Jurnal Perikanan (*J. Fish. Sci.*) IX (2): 267-273 ISSN: 0853-6384 267

Full Paper

AN EXPERIMENTAL FISHING OPERATION OF COLLAPSIBLE TRAP FOR CAPTURE OF CORAL FISH

UJI COBA PENGOPERASIAN BUBU LIPAT UNTUK PENANGKAPAN IKAN KARANG

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Abstract

The aim of this research was to know the effectiveness of the trap which was modified and redesigned from its original. The research was conducted in the water of Baa, Rotendao district, East Nusa Tenggara Province. The trap was operated for 3 months started from August to November 2004 by using three types of baits. Fishes were collected from the trap every 2-3 days immersion by pulling up the trap on board. There were 69 individuals fishes in one trap representing 11 families and 15 species. Most fish species were highly economic values and was dominated by snappers (Lutjanidae) and groupers (Serranidae). The fish size were ranging from 17 to 29 cm of tolat lenght (TL). There was no significant difference between bait used on the catch (p>0.05) suggesting that bait may not be required anymore on this specific reef fishing methods. It is realized that further studies may be required, however in the mean time, this gear may provide an alternative method for small scale reef fishing.

Key words: bait, collapsible fish trap, reef fishing method

Introduction

It has been known that numbers of fishing techniques have direct effect on coral reef habitat (Jennings & Lock, 1996) and according to Munro (1987), trap was one of them. In Komodo National Park, three main destructive fishing methods were identified namely bomb, cyanide and the use of traditional traps (Mosse *et al.,* 2005). Although they have raised this concern, they did not specifically provide further details of the effect on reef habitats. Previously, trap was often operated in shallow water and across to reef habitat. Recently, this practice has changed drastically to deeper water after additional equipments were used and operation method were developed including the use of canoe or boats to carry the traps. In addition, bad practice seems to be remained undergo as fisherman always using coral reef by putting on top of the trap as an additional weight and attractor. Fisherman also often argued that the use of extra rock, especially coral reef, would help to accelerate the catch because coral reef acts as camouflage. As the use traps increased, coral reef habitats have experienced more significant destruction (Munro, 1987).

Studies on fish trap practices have developed in many places to get better practice and environmentally sound. Numbers of studies showed that fish trap gave significant contribution on fish catch especially when operating in more heterogeneous habitats including rocks, coral reefs and mangroves areas (Ferry & Kohler, 1987; Sainbury, 1988; Davies, *et al.*, 1989; Sheaves, 1996).

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Given such varieties of environments, studies have been done in order to increase its effectiveness as well as to minimize its negative impact on habitats. Studies on fish trap were done by modifying the shape, size and material used. This was considered as an era for collapsible trap following experiments undertaken in the North Australian water to catch demersal fish including snappers or Lutjanids (Bryce, pers com, 1993). In Indonesian waters, this type of fish trap has been also experimented since 1995 until 2003 including in Ambon Bay and in Lembata water, East Flores, NTT (Martasuganda, 2003). Martasuganda (2003) explained various models of fish traps, however materials used in this model consist of aluminum or iron, which in fact has high cost and consequently unaffordable by traditional fisherman. Therefore, information on collapsible fish trap remains sparse although it has number of advantage including the effectiveness, more practical use and easy to operate especially for traditional fisherman. This study was conducted to further examine the model of fish trap which cheaper, useable, more effective and environmentally friendly.

Materials and Methods

Material used and design

This study was undertaken in three consecutive months started from August until November 2004 in the water of Baa, sub district of Lobalain, District of Rote Ndao, East Nusa Tenggara. The area lies in the north part of Rote Island at the position between 11^0S and 123^0E (Fig.1). Materials used in this experiment to construct the fish trap were consist of PVC pipe, waring net, nylon string, nylon rope, nylon net, rattan and bike tube. The size was 100 x 40 x 60 cm and the design can be seen in Fig. 2, while Table 1 showed the details of its specifications.

