

IH272 Damselfish: Facilitators or Inhibitors in Indonesia

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Damselfish occur in high diversity and densities on coral reefs and have a considerable influence on reef dynamics. They exhibit a wide range in behaviour and resource preferences; consequently, they vary in their functional contribution to the reef. There are multiple projects that could be developed to provide a further understanding of their ecological role on the reef and how this varies within and between reefs of differing quality. The following paragraphs each address potential aims that could be addressed.

One project could examine the spatial variation in the densities of damselfish and determine to what extent damselfish populations are influenced by habitat availability. This project could survey different damselfish species to determine their specific habitat preferences and examine how this varies among reef zones and of reefs of differing habitat quality. It is important to identify resource requirements for reef fish in light of increased natural and anthropogenic disturbances on coral reefs worldwide. This study could provide insight into how damselfish may respond to future predicted changes in resources (i.e. do they have the potential for adaptive strategies?)

Another potential project could investigate factors influencing algal abundance and diversity and growth within territories. Some damselfish species are algal farmers and set up distinct territories where they cultivate algae and guard it from intruders. They have been shown to have a significant influence on algal growth and coral community structure. Studies have shown that herbivores can increase algal diversity by exposing new substrates upon which algae can grow, they can relieve competition by consuming the more competitive algae, thereby enabling growth for the non-dominating algae, and some herbivorous even fertilize their grazing areas with fecal material. This study could map territories of damselfish species followed by data collection of algal abundance and diversity, surrounding habitats, reef quality, and benthic substrate within the territory (both benthic composition and structural complexity). An experimental component could also be incorporated to determine algal growth rates within and outside of territories and compare this among zones and reefs.

Another option is to examine territorial behaviour of damselfish towards intruders. Territorial defence is displayed by some species of damselfish but the level of territoriality varies greatly among family and species, ranging from weak home-ranging to strong territorial behaviour. They can have a significant influence on the surrounding ecosystem and reef structure as a result of their aggressive and territorial behaviour (Caldow & Wellington, 2003). Adults defend territories which include a shelter hole, grazing area and for some males, a nest site. The primary function of the territory is to defend food resources and as the inhabitant farms algae on the corals within the territory it displays aggressive behaviour towards intruding territories to protect most importantly its food source, but also its own area on the reef. The Pomacentridae family itself represent one of the numerically dominant tropical reef fish taxa and therefore as a

result of this territorial defence, other fish species on the reef will be limited as to the areas of the reef where they can feed, shelter and nest hence damselfish territorial behaviour can directly affect the reef community structure. This project could compare the behavioural interactions of the damselfish towards intruders and determine numbers and intensity of aggressive behaviours and how this varies among species.

This research requires in water activity and is suitable for those interested in both snorkeling and SCUBA based research.

Suggested Reading

Bay LK, Jones GP, McCormick MI (2001). Habitat selection and aggression as determinants of spatial segregation among damselfish on a coral reef. *Coral reefs* 20:289-298

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Hixon, M.A. 1996. Effects of reef fishes on corals and algae. Page 233 in C. Birkeland, editor. *Life and death on coral reefs*. Chapman and Hall, New York, New York, USA.

Lobel PS (1980) Herbivory by damselfishes and their role in coral reef community ecology. *Bull Mar Sci* 30:273–289