

# Fish assemblages on coral reefs of Karimun Jawa Islands, Central Java, Indonesia

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**Abstract**—A visual census of reef fish at 56 sites along reefs at Karimun Jawa Islands was carried out to describe abundance and diversity of fishes. A total of 9946 fish individuals were recorded. They belonged to 196 species from 29 families. Of these fishes, 102 species were major fishes, 74 species were target fishes and 20 species were recorded as an indicator fishes. The 10 numerically dominant species of target fishes accounted for 53.33%. Of these fishes, Scaridae is the most dominant family. Unlike other places in Java waters, butterfly fishes as an indicator fishes was abundant in terms of number of species. The remaining dominant species were made up of major species commonly associated with coral reef habitat.

**Key words:** coral reef fishes, major fishes, target fishes, indicator fishes

## Introduction

Karimun Jawa Islands are comprised of an archipelago of around 27 small islets, of which Karimun Jawa is the largest. The islands are located on approximately 90 km north of Semarang, Capital City of Central Java. Of those islets, only seven are inhabited. Most of the islands are surrounded by sandy beaches and fringing coral reefs. The vegetation consists mainly of mangroves and beach forests. The islands have been designated as a Marine Nature Reserve. The archipelago has considerable potential for tourism as well as for scientific research.

The rich fish fauna of the archipelago includes many edible species and a great variety of ornamental fishes. Therefore fish resources become very important and main income beside renting houses for tourists in week ends. However, there is still lack of data and information of how much the potential of fish resources is. This information is needed to be used for evaluation, concerning disturbances of marine resources by dynamite fishing and other illegal fishing.

The aim of the study is to understand the diversity and abundance of coral reef fishes in the islands. The result is expected to be useful for local government to manage the sustainability of their fishery resources and coral reefs in general.

## Materials and Methods

To understand the general view of fish diversity, Rapid

Resources Assessment (RRA) was applied. There were 7 study areas, namely Menyawakan Islet., Cemara Besar Islet., Cemara Kecil Islet., Karimun Islet., Gelean Islet., Menjangan Besar Islet., and Menjangan Kecil Islet (Fig. 1).

Reef fishes were mainly recorded through sighting during census at various sites at reefs in the Karimun Jawa Islands. Divers swam for 5 minutes and recorded all the species and number of fishes seen within 2 m distance at either side of the divers. The research sites were recorded using Global Positioning System (GPS).

To assess the reef fishes in this study, the assessment is divided into 3 categories (ASEAN-Australia Marine Science Project: Living Coastal Resources 1994).

1. Major fishes are defined as group of fishes which generally easy to find and easy to quickly assess the richness at particular coral reefs such as pomacentrids, labrids and other species that are visually obvious. Counting is done semi-quantitatively of relative abundance.
2. Target fishes are defined as fishes favoured 'targets' of fishermen (e.g. serranids, acanthurids, siganids, lutjanids, lethrinids, haemulids, scarids).
3. Indicator fishes are those fishes useful as indicator species for coral reef health (e.g. chaetodontids)

## Results and Discussion

Overall, there are 9946 individuals of reef fishes being classified into 196 species belonging to 29 families from 56 stations. From these, 103 species of 12 families belong to

