



<b>WRL reference</b>	M05 D01
<b>Module</b>	M05 Natural Resource Use and Sustainability
<b>Data set</b>	D01 Identifying overfishing on Indonesian coral reefs

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### **Research questions:**

1. How have catches from fish fences changed between 2005 and 2011 in the Wakatobi Marine National Park?
2. What does the data tell us about the sustainability of coral reef fisheries in the Wakatobi Marine National Park?

***IF YOU OPEN THE FILE "COMPLETED.xls" YOU WILL SEE WHAT THE FULLY ANALYSED AND PLOTTED DATA SET SHOULD LOOK LIKE***

### **Answers/discussions to research questions:**

1. Our data clearly demonstrate an increase in the amount of fish fence effort around Kaledupa Island, with both the number and mean length of fence increasing between 2005 and 2011. However, despite building bigger fences, the amount of fish caught each day (catch per unit effort, CPUE) decreased by approximately 70% from 12.75 to 4.13 kg per fence per day. This was shown to be a statistically significant decrease using a paired t-test ( $P < 0.05$ ). While the overall weight of fish caught decreased, the proportion of fish caught as juveniles increased by approximately 400% from 9.72 to 39.43%. This was also shown to be a statistically significant increase using a paired t-test ( $P < 0.05$ ).
2. The definition of sustainability is where the amount of a resource removed from a system can be maintained at the same level indefinitely. In other words, the resource is able to recover just as quickly as it is being removed, and in the case of living resources this can be simplified to a situation where the rate of reproduction is equal to or greater than the death rate. In a sustainably exploited fishery, you would therefore expect catches to remain the same over time where effort (i.e. the size of fence) was the same or higher. With this in mind, our catch per unit effort data clearly shows that the Kaledupa fishery is being overexploited, and therefore overfishing (or unsustainable fishing) is taking place. An increase in the proportion of juveniles being caught provides additional evidence that the fishery is being exploited unsustainably. Sustainability relies on maximising the rate of fish reproduction, and each juvenile which is removed means one less individual to mature and have an opportunity to reproduce. The removal of high numbers of juveniles therefore creates a negative cycle whereby unsustainability becomes increasingly worse as fewer and fewer adults remain in the fishery, and therefore reproduction rate continues to decline.

