

## Field Report

### Fishing Grounds and Supply Lines in Indonesia Fishery Management Areas 573, 713, and 714 Part 3: West Flores (Labuan Bajo and Riung)



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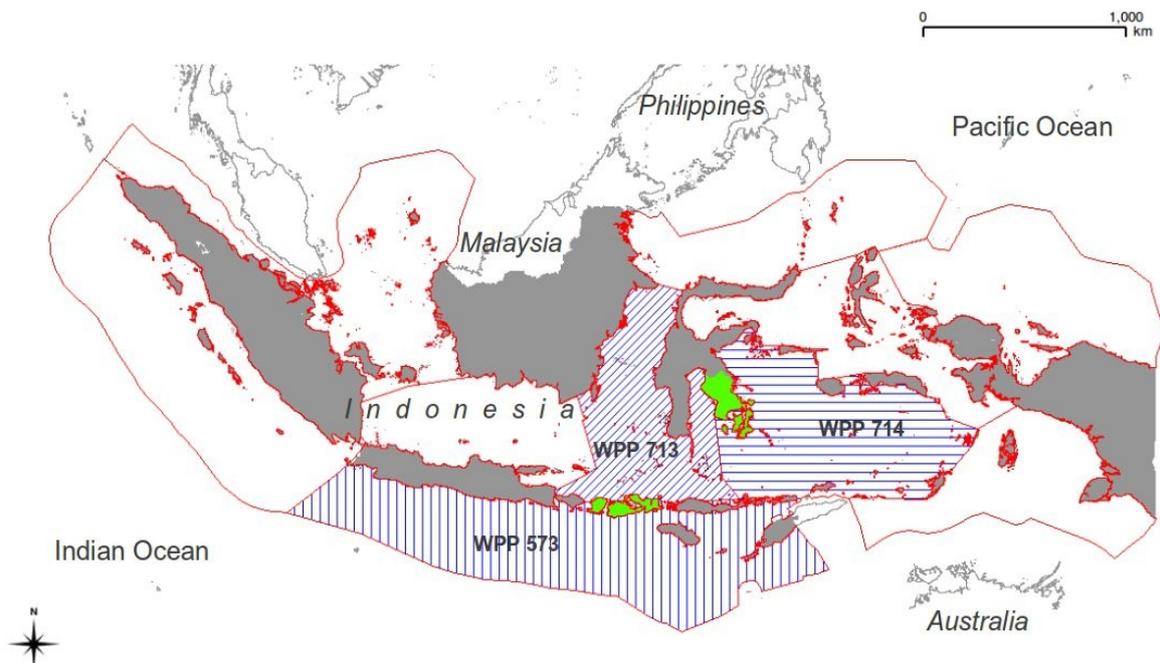
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## 1. INTRODUCTION

This report covers a 5-day field survey to West Flores (Labuan Bajo and Riung), conducted in January 2012 by consultants from IMACS and PNCI, assisted by local experts and DKP Manggarai Barat (Labuan Bajo). This survey is part of a program to map fishing grounds, fisheries resources and infrastructure in three Fisheries Management Areas in Central Indonesia. The survey program focuses on three groups of exported species: Demersal fish from 30 - 200 m depth, yellowfin tuna and associated large pelagics, and the combination of skipjack tuna and juvenile large tuna species ("baby tuna"). As we found very little fishery for yellowfin tuna and large pelagics in West Flores, this report is mainly concerned with demersal fisheries and fisheries on small pelagics.

The demersal fish category includes snappers, groupers, emperors and sea breams of various species, and is mainly caught with bottom hook and line and bottom longline. We also encountered important fisheries on tenggiri and octopus, and we reported findings on these fisheries even though these fisheries are not part of this category. The "small pelagics" category includes skipjack tuna, juvenile yellowfin and bigeye tuna ("baby tuna"), and Eastern little tuna, which is landed mostly with purse seines, and to a lesser extent with pole-and-liners. The purse seine boats also land varying quantities of scads, schooling jacks and trevallies, Indian mackerel, and other small pelagics.



*Location of Fisheries Management areas WPP 573, 713 and 714, and IMACS Provinces Nusa Tenggara Barat and Southeast Sulawesi.*

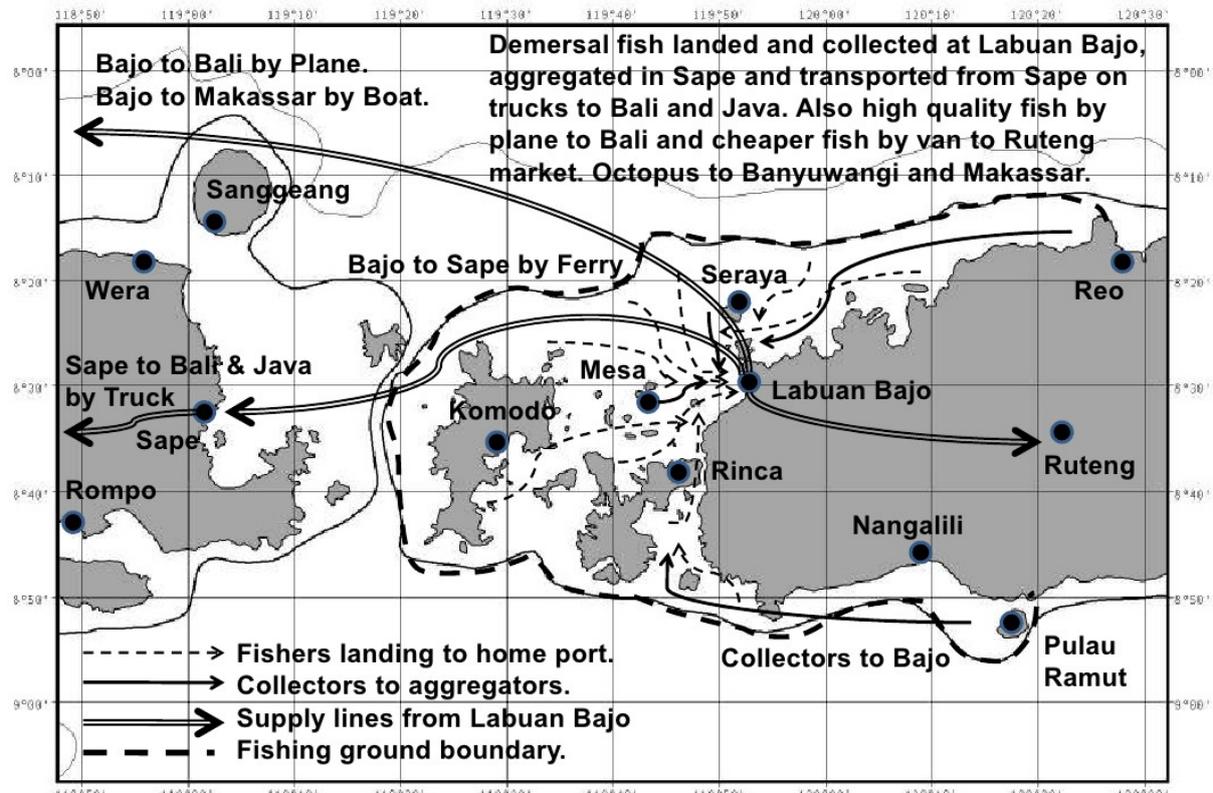


*Flores with main population centers and main roads.*

## **2. Fisheries around Labuan Bajo**

### **2.1 Snappers and groupers**

Few snappers were being landed during our field survey in January 2012, because preferred fishing grounds on the shelf area north of Labuan Bajo were badly affected by north westerly wind and storms at the time. This is a common situation during the peak of the North West Monsoon (the rainy season) here in the months of January and February. Still, a single landing from a 2-day trip by a local snapper fisher (with total 3 crew) amounted to c. 250 kg of demersals (mostly snappers and giant trevally) with at least 50 kg of high quality snappers in that catch. He caught this fish North of Seraya island, at a depth of about 60 m. Local traders mentioned that most snapper fishery takes place during the Southeasterly monsoon (May - August) rather than during the Northwesterly monsoon (November - February). One of the three major traders in Labuan Bajo, Mr Tommy Mandiri, estimated that there are about 50 demersal fishing boats from Labuan Bajo and another 50 from nearby islands operating regularly in the seas around Labuan Bajo. Most fish from this fishery are landed in the morning, between 9am and 12am.



