

**THE ROLE OF SOCIOECONOMIC FACTORS IN  
CUSTOMARY CORAL REEF MANAGEMENT IN PAPUA  
NEW GUINEA**

Thesis submitted by

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## STATEMENT OF ACCESS

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## **STATEMENT OF SOURCES**

### **DECLARATION**

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of higher education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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## CONTRIBUTIONS OF OTHERS

This work would not have been possible without the valuable contributions of a great many people. Funding for this project was provided by the David and Lucile Packard Foundation through a US\$500,000 grant to the Wildlife Conservation Society. I collected these data as part of a Wildlife Conservation Society project, led by Dr. Tim McClanahan, that examined the effectiveness of coral reef management in the Indo-Pacific. My university fees and stipend support were provided by the James Cook University International Postgraduate Research Scholarship and a scholarship from the school of Tropical Environment Studies and Geography.

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Data were collected with the assistance of Mr. John Ben from the University of Papua New Guinea. His assistance was crucial in obtaining and interpreting these data. Mr. Ben also collected data for two sites, Madina and Fissoa after I left Papua New Guinea. Mr Paul Led also assisted with translation for research conducted in the Madang province.

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## **ABSTRACT**

For generations, communities in the Pacific islands have employed a range of resource management techniques (including reef closures, gear restrictions, limiting entry, and the protection of spawning aggregations) to limit marine resource use. Because of their perceived potential to meet both conservation and community goals, these traditional resource management techniques are being revitalized by communities, governments, and conservation groups as an integral part of national and regional marine conservation plans in the Pacific. However, it is uncertain whether traditional management can provide a solid foundation for the development of these conservation strategies. Little is known about the social, economic, and cultural processes that enable communities to employ traditional management and it remains unclear if the traditional management systems will be resilient to the profound socioeconomic changes sweeping the Pacific region. Indiscriminate application of “traditional” solutions to present day problems in Pacific communities without understanding the socioeconomic context in which these systems can operate effectively may lead to disappointment with results and disenchantment with the conservation process if results do not meet expectations.

Theoretical and empirical studies have identified a number of specific socioeconomic factors that may influence the ability of a community to implement or maintain traditional management, but specific relationships between socioeconomic conditions and the use of traditional management practices are still not well understood. This thesis aims to examine the socioeconomic context within which select traditional management systems operate in Papua New Guinea and further debate on how these systems may be applicable in the modern conservation context by exploring the following research questions: Do communities with traditional reef closures have different socioeconomic characteristics than communities that do not? How do traditional closure systems reflect the socioeconomic conditions of the communities that implement them?

This thesis identified socioeconomic factors that may influence whether a community employs or maintains traditional management and prioritised 11 that could be collected within the research timeframe. These factors were population, size of the resource, distance to market, conflicts, settlement pattern, dependence on marine resources, modernisation, perceptions about the complexity of human-environment interactions, perceptions about the condition of the marine environment, social capital and occupational mobility. These socioeconomic factors were examined in 14 coastal communities in Papua New Guinea, five of which had traditional closures and nine of which did not. Data were collected using a combination of quantitative and qualitative techniques, including household surveys, key informant interviews, participant observation, and oral histories. A technique called Rasch modelling, commonly used in psychology and education, was employed to aggregate household-level socioeconomic indicators into thematic interval-level variables. Then the socioeconomic factors in the five communities that employ traditional closures of coral reefs were quantitatively compared with the nine communities that do not. Results showed that the constructs used to measure modernisation, social capital and occupational mobility had a slight but significant relationship to the presence of traditional closures, and the construct of dependence on marine resources was strongly related to the presence of traditional closures.

Two case studies were used to provide a more detailed examination of how dependence on marine resources influences whether and how communities can employ a traditional closure. One case study is from Ahus Island, Manus province where dependence on marine resources is extremely high. The other is from Muluk village on Karkar Island, where dependence on marine resources is low. These contrasting case studies help to provide more detail into the socioeconomic context within which these traditional practices operate and how a community's dependence on marine resources may determine whether and how traditional closures may meet their goals. The thesis concludes by exploring how traditional closures in Papua New Guinea focus on providing the communities with benefits rather than biodiversity conservation and examining how this leads to a fundamentally different resource governance model than we see in western

fisheries management and resource conservation. This utilitarian model of conservation may have a place in the modern conservation context of many developing countries where the social and economic burdens of Western conservation models are unrealistic.



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## PROLOGUE

The purpose of this prologue is to provide some context into the industry relationship that enabled this research to occur. Although common in fields such as medical or pharmaceutical research, industry sponsors or partnerships are somewhat atypical for a human geography thesis. Thus, it is important for the reader to understand the context within which this research occurred and briefly review some of the benefits and limitations to this approach.

Research for this thesis was collected as part of a Wildlife Conservation Society (WCS) project that examined the effectiveness of different coral reef conservation strategies in Papua New Guinea and Indonesia. The research question that this project set out to answer: “what strategies are working in coral reef conservation?” is a question spawned by the woeful success rate of coral reef conservation initiatives worldwide (Burke, 2001; Burke & Maidens, 2004; Burke et al., 2002). Answering this question required an interdisciplinary approach that examined socioeconomic as well as ecological aspects of resource use and governance. Research for this project involved a total of 13 scientists in data collection and analysis. We examined reef governance institutions, socioeconomic conditions, and the ecological status of coral reefs in 29 coastal communities throughout Papua New Guinea and Indonesia.

As the lead social scientist for the project, I was in charge of defining, planning, conducting, and analysing all social science research for the project. The PNG component involved two social scientists (myself and a Papua New Guinean research assistant), while the Indonesian component involved five (myself and four Indonesian research assistants). My research focused on defining the formal and *de facto* reef governance institutions, examining relevant social and economic processes, and quantifying resource use patterns. The abundance and calibre of data we expected to generate from the project suggested that it might be appropriate for the scope of a PhD. James Cook University agreed and awarded me the highly competitive International Postgraduate Research



Scholarship to incorporate these data into a PhD. In consultation with my supervisors, it was decided that the scope of the PhD should be limited to socioeconomic processes influencing resource management in one country because national-level differences in socioeconomic factors may override the village-level patterns I was examining. One of the more interesting findings of the WCS study was that traditional reef conservation efforts appeared to be better at protecting coral reef resources than conventional marine reserves (McClanahan et al., in review). Thus, to figure out the social underpinnings of these traditional systems, I decided to focus the PhD thesis on Papua New Guinea, where there was a higher incidence of traditional conservation in the management sites.

The benefits of incorporating research from this project into a PhD were that WCS provided research funding that allowed for what has typically been a prohibitively expensive comparative study and that detailed interdisciplinary work was conducted which provided insights into the ecological questions about traditional management raised in Chapter II. The ecological data are presented in papers and are not included in this thesis (e.g., Cinner et al., in press; Cinner et al., in review-a; Cinner et al., in review-b; McClanahan et al., in review). The compromises were that data had to be collected in a way that would allow them to be easily integrated with the ecological data and that research was also conducted on WCS research priorities that were not covered in the scope of this thesis. For example, significant research was conducted on the composition of fish catch to examine how fishing pressure in six regions influence the size and trophic level of fish being captured (Cinner & McClanahan, in review).