**The value of many small vs. few large marine protected areas in the Western Solomon Islands**

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**Introduction**

Scientists and policy makers are universally promoting marine protected areas (MPAs) as a fisheries and ecosystem management tool. Experts generally agree that MPAs, particularly fully protected “no-take” zones, can enhance spawning stock biomass, allow for larval dispersal and the export of adults to adjacent non-protected areas, maintain species diversity, preserve habitat, and sustain ecosystem function (e.g. Bergen and Carr 2003; Johnson et al. 1999; Russ and Alcala 1999). In the case of tropical multi-species fisheries, in which absolute yields are difficult to predict and in which there are multiple users and fishing techniques, marine reserves also can act as precautionary tools to prevent overexploitation. Considering that orthodox fisheries management strategies have generally failed to prevent overfishing globally, the inception of MPAs as a management tool is of particular preventive significance (Russ 2002).

Proponents of MPAs have broadly debated the appropriate size and number of MPAs that should be established in order to produce what a particular management prescription proposes to deliver. Some scientists argue that for MPAs to be effective they should cover areas in the magnitude of hundreds or even thousands of square miles, depending upon the type of environment (e.g. Beattie et al. 2002; Man et al. 1995; Walters 2000). Others have suggested that from a fisheries enhancement perspective, many small reserves in a network are preferred over fewer, larger reserves (e.g. Roberts et al. 2003). Other debates have centred on how much attention should be paid to science-driven vs. stakeholder-driven considerations when designing MPAs (e.g. Agardy 1997; Alder et al. 2002; Christie et al. 2003; Jones 2002).

In this article, we describe our effort to establish a network of marine protected areas in the Western Solomon Islands and summarise the biological and social rationale employed for setting multiple small reserves within a biogeographical region. We argue that in the case of the Western Solomons, a network of small MPAs is a more biologically effective and socially attainable strategy than establishing a few large reserves. We also suggest that practitioners need to pay more attention to economic factors (e.g. McClanahan 1999) and social sustainability issues (e.g. Mascia 2003) when establishing MPAs, rather than concentrating on their intrinsic biological and ecological value alone. Finally, we outline some lessons learned and the necessary steps involved in attaining a committed level of community participation in order to sustain the MPAs over the long term.

**The MPA network**

The Western Solomon Islands (Fig. 1) lie in the Bismarck Solomon Seas Ecoregion. This area comprises a large marine ecosystem that extends through the Solomon Islands, the north coast of Papua New Guinea, and the northern West Papua region. Regional marine biotopes are highly diverse, productive, and moderately undamaged by human activities, making this area a biodiversity conservation hotspot (WWF South Sea Program 2003). Pressures from a population explosion and rampant development, however, are increasingly threatening the ecology and social stability of the region.

In light of these increasing threats, we designed a preventive management strategy to safeguard representative habitats and species in southwestern New Georgia. We marked for protection riparian...

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and marine habitats, including outer-lagoon and shallow inner-lagoon coral reefs, inner-lagoon seagrass beds, mangroves, coastal swamps, and strand vegetation. We also targeted for protection the critical habitats for flagship species such as bumphead parrotfish (e.g. Aswani and Hamilton 2004). Since 1999, we have assisted local communities in the Roviana and Vonavona Lagoons in establishing a network of MPAs under customary sea tenure (Fig. 2). We have instituted 12 MPAs, most of which have been set up as permanent “no-take” zones. Of these, four have dual zoning regimes, whereby one-half of the area is permanently closed and the other half temporarily so (the period of closure varies from site to site). In addition, two of the closures protect adjacent mangrove and swamp forest by banning land-based activities, such as clearing or harvesting firewood.

It should be noted that MPA designation has been consistent with local requests and socio-political processes. Our approach, which has been three-pronged, involves articulating conservation goals while also addressing such local needs as the funding of infrastructure development and educational initiatives (see Aswani and Weiant in press). We have assisted with various development enterprises (e.g. a clinic, two health posts, two schools, a school renovation, three community halls, and two women’s halls), and we have supported local students with grants and capacity building. We project to establish 10 additional “no-take” MPAs in the inner and outer Roviana and Vonavona Lagoons, bringing their total number to 22 (or perhaps more, as local communities take the initiative to establish their own) (Fig. 3). It is quite likely that we will also work with local communities to establish MPAs in Marovo, Kolobangara, North New Georgia, Vella Lavella, and Choiseul.

