Component 4 Social

The overview and the actual state of fisheries around the Batan Estuary, Aklan, Central Philippines

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▶ Keywords: multi-species, multi-gear, small-scale fisheries, fishing gear classification, Philippines

1. Introduction

Southeast Asia is gaining importance in the world fish supply. Indeed, Southeast Asia accounts for 19% of world fisheries and aquaculture production in 2009, although the percentage was only 9% in 2000. To manage and sustain these rich resources, it is necessary to understand human society and economy which utilize them. However, socio-economic studies on fisheries in Southeast Asia have not been accumulated enough. This is consider to be a problem under the situation where fishery resources in the area tend to be depleted, which are often caused by overfishing (Stobutzki et al, 2006).

This study explores socio-economic status of fisheries around the Batan Estuary, Aklan, Central Philippines. First, we overview fisheries in the Philippines and the Batan Estuary based on previous studies and statistics. Then, we clarify the actual state of fisheries in the area by analyzing data obtained by household survey in selected coastal villages.

2. Overview of fisheries in the Philippines and the Batan Estuary

Coastal ecosystems in the tropical area have very high biodiversity, and Southeast Asia has the highest biodiversity among them (Tittensor et al, 2010). Because of this ecological background, fishers can catch various species of fishes, and fishing gears used by them also have much variety. Therefore, fisheries in Southeast Asia are characterized as multi-species and multi-gear (SEAFDEC, 2003). These fisheries are mainly operated by small-scale fishers. It is estimated that, in developing countries, the small-scale fisheries account for 93 % of fishing population, and for 56% of fishery production (Mills et al, 2011). In Indonesia and Thailand, small-scale fisheries account for 90% and 79% of total number of fishing vessels respectively (Stobutzki et al, 2006). In Malaysia and Vietnam, small-scale fisheries accounts for 29% and 63% of domestic fishery production respectively (Stobutzki et al, 2006). Thus, another characteristic of Southeast Asian fisheries is small-scale.

The coastal waters in the Philippines have mangrove forests and coral reefs (Giesen et al, 2007), and they have the highest biodiversity in the world (Carpenter and Springer, 2005). In the case of the Malalison island, it is reported that reef fishers used various types of fishing gears including gill nets, hook and line, spear gun, and scoop net (Amar et al, 1996). Small-scale fisheries (municipal fisheries) account for 98.8% of fishing population in the Philippines and for 56% of the volume of annual fishery production. Thus, Philippine fisheries are considered as typical cases of multi-species, multi-gear, small-scale fisheries.

Among 17 Regions (wide administrative division) in the Philippines, Region VI (Western Visayas) had the highest small-scale fisheries production in value terms in 2011, according to the national fisheries profile. Our study site, the Batan Estuary, is located at the northern coast of the Panay Island in Region VI. The coastline of the Batan Estuary is shared by three municipalities including New Washington, Batan,

and Altavas. According to the municipal fisheries profile 2012, total population of three municipalities was 101,382, and 80% of them lived in coastal villages. Almost 5,000 people worked in fishery related industries like fisheries, aquaculture, trading and processing. Small-scale fishers accounted for 43.5% of them while fish farmers and commercial fishers accounted for 39.3% and 13.3% respectively. Small-scale fisheries in three municipalities produced 3,248t in 2012 while commercial fisheries produced only 1,812t which was from New Washington only. Thus, fisheries industries are important in the communities around the Batan Estuary, and small-scale fisheries are the most important among them.

According to Municipal fisheries profile 2012 fishers around the Batan Estuary used more than 10 types of fishing gears including fish corral, gillnet, long line, crab lift net, spear gun, stationary lift net, crab pot, hand line, fish pot, filter net, beach seine, drag net, push net, drive-in gill net, and fish barricade. It was reported that 463 species were caught by these fishing gear (Babaran et al, 2000). Therefore, the coastal area of the Batan Estuary is considered to be a typical case of multi-species, multi-gear, small-scale fisheries.

3. Actual state of fisheries around the Batan Estuary

It is said that more than hundred of languages are spoken in the Philippines. Fishing gears often have several different local names, and it sometimes causes difficulty in figuring out the actual state of fisheries. For example, Umali (1950) reported that "the same gear was charged different rates due to overlapping of dialect or local names, and many fishermen were sometimes unjustly penalized because of the absence of a standard classification." We gathered data for this study by household interview surveys where respondents usually answered in the local language. It is highly possible that the same fishing gear was answered in different local names. Therefore, it is necessary to group fishing gears not only by using their local names but also by another way.

The purpose of this study is to clarify the actual state of fisheries around the Batan Estuary based on data obtained by household survey. In the process, we grouped fishing gears in the answers based on the similarity of target fish species because we considered if there are two fishing gears which has different local names but catch same target species, they may be the same type of fishing gear.

3.1 Methods

3.1.1 Data

The household survey was performed in the 11 fishing villages around the Batan Estuary, from Aug. 24 to Nov. 3, 2012. Respondents (n = 467) were randomly chosen from all fishing households in each village (1,142 households in total). In Altavas, we interviewed with all fishing household since the total number in the town was not many. Data collectors, who can speak local language and had trained by researchers for two days, performed interviews with the structured questionnaire prepared for this study. The questions included types of fishing gears, the locations of fishing ground, target fish species, number of fishing days, the volume of catch and the amount of income from the catch.