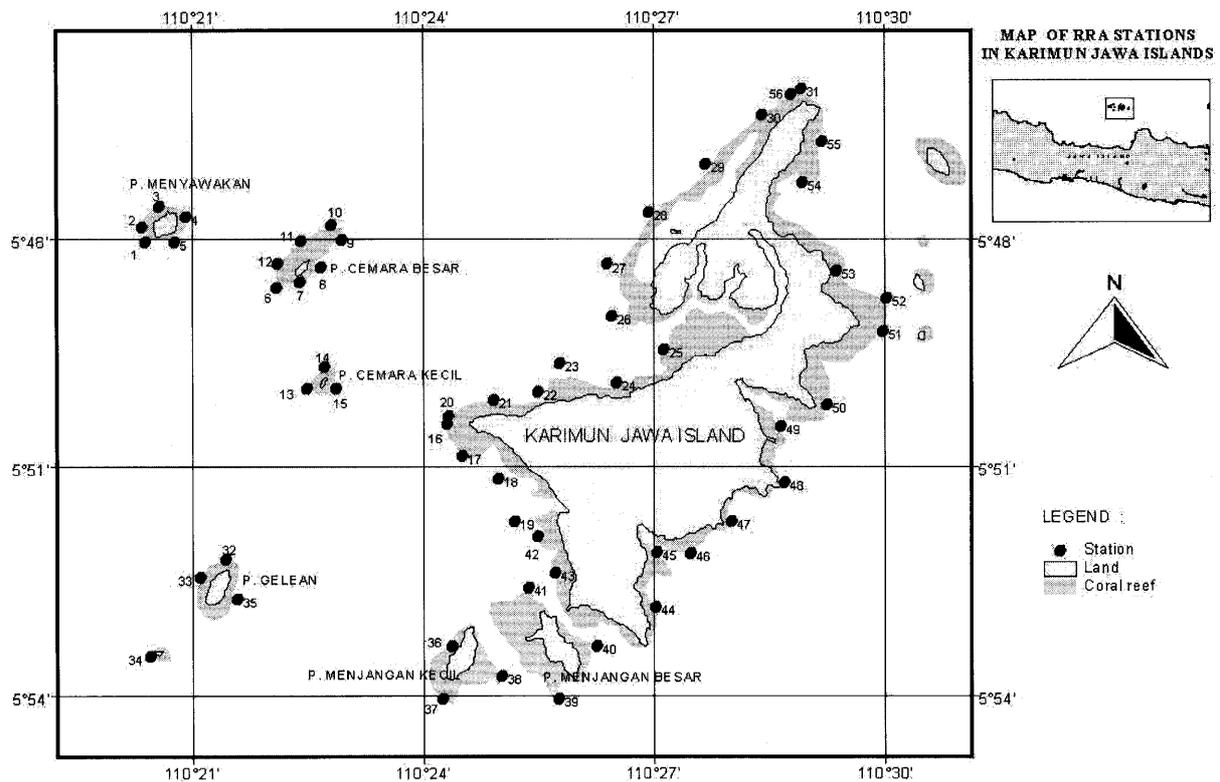


Fig. 1. Map showing study sites of Rapid Reef Assessment in Karimun Jawa Islands, Central Java.

Table 1. Species richness and abundance of reef fishes in Karimun Jawa Islands, Central Java.

Fish category	Number of families	Number of species	Number of individuals
Major fishes	12	103	6811
Target fishes	16	73	2554
Indicator fishes	1	20	581

major fishes, 73 species of 16 families belong to target fish and 20 species of 1 family comprised of belong to indicator fishes (Table 1). General view of the results can be seen in Fig. 2.