Anthropological and marine science studies of indigenous resource use (e.g. local fishing methods and knowledge) and access practices (e.g. customary sea tenure) show that, for this region, MPAs are the most realistic and enforceable management prescription (e.g. Aswani 1999, 2002; Aswani and Hamilton 2004; Hamilton 1999, 2004). To achieve optimal MPA design, however, source
Figure 2. Current MPA sites in Roviana and Vonavona Lagoons
and sink locations for protection must be selected based on the patterns of larval recruitment and dynamics, as determined by local hydrodynamics (e.g. Roberts 1998). In this regard, we currently have only fragmentary information, which is unfortunate because there are social and biological risks involved in establishing MPAs without comprehensive scientific information (Huber and McGregor 2002). We acknowledge this scientific uncertainty but, nonetheless, subscribe to an opportunistic approach (e.g. Johannes 1998; Ludwig et al. 1993; Roberts 2000) that harnesses available scientific information and indigenous ecological knowledge in selecting locations for and designing MPAs.

To this end, we have employed a research strategy that integrates indigenous ecological knowledge (e.g. GIS mapping of locally identified nursery grounds and spawning aggregation sites) with marine science (e.g. underwater visual census [UVC] surveys). We are especially interested in indigenous knowledge that is commensurable with scientific approaches to biodiversity conservation and the recovery of overexploited species (see Aswani and Hamilton 2004). Our approach to establishing MPAs also harnesses local forms of sea tenure and resource use and management strategies. We have studied customary sea tenure by researching economic, political, sociocultural, and demographic patterns across the region (see Aswani 1999, 2002). This stakeholder-driven strategy recognises that if members of sea tenure groups cannot enforce the exclusion of non-members and maintain harvest restriction rules, it is meaningless to implement a management regime no matter how rich in marine biodiversity the area may be. Because of the rapid rate of resource depletion in the region, this strategy may prevent further decline while also serving as a cost-effective way to manage resources despite the dearth of substantial biological information.

**Biological rationale**

The biological rationale for establishing a network of small MPAs has been to: 1) protect vulnerable species and habitats (i.e. biodiversity and ecosystem function), 2) protect susceptible life history stages (i.e. spawning and nursery grounds), and 3) enhance fisheries productivity in the region. Tropical lagoons are environments of low ecological resilience that are vulnerable to human disturbances. We believe that establishing a network of reserves will provide protection for representative habitats and for exploited marine organisms. Most experts view marine reserves as precautionary insurance policies against overexploitation and inadequate fisheries management strategies (e.g. Lubchenco et al. 2003; Russ 2002). A recent review by Halpern (2003) of 89 reserves worldwide has shown that the magnitude of increase in abundance, biomass, size, and diversity of organisms is independent of the size of the reserve (the size range examined was 0.002–846 km²). The aggregated biological benefits of reserves increase directly with the total area protected, regardless of how this area is subdivided into reserve units. In designing marine protected areas, therefore, not only is biodiversity an important factor, but also the selection of sites that incorporate the ecological processes that support that biodiversity, including the presence of exploitable species, vulnerable life stages, and links among habitats, regardless of the reserve’s size (Roberts et al. 2003). To this end, we have gained information on habitat characteristics and quality and species diversity through local interviewing (e.g. participatory GIS habitat mapping) and field research (e.g. underwater visual census and Reef Check).

Current MPA studies and an increasing amount of theoretical modelling data also suggest that a network of reserves buffers against the vagaries of environmental variability and provides significantly more protection for marine communities than does a single reserve (Hastings and Botsford 2003; Lubchenco et al. 2003; Roberts et al. 2003). In addition, from a fisheries enhancement perspective, many small reserves in a network are preferred over fewer, larger reserves. The large edge-to-area ratios of small reserves result in higher rates of juvenile and adult spillover and more regional benefits through greater larval export (Roberts et al. 2003). For instance, a recent study showed that within five years of creation, a network of five small marine reserves in St. Lucia increased adjacent catches of artisanal fishers by between 46 per cent and 90 per cent, depending upon the type of gear the fishers used (Roberts et al. 2001).

Generally, reserves in a network should be 4–6 km in diameter and should be spaced 10–20 km apart. This allows individual reserves to be large enough to contain the short-distance dispersing propagules and to be spaced far enough apart so that long-distance dispersing propagules released from one reserve can settle in adjacent ones (Hastings and Botsford 2003). Recent research indicates that protecting 20 per cent of each habitat present within a biogeographical region is considered necessary to support fisheries function and to safeguard biodiversity (Roberts and Hawkins 2000). Given a number of socio-political constraints, we are trying to protect between 15 per cent and 20 per cent of aggregated habitats in the Roviana and Vonavona Lagoons by working with various communities. To date, local communities, with our
Figure 3. Proposed MPA sites in Roviana and Vonavona Lagoons
assistance, have protected 1474 ha of marine habitat divided into 12 MPAs, each site ranging in size from 25 ha to 266 ha, or about 5.7 per cent of all lagoon habitats in the area (Fig. 2).

