Chapter fourteen

Developments in tropical reef fisheries science and management

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SUMMARY

Extinction is conceivable for some species, including aquarium-fish stocks of high value and limited geographical range, but a biological basis exists for management of such small fishes. Immediate data needs are much greater for management of stocks of larger species which most reef fishing targets. The strengths and limitations of underwater visual census are now better recognized, and there is improved capacity for fish ageing, especially through otolith analysis, as a basis for growth and mortality assessments. Information technology has grown rapidly in scope, and modelling approaches offer a better foundation now for incorporating biological data into analytical approaches to sustainability. Reef fishery dynamics may widely be simpler than implied by their 'multispecies' condition, and in spite of their assumptions, surplus production models have proved useful in stock assessment. Empirical and exploratory approaches to sustainability, however, are more desirable than ever, as uncertainty about long-term ecosystem effects of fishing increases. Work of an experimental nature urgently needs also to be directed at rehabilitation techniques, especially marine fishery reserves. Successful management is, however, unlikely without local community involvement. Understanding

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the scope of such participation demands a greater social science input to reef fishery studies; here as elsewhere there are encouraging trends in recent studies.

14.1 INTRODUCTION

It is not so long since tropical reef fishery yields were thought, admittedly on the basis of limited data, to range from 0.5 to 5 $t\,km^{-2}\,year^{-1}$ (Stevenson and Marshall, 1974; Marten and Polovina, 1982). Much higher estimates, around 20 $t\,km^{-2}\,year^{-1}$, by Alcala (1981) and Alcala and Luchavez (1981) in the Philippines, and by Wass (1982) in Samoa, were thought at first not to be representative (Marshall, 1980). However, high yields of this order have now been independently estimated for a number of sites in the South Pacific and South East Asia (Dalzell, Chapter 7), and the higher estimates are now close to the maximum levels of fish production predicted by trophic and other models of reef ecosystems (Fig. 14.1). One research problem that remains, however, is the rigorous quantification of the effects of factors such as primary productivity, depth, sampling

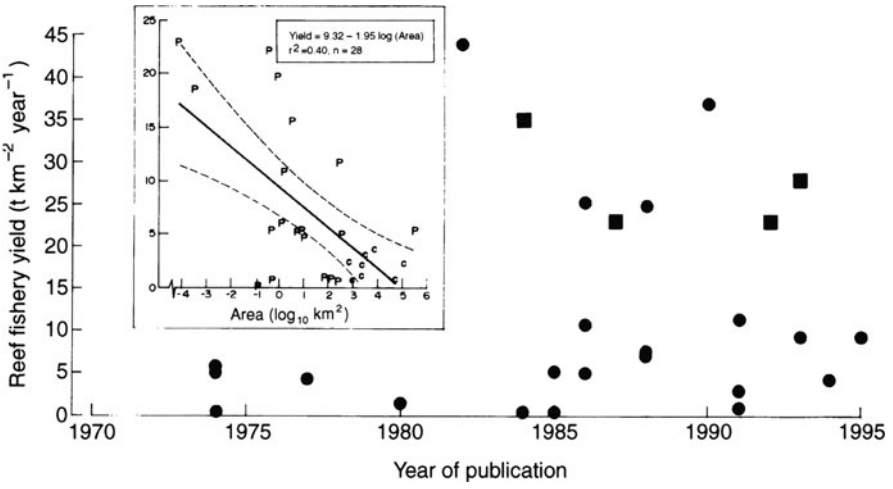

Fig. 14.1 Recent estimates of tropical reef fisheries yield have in some instances reached the high value of fish production indicated by trophic models. Filled circles (from Dalzell, Chapter 7) show observed yields, filled squares show model estimates, both plotted against year of publication. The model data are those of Galzin (1987), Polunin and Klumpp (1992b), Arias-Gonzalez (1993) and Polovina (1984). The insert, adapted from Arias-Gonzalez *et al.* (1994), shows the relationship between observed yields (t km^{-2} $year^{-1}$) and the area from which yields were estimated, in the Caribbean (c) and the South Pacific (p).