The daily maintenance tasks of seaweed farming are checks to remove any macro algae pests in the morning from about 4am for several hours, then in the afternoon checking, retying and collecting seaweed as necessary.

According to farmers, October is the best time for kotoni to grow. In the past, a good season lasted for six months from June to December. However, SF14 reported that August-September-October were the worst seasons in his experience for the detachment of seaweed from the ropes. Additionally, in May a strong wind from the east along with high heat created seaweed discoloration and death.

In Nusa Penida there is no license or permit required to open a new farm, however village officials informally regulate ownership based on agreed boundaries when starting new farms. Farmers report that the current price of a 5-acre seaweed farm is approximately AU\$1000.

Currently the price of cottoni is from AU\$0.70-1.4, while spinosum is AU\$8. Farmers complained that the price of seaweed is not stable and that decreases are far more significant than increases. Most farmers stated that the number of seaweed collectors is enough to absorb the entire harvest. However, farmers complained that collectors were able to drive prices down by deferring purchase of the seaweed harvest for months. This also happens on Hindu public holidays (*hari raya*). Several farmers indicated that their only way of avoiding this market control was if they were able to choose not to sell their seaweed until the price returned to normal.

Seaweed market structure in Nusa Penida is an oligopoly where only a few buyers absorb the harvest which is similar to Firdausy and Tisdell (1991) findings. Sometimes, seaweed collectors provide loans to farmers to meet their initial needs for planting. In most cases, seaweed collectors do not charge farmers for transportation, except for farmers who live outside Nusa Lembongan.

## Appendix E. Summary of Regulations Related to the Policies and Programs

No	Legislations Related to Marine and Fisheries Industrialisation Policy	Information	Related Programs
1	1945 Indonesian Constitution	Indonesian constitution	
	Law No. 5/1984 on Industry	Law on the national industry development	
	Law No. 7/1996 on Food	Law on food biosecurity	
1	Law No. 3/2014	Law on the industry sector	
2	Law No. 5/1984	Old law on the industry sector	
3	Presidential Instruction No. 1/2010	Accelerating the Implementation of 2010 National Development Priorities	Inka Mina
4	Presidential Regulation No.5/2010	National Medium-Term Development Plan (RPJMN) 2010-2014	
5	Presidential Regulation No.13/2009	Poverty reduction coordination	Fishers Livelihood Improvement Program (PKN)
6	Presidential Regulation No. 28/2008	Regulation on the national industry policy	
7	Ministerial Decree No. 7/2013	The Road Map for Marine and Fisheries Industrialisation	
8	Ministerial Decree No. 32/2010	The Establishment of Minapolitan Regions	Minapolitan
9	Ministerial Decree No. 21/2010	Guidelines of the National Program for Coastal Community Implementation in 2011.	National Program for Community Empowerment (PNPM Mandiri) Marine and Fisheries
10	Ministerial Decree No. 36/2009	Technical guidelines for the National Program for Coastal Community Empowerment	National Program for Community Empowerment (PNPM Mandiri) Marine and Fisheries



11	Ministerial Regulation No. 27/2012	General Guidelines for Marine and Fisheries Industrialisation	
12	Ministerial Regulation No. 15/2012	Ministry of Marine Affairs and Fisheries Strategic Plan	
13	Ministerial Regulation No. 41/2011	Guidelines of the National Program for Coastal Community Implementation in 2011.	National Program for Community Empowerment (PNPM Mandiri) Marine and Fisheries
14	Ministerial Regulation No. 12/2010	Legislation on the implementation of Minapolitans	Minapolitan



## Appendix F. Summary Table of Respondents

Interview Code Number	Date	Location
<b>Tuna Fishers</b>		
TF1	24/10/2014	Cilacap
TF2	25/10/2014	Cilacap
TF3	26/10/2014	Cilacap
TF4	26-Oct	Cilacap
TF5	28-Oct	Cilacap
TF6	28/10/2014	Cilacap
TFC1	24/10/2014	Cilacap
TFC2	26/10/2014	Cilacap
TFC3	25/10/2014	Cilacap
TFC4	25/10/2014	Cilacap
TFC5	24/10/2014	Cilacap
TFE	28/10/2014	Cilacap
TBO 1	25/10/2014	Cilacap
TBO 2	25/10/2014	Cilacap
TBO3	28/10/2014	Cilacap
<b>Tuna Fish Processors</b>		
FPO1	25/10/2014	Cilacap
FPO2	27/10/2014	Cilacap
FPO3	28/10/2014	Cilacap
FPO4	29/10/2014	Cilacap
FPO5	29/10/2014	Cilacap
FPOff	29/10/2014	Cilacap
FPW1	28/10/2014	Cilacap
FPW2	28/10/2014	Cilacap
FPW3	29/10/2014	Cilacap
FPW4	29/10/2014	Cilacap
FPW5	29/10/2014	Cilacap
FPW6	29/10/2014	Cilacap
FPW7	29/10/2014	Cilacap
FPM	27/10/2014	Cilacap
<b>Seaweed Farmers</b>		
SF1	4/11/2014	Nusa Penida, Bali
SF2	4/11/2014	Nusa Penida, Bali
SF3	4/11/2014	Nusa Penida, Bali
SF4	4/11/2014	Nusa Penida, Bali
SF5	4/11/2014	Nusa Penida, Bali
SF6	4/11/2014	Nusa Penida, Bali
SF7	4/11/2014	Nusa Penida, Bali

SF8	4/11/2014	Nusa Penida, Bali
SF9	4/11/2014	Nusa Penida, Bali
SF10	4/11/2014	Nusa Penida, Bali
SF11	5/11/2014	Nusa Penida, Bali
SF12	5/11/2014	Nusa Penida, Bali
SF13	5/11/2014	Nusa Penida, Bali
SF14	5/11/2014	Nusa Penida, Bali
SF15	5/11/2014	Nusa Penida, Bali
SFE	5/11/2014	Nusa Penida, Bali
<b>Other stakeholders and experts</b>		
AC1	16-Oct-15	Jakarta
AC2	18-Oct-14	Bogor
AC3	18-Oct-14	Bogor
DKP1	27-Oct-14	Cilacap
DKP2	5-Nov-14	Bali
KUD	26-Oct-14	Cilacap
MMAF1	20/10/2014	Jakarta
MMAF 2	20/10/2014	Jakarta
MMAF 3	21/10/2014	Jakarta
MMAF4	21/10/2014	Jakarta
MMAF5	21/10/2014	Jakarta
MMAF6	27/10/2014	Cilacap
MMAF7	27/10/2014	Cilacap
NGO1	16/10/2014	Jakarta
NGO2	17/10/2014	Jakarta
NGO3	17/10/2014	Jakarta
NGO4	18/10/2015	Jakarta
NGO5	20/10/2014	Jakarta
NGO6	20/10/2014	Jakarta
NGO7	22/10/2014	Jakarta
NGO8	22/10/2014	Jakarta
NGO9	28/10/2014	Cilacap
NGO10	31/10/2014	Bali
NGO11	31/10/2014	Bali
NGO12	31/10/2014	Bali