Fishing grounds and supply lines of demersal fish, landed and aggregated in Labuan Bajo, West Flores.



Left: One of the less valuable grouper species (top), and a red snapper (bottom) at the Labuan Bajo fish market.

Right: A mangrove snapper (*Lutjanus argentimaculatus*) at the Labuan Bajo fish market.



*Left: A malabar snapper (*Lutjanus malabaricus*) at the Labuan Bajo fish market*

*Right: A rock cod (*Cephalopholis sonnerati*) at the Labuan Bajo fish market*

Circa one month before our field survey in Labuan Bajo (November-December 2012), a local informant checked for availability of larger red snappers (especially *Lutjanus malabaricus*) at local landing sites, markets and collectors. This assessment was done during a full moon period, when fishing intensity is usually low. Full moon is traditionally a resting period for Labuan Bajo fishers and they prefer to fish, also in deeper water, during dark moon phases. The North-Western winds had not yet started, so sea conditions were good at this time. The informant found in one afternoon c. 60 red snappers (*L. malabaricus*) delivered that day to a number of local collectors and local market vendors. All these fish were of 2-8 kg individual weight, so roughly 300 kg of these snappers was landed that day, together with a large quantity of other snappers, trevallies and some groupers. According to the informant, these catches came from about 6 to 8 boats, fishing with mini bottom long-lines and hand lines. This would mean that around 40 kg of Malabar snappers (or about 8 fish) was produced per boat (per trip) during that time. These boats made trips of 1 or 2 nights only. Again, this was not considered a peak day due to full moon. Data on snapper landings from dark moon phases during the same period (November – December) are not available.



*Left: Part of a hand-lining catch for sale at the Labuan Bajo fish market. The greenish fish in the center is a longnose emperor.*

*Right: Various demersal fish for sale at the Labuan Bajo fish market. The fish in the center is a maori snapper, *Lutjanus rivulatus*.*

During times of limited supply, most if not all high quality snappers are absorbed by the local market. Local market vendors buy snappers at around IDR 20,000 per kg from fishers (and up to IDR 25,000 when landings are limited), and sell them at the local market at prices ranging (depending on supply) from IDR 25,000 to IDR 30,000 and sometimes up to IDR 35,000 per kg. Vendors buy supplies for up to 2 days to sell at the local market. If landings are above local market saturation levels, high-quality snappers are sold by the fishers to collectors at similar prices of around IDR 20,000, whereas Bohar snappers, which are of lower quality, fetch only IDR 15,000 per kg. Fishers receive around IDR 17,000 per kg for larger emperors. Groupers are sold at much higher prices, depending on species. None of the current collectors specialize in snappers, but all seem to be buying when the local market is saturated. Local markets in Labuan Bajo and Ruteng consume all the landed snappers when landings are below average. Prices on these local markets are higher than what collectors currently can offer for snappers. Most if not all groupers, coral trout and octopus are exported, as is most of the Spanish mackerel.



*Left: Various large snappers and a giant trevally, just landed by a hand-liner at the Labuan Bajo fish market.*

*Right: Various reef fish, probably from a single hand-line catch, for sale at the Labuan Bajo fish market. Note the poor hygienic conditions, with fish lying around on the floor.*

Pak Tommy Mandiri, a trader whose collection station is next to the main hall of the Labuan Bajo TPI (fish landing place) works closely with about 10 to 20 demersal handline fishing boats that target coral trout and groupers, and with a few "kedo-kedo" (a small one-person canoe with single outrigger, powered by a 5-10 HP engine). The demersal handline boats land their catch at his collecting station on a regular basis, while others do so occasionally, especially when local markets are saturated. Pak Tommy buys an average of around 100 kg of demersals per day, mostly small groupers, for export by truck via Sape to Bali. Only relatively small fish were observed at Tommy's collecting station, with few exceptions, during the time of our visit, including *Variola*, *Cephalopholis*, and *Plectropomus*, from what seemed to be shallow coral reef catches.



*Left and right: Fish from a single hand-line catch (2-day trip) at the Labuan Bajo fish market. Most of the catch consists of red snapper, but there is also a cobia (left picture, the brownish fish in front) and various small groupers (right picture, small red fish to the right of the women's feet). Note again the poor hygienic conditions, which makes fish landed at local fish markets prone to contamination with Salmonella and other pathogens.*

Pak Tommy pays fishers around IDR 40,000 for various grouper species, with higher prices for coral trout, ranging from IDR 70,000 to IDR 90,000 per kg for larger *P. leopardus* ("sunu halus"). The fishing boats that Pak Tommy works with are partly from Labuan Bajo and partly from nearby islands like Pulau Mesa. Some boats are from Sape too, and all indications are that the majority of these demersal catches come from Komodo National Park. Trader Tomy does not export red snappers, but he does sell snappers to local markets. On the day of our visit (January 7) at around 10am, Tomy Mandiri had collected c. 10 kg of small sunu (0.3 - 0.5 kg individual weight), paying fishers about Rp 65,000 per kg. At around 16:30, no other fish had come in.



*Left: Small grouper on ice at trader Tommy's facility.*

*Right: Mid-sized grouper for sale at a stall at the Labuan Bajo fish market.*



*Left: Facility of trader Tommy, at the Labuan Bajo fish market.*

*Right: Back yard of trader Elias, at Kampung Air, Labuan Bajo. The styrofoam boxes are for transporting fish on ice.*

Ibu Asma, who is based in Kampung Ujung (c. 500 m from the Labuan Bajo TPI) also trades in demersals of various kinds. She has been buying fish in Labuan Bajo since 2004. Ibu Asma buys most of her

demersal fish from mini bottom long-line (500-600 hooks per boat) and hand line boats. She works with about 5 hand-lining boats (c. 2-3 GT, 24 HP engines, 6-10 crew) and 20 long-lining boats (c. 2-3 GT, 5.5 - 10 HP engines, 2-3 crew), most of which are from Sape---Rather than having to return to Sape with their catches, these boats sell to Ibu Asma in Labuan Bajo. These boats fish on the shelf area north of Labuan Bajo and in Komodo National Park., who then transports by ferry and sells to Sape aggregators in turn. From Sape all these demersal fish then go to Bali by truck, destined for export mainly to Asian markets. During the time that the Sape boats are landing in Labuan Bajo, ibu Asma buys around 100 kg demersals per day from them. This includes snappers from deeper water bottom longline catches, but also small groupers and coral trout like *Cephalopholus*, *Variola* and *Plectropomus* species. Ibu Asma reports buying around 300 kg of Malabar snapper per week on average, at IDR 20,000 per kg, during times that the weather allows fishing on the shelf area north of Labuan Bajo. During the Northwesterly Monsoon, which peaks in January and February, the demersal catches do not include these snappers, as the fishing takes place only in shallower water in between the islands west of Flores and in Komodo National Park.