Networks of small inner-lagoon reserves (e.g. in Roviana, Vonavona, Marovo, Nono, etc.) are also critical for protecting vulnerable life-history stages of many heavily exploited coral reef fish. The larvae of these fish predominantly settle out of the plankton into shallow water biotopes of high structural complexity such as mangroves and seagrass beds (Nagelkerken et al. 2000). The importance of the nursery function of the lagoon for coral reef fish species in this region can be deduced from the high densities of juveniles in the inner lagoon in contrast to the complete absence of juveniles on outer-lagoon coral reefs. We have documented this in the region for bumphead parrotfish (Bolbometopon muricatum) and humphead wrasse (Chelmon undulatus) (Aswani and Hamilton 2004; Hamilton 2003, 2004), and other authors have documented the importance of inner-lagoon habitats for various threatened coral reef fishes (e.g. Nagelkerken et al. 2000). We predict that the number of juvenile coral reef fish will increase within reserves if nursery areas are protected. Further, the connectivity of inner-lagoon habitats and coral reefs means that this approach has the potential of enhancing adjacent coral reef fisheries through increased rates of juvenile recruitment.

We are also attempting to protect outer-lagoon coral reefs because the long-term benefit of protecting coral reef fish nursery grounds is dependent on these areas receiving an adequate supply of dispersive larvae from adult populations. These adult populations occur in low numbers or not at all within the inner lagoons, and if adult population numbers were to decline dramatically over a wide geographical area it could lead to widespread recruitment failure (i.e. shortage of eggs and larvae) and subsequent decline of juveniles within protected inner-lagoon reserves. Within the context of protecting adult spawning stocks, we are particularly interested in focusing management attention on known spawning aggregation sites of the larger grouper species and the humphead wrasse. Transient grouper spawning aggregations are highly vulnerable to over-exploitation (Colin et al. 2003), and the humphead wrasse is globally threatened throughout its range (Sadovy et al. in press). The conservation and management of such spawning aggregations is therefore critical for the persistence of the populations that form them (Sadovy and Vincent 2002).

Currently, we do not have the biological data necessary to determine the effects of the existing reserve network on a variety of exploited species. We will soon begin to collect this biological information so that we can quantify which targeted species respond to this form of management and the long-term spillover effects of the Roviana reserve network. In addition to the biological value of such data, this information (i.e. assuming positive results) will be necessary to reinforce and validate the local perception that the MPA network has a positive fisheries value and to help ensure the network’s permanent acceptance and protection. To date, we have only monitored invertebrate abundances and size distributions in the Duduli-Rereghana MPA (Baraulu) and have disseminated the scientific results locally (see Aswani and Weiant 2003, in press).

**Socio-cultural rationale**

The site-based implementation of community-based marine protected areas requires the identification of not only major biological and ecological processes but also the socio-cultural, economic, and political processes patterning the targeted area. For most of the Western Solomons, customary chiefs and elders control each of their district’s seas and exercise control over resource use and access. Both property composed primarily of natural resources and property governed as part of management systems are subject to local controls (Aswani 2002). For this reason, any management prescription has to transpire within the context of customary sea tenure. Foale and Manele (2003:1) have argued that the “typical Melanesian CMT regimes make MPAs difficult to establish because many coastal zones are finely divided along clan boundaries, such that few clans would be willing to ‘lock up’ their own reefs for the benefit of neighbouring clans.” The essence of their argument is that if a local group closes a reef, the benefits of their MPA are likely to be reaped by neighbouring groups because larvae produced in the closed site are likely to recruit in neighbouring or distant reefs that quite likely belong to other groups who are not bounded by the same restrictions. The question, then, is: Why forfeit harvesting one’s own resources for the benefit of others? From a socio-cultural perspective, however, the only management prescription that can work in the Western Solomons is a network of small MPAs under customary sea tenure.