3.1.2 Analysis

To group fishing gears, we conducted hierarchical cluster analysis based on the similarity of target species. The similarity was defined by the probability of appearance P_{ij} of species i in fishing gear j, which was calculated by the formula, $P_{ij} = f_{ij} / g_j$. Here, g_j refer to the number of households who owned gear j, and f_{ij} refer to the number of households who catch species i by gear j. P_{ij} was calculated for all fishing gears (n = 61) and fish (n = 64) appeared in answers. Then, hierarchical cluster analysis was performed using Squared Euclidean distances and Ward's method.

This cluster analysis was considered to have a limitation because it cannot distinguish fishing gears whose target fish are similar but whose structures and/or fishing methods are totally different. Therefore, we also performed interviews with fisheries technicians in Local Government Units and experts in local

universities to get English names for all fishing gear. The English names were considered to reflect the structure of fishing gear or the method of using it. Therefore, by comparing with the information on English name, we validated the results of the cluster analysis and finalized the grouping of fishing gears. We considered fishing gears can be grouped when they were in the same cluster and also had same English name, meaning they have the same structure/ fishing method and target same fish. Using this finalized grouping, we aggregated the data on fishing vessels, fishing ground, its operation and production.

3.2 Results

Figure 1 shows the result of the hierarchical cluster analysis. The differences between groups were clearest when clusters were cut at the distance of 10 (Figure 1). For example, the cluster A included ignat, panaboy, pangilanga, taboy and ugnat, whose main target was gobies. Also their English names were "drive-in gill net for goby" according to local technicians. In a similar way, the cluster B mainly included scoop nets whose main target was acetes. Although other clusters were composed of various types of gears, cluster C, D, F, G and H had specific target fish including mud crab, anchovy, mackerel or herring, and shrimp respectively. The cluster E was composed of gears which didn't have similarity to others. Sixty one fishing gears were grouped into 37 groups by finalizing the grouping. It was clarified the fish corrals targeting shrimp was operated by 217 households (46%) and it was the biggest majority. Table 1 shows the actual state of 10 major fishing gear groups. This table clearly shows the difference of characteristics between groups. For example, the average fishing days of the fish corral for shrimp and the lift net for anchovy were more than 300 days in a year while the average fishing days of long line and crab lift net were around 150 days in a year.

4. Discussion and conclusion

We succeeded to group 61 local names of fishing gears into 37 groups. This grouping successfully showed the difference between fishing gears. One example was the difference in fishing days in a year and this result indicated there was a fishing gear which was operated during a whole year while another was operated seasonally for only half of a year. These results can be utilized by researchers and managers to avoid such confusions as Umali (1950) had reported. The future analysis will include the comparison of income from the catch between fishing gear groups. With regard to the gears operated seasonally, it will be important to clarify how they earn income during off season of the fisheries.

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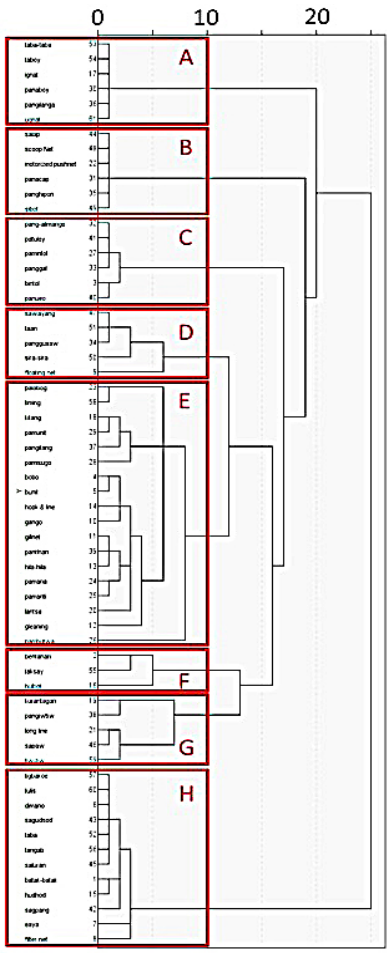

Figure 1.
The result of the hierarchical cluster analysis (Euclidean distance, Ward's method).
The red boxes indicate clusters cut at the distance of 10.

Table 1. Types of fishing vessel and fishing ground, average daily catch and average fishing days in a year of top 10 major fishing gear group around the Batan Estuary

Cluster	English name	Target fish	No. of Households	Fishing vessel	Fishing ground	Average daily catch (kg/day)	Average fishing days in a year (days/year)
H	Fish corral	Shrimp	217	Non-motorized	Rivers/Bays	4.22	308.7
E	Gill net	Not specified	62	Non-motorized	Rivers/Bays/ Open sea	6.30	230.5
A	Drive-in net	Goby	54	No vessel/ Non-motorized	Rivers	6.94	254.6
H	Push net	Shrimp	39	Non-motorized/ Motorized	Rivers	5.00	225.5
E	Long line	Not specified	27	Non-motorized	Rivers/Bays/ Open sea	4.94	140.9
C	Crab lift net	Mangrove crab	26	Non-motorized/ Motorized	Rivers/Bays	3.96	168.7
E	Hook and line	Not specified	25	Non-motorized/ Motorized	Rivers/Bays/ Open sea	7.92	221.0
B	Scoop net	Acetes	25	Non-motorized	Rivers	11.90	215.8
F	Lift net	Anchovy	23	Motorized	Bays	8.67	325.7
E	Crab pot	Swimming crab	20	Non-motorized	Rivers/Bays/ Open sea	7.23	242.8