*Left: Facility of trader Ibu Asma in Kampung Ujung, Labuan Bajo*  
*Right: Badi Sasongko interviews fish trader Ibu Asma.*

Elias, the third major trader of Labuan Bajo, is based in Kampung Air at a short car drive from the Labuan Bajo TPI. He specializes in Spanish mackerel, but if mackerel catches are low he buys around 30 kg of coral trout per day from the 15 kedo kedo boats, for which he pays prices from IDR 60,000 up to IDR 90,000 per kg (the highest price for larger *Plectropomus leopardus*). There are also 2 or 3 demersal fishing boats landing their catches of snappers and groupers from mini bottom long-lines and handlines to Pak Elias each week. Elias does not have a fixed relationship with these handliners, he buys from whoever shows up to sell his fish. Elias pays IRP 20,000 per kg for red snapper. Elias transports his fish by truck via Sape and Bima to Bali. At the time of the visit (January 6), Elias had just shipped out his fish, and he had only 1 *Lutjanus malabaricus* of 6 kg in storage. On January 7, the fishers of Mr Elias returned early without catch because of bad weather.

Ibu Fadiyah, a local vendor working at the Labuan Bajo TPI, pays fishers 15,000 / kg for low-quality snapper (*L. bohar* and also mistakenly *L. argentimaculatus*, which is actually a high-quality snapper), and 25,000 / kg for *L. malabaricus* and similar species (including also one or two rock cod *Cephalopholis*

sonnerati). She sells high-quality fish for 35,000 / kg at the TPI. She pays the fisher IRP 17,000 per kg for giant trevally and longnose emperor. Ibu Fadiyah works with only one fisher, as her customer base cannot absorb more fish. Her fisher lands at the Labuan Bajo TPI, Ibu Fadiyah puts the fish on ice and sells to local consumers in the main hall.



*Left: Ibu Fadiyah, a fish buyer and vendor at the Labuan Bajo fish market.*

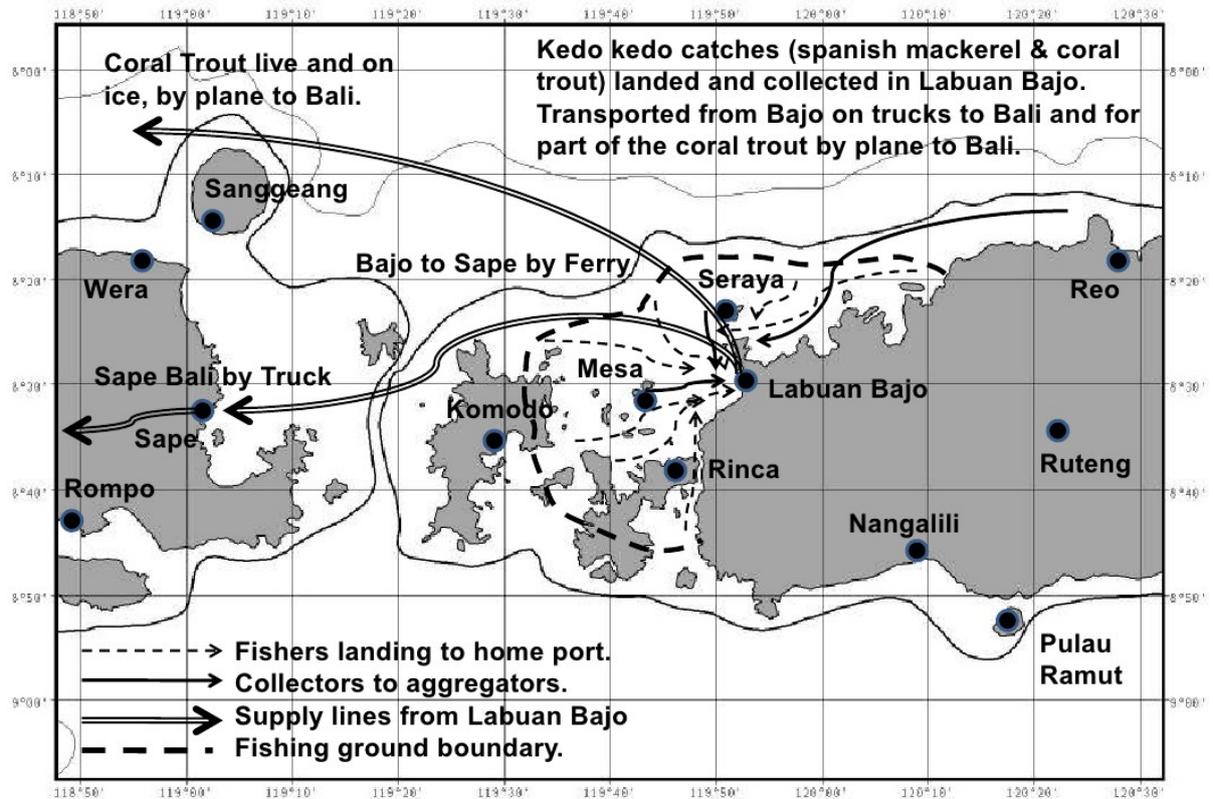
*Right: The hand-line catch that was just landed and bought by Ibu Fadiyah.*



*Left: Northern side of the main hall of the Labuan Bajo fish market, bordering on the sea shore. Fishers land their catch at this side, and buyers store the fish on ice in the boxes shown here.*  
*Right: Part of a catch of red snapper (*Lutjanus malabaricus*).*

## **2.2 Tenggiri (Spanish mackerel) caught by kedo-kedo**

During peak seasons, up to 40 or 50 small hook-and-line trolling boats (“kedo kedo”), originally from Sulawesi, are active in the waters around Labuan Bajo, producing up to 3 or 4 Spanish mackerel per boat per day. This could mean that peak season catches amount to more than 100 mackerel per day from these waters. Variation, however, is high, and only very rarely are all the small boats active at the same time. Fish sizes were reported to range from about 5 to 15 kg with most fish weighing around 7 to 10 kg each. During peak season, up to 1 ton of Spanish mackerel might be landed on a daily basis in Labuan Bajo, but there are also many days each year when there are no mackerel landed due to weather conditions or for other reasons. One factor stabilizing the catch is the option for fishers to work either on the North, South or West side of Flores, with many sheltered parts of fishing ground in between the islands. Some tenggiri goes to the local market, some is sent to Sape, and one local collector (Pak Elias) specializes in export of this species, whereas the other 2 local collectors (Ibu Asma and Pak Tommy) also buy and export tenggiri opportunistically.



*Fishing grounds and supply lines of Spanish mackerel and coral trout caught by kedo-kedo.*



*Left: Helpers of Ibu Asma holding up a 17 kg Spanish mackerel.*

*Right: Kedo-kedo vessels in the back yard of trader Elias, Kampung Air, Labuan Bajo.*



*Left and right: Various kedo-kedo vessels in Labuan Bajo harbour.*

Trader Tommy Mandiri specializes in grouper, but he also buys tenggiri when these are offered to him at IDR 40,000 per kg for fish between 7 and 20 kilos individual weight, and IRP 31,000 / kg for fish of 5-7 kg body weight. Tommy sells the tenggiri to Sape from where they are moved to Bali and eventually exported. Varying numbers of those boats would offer fish to him at what seemed to be unpredictable occasions.