Fishing technique and data collection

Due to its experimental nature, number of fish trap deployed was only one which was set out in the reef flat area between 500-1000 m from the shore and at 10 m depth. Time of setting was 2-3 days using three kinds of baits which were flying fish, freshwater prawn and clam meets. Application of these baits was aimed to assess effectiveness of the unit.

Fish caught were identified following to Allen & Swainston (1988) and Randall

Table 1. Specification of the collapsible trap used in this study

Part of the trap	Materials	Sizes
Main body	Waring net	∅ 1 cm
		Length 3 m
Frame	PVC pipe	∅ 0.5”
		Length 8 m
	Knee	8 peaces
Joint body	Rubber from bike tube	Length 0.5 m
Rope	Nylon	No. 9
		∅ 2 mm
		Length 5 m
Mouth part	Rattan	∅ 1 cm
		Length 2 m
	Nylon net	Mesh. 0.25”
		Length 1 m

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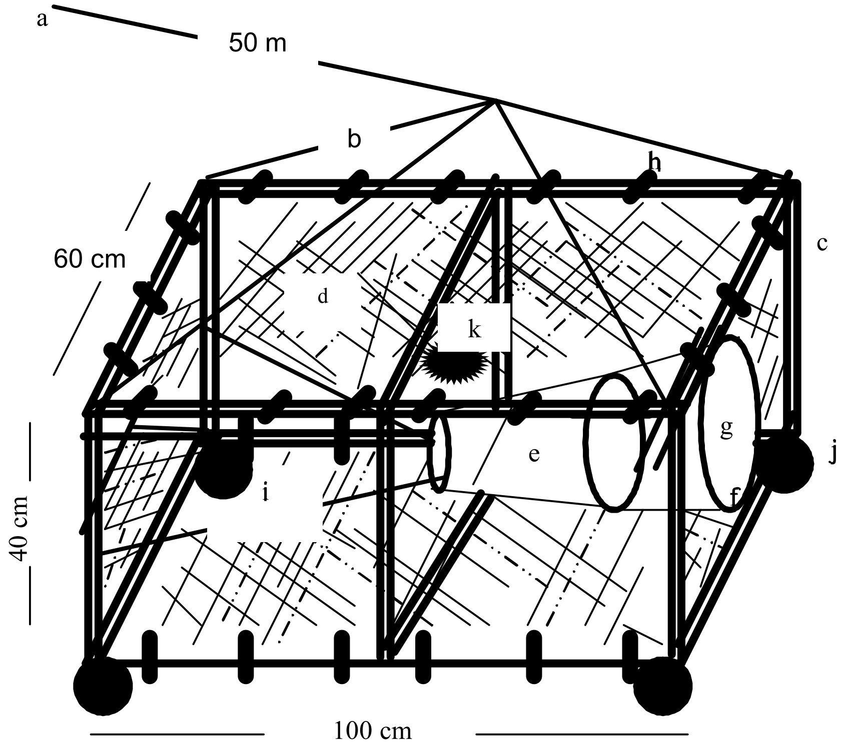
et al., (1999). Due to limited data, the actual catch for each bait was not used in the analysis therefore ranking system of the catch number was used. Fish data was ranked from the lowest to the highest number and tested between two kinds of bait using the Mann-Whitney U-test (Zar, 1984).

Result and Discussion

Construction

The construction of this trap was very simple. The following features should be taken into account like its smaller size, box shape with one entry door and collapsible. All these were represent the advantageous aspect when comparing to traditional ones. This collapsible feature was enable the trap to be easily transported into to the field as well as when setting up into between coral. Materials for construction were derived also from used material which was consequently cheaper than the new ones. This suggest that the type of trap was affordable and could be easily made. Fisherman could also modify the shape and form as they like as Z-shape, S-shape, arrowhead, cylinder as well as other shapes to suit their operation target. For comparison, Dalzel & Aini (1992) reported that number of fish caught by S-type shape range between 1-5 fish per trip and arrowhead type between 0-6 fish per trip. Collapsible trap on the other hand was appeared to give better result as 4-9 fish per trip.