First, it is important to recognize that sea tenure is not homogeneous and to discern the institutional characteristics of governance and management intrinsic to existing forms. Studies in the Western Solomons have shown that different forms of customary sea tenure exist and that growth in population and consumption affect these institutions in
different ways (Aswani 1997, 2002; Hviding 1989). Concluding that customary sea tenure is uniform, therefore, is erroneous and misleading. For instance, in Roviana and Vonavona there are marked differences in cultural attitudes regarding governance and operational rules of management among regional polities. For various historical reasons, traditional leaders in some sea territories are more capable of managing their resources than are leaders of other sea estates. Hence, MPAs can be established successfully under sea tenure regimes as long as entitlements are secure. Such systems (or the territorial-enclosed regime) require that territorial boundaries be circumscribed, that the sea estate be under a centralised traditional authority, and that people recognise and respect the territorial boundaries regionally (see Aswani 1999 for further discussion). In Roviana and Vonavona, these circumstances generally occur in areas in which the majority of sea entitlement holders live adjacent to their marine property (e.g. Kalikoqu and Saikile) (Fig. 4).

On the other hand, establishing MPAs in areas in which sea tenure is less secure and where there are permeable boundaries (or the mosaic-entitlement regime), is more problematic given that neighbours are less likely to respect the management initiative. Still, it is conceivable that future management success in areas that have secure tenure will encourage stakeholders in other areas that are more vulnerable to resource conflict and overexploitation to negotiate with neighbouring groups to implement their own MPAs. This process, in fact, has already begun with the establishment of a spatio-temporal “no take” zone in Nusa Roviana in 2003 — an area in which a large proportion of the reef’s owners do not live adjacent to their property (particularly the nearby barrier reefs that have entitlements shared by many polities) and, hence, where sea tenure is highly contested by neighbouring villages (e.g. Munda area villages) (Fig. 4). It is essential, then, to map forms of sea tenure prior to drafting any form of co-management policies between local fishers and government or non-governmental organisations (see Aswani 1999, 2002).

Yet, even under a secure tenure regime, the question remains: How can villagers prevent neigh-

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**Figure 4.** Sea tenure regimes in Roviana Lagoon (Vonavona regimes not shown). Note that these are only conceptual boundaries and are not definitive.
bouring groups from reaping the fishery benefits of their MPA by way of the spillover of larvae into neighbouring unmanaged reefs? The solution is to establish multiple sites within the boundaries of all regional sea tenure regimes that are institutionally secure. Given that the majority of polities in Roviana and Vonavona have secure tenure (as do most polities in the Western Solomons), it is possible to establish networks of MPAs. Simply put, all stakeholders have to share the biological and social costs and benefits of the closures under this prescription. From a fisheries perspective, multiple MPAs that protect representative habitats in a biogeographical region are likely to safeguard and improve the connectivity between sink and source populations and, therefore, result in fisheries enhancement. From a social perspective, conflict and free riding decreases when neighbouring tribes invest time and effort in managing their own marine resources respectively. Stakeholders of neighbouring MPAs will tend to respect each other’s closures and prevent interlopers from exploiting their resources, because if everyone cooperates, all are more likely to benefit in the long term from sustainable resource management practices. We have seen this occur between the villages of Ha’apai and Olive (Saikile) and between various settlements in Vonavona Lagoon (e.g. see village MPAs adjacent to Kohinggo Island in Fig. 2).

Second, the MPAs should be relatively small, in addition to being strategically located within the confines of all secure sea tenure estates. Single large MPAs are likely to extend across the territory of various stakeholders and lead to difficult negotiations and conflict for most areas in the Western Solomons. Large MPAs would concentrate the burden of resource use and access restrictions on only a few polities, while neighbouring entitlement bearers would share the benefits. Thus, in order to work, the MPAs have to be small enough to be situated within the territory of a polity or village. Furthermore, they have to be sufficiently small in relation to the total sea estate to allow inclusive stakeholders access to alternative fishing grounds. Large MPAs restrict subsistencefishers from accessing their traditional grounds, leading to resource degradation in adjacent unmanaged reefs and, because of a lack of alternative sites, to an increase in poaching by inclusive fishers. The only area in the Western Solomons that could accommodate a large MPA is the uninhabited island of Tetepare. In fact, WWF-Solomon Islands is currently working with various regional stakeholders to establish a large MPA in the island.