Ibu Asma also works with about 20 kedo kedo trolling boats which land Spanish mackerel, jacks (mostly tille trevally) and coral trout to her collecting station. The main target for these boats is Spanish mackerel and she buys around 100 kg of these fish of them on a daily basis, when the weather allows fishing and the fish are around. According to Ibu Asma, peak season for Spanish mackerel is August - December. The kedo-kedo boats that deliver fish to her fish mostly in Loh Baru in East Rinca. Ibu Asma's kedo-kedo fleet sometimes bring up to 300 kg of jacks on a day, when these fish are dense in feeding aggregations in Loh Baru. These are just occasional events and these jacks mostly go on the local market, including the market in the town of Ruteng, further east in Flores. Ibu Asma sends all Spanish mackerel (and coral trout) by ferry to Sape (East Sumbawa), selling to aggregators who transport to the fish to Bali for further export, mainly to Asian markets. Ibu Asma also sent various shipments of fish and octopus to Makassar via transport boats from Labuan Bajo. At the time of the survey team visit, on January 7, only one of Ibu Asma's kedo-kedo brought in a 16 kg tenggiri, caught at Pulau Sababi.



*Spanish mackerel on the weighing scale at the facility of Ibu Asma.*

Pak Elias works directly with about 15 kedo-kedo trolling boats, which fish either on Spanish mackerel, when those are around, or on coral trout with sinking (metal) trolling lines. These boats keep their fish on ice during their day trips. When the mackerel are around, Elias buys around 100 kg of this species from kedo kedo fishers on an average day. For the fish weighing 7 kg individual weight or over, he pays the fishers IDR 40,000 per kg. The group of fishers hanging out at Elias's place say that their fishing grounds comprise Loh Baru (south of Rinca), Tatawa, and Longos. Their one-day fishing trips usually start at 7am and end around 3pm. Elias produces his own ice with household refrigerators.



*Left and right: Kedo-kedo near the facility of trader Elias, Kampung Air, Labuan Bajo.*

### **2.3 Octopus**

A relatively new development in Labuan Bajo is the landing of substantial quantities of octopus (“gurita”), which started around 2001, after catches of grouper started to drop. The fishery has intensified since 2009. Octopus are being collected by a single buyer (Ibu Asma), who sends the octopus to her business partner pak Suhirman in Banyuwangi (East Java). Ibu Asma is working directly with around 20 boats that fish themselves as well as collect octopus from smaller boats and local fishers. These boats operate in the waters around West Flores, including the local islands (from Ranko in the north to Mesa in the West and Ramut to the South of West Flores). Octopus are caught by fishers working from a non-motorized canoe, who use mask and snorkel to look over the side, dangling an artificial lure over the reef at depths up to 5 m. It seemed that she was buying an average of around 150 kg of octopus per day, from 2 to 4 boats landing at her place on average each day, at the time of our visit - although this is a very rough estimate. Octopus are traded in three size classes: big (> 2 kg, IRP 38,000/kg), medium (1-2 kg, IRP 28,000/kg), and small (0.5 - 1 kg, IRP 18,000/kg) She reported buying up to 3 tons of octopus per week, during periods of peak landings. For Ibu Asma, octopus is now her main business: For every 5 t of octopus, she ships out only 200 kg of sunu. The octopus is transported to Makassar (for end destination US), and to Surabaya (via Banyuwangi) (for end destination Singapore). Ibu Asma ships sunu and tenggiri to Bali, from where it is transported to Singapore and Taiwan.

Several styrofoam boxes with hundreds of kilos of octopus were present at Ibu Asma's collecting station at the time of the visit by the survey team on January 6. She had bought this amount from several boats that landed in last few days. At the time of the visit, a collector vessel brought in a c. 100 kg of octopus, collected over a 3-day trip. The octopus were collected on the South coast of Flores, up to Pulau Ramut. Ibu Asma has been working as a trader in Labuan Bajo since 7 years.

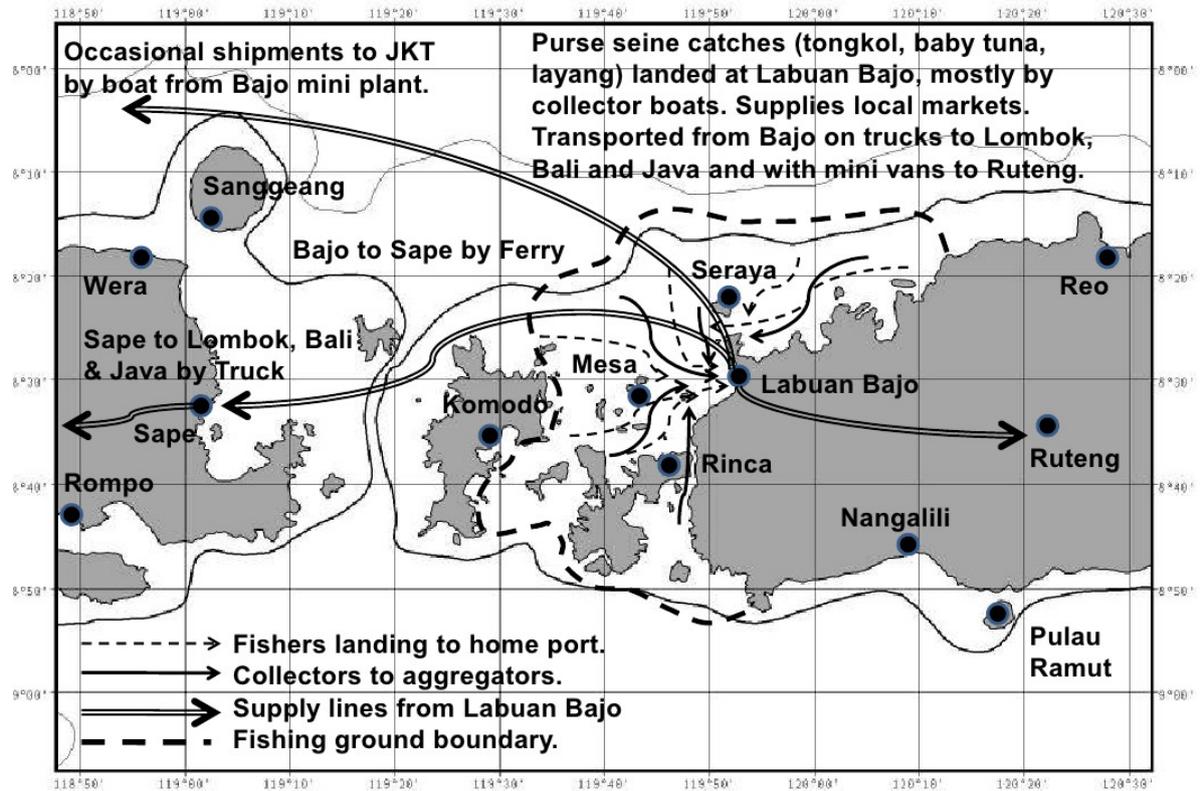


*Left: Collector vessel landing octopus at the facility of Ibu Asma, Kampung Ujung, Labuan Bajo.*

*Right: One of the crew of the collector vessel holding up a large octopus.*

## **2.4 Small pelagics (mini purse-seine)**

Labuan Bajo has a mini purse seine fishery. The fishery takes place at night, using lights to attract and catch mainly skipjack tun, tongkol, scads (layang) and other small pelagics. There are c 40 collecting vessels landing at the Labuan Bajo TPI, and Labuan Bajo has 5 large purse-seiners (length 18 m, 24-30 HP engine, 18 crew) and 18 small purse seiners (length 16 m, 24 HP engine, 10 crew). Most of the mini purse seiners are not originally from Labuan Bajo. The collecting vessels bring in about 3-4 t per day each. The purse seiners usually stay at the fishing grounds for up to 2 months at a time, and when fishing near Labuan Bajo they do not use FADs. The purse seine catch landed in Labuan Bajo is mostly transported to Ruteng and other markets in Western and Central Flores.



*Fishing grounds and supply lines of mini-purse seiners landing in Labuan Bajo, West Flores.*

During April - November, purse seining takes place to the south of Labuan Bajo, in the waters south off Selat Molo, including Loh Baru and around Gilimotang. During December-January, the fishery takes place to the North of Seraya Besar.