Legend:
a. Floating line
b. Tighter
c. PVC pipe
d. Waring net
e. Nylon net for mouth
f. Ring of mouth
g. Mouth
h. Joiner (made of bike tube)
i. Line controller for the mouth
j. Weight
k. Bait

Figure 1. Construction of collapsible trap and its material used

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Another advantage was mesh size of the nets used for this trap. In fact, the use of waring net material of smaller mesh size as 1 cm could provide better catch of reef fish because it was relatively more selective in terms of size and diversity of species. Total number of fish caught during this study was 69 comprising of 11 families and 15 species and the size was ranged between 17-29 cm total length (TL) (Table 2). It might be argued that one side of mouth trap construction and the directing way of mouth toward to coral wholes and ledges was believed contributing to the selective performance of this gear. In comparison, there have been other studies using large mesh of the trap body which tended to be none selective both in size and species. Matrutty *et al*. (2005) reported that off her 9 fishing trips using traditional traps in the water of Pulau Tiga (Three Islands) west of Ambon Island, 679 fish species of reef were caught. Another study by Dalzel & Aini (1992) also showed that traditional trap with S-type and arrowhead type were in fact caught as much as 117-175 species. Mesh size of the net used in their studies were 5 and 6.5 cm. This suggest that selectivity level of this type of gears relatively small as many species will be caught inside. On the other hand, Sheaves (1996) has shown that trap with zigzag formation with mesh size of 11.4 cm only caught 19 species. The above results should lead to a conclusion that mesh size over the body of trap also determine selectivity level of catch. As wider and larger mesh would allow more and diverse fish species to enter and eventually get trapped inside.

Monintja *et al.* (2002) pointed out that selectivity level in terms of species could be used as an important indicator to assess whether the gear was environmentally friendly or not. It is argued that high number of species entering the trap also tends to have low economical value. Hutubessy (2005) also argued that trapping small size of fish would cause significant failure on recruitment processes. Thus, it was concluded that this negative impact should be minimized by applying small mesh size to prevent small fish to enter the trap.

Table 2. Total catch according to species based on the type of bait used

No	Fish		Bait		
			Fish	Prawn	Snail
1	*Lutjanus carponotatus*	Stripey seaperch	4	0	7
2	*L. timorensis*	Red snapper	2	0	1
3	*L. ruselli*	Moses perch	1	4	1
4	*Pristipomoides typus*	Shrap-toothed snapper	0	7	0
5	*Cephalopholis sexmaculata*	Sixspot rockcod	5	2	1
6	*Epinephelus corallicola*	Coral rockcod	2	4	4
7	*Lethrinus miniatus*	Sweetlip emperor	7	0	0
8	*Siganus canaliculatus*	Rabbitfish	2	0	0
9	*Terapon jarbua*	Crescent perch	2	0	0
10	*Ctenochaetus strigosus*	Surgeonfish	0	3	0
11	*Parupeneus indicus*	Indian goatfish	0	1	0
12	*Parupenues* sp.	Goatfish	0	1	0
13	*Sargocentron rubrum*	Squirrelfish	0	0	2
14	*Chaetodon auriga*	Butterflyfish	0	0	1
15	*Scarus rivulatus*	Parrotfish	0	0	5
	T O T A L		25	22	22

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Catch rates

Of the 9 fishing trips, 69 fish were caught representing 11 families and 15 species of reef fish. Generally the catches were dominated by snappers (Lutjanids) and groupers or Kerapu (Serranids) (Table 2). These two groups have very high economic value both at local and international markets. There was only 1 species of ornamental fish (*Chaetodon auriga*) while the rest having consumptive value. Randall *et al*. (1997) pointed out that this species feeds on reef polyp and therefore it was often being used as an indicator to assess reef healthy (Reese, 1981; Robert *et al.*, 1988). This fact may therefore have twofold implications which reflect both good health condition of coral reef in the study area and better selectivity of the unit towards its target.

