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A.C.I.A.R. PROJECT: GROWTH AND RECRUITMENT OF COCONUT CRABS IN VANUATU

by

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SUMMARY

The ACIAR project on coconut crabs in Vanuatu has been in progress for 1 year of its 2.5 year duration. Sampling at different areas has shown that densities and sizes of the crabs varies greatly, with reduced catches found at sites where previous exploitation has been intense. Preliminary information on growth confirms earlier predictions that this rate is very slow (1-3mm per moult). Poor rates of recruitment by juveniles have also been found, this may be a major problem for their potential for future harvesting. Attempts to artificially rear their larvae have not been fully successful with no full term juveniles obtained. Most problems encountered are expected to be rectified in the next year.

1. The ACIAR project on coconut crabs in Vanuatu was devised to investigate the biology and ecology of the species (Birgus latro) with the view to provide the basic information necessary to enable a rational plan for management for their stocks. Such management procedures were perceived as necessary due to the apparent declines in the numbers of crabs in Vanuatu and also throughout much of the Pacific region.

2. Whilst coconut crabs have been known for centuries, and large numbers of workers have investigated their behaviour and life-history, basic information on their growth, recruitment and population dynamics are almost non-existent. Yet, these parameters are vital for any rational attempt to model stocks of the crabs, and therefore infer appropriate levels of harvesting. Consequently, it is to these aspects of the crabs' ecology which this project has been focused; specifically growth rates, effects of exploitation, levels of juvenile recruitment and larval life-history dynamics are being investigated. Our studies started in September 1985 and will continue until December 1987, so this can only be described as an interim report.

Population Studies.

3. The method used to assess the density, size and sex structure of Birgus within different areas utilizes the same techniques as those used by local collectors i.e. using staked coconuts as baits to attract the crabs. Our estimates of density are restricted to catch per unit effort (CPUE) indices (crabs/coconut) as mark recapture techniques were found to be inappropriate - probably due to the large size of the islands and the likely vagile behaviour of the crabs.

4. The CPUE indices found so far have differed greatly amongst areas. Generally, where collections of the crabs have been intensive (determined from discussions with locals &/or direct observation of old baits) the numbers of crabs caught per bait has been small (1 crab/ 10 baits). This is in contrast to areas where collections and general disturbances have been minimal, at these places 5 crabs/ 1 bait were found (i.e. a 50 fold increase). The sizes of crabs also tends to be larger in areas where collections have been fewer.

5. Within a site, CPUE indices were greatest during the summer months, and all sites have experienced a decline towards winter. This decline is likely to be associated with moulting, which is the method of growth in this group. The crabs bury themselves (and therefore will not be caught at the baits), shed their old "skin" and produce a new larger skin. Prior to burial, the abdomen of the crabs has to increase greatly, which is evidence of an increase in fat deposits and also a large reserve of fluids (mostly salt water). Thus, from summer to winter we observed a general increase in the mean size of the abdomens of the crabs. All this evidence, therefore, suggests that the crabs are all moulting during winter.

6. The increment of growth in individual crabs has been studied in the field and more successfully in enclosures at our base. So far the increments observed have been small: 1 - 3 mm in length. This confirms previous suppositions that this species has a very slow rate of growth. More field evidence is required to back up these laboratory observations.

7. As with all previous studies on Birgus, juveniles (<3 cm) have been very scarce. In over 100 field trips covering all types of habitats only 5 juvenile crabs have been found. Furthermore, no crabs under 2 cm in length have been found. This suggests that recruitment by this species is very poor, and this may prove to be the major determinant of future harvesting intensities.

Larval Life History

8. Like most crabs, Birgus carries its eggs underneath its abdomen whilst they are maturing. When the eggs are mature they spontaneously hatch upon contact with seawater; in general, the females deposit the eggs into the sea just after dusk. The spawning season for this species in Vanuatu appears to be confined to the summer months (Nov. - March), which was the case in other studies.

9. Artificial rearings of the hatched larvae have been attempted a number of times during the previous breeding season. The larvae showed little mortality during the four zoeal stages but there was almost complete mortality when moulting into the amphibious glaucothoe stage (the stage where they come out onto land). Consequently we have been unable to gather information on the very early juvenile rates of growth. Similarly, despite numerous and extensive searches of the beaches, no Birgus glaucothoes have been found, whilst numerous numbers of other coenobitidae glaucothoes have been found. This again points to a lack of successful recruitment by this species. The difficulties in the larval rearing are likely to be related to deficiencies in the diets they were given, this should be corrected during the next breeding season.

Conclusions

10. A large amount of information of the biology of the coconut crab has already been elucidated. Moreover, the information gained so far has enabled us to define the problems more clearly so we are now in a position to complete the task of determining the life-history dynamics of this species.