*Left: Tongkol catch of a mini purse-seiner being prepared for transport by pick-up at Labuan Bajo fish market.*

*Right: Collector vessels landing a tongkol catch of mini purse-seiners at Labuan Bajo fish market. The boats with the white nets on the deck are gillnetters.*

The purse seiners also travel to distant FADs which are set by fishers from other areas (Sinjai, Sulawesi), which usually also means landing at places far from Labuan Bajo, closer to those FADs.

Trader Tommy Mandiri also trades in small pelagics when catches of tongkol and layang (scads) are large and purse seiners offer their fish to him. These fish are not exported but sold to buyers from Ruteng (a town in West Flores, about 4 hours by car from Labuan Bajo).

At the time of the survey team's morning visit to TPI on January 7, collecting vessels brought in Eastern little tuna (c. 4-5 kg body weight), and layang caught by purse seiners. The purse seiners were fishing nearby, around Bidadari Island. Gill netters brought in garfish. Purse seine and gar fish catch is transported to Ruteng and to Bima and Mataram by truck.



*Left: A gillnet catch of garfish being prepared for transport out of Labuan Bajo fish market.  
Right: A collector vessel landing a purse-seine catch of tongkol.*



*Left: Labuan Bajo harbour, near the fish market. The large vessel in the background is the ferry from Labuan Bajo to Sape.*

*Right: A catch of queenfish at the Labuan Bajo fish market.*

Many mini purse seiners, mainly from outside Labuan Bajo, from Sulawesi, Sape or other East Sumbawa origin, used to land their catches at the Binonko mini plant, which is located to the North of Labuan Bajo. At the time of the visit, the plant was not operating, but the manager and some workers doing maintenance were present. The plant was said to have processed up to 500 tons of scads (layang) every 3 months during the peak season each year. The fish were destined for Bali and Jakarta, both for human consumption and as bait for industrial tuna longline boats.

The Binongko mini plant, built on rented land and operated by PT Damarina Sumber Bahari (an industrial fishing company from Benoa, Bali), was reported to process mainly pelagic catches from purse seiners, whenever those are available, and to supply ice (only) to the boats that they directly work with. The freezing and cold storage capacity, as well as the 2 ice plants here, are still being maintained but were not operating during our visit, apparently due to the lack of fish being delivered at that moment. The capacity of the combined cold storage rooms is around 120 tons and the two ice plants here can produce 400 ice-blocks of 25 kg each 24-hour period.

PT Damarina itself owns and operates large and modern industrial tuna longliners out of the port of Benoa in Bali. The current mini plant manager in Labuan Bajo mentioned that operations at his plant were expected to start again after the North West monsoon, around March, when Sulawesi purse seiners were expected to operate again in large numbers in waters around Labuan Bajo, and to supply fish again well beyond what local markets could absorb. During times of low catches and landings, the mini plant is outcompeted by prices at local markets, while at the same time the plant is not efficient below minimum amounts of fish. The mini plants is expected by the local manager to be put back into operation again as soon as scads (layang) are landed in large quantities. According to him the mini plant stops operating each year from December

through February, and other informants confirmed that the plant had operated through part of 2011. According to the mini plant manager they would work with about 20 collector boats bringing the fish from the purse seiners to the plant. The mini plant expects to pay IDR 2,000 per kg of layang in such situations, whereas prices on local markets, during times with limited supply can be as high as IDR 20,000 per kg (or IDR 10,000 for a bundle of 5 layang, jointly weighing around half a kg).

The manager of the Binongko mini plant mentioned that some years ago there were FADs present just north of Labuan Bajo where purse seiners mainly caught large quantities of layang (scads) with by-catch of skipjack and baby tuna. It was mainly these large quantities of layang that kept the mini plant running in recent years. The manager was not sure who actually placed these shallow water FADs (deployed in waters of around 800 meters deep), but it was not his company. Since these FADs are gone, the mini plant has not received large quantities of fish, and the manager did not know of any intent from his company or others to re-employ FADs in the area.

The mini plant also used to process considerable amounts of skipjack, eastern little tuna (tongkol) and baby tuna, up to around 40 tons per month, according to the local manager. These fish were sent to Java, with a transport boat when quantities were large or with freezer truck (Thermoking) when quantities were small and such a truck was available. The plant manager mentioned prices of IDR 8,000 per kg for baby tuna and IDR 7,000 for skipjack being paid by his company to fishers or collector boats.



*Left: Main hall of the Binongko mini-plant, Labuan Bajo.*

*Right: Ice factory at the Binongko mini-plant, Labuan Bajo.*

## **2.5 Tuna**

Local traders say that there is no fishery for large tuna in West Flores---The main centers for tuna in Flores are Larantuka and Maumere in East Flores. There is currently

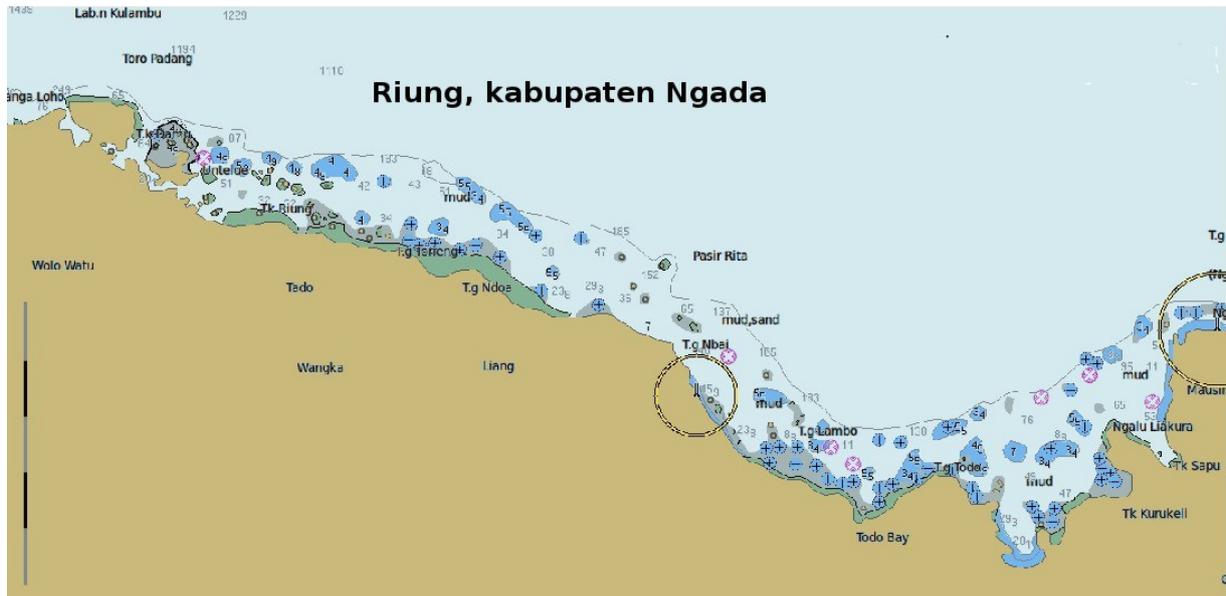
no organized fishery for larger tunas operating out of Labuan Bajo, mostly because there are no tuna buyers present here.