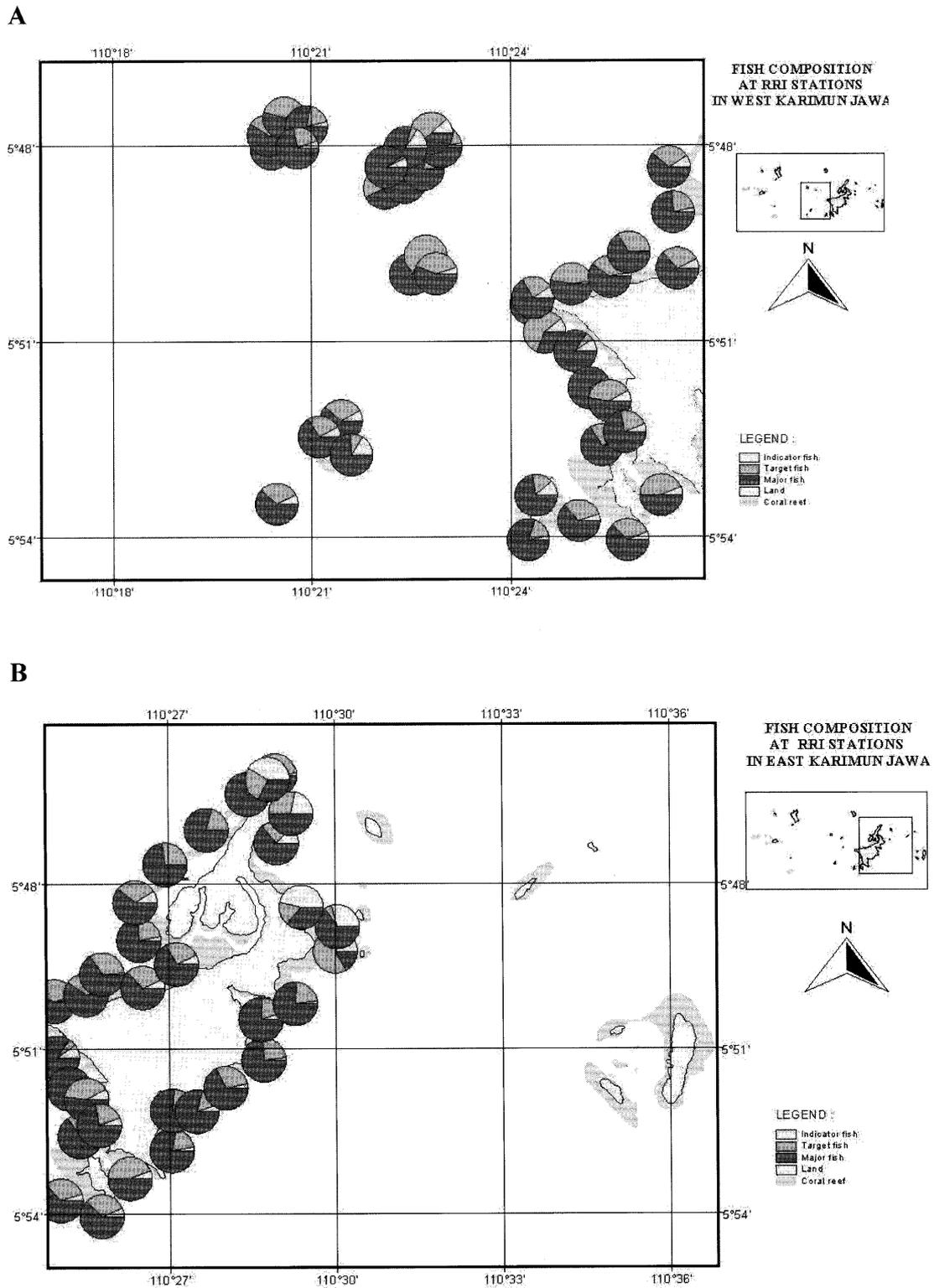
In Karimun Jawa waters, fish abundance of target fishes occupied 25.7% of the whole fish recorded, and *Scarus ghobban* was the most abundant, accounting for 11.7%.

Diversities among coral reef fishes of target/commercial and non-commercial families differed. In general, number of families mostly higher in major fishes than target fishes. In this study it was found that around 55.2% (16 families) of all families recorded belonged to target fishes. Among these families, the 10 predominant target fishes accounted for 37.5%. Distribution and abundance of 10 most dominant target fishes can be seen in Fig. 3. Indicator fishes being classified into 1 family constitute only 5.8% of the whole fishes recorded. Figure 4 shows the distribution and abundance of chaetodontids in Karimun Jawa waters.

In this study it was found that in a habitat where coral cover was high and uniform, the diversity of fish was not as high as at intermediate coral cover, and in a habitat where coral cover is not too high but the variety of coral species is high, species richness of reef fishes is high. It can be seen in Menjangan Kecil Islet where the coral cover is the highest among 7 locations, but mostly dominated by *Acropora*, the diversity of fishes is not high. This finding confirms the statement of Jones and Syms (1995) which found that at intermediate coral cover, coral substratum complexity is greater than at uniform coral cover. From the observation during the study it was found that habitat complexity supported a range of coral and non-coral patch type made up of a variety of coral species. As we all know, reef fish communities contain a variety of species; some are specialized to exploit live coral habitats, others focusing predominantly on dead coral substratum and the rest are associated with intermediate coral cover.

The increasing number of fish families in the target groups, is due to among others to the declining number of target fishes which is evidenced from the increasing difficulty to catch target fishes. Thus, the decline of target groups have shifted some species/families which previously under major group category into target groups, despite the fact that they are economically of minor importance.