Finally, for people to monitor their MPA successfully, it is essential that it be located within eye-sight of the village. In other words, villagers have to be able to police their resources and spot poachers entering their area. Local monitoring and enforcement not only reinvigorates traditional authority over stakeholders’ sea territories, but also generates innovative governance institutions that can be articulated with customary and statutory law. For instance, several Roviana and Vonavona communities have begun to form new governance institutions and to strengthen existing traditional ones. With our assistance, villages are establishing Resource Management Committees (RMCs), each formed by various village constituencies, including chiefs, church authorities, and women’s representatives. The responsibilities of the RMCs are to: 1) ensure that the MPAs are secured and free from disputes; 2) enforce all agreed-upon regulations by warning, educating, and fining offenders if necessary; 3) run awareness workshops detailing the objectives of the MPAs; 4) organise workshops that will bring together other RMCs to discuss successes/problems/issues related to MPAs; and 5) encourage exchange and educational programmes with outside institutions. To date, a number of these new governance institutions have been set across Roviana and Vonavona Lagoons.

In sum, we suggest that building upon customary sea tenure is not only advantageous but also the only possible way to implement MPAs in this region effectively. Relying exclusively on scientific biological data to determine what species and habitats require environmental protection is an incomplete research and management strategy. As suggested in this discussion, mapping the forms of sea tenure (i.e. secure versus insecure tenure) is crucial for distinguishing regimes that are adaptable and capable of success from those that are not and in determining which MPAs are more likely to work.

**Lessons learned to date**

In general, we have learned a number of lessons, which are outlined below.

1. In the Western Solomons, fishery scientists and coastal managers will rarely achieve ecological sustainability and the protection of marine biodiversity unless they seriously consider local forms of sea tenure and their adaptability to introduced management regimes. Survey results indicate that up to 90 per cent of Roviana and Vonavona Lagoon inhabitants have confidence in the MPA initiatives. Their confidence in the programme derives partly from the fact that it includes customary authority and practices. That is, it represents an extension and revivalisation of traditional sea tenure practices in ways that the people can relate to.
and articulate in the local cultural idiom (Aswani and Herman n.d.). Indeed, we can raise a number of issues concerning the integration of sea tenure institutions into fisheries co-management policies. These include issues regarding the differences between Western and indigenous forms of knowledge and questions of equity, empowerment, jurisprudence, and conflict resolution among local, state, and international players (e.g. Berkes 1999). However, the absence of any binding and enforceable legislative or regulatory tools in the Solomon Islands necessitates the use of sea tenure as a framework for establishing any form of fisheries regulations.

2. It is unrealistic to expect a community-based conservation project to succeed with only short-term expert guidance and financial support. Solomon Islanders have developmental aspirations that cannot be ignored. Hence, if local communities are to forfeit exploiting their resources, some form of alternative livelihood has to be furnished. While we provide infrastructural assistance to various communities (e.g. clinics and schools) and they contribute free labour and local materials, we believe that continued environmental education is vital if we are to move beyond the capital dependency created by financial incentives as components of conservation projects (see Aswani and Weiant in press).

3. Outside project leaders and funding agencies have to be prepared to accept that local interest in marine resource management may wax and wane over time, particularly in places such as Melanesia. For instance, local peoples may have diverse conceptions of a marine protected area’s time horizon, and stakeholders’ commitment to protecting a site indefinitely may vary widely.

4. The marine protected areas and their resulting biological outcomes are tangible means of demonstrating the significance of resource management. The witnessing of actual management results, whether real or perceived, is the most effective means of environmental education — i.e. “seeing is believing.” Concurrently, the results of scientific monitoring become of critical importance. Scientific results can be a catalyst for reinforcing the local perception that the MPAs are having positive biological results (see Aswani and Weiant 2003, in press).

5. The participation of local church leaders is of paramount importance. The recent sanction of our project by the head of the Christian Fellowship Church, whose members have customary control over huge areas of the Western Solomons, will help ensure the long-term sustainability of the conservation and development initiatives.

6. It is possible for MPAs to meet their social and biological goals. From the perspective of the social sciences, however, we need to move beyond programmatic statements (e.g. promoting the value of social science for MPA design [e.g. Mascia et al. 2003]) and overemphasizing social critique (e.g. deconstructing colonial histories and analysing NGO discourses and intentions [e.g. Brosius 1997]) and take leadership roles by designing stakeholder-driven programs in partnership with natural scientists. These programmes should consider not only key biological and ecological parameters but also, as noted by Christie et al. (2003:25), the characteristics and behaviours of all the stakeholders involved, the desires of different stakeholders, and the stakeholders’ knowledge. Only then will we completely realise the true value of social science research in MPA design and implementation. Stated another way, skeptical natural scientists need to “see” theoretically and methodologically informed applied social science in action.