Even for the the mini plant at Binonko (see section 4 below), large tuna was never an important product. Small numbers of larger tuna (over 20 kg) were landed at the Binonko mini plant in the past, by Sulawesi tuna hand liners who maintained deepwater FADs, usually between August and December. The large tuna were frozen as whole fish at the Binonko mini plant, for transport to Jakarta by freezer truck (Thermoking). No loining has ever taken place here. The production of large tuna never exceeded about a ton each month according to mini plant manager. Whether this reflects the lack of fish in nearby waters or the lack of interest from fishers to land fish here (because of prices), or both, is not completely clear. The mini plant manager mentioned prices of IDR 13,000 per kg paid by his company for large tuna, which is considerably lower than what fishers are getting elsewhere at the moment. Local fishers in Labuan Bajo comment that they could fish for larger tuna, if there was a buyer offering prices that would make this interesting for them. They say that the fish is out there.

Tuna fishing grounds for the Sulawesi handliners are mostly South of Flores, into the Savu Sea, and north of Flores, in the Flores Sea. They used to do 10 to 12 day trips taking ice from the Binonko plant. These same boats may currently be working elsewhere: According to the current mini plant manager, many of the tuna handliners had moved their bases for operations to Lombok, Sumbawa, Sulawesi, and Kupang.

### **3. Fisheries in kecamatan Riung**

*Kecamatan* (municipality) Riung (S 8 25.28, E 121 01.64, district Ngada.) is on the North coast of Flores, about 12 hours by car from Labuan Bajo. Riung has a coastline with many islands and coral reefs, sustaining a modest dive tourism industry, comprising mostly backpackers. Many of the fishers occasionally rent out their boats to tourists.



*Nautical chart of the coastline of kabupaten Riung (see the green areas in the western part of the chart, covering a distance of about 25 km), showing the islands and patch reefs on extending from the coast to the 200 m depth line.*

The main fisheries in Kecamatan Riung are handlining for demersal fish, and gillnetting. Kecamatan Riung comprises 6 coastal desa and 1 coastal kelurahan, each with c. 75 fishing households. About 70% of families have a non-motorized vessel (canoe or sailing canoe), and about 30% have a motorized vessel, who engage in handlining or gillnetting. Besides this fleet of small vessels, there are c. 5-10 motorized lift net vessels (bagan), and at the time of the visit there was one mini purse-seiner from West Sumbawa (Alas District), who had been fishing in Riung since one month, selling its catch to local traders from Bajawa and surroundings who arrive by motorcycle, bus, or van. Assuming an average catch of 20 kg / trip for motorized vessels and 10 kg / trip for non-motorized vessels, total production of demersal fish in kecamatan Riung (excluding catch from bagans and mini purse seines) could amount up to 7 t / day on a good day during peak season. Of course, this is a maximum estimate of a combined catch of low-quality and high-quality fish, and the daily catch of high-quality snappers and groupers is probably 1-2 t at best.



*Left: Market in Riung.*



*Right: Riung seashore, featuring mangroves, coral reefs, and small islands.*

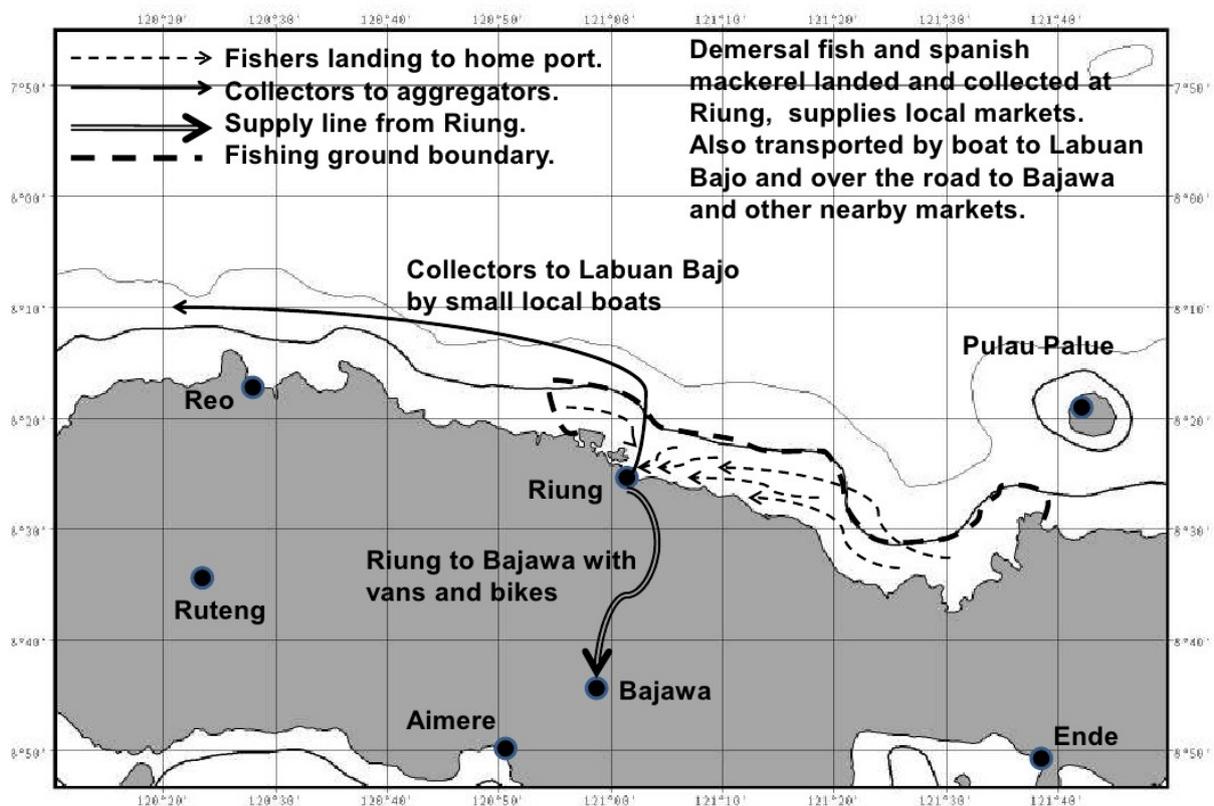


*Left: Coastal village in Riung.*



*Right: Bagan (lift net) vessels at the main fish landing site (TPI) in Riung.*

The fishers of Riung usually fish at night with gillnets (mesh sizes 1.25", 1.5", and 2") and handlines, making trips of one night only. Fishing grounds are only 1-2 nm from the shore. Motorized boats are generally about 17 m long, powered by a 16 HP engine, with a crew of one or two persons. Handlining takes place at depths between 15 - 70 depa (23 - 100 m), gillnetting is usually done at 20 depa (30 m). Fishers usually only take 0.5 hours to reach their fishing grounds. A typical catch of a motorized vessel is about 20 kg per night. Handline catch includes snappers between 5 and 10 kg individual weight, which is sold at IRP 12,000 per kg irrespective of the species. Gillnet catches typically sell for IRP 8,000 per kg, irrespective of species. Fishers also sell "sunu" (coral trout) at IRP 12,000 per kg as dead fish, and at IRP 120,000 as live fish. There is a live fish holding cage, but it was not active at the time of the survey team visit. At the time of the visit it was full moon, and most of the fishers did not go out. Peak season for fishing is April - November, fishing intensity is low during the Westerly monsoon (December - March). There are many visiting fishers from neighboring islands (Sumbawa, Lombok, Bali, Sulawesi) who operate in Riung waters.



*Fishing grounds and supply lines of the small-scale demersal fisheries of Riung.*

Fishers take about 5 kg of ice, bought locally at IRP 1,000 per kg. Riung does not have an ice factory, but some of the fishers and local traders have household refrigerators to produce ice. There are five local traders, and there are many small-scale traders who pick up fish with motorcycles, pick-up trucks, or bus for transport to Bajawa (2 hours from Riung) and other local markets.



