Traditional rights and management of Yap's coastal fisheries and the role of fisherwomen

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Background

Yap State consists of a cluster of high islands and 134 scattered low atolls and islets, 22 of which are populated. It is situated in the Western Caroline Islands between latitudes 7–10° N, and longitudes 137–148° E. The low coralline islands and atolls are referred to as the outer or neighbouring islands, or *Rematha*u.

Mainland Yap includes four high islands, Yap, Tamil-Gagil, Maap and Rumung, within an extensive fringing reef system that is 31 km long and up to 12 km wide. There are eight deep channels through the outer fringing reef and three of these lead to a deep embayment (Orcott et al. 1989). Mangroves make up to 12% of the vegetation, and there are extensive seagrass meadows with at least seven species of seagrass (Falanruw et al. 1987). There are 99 species of algae reported as well as 169 species of hard corals, 426 species of fish and four species of sea turtles (Tsuda 1978; Falanruw et al. 1975).

According to the 2000 census, the total population of the state was 11,241 with a population growth rate of about 2% per year.

Coastal fisheries

Fishing activities on Yap are guided to some extent by a complex system of traditional rights, restrictions and controls (Falanruw 1994). However, the strength of these systems has been substantially weakened over the past two decades by changes in Yap's social, religious, economic and political systems (Graham 1991). Recent changes include the introduction of motorised boats, flashlight spearing and gillnets – all techniques that also enable bypassing of regulations. Thus, fishing at night and with flashlights, and outside the permitted fishing ground, is now common. Estimates made in 1987 suggested that night and day spearing combined accounted for 57% of the reef fish catch (44% by night), while surround nets and gillnets accounted for only 17% (MRMD 1987). The remainder was caught by fish traps, throw nets, scoop nets and hook and line. The increased importance of salaries has lessened the time available to employ traditional and more time-consuming fishing techniques. It has also increased market demand for reef fish and other seafood, and not all individuals within the community contribute to controlling fishing activity at the community's reef.

Today, there is an overlap between traditional and commercial fishing, with citizens of Yap selling some or all of their harvest to local retail outlets or sending it off-island. Any activity involving commercial exploitation of Yap's reef and lagoon first requires the consent of the traditional leaders and custodians of that resource. In that respect, traditional controls are still maintained, but these relate mainly to whether or not an activity should occur rather than to how it is managed. There is increasing concern being expressed that the sale of reef fish in local stores and restaurants is contributing to overfishing and depletion of fish stocks.

Customary tenure and fisheries management

Traditionally, two basic characteristics of Yapese customary tenure systems helped to avoid overexploitation: (1) ownership of reef areas and fishing rights by small groups, such as villages, *tabinaw* (estate, or household and associated resources), and village associations; and (2) ownership of marine resources that are not purely private but subject to hierarchical systems of control. This system of quasi-private ownership and associated fishing rights included regulations on the use of geographical areas or habitats, gear, methods and target species. Attached to the regulations were explicit "rules of conduct and obligations for distribution of catch" (Falanruw 1991). Fishing rights sometimes also involved reef closure practices to restrict effort. Falanruw (1991) describes the existence of "an ethic of not taking more than one's share, or of not harvesting all out of deference to social and spiritual sanctions".

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3. Falanruw and Faimau (in: MRMD 1987) referred to 125 named fishing methods on Yap that can be categorised into 15 major groups: (i) fishing with curved sticks (*tholom*), (ii) using poison (*yuub*), (iii) using nooses, (iv) spear fishing (*piska*), and (v) using rafts, as mini fish aggregating devices while spear fishing (*pipi fafat*), (vi) hook and line, (vii) butterfly (*yinup*) hand nets, (viii) push nets (*manago*), (ix) fishing for flying fish using sailing canoes and hand nets (*magal gog*), (x) net fishing, (xi) use of leaf sweeps (*ruwol*), (xii) individual fish traps (*yinup*), (xiii) large bamboo fish weirs (*sagel*), (xiv) stone fish weirs (*ach*), (xv) collecting invertebrates by various methods.