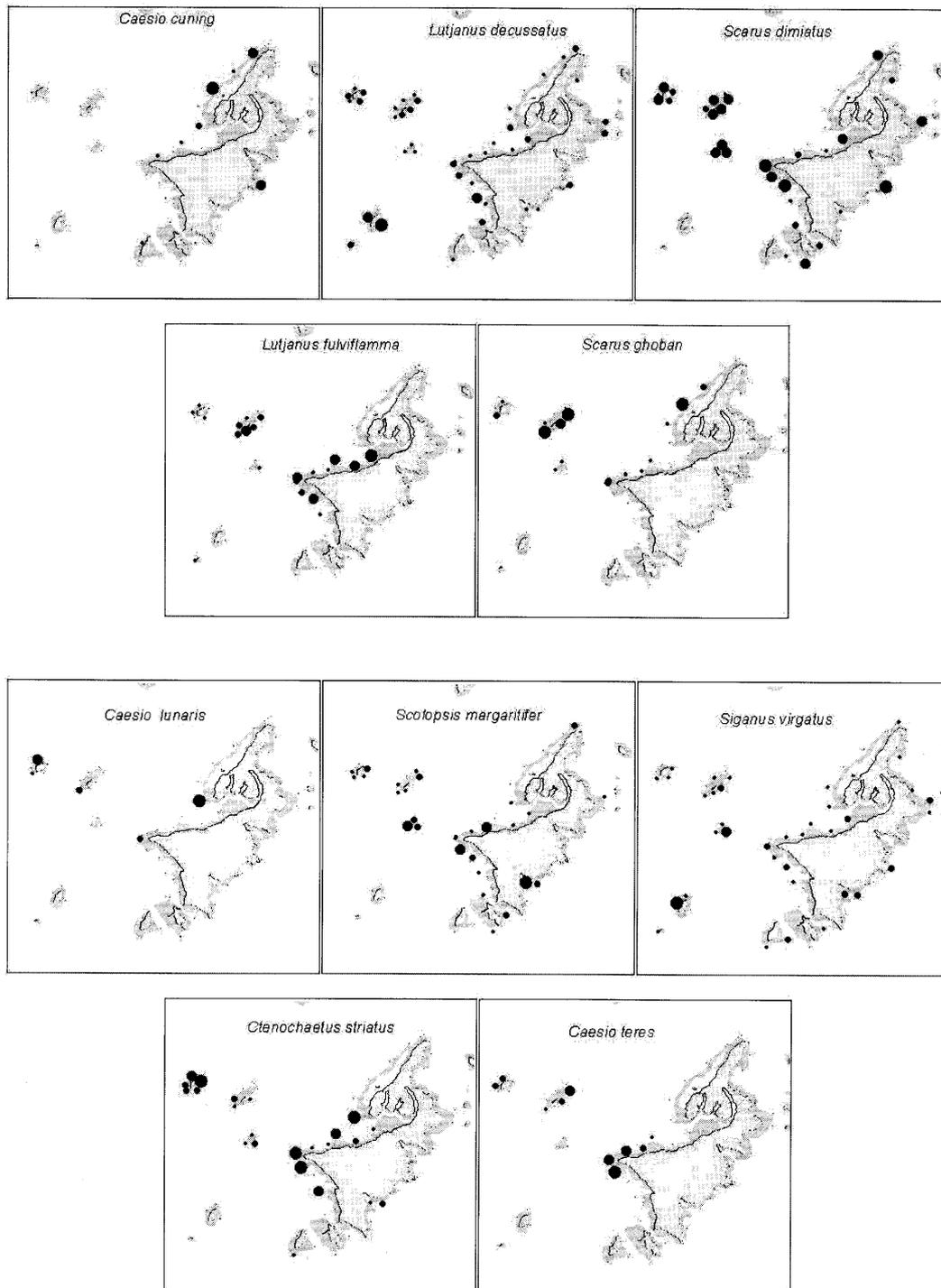
Many studies on butterfly fishes as an indicator fishes found that diversity and abundance of chaetodontid fishes increases with the increase of coral cover (Bell and Galzin



**Fig. 2.** Pie chart of reef fish visual census result on reefs at Karimun Jawa Islands using Rapid Reef Assessment method (A, West Karimun Jawa Is.; B, East Karimun Jawa Is.)