*Left: Small-scale demersal fishing boats (mostly using gillnets and handlines)*

*Right: Visiting mini purse-seiner in Riung.*

Trader Ramli from Riung works with up to 30 fishers. He advances operational expenses to fishers, and in addition he makes loans of c. 5-6 million Rp. As long as the fisher is paying back this loan, he will exclusively supply the trader whom he owes; this is a common arrangement in small-scale fisheries in Indonesia. Ramli pays fishers IRP 20,000 per kg for tenggiri of 7-10 kg individual weight, whereas smaller and larger tenggiri have a lower price. This is about half of the price in Labuan Bajo. Mr Ramli did not give information on prices of other fish species. At the moment of the visit, Mr Ramli had only a few kg of small fish in stock, which were probably caught by handlining in mangrove areas.



*Low-value fish, mostly caught by handline near mangroves, in storage at the facility of trader Ramli.*



*Left: Boys with their handline catch in Riung.  
Right: Market in Riung.*



*Facility of trader Ramli, Riung.*

Trader and collector Hadi owns a non-motorized sailing canoe. He usually fishes during daytime starting 5am and returning around 2-3pm, fishing at a depth of 30-100 depa (45

- 150 m), and he also collects from other fishers. He usually takes one hour to reach his fishing grounds, and he usually catches 2-3 fish (10 kg on average). He handlines for grouper, coral trout, and snapper, and he sells to a trader from Labuan Bajo, who only visits Riung during the months March - September. This trader has a live fish transporter vessel, which also takes dead fish on ice. Hadi sells coral trout ("sunu") for IRP 45,000 / kg (dead) or IRP 250,000 / kg (alive). Smaller sunu such as *Variola louti* sell for IRP 35,000 / kg. Red snapper (species not identified) sell for Rp 25,000 / kg to local markets. These prices are substantially higher than the Rp 12,000 / kg mentioned by other fishers, and Hadi explained this difference from the fact that besides a fisher he is also a trader. In other words, fishers appear to get Rp 12,000 per kg for reef fish (without further diversification in price, with the catch comprising both low-value and high-value species), and price diversification only happens after the fish has been bought by the local trader. At the moment of the visit, fisher/trader Hadi did not have any fish in storage.

#### **4. Fisheries of kecamatan Borong and kec. Aimere**

The kecamatan Borong and kec. Aimere are on the South coast of Flores. They have small-scale fisheries (including motorized mini purse-seiners), which we could not assess, except for a short visit to the beach of desa Legeladu, Aimere (S 8 49.751, E 120 50.000). At the time of the visit (January 9), a fisher brought in a small catch of a large species of scad and some small-sized demersals, caught by handline at 150 m depth. He was actually gillnetting for tembang (a herring-like fish), but there was no fish around so he returned early. The fisher said that he normally makes day trips, going 1 nm offshore to reach his fishing grounds, and that in this area gillnetting for tembang is an important fishery. Another fisher was selling a red snapper, caught on that morning, of c. 3 kg for IRP 60,000 at the side of the road. According to this fisher, kecamatan Aimere has about 60 small motorized boats (1-2 crew), and about 26 larger boats of 3-4 GT who gillnet for tembang at night. Fishing trips are usually 1 night, sometimes up to 2 nights.



*Left: Fishers push their vessel on the beach of Aimere.  
Right: Handline catch of the vessel just landed at the beach of Aimere.*



*Red snapper for sale at the roadside, Aimere.*

## 5. Trading and facilities in Labuan Bajo and Riung

The local market (TPI) of Labuan Bajo during our visit contained around 50% fresh fish, demersals as well as smaller pelagics, and about 50% dry fish, from lift net (bagan) catches including small clupeids, as well as dried rabbit fish. The rabbit fish are reportedly often caught with poisons on reef flats. The species composition of dried fish (fusiliers, parrotfish, surgeons) suggests that many of larger dried fish were caught by blast fishing. Note that in terms of turn over, the trade of fresh fish is more important than dried fish.



*Main hall of the Labuan Bajo fish market (TPI).*



*Left and right: Half-dried fish of very poor quality for sale at the Labuan Bajo fish market.*



*Left: Fresh fish for sale in the front part of the Labuan Bajo fish market.*

*Right: Sun-dried fish for sale in the back part of the Labuan Bajo fish market.*



*Left and right: Dried fish for sale in the main hall of the Labuan Bajo fish market.*



*Left and right: Fresh fish for sale in the main hall of the Labuan Bajo fish market.*



*Mixed reef fish for sale in the main hall of the Labuan Bajo fish market.*

There are three major traders in Labuan Bajo: Ibu Asma (Kampung Ujung, specializing in octopus), Tomy Mandiri (TPI Labuan Bajo, specializing in grouper), and Elias (Labuan Bajo, specializing in Spanish mackerel). Trader Tomy Mandiri, conducts his business from a shed right next to the Labuan Bajo TPI. Trader Elias buys Spanish mackerel as well as live and dead grouper ("sunu"), and he operates a karamba (fish cage).

The most important fishing villages in the Labuan Bajo area, besides Labuan Bajo itself, are Seraya Besar, Mesa, and Papagaran. Seraya Besar has fish cages, owned by Hj. Amir. There are also fish cages near Kukusan Island, to the North of Labuan Bajo, and, as mentioned above, one of the traders (Elias) operates fish cages to store live fish.

There is no ice factory in Labuan Bajo from where independent fishers could obtain ice. All ice used by fishers, collectors and vendors in Labuan Bajo comes from domestic freezer production. The only larger scale ice production plants (2 units) are at a mini

plant situated at Binonko, on the North side of Labuan Bajo, but this plant was not operating during our visit. The ice production capacity of the Binongko plant is 10 t per 24 hours. Home-produced ice costs IRP 600 per block of 0.5 kg.

Kecamatan Riung does not have an ice factory, but local traders and some of the fishers use refrigerators to produce 1 kg ice blocks. Riung features a long jetty, which is used by fishing boats as well as (dive) tourism boats, and there is a TPI, which has a concrete jetty. Access to both jetties by road is good, but Riung itself is far from other population centers of Flores. Nearest is the district capital Bajawa, which is about two hours from Riung, but during the rainy season the road to Bajawa gets bad. There is a detour around this bad section, but it adds about 2 hours to the route. The main road from Labuan Bajo to Riung runs via the south coast of Flores, passing Borong and Aimere, to Bajawa, and from Bajawa north to Riung. Labuan Bajo - Riung takes about 10-12 hours. Whereas there are some local traders in Riung, these traders appear to turn over only small quantities of fish, and a substantial part of the catch appears to be bought by vendors and traders who are based elsewhere.

## 6. Notes on destructive fishing

Signs of destructive fishing practices were all around in Labuan Bajo, including reports of cyanide fishing for live coral trout which were kept in cages near Labuan Bajo. Furthermore, the species composition of dried fish for sale in the Labuan Bajo fish market (fusiliers, surgeons, small parrotfish, and various other small species that are difficult to catch by handline or gillnet) suggests that most of these fish were caught by blast fishing. One elderly fishermen reported blast fishing to be rampant among fishers from nearby Seraya island, and he asked about chances of conservation programs returning to the area to actively support enforcement – referring to what he remembered as effective enforcement programs in the late nineties.



*Left and right: Dried and salted fish for sale at the fish market of Labuan Bajo. It is likely that most of these fish were caught by blast fishing.*

Another indication for the occurrence of destructive fishing is the prevalence of hookah compressor fishing in West Manggarai waters. This fishing gear is often used in cyanide fishing and blast fishing, and for this reason compressor fishing is illegal under a local regulation issued by District Manggarai (which was adopted by District Manggarai Barat when it split off from Manggarai). Nevertheless, traders in Labuan Bajo report that compressor fishers from Sumbawa Besar frequently operate in West Manggarai waters.