Yapese villages are grouped into networks of chiefly villages and lower ranked allies. Management of marine resources serves to support the hierarchical system of each network. Marine resources are exploited for subsistence use, to support cooperative efforts within the network, and to support the head of the network. Access to fishing grounds, fishing gear and fishing rights is managed within the hierarchical system. In general, fishing methods involving the most elaborate equipment (such as special canoes and gear) are limited to higher groups. They are controlled by fishing masters of each method who oversee the conduct of the fishing, often in response to requests from, or in support of, their chief. In addition, particular species are the property of certain higher ranking people.

The inshore waters of each village are within the jurisdiction of the village, and, except in the case of some fishing methods, outsiders are prohibited from exploiting the resources. Some methods are available to all fishermen within a village, while other methods, and sometimes the area in which they can be used, are vested in certain estates. The lowest ranking villages have no land or fishing rights except for a few methods practised in specified limited areas. The servant level has land, but the title belongs to a high chief to whom "the first fruits" and other tributes and services must be given.

Current reef and lagoon fisheries

In 2006, under the Pacific Regional Oceanic and Coastal Fisheries Programme (PROCFish), surveys to assess the current status of reef resources and their use were carried out in two Yapese communities: Riiken (including Wanyaan) located on the eastern coast, and Yyin (including Gilfith) on the western coast of Yap proper. The survey covered 74% of Riiken and 77% of Yyin communities. Fully structured questionnaires were administered to heads of households to collect data on general demographic, socioeconomic and consumption indicators, and to male and female fishers to collect data on finfish and invertebrate fisheries.

The survey results showed that both communities still enjoyed a rather traditional lifestyle, mingled with modern influences. Traditionally, Yap was supported by a subsistence economy, and the survey confirmed that is still largely the case. Each household has about two members who regularly fish, and all households confirmed consuming fresh seafood, mostly invertebrates. The average per capita consumption was as high as ~ 44 kg (SE ±7.3) in Riiken and ~47 kg (SE ±12.8) in Yyin. Most seafood consumed was from the household catch or offered as a gift, on a non-monetary basis, by a family or community member, pinpointing the importance of reef fisheries at the subsistence level.

However, the volume of imported food, fuel, manufactured goods, machinery and vehicles in these communities is increasing. The strong influence of a westernised cash-based economy was highlighted by the fact that most households surveyed depended on salaries, small businesses and money from retirement funds, family support and welfare payments for cash income. Fishing was not the principal source of income for either community and did not play a significant role as a source of complementary income.

Women in fisheries

Fishing in Riiken and Yyin is performed by both men and women (Fig. 1). Overall, women's participation is low (23–36% of all fishers are women), while 68% and 42%, respectively, of all male fishers in Riiken and Yyin exclusively target finfish. Surprisingly, only a low proportion of women engage in invertebrate collection: ~17% of all women in Riiken and 23% of all women in Yyin confirmed collecting invertebrates at some stage. Men do not usually specialise in invertebrate fisheries, but 11% of male fishers from Riiken and 35% from Yyin said that they gleaned or free dived for lobsters and giant clams in addition to finfishing.

The lower percentage of fishers pursuing invertebrate fishing, and the low diversity and productivity of this fishery, suggest that the invertebrate fishery is now less important than finfishing. In both communities, invertebrates are collected from the reef top or soft benthos, while divers collect lobsters and giant clams. In Riiken, the soft benthos and reef-top habitats may be jointly targeted during a fishing trip, while they are individually targeted by Yyin fishers (Fig. 2). Women collect invertebrates exclusively from the soft benthos and reef top, while men target the soft benthos and reef tops for gleaning and also go free diving for lobsters and giant clams. Soft benthos collectors mainly target *Gafrarium* sp. (*dab*), *Nerita polita* (*ligarich*), *Nerita albicilla* (*mire*), *Donax cuneatus* (*tuntheth*) and *Anadara* sp. (*goy*). Respondents confirmed that invertebrates are collected throughout the year. Frequencies of fishing trips are low, at most once a week, but usually only once a month. Each trip takes between 2 to 4 hours. Most fisherwomen glean according to the tide, i.e. during the day or at night.