Table 3 show that the fish size were varies between 10-29 cm. Groupers ranged between 19.9-27.0 cm TL and for the Snappers ranged between 17.2-27.0 cm TL. It was argued that data on reproductive cycles for fish caught during this study was unavailable. However comparison could still be made using their closed relatives including *Lutjanus carponotatus, L. timorensis*, *L. ruselli* and *L. vita* that were reached maximum size of 40-45 cm TL (Davis & West, 1992) and *Cephalopholis cyanostigma* (Mosse, 2001) and *Epinephelus faciatus* that was attained 30-32 cm TL. It was therefore the above sizes of fish were within reasonable range because snappers (*L. vita*) were generally reproduce for the first time at the size of 14 cm TL (*L. vita*) (Davis & West, 1993). Groupers of this group, on the other hand, were reproduce for the first time at the size between 11.6-21 cm TL (Ferry & Kohler, 1987; Bohnsack *et al.*, 1989; Sparre *et al.*, 1989; Mosse, 2001). It appears that snappers and groupers fall within the save range of size. Further study was remain critical in order to assess the affect of this collapsible trap on the reproductive aspects of other species as well.

Baits

The use of baits during this experimental fishing was aimed not just to shorten the immersion period of the unit but also to get picture on the baits effectiveness. It has been known that bait was used to attract fish entering the unit via the smell released. This study found that 7 fishes entered the trap after 2-3 days immersion period. Sheaves (1996) also used Z type of trap with bait (sardine) and found that he only needs 3 days to reach maximum catch. After 5 days however there was

Table 3. Length and weight distribution of fish caught during this study

No	Species	Length (cm)	Weight(kg)
1	*Lutjanus carponotatus*	17.2-21.3	0.95-1.12
2	*L. timorensis*	20.0-29.0	1.00-1.80
3	*L. ruselli*	17.9-20.3	0.75-1.30
4	*Pristipomoides typus*	22.0-25.1	0.57-0.65
5	*Cephalopholis sexmaculata*	23.0-27.0	1.25-1.90
6	*Epinephelus corallicola*	19.9-24.0	1.00-1.50
7	*Lethrinus miniata*	19.0-29.3	0.90-1.50
8	*Siganus canaliculatus*	16.0	0.75
9	*Terapon jarbua*	15.3	0.80-0.83
10	*Ctenochaetus strigosus*	10.4-11.1	0.50-0.75
11	*Parupeneus indicus*	24.1	0.50
12	*Parupenues sp*	24.1	0.75
13	*Sargocentron rubrum*	15.2	0.90
14	*Chaetodon auriga*	10.0	0.40
15	*Scarus rivulatus*	19.3-20.1	0.65

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no significant increase occurred. Similar experiment which was done without baits, however, require slightly longer periods than between 3-5 days. In case of traditional fish trap which was without bait, Martasuganda (2003) reported that 7 to 10 days immersion period was needed. On the other hand, Dalzel & Aini (1992) reported that within 2 to 5 days immersion time catch was increased but after 5 days no significant change on catch was noted.

It was also found that of the baits type, sardine represent 37% of the total catch slightly higher than the other two baits which was 30% and 33% for freshwater prawn and clams, respectively. Mann-Whitney U-test showed that there was no significant difference (p>0.05) between baits used during the study (Table 4). There were several species that also present in the catch like parrotfish, rabitfish, sturgeonfish and grunter. However, these are herbivorous species (feeds on fined detrital and algal) suggesting that their presence in the catch may not necessarily due to the attraction of baits. In addition, this also means that bait treatment did not show its significant effect in terms of total catch as well as species varieties. Apart from the above facts, however, it was argued that introduction of this fishing unit may provide another alternative for traditional fishermen. This is critical not just in the area of cost but also in the aspect of protecting the environment. And in order to achieve these expectation, further studies are required to improve its performance as well as other related aspects covering wide range of applications.

Table 4. Mann-Whitney U-test on catch of the collapsible trap with different baits treatment.