Also in Riung blast fishing and cyanide fishing appears to still occur, but the local informant reports that awareness among local fishers about the problems of blast fishing and cyanide fishing is high, thanks to a conservation program implemented by WWF-Indonesia. This conservation program was completed in 2009.

## **7. Notes on development of sustainable supply lines**

Labuan Bajo and nearby islands offers opportunities for developing a sustainable supply line for high-quality snappers, and possibly also for yellowfin tuna. In respect to high-quality snappers, there currently are about 100 small-scale boats in the area, who catch about 40 kg of high-quality snapper (e.g. *Lutjanus malabaricus*) per trip of 1-2 days. This supply might be high enough to establish a mini-plant, providing that the mini-plant cooperates with the three local traders in Labuan Bajo so that most of the local production of high-quality snappers can be channeled to the mini-plant. To remain competitive and to secure supply, the mini-plant would have to offer a price of IDR 20,000-30,000 per kg. A matter of concern is continuity of supply, as fishing intensity is low during the north-westerly monsoon (November - February) and during full moon of any month. Furthermore, festivities and religious events often disrupt supply--During the time of the survey team visit, traders said that supply was low due to an important wedding ceremony on one of the islands.

One way to ensure continuity in supply is by broadening the portfolio of species, and Spanish mackerel ("tenggiri", *Scomberomorus commerson*) is an interesting species in this respect. Spanish mackerel is landed year-round in Labuan Bajo, and as a coastal pelagic, Spanish mackerel is relatively resilient to fishing pressure (more so than any of the target demersals at least). Spanish mackerel is also available in Sumbawa, potentially in large quantities seasonally in the bay at Hu'u, and supplies from Labuan Bajo and Sumbawa could easily be combined. Such combination with Spanish mackerel from Sumbawa provides another opportunity to stabilize supplies.

It appears that groupers in West Manggarai waters, especially those caught on shallow (< 30 m depth) reefs, are already severely over-exploited. All local buyers mentioned that grouper and coral trout landings are currently only a fraction of what they were 10 to 15 years ago, whereas snapper landings have reportedly remained more stable. Little is known on the sustainability of the current octopus fishery, but considering that octopus is a territorial animal with a small home range, it is likely that the octopus population cannot sustain the current fishing effort. In other words, the fishery may currently be in the first phase of a boom-and-bust cycle.

The supply chains in Riung municipality are less developed than those of West Manggarai. The traders based in Riung appear to run smaller operations than those in West Manggarai, and a relatively large part of the catch is bought by traders and vendors who are not from Riung. This does not say much about the exploitation status of local fish stocks, since there appear to be many visiting fishers, and therefore much of the fish from Riung and surroundings might be landed elsewhere (Labuan Bajo, for example). Nevertheless, the lack of a well-established supply chain might present an opportunity for the creation of a new business model that integrates mini-plant, buyers, and fishers---The question is whether Riung coastal waters have the ecological capacity to sustain such an operation. Riung and the area to the west of Riung has a lot of habitat for demersal fish, as the 200 m depth line is about 5 km from the coastline, with many islands and coral reefs in 75 km long strip between the coastline and the 200 m depth line. This is probably sufficient to sustain a production of 1-2 t of high-quality demersal fish per day (or 8 kg per ha per year, assuming 200 fishing days), provided that fishers from elsewhere are prevented from fishing in these waters.

To establish a sustainable supply chain, the issue of open access must be addressed. The survey team did not find any evidence for strong coordination among fishers, and therefore it is unlikely that fishers can self-govern to control fishing effort and fishing mortality. It may be possible, however, to establish a management approach where local government, the three local traders, and the mini plant operator, collaborate to maintain fishing effort at an optimum level. A condition for this approach to succeed is that access to fishing grounds is restricted to local fishers (i.e. fishers from the District Manggarai Barat and District Ngada).

## **ANNEX 1: LOCAL RESOURCE PERSONS AND DATA-GATHERING EVENTS**

1. Meeting with Mr Fidel Kerong (now Expert Staf for the West Manggarai bupati, former head of DKP Manggarai in Ruteng and former head of DKP West Manggarai in Labuan Bajo), at DKP office of Labuan Bajo, January 6 2012 (Peter Mous, Budi Sasongko).
2. Meeting with various DKP West Manggarai officials at their office in Labuan Bajo, January 6, 2012 (Peter Mous, Budi Sasongko)
3. Visit to Labuan Bajo TPI on January 6, 2012 (17:00 - 18:00)
4. Visit to trader Ibu Asma in Kampung Ujung, Labuan Bajo on January 6 2012 (Peter Mous, Jos Pet, Budi Sasongko)
5. Visit to trader Tomy Mandiri, at the TPI of Labuan Bajo, on January 6 2012 (Peter Mous, Jos Pet, Budi Sasongko)
6. Visit to trader Elias, in Labuan Bajo, on January 6 2012 (Peter Mous, Jos Pet, Budi Sasongko)
7. Visit to Labuan Bajo TPI with DKP official Joseph Tala, on January 7 2012, 5:30 (Peter Mous, Budi Sasongko)
8. Visit to Labuan Bajo TPI and trader Ibu Asma with DKP official Joseph Tala, on January 7 2012, 9:00 (Peter Mous, Budi Sasongko)
- 9a. Interview with Ibu Fadiah, fish trader at the Labuan Bajo TPI, on January 7 2012, 9:00; 9b. interview with a Labuan Bajo fisher who just sold his fish to Ibu Fadiah (Peter Mous, Jos Pet)
10. Interview with Ibu Asma, fish trader at Kampung Ujung, and Pak Lukman, fisherman from Manggarai Timur) on January 7 2012, 9:00 (Budi Sasongko)
11. Visit to the cold storage and ice factory of Binongko, on January 7 2012, (Peter Mous, Budi Sasongko)
12. Visit to the live fish holding cages (karamba) near Kukusan island on January 7 2012, 11:30 (Budi Sasongko)
13. Interview with a former fisher from Seraya Besar on the sea shore of Labuan Bajo on January 7 2012 (Jos Pet, Peter Mous)
14. Visit to trader Ibu Asma (Kampung Ujung), Labuan Bajo TPI, trader Tomy Mandiri (TPI Labuan Bajo), and trader Elias (Labuan Bajo), January 7 2012, 16:00 (Peter Mous)

15. Interviews with Mr Paulus Lali, government employee of kecamatan Riung, kab. , January 8 2012 (Peter Mous, Budi Sasongko)
16. Interviews with fishers, kec. Riung, January 8 2012 (Peter Mous, Budi Sasongko)
17. Visit to jetty and TPI of Riung, January 8 2012 (Peter Mous, Budi Sasongko)
18. Interview with trader Ramli, Riung, January 8 2012 (Peter Mous, Budi Sasongko).
19. Interview with fisher / collector Hadi, January 8 2012 (Peter Mous, Budi Sasongko)
19. Interview with fishers on the beach of Aimere, desa Legeladu, January 9 2012 (Peter Mous, Budi Sasongko).

## **ANNEX 2: CONTACT DETAILS**

Mr. Joseph Tala, DKP official ("pengawas" or patroller) based at TPI Labuan Bajo, 0821-45739899

Mr. Mengayung, DKP West Manggarai, 082194571025

Mr Nados Odem, DKP West Manggarai, 085333645247

Mr Yos, DKP West Manggarai, 082145739899

Mr Sebastian, head of DKP Manggarai Barat, 0813390265147

Ibu Asma, fish trader in Labuan Bajo, 081353939819

Mr Paulus Lali, government kecamatan Riung, kabupaten Ngada, ndunglali@yahoo.com

Mr Duking, Riung fisherman, 081353863922