Figure 3 shows that the highest average annual catches by wet weight are obtained by women gleaners from Riiken (reef top, soft benthos) with over 400 kg wet weight caught per fisher per year on average, while divers for lobster and giant clam collect less than 100 kg each per year.

The total annual catch volume extrapolated for the Riiken community was 5.99 t, while data suggest

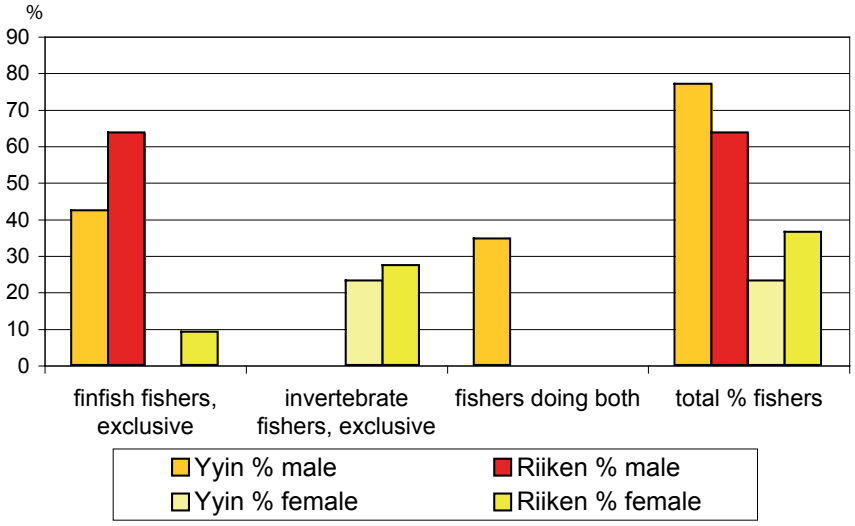

Figure 1. Proportion of fishers that target finfish or invertebrates exclusively, or both fisheries (not necessarily during one fishing trip). Figures are in percent of total fishers (all fishers = 100%)

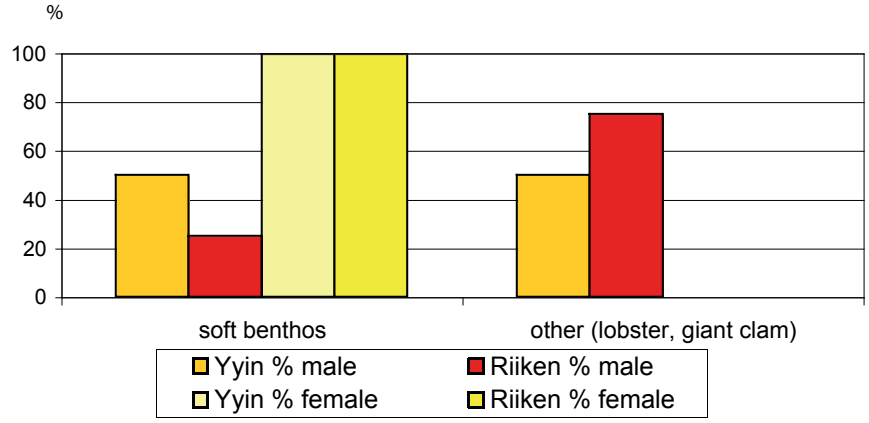

Figure 2. Proportion of male and female fishers from Yyin and Riiken taking part in various invertebrate fisheries