1984, Hutomo and Adrim 1985, Bouchon-Navaro and Bouchon 1989). On the other hand, Roberts et al. (1988) and Cox (1994) mentioned that there is a little or no correlation between them. It is difficult to show which hypothesis is correct

since results could be different due to spatial and temporal scale of sampling, and/or the range of coral cover and topographic complexity examined and many other factors. Compared to other studies in Java waters, chaetodontid fishes



**Fig. 3.** Distribution and abundance of 10 most dominant target fishes on reefs at Karimun Jawa Islands.

found in Karimun Jawa waters are considered high in number of species. Adrim et al. (1991) recorded 19 species in 5 genera of butterfly fishes in Jakarta Bay. In contrast, Suharsono et al. (1998) found only 9 species in Jakarta Bay where coral cover was decreased about 10% than that in 1991. However, Hutomo et al. (1991) found 32 species in 3 genera of chaetodontid fishes in Sunda Strait waters. These data suggest that there was a similar phenomenon of coral reef fishes

in Karimun Jawa and Sunda Strait waters.

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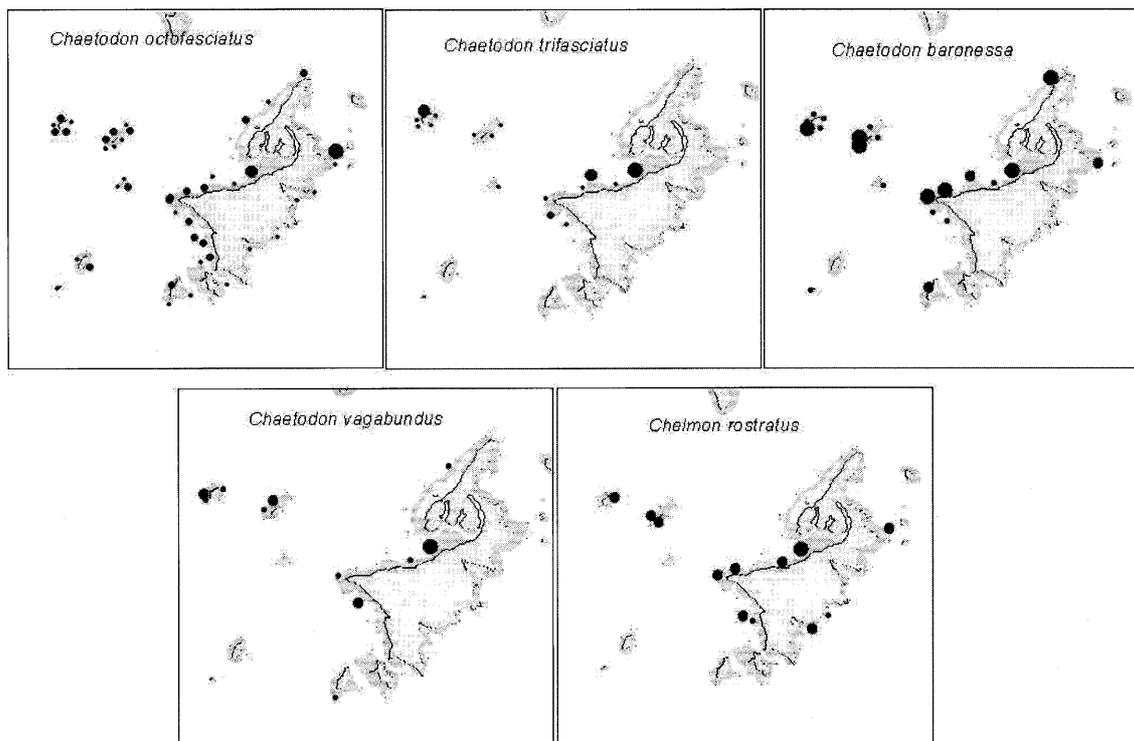


Fig. 4. Distribution and abundance of 5 most dominant indicator fishes on reefs at Karimun Jawa Islands.

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