**Future initiatives**

In consolidating the future of the community-based MPA network we will continue to: 1) foster MPA environmental education and awareness at the local, national, and international levels; 2) establish an institutional infrastructure to sustain the MPAs (e.g. encouraging the consolidation of RMCs); 3) enhance participatory development; 4) formally legalise all MPAs at the provincial and national levels; and 5) conduct baseline/evaluation marine and social science research on all of the MPAs. The latter is of key importance, as obtaining this information will not only provide baseline data for future reference and research but also allow for the dissemination of information to local communities on the effects of the current reserve network. This will enable us to work with local communities in developing additional management strategies such as increasing the level of participation and involvement of the communities, especially by the women and children, through training the participants in monitoring methods, encouraging local participation in the monitoring, and discussing the meaning of the monitoring results. These steps will be required to ensure the long-term sustainability of MPAs in the region.
Conclusion

In this article we have suggested that the optimal strategy for establishing MPAs in the Western Solomons is to create networks of small MPAs under secure customary sea tenure. Biologically, the MPA network is vital for protecting vulnerable life-history stages of many coral reef fish. The connectivity of inner-lagoon habitats (e.g. Roviana, Vonavona, and Marovo) means that networks can enhance neighbouring coral reef fisheries through increased rates of juvenile recruitment. Protecting vulnerable spawning aggregation sites and establishing MPAs in outer-lagoon coral reefs are also a critical next step, because the long-term benefits of inner-lagoon protection of vulnerable juvenile life stages of fish relies on an adequate supply of dispersive larvae from coral reef adult populations. Socially, small MPAs situated within secure marine territories build upon practices with which the community members are familiar, and thus the inhabitants are better able to grasp the biological value of the programme and understand the use restrictions it entails. Monitoring and enforcement are, therefore, less problematic. It is of paramount importance, however, to select sites in which: 1) there is minimal public contest over natural resources, 2) boundaries are well defined and recognised regionally, 3) there is little or no poaching by neighbouring groups, 4) there is a capacity to monitor and enforce rules, and 5) the majority of inclusive stakeholders endorse the management initiative. Furthermore, it is essential to create an MPA network so that all regional stakeholders share the costs and benefits of the MPAs.

In summary, understanding and including these social parameters are fundamental for the success of MPAs. If our work is successful in the long term, it will provide a methodology for establishing MPAs in regions that have socio-cultural, economic, political, and ecological characteristics similar to those of the Western Solomons, including the rest of the Solomons, Papua New Guinea, Vanuatu, and possibly Fiji. More generally, our work illustrates ways in which social and natural sciences can be linked for protecting vulnerable marine habitats and species in the Pacific region.

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References


Recent publications on related topics


Abstract:
This paper investigates how sea tenure institutions in the Roviana Lagoon, Solomon Islands, mediate among population, consumption, and the environment. The focus is on explaining how growth in population and consumption alter sea tenure regimes, and the factors that shape either their institutional robustness or vulnerability. The paper also addresses the regional differences among sea tenure institutional arrangements, the processes that are producing them, and the social and environmental outcomes of these institutions as they engage external forces and internal changes. A major question is how existing forms of sea tenure respond comparatively when faced with parallel demographic and economic transformations? Two villages representing different sea tenure arrangements within the Roviana Lagoon are compared. Results show that inhabitants in these villages perceive their systems of sea tenure governance similarly; yet their managerial responses to changes brought about by growth in population and consumption differ, and the responses produce contrasting environmental effects.


Abstract:
Indigenous ecological knowledge and customary sea tenure may be integrated with marine and social science to conserve the bumphead parrotfish (Bolbometopon muricatum) in the Roviana Lagoon, Western Solomon Islands. Three aspects of indigenous ecological knowledge in Roviana were identified as most relevant for the management and conservation of bumphead parrotfish, and studied through a combination of marine science and anthropological methods. These were: 1) local claims that fishing pressure has had a significant impact on bumphead parrotfish populations in the Roviana Lagoon; 2) the claim that only small bumphead parrotfish were ever seen or captured in the inner lagoon and that very small fish were restricted to specific shallow inner-lagoon nursery regions; and 3) assertions made by local divers that bumphead parrotfish predominantly aggregated at night around the new moon period and that catches were highest at that time. The research supported claims 1) and 2), but did not support proposition 3). Although the people of the Roviana Lagoon had similar conceptions about their entitlement rights to sea space, there were marked differences among regional villages in their opinions regarding governance and actual operational rules of management in the lagoon. Contemporary differences in management strategies resulted from people’s historical and spatial patterns of settlement across the landscape.