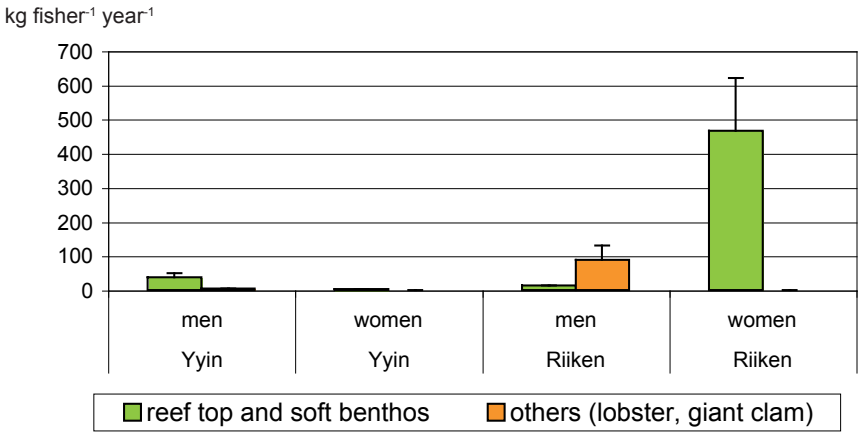

Figure 3. Average annual invertebrate catch (kg wet weight per fisher) by gender and fishery

an annual total catch of only 0.24 t wet weight for Yyin. In Yyin, most of this very small annual harvest consists of giant clams, which are, to a large extent, collected by men (86% of the total annual catch). The opposite is true for Riiken, where women are responsible for most of the annual catch (~90%), targeting lobsters and giant clams mainly (Figs 4 and 5).

Regarding general socioeconomic changes and trends reported for Yap's coastal fisheries, the surveys in the Riiken and Yyin communities confirmed that fisheries continue to play an important role in the subsistence economy. People mostly fish for leisure and to satisfy their own needs. Per capita consumption is high considering that the island sustains a healthy agricultural potential and thus offers alternatives for nutrition. Models indicate that, based on purchasing equivalent produce in a cash economy, Yapese coral reefs produce a value of around USD 3.5 million in seafood annually (Marine Resources and Coastal Management Plan; Smith (undated); Tafleichig and Inoue 2001).

Results of the 2006 PROCFish survey also showed that very few households generated income from fisheries. In this paper, we have not dealt with the finfish catch as it is an almost exclusively male activity. However, for each community, about half of the total annual finfish catch is sold outside. In the case of invertebrates, less than 1% of the total annual invertebrate catch is sold. Thus, our survey showed that the finfish catch is used both for sale and to satisfy local community demand, while in the case of invertebrates, all fishing pressure is imposed by community demand only. However, when considering fishing pressure on invertebrates, it should be noted that fishers target one or only a few species, and the available fishing grounds are limited, sug-

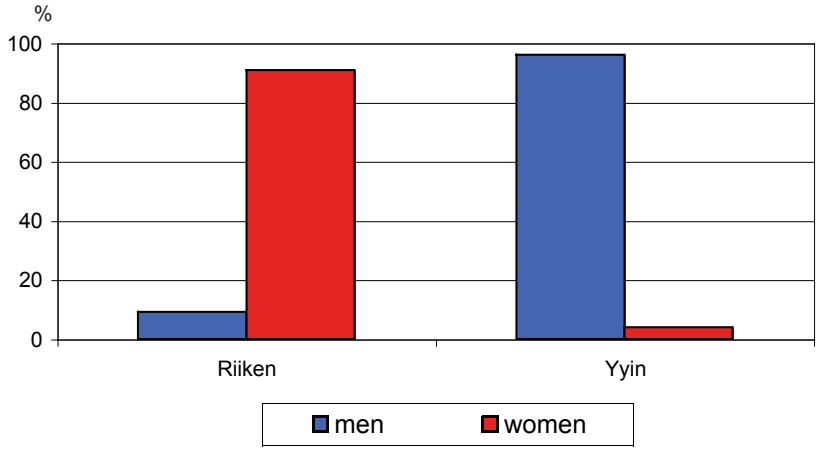

Figure 4. Contribution (%) by women and men to total annual reported invertebrate catch (wet weight)