Baits	U-test	$U_{0.05,3,3}$	P
Fish vs Prawns	6	9	0.05
Prawns vs Clams	8	9	0.05
Fish vs Clams	6	9	0.05

References

Bohnsack, J.A. 1996. Maintenance and recovery of reef fishery productivity. *In*: Reef fisheries. Polunin and Roberts (Eds.). Chapmen and Hall. New York. 283-314.

Dalzell, P. and J.W. Aini. 1992.The performance of antillean wire mesh fish traps set on coral reefs in Northern Papua New Guinea. Asian Fish. Sci. 5: 89-102.

Davis, T.L.O and G.J. West. 1992. Growth and mortality of *Lutjanus vittus* (Quoy and Gaimard) from the North West Shelf of Australia. Fish.Bull. US. 90: 395-404.

Davis, T.L.O and G.J. West. 1993. Maturation, reproductive seasonality, fecundity and spawning in *Lutjanus vittus* (Quoy and G *Lutjanus vittus* (Quoy and gaimard) from the North West Shelf of Australia. Fish.Bull. US 91: 224-36 aimard) from the North West Shelf of Australia. Fish.Bull. US 91: 224-36.

Davies, C.R., B.D. Mapstone, A. Ayling, D.C. Lou, A. Punt, G.R. Russ, M.A. Samoilys, A.D.M. Smith, D.J. Welch, and Mc.B Williams. 1989. Effects of line fishing experiment 1995-1997. Project structure and operations. CRC Reef Res.Cent.Tech.Rep: 29.

Ferry, R.E. and C.C. Kohler. 1987. Effects of trap fishing on fish population inhabiting a fringing coral reef. North Ame. J. Fish. Man. 7: 580-588.

Hutubessy, B.G. 2005. Effect of fishing on recruitment of reef fishes. A case from Kupang Bay, NTT. Internasional Workshop of Eco-friendly Coral Reef Fishery. 17–19 March 2005. Ambon: 26.

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Matrutty, D.D.P., S. Siahainenia, and A. Tupamahu. 2005. Fishing technology with portable trap bubu in coral reef area of Pulau Tiga, Western Ambon Island. International workshop of Eco-Friendly Coral Reef Fishery. Ambon. 22 p.

Monintja, D., S. Marjani, dan Sarminto. 2002. Metode seleksi teknologi penangkapan ikan yang ramah lingkungan dan berkelanjutan di kawasan terumbu karang. Prosiding Konferensi Nasional III 2002. Pengelolaan Sumberdaya Pesisir dan Laut Indonesia. Bali.1-14.

Mosse, J.W. 2001. Population biology of *Cephalopholis cyanostigma* (Serranidae) of the Great Barrier reef. Australia. PhD. Thesis. James Cook University of North Queensland. Australia. 275 p.

Mosse, J.W, H. Widodo, and A. Rais, 2005. Comodo progress report of the nature concervancy. 98 p.

Randal, J.E., G.R. Allen, and R.C. Steene. 1997.The complete divers' and fishermen's guide to fishes of the great barrier reef and coral sea. Revised and expanded edition. Crawford house publishing. Bathurst. 201 p.

Reese, E.S. 1981. Predation on corals of the family Chaetodontidae: implication for conservation management of coral reef ecosystems. Bull.Mar.Sci. 31: 594-604.

Roberts, C.M., R.F.G. Ormond, and A.R.D. Shepherd. 1988. The usefulness of butterflyfishes as environmental indicators on coral reefs. Proc. 6th Int. Coral Reef Symp. 2: 331-336.

Sainbury, K.J. 1988. The ecological bassis of multispecies fisheries, and management of a demersal fishery in tropical Australia. *In*: Fish population dynamics. J.A. Gulland (Ed.). Wiley, London. 349-382.

Sheaves, M.J. 1996. Habitat-specific distributions of some fishes in a tropical estuary. Mar.Frshwater Res. 47: 827-830.

Sparre, P. and S.C. Venema. 1992. Introduction to tropical fish stock assessment. Part I – Manual. FAO Fisheries Technical Paper 306/1: 126-40.

Zar, J.H. 1984. Biostatistical analysis. Prentice-Hall Int. Editories. New Jersey. 718 p.

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