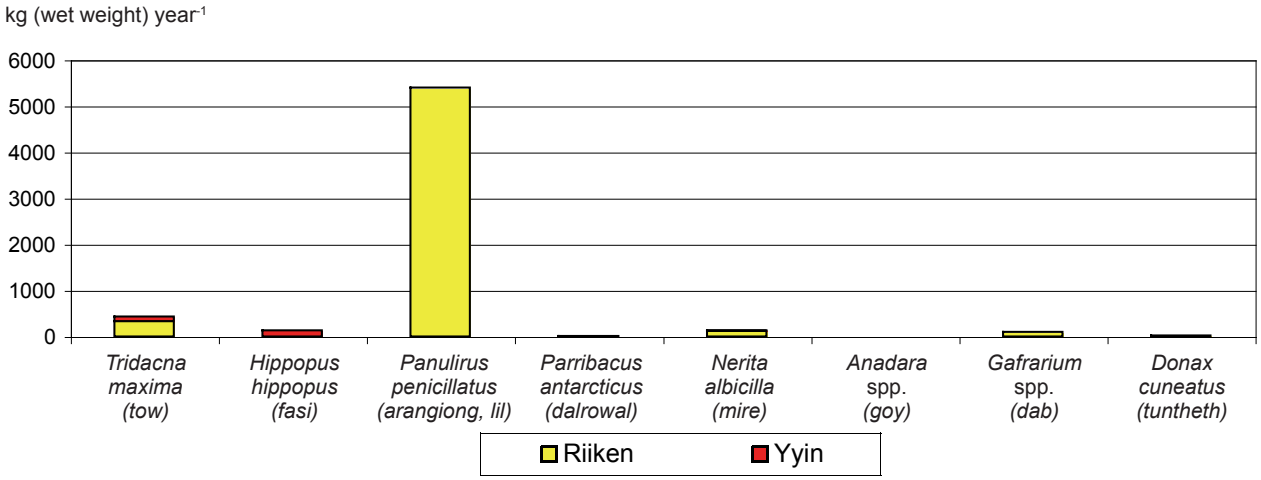

Figure 5. Annual extrapolated catch (wet weight) by species collected from reef tops, soft benthos and by free diving for Riiken and Yyin

gesting that possible detrimental effects may need to be monitored.

For example, in the case of Riiken, the highest invertebrate fishing pressure was observed for lobsters, which make up most of the total annual catch (wet weight). Assuming a reef length of 7 km to support lobsters, and given the total number of fishers targeting lobsters in Riiken, we may assume a fisher density of one fisher per kilometre, with each fisher collecting about 40 to 80 kg per year. Yyin has very limited reef surfaces suitable for gleaning, and hence a high fisher density of 13 per kilometre. Taking into account that each fisher may collect between 25 and 50 kg per year and that only a few species are targeted, again possible detrimental impacts may need to be monitored.

The survey also revealed a clear distinction in roles by gender. Men engage mostly — if not almost exclusively — in finfishing, while women engage in reef and soft benthos gleaning activities, but only to a relatively limited extent. Male fishers do not appear to specialise in invertebrate collection only, but are likely to free dive for lobsters and giant clams as well, and may also pick up other invertebrate species in addition to finfishing. This result supports the strong influence of Yapese traditions and culture discussed above.

In terms of women and men's participation in fishing, the major difference between the two communities surveyed is mainly explained by the fact that almost no invertebrate collection is done in Riiken (0.24 t year per year) compared to Yyin (~6 t year per year wet weight). Given the very low annual catches reported for Riiken, any small differences in data obtained from male and female fishers can result in misleadingly high percentages.

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