



A note on indigenous ecological knowledge and management of the river mullet, *Cestraeus goldiei*, in the Vurulata River, south Choiseul Island, Solomon Islands

Two weeks before he died, Bob Johannes emailed me to ask if I wanted to co-author a paper with him about indigenous ecological knowledge (IEK) of mullet. I had remarked earlier that I had heard all sorts of fascinating snippets of folklore, suggesting the existence of a lot of IEK about mullets of various species in the Solomons, but to my regret I have not actually been able to record much of it. One of the more tantalizing stories, which I heard from a number of people is that they sometimes experience hallucinatory dreams after eating mullet from certain locations (Makira Island in the Solomons was one of these). This may have something to do with what mullet eat, which for some of the common species includes the algal/fungal mat on the surface of sandy seabeds. However, despite having heard a lot of bits and pieces, the only mullet lore I have of any substance is what I present here. Although the following brief note concerns only one species, I thought it would be an appropriate, if small, contribution to a compilation in honour of Bob, because since I first corresponded with him, I noticed that the ecology and IEK of mullets had always intrigued and fascinated him.

Bob Johannes was always an inspiration to me. Indeed it was his wonderful and seminal book, *Words of the Lagoon*, that inspired me as a University of Queensland zoology honours student, in 1984, to do my PhD on the indigenous fishing knowledge of Solomon Islanders. I was born and grew up in the Solomons, and have many fond memories of wagging school to accompany Langalanga men and women on fishing trips during that time. The very idea, put forward so eloquently and persuasively by Bob, that people without degrees in biology (indeed, people who may not even be literate) knew more about many aspects of the ecology and biology of tropical fish than the leading scientists of the time, completely captivated me (and still does!).

Soon after that, I started corresponding with Bob by email and eventually met him in Hobart, when he was still working for CSIRO in 1990. He was always helpful and encouraging, and through him I came into contact with a lot of wonderful and interesting people working in this fascinating field. Although I once argued with him about some of the finer points of one of his papers (Johannes 1998), he won the argument hands down! Bob's scholarship was always impressively broad and watertight, but more importantly, his ability to distill often overwhelmingly complex issues into pithy, lucid arguments, without cutting corners or neglecting critical points, never ceased to impress me. He always had an eye to the practical, was intolerant of any form of intellectual pretension, and was always at the cutting edge with usable, affordable policy recommendations for fishery management in cash-poor, developing countries. He was always ahead of the field in this respect. Bob's 1998 paper in *Trends in Ecology and Evolution*, "The case for data-less marine resource management", the paper I quibbled with, is I think one of his most important, and indeed one of the most important papers about fishery management in the developing world. I am shocked and dismayed that he has gone, and will miss him.

The story of *bori*

The information contained in this note was obtained during and after a trip that I made to Rarakisi Village, on the Vurulata River of southern Choiseul Island, Solomon Islands, on 17 and 18 April 2000. The purpose of the trip was to follow up on a request from the Rarakisi community to investigate the declining population of local river mullet, called *bori* in the local Sengga language (or *buri*, in the neighbouring Babatana language). This trip was made when I was employed as Senior Technical Advisor for the WWF Community Resource Conservation and Development Project.

A small group from the WWF project based in Gizo, Western Province, traveled to Rarakisi on the south central Choiseul coast, and after discussing the problem of the declining *bori* population with various community members, we headed upstream to try to find some of the fish, so as to see where the fish lived and try to determine its scientific identification. After about four or five hours of walking and paddling upstream with two dugout canoes borrowed from Rarakisi people, we arrived at Leadley Jonata's two garden houses, where we overnighted. In the morning Leadley, with a small team, went out to find a *bori*. They did not take long to bring one back (plus a couple of other species), which was then photographed and measured. *Bori* belongs to the mullet family Mugilidae (*lipa* in Solomon Pijin), which contains several members that occur in fresh water. I later sent the photographs to Gerry Allen, who immediately identified it as *Cestraeus goldiei* (Macleay, 1883), the river mullet. *C. goldiei* is a very unusual looking fish with a strangely underslung bottom jaw and thick lips. A quick glance at FishBase



The *bori* (*Cestraeus goldiei*) and the speargun used to catch it



The *bori* (*Cestraeus goldiei*) head



A gravid *bori* (*Cestraeus goldiei*)

indicates that the species has also been reported from PNG and the Philippines, and probably has quite a wide distribution in Asia and the western Pacific. However there does not appear to be a great deal of scientific information available about this species.

The local knowledge that I was given about this fish, especially by Leadley Jonata, was quite detailed and impressive. According to Leadley and other Rarakisi people, the fish used to be extremely abundant and could easily be caught quite close to Rarakisi. Now it is very scarce, as evidenced by our long trip up-river to find one. *Bori* feed on a slimy green alga, *lapa*, which grows on the stones in the river, as well as the fruits of the *koa* tree that grows along the banks of the river. Its breeding is seasonal and involves a migration downstream every May and June to an area just inside the mouth of the river where it lays its eggs on the hairy roots of the *renggisi* vine (*susun-duru* in Babatana). This vine hangs from trees on the side of the riverbank. Unfortunately I was not able to determine the scientific names of any of these plants. People used to catch the fish in large numbers with nets when they were making this annual breeding migration downstream. The *bori* individual that Leadley and the team caught was a gravid female and was about 30 cm long.

The Rarakisi people said that the overharvesting of the fish had almost certainly been the result of using gill nets during the fish's spawning migrations down the river. A factor that may add to the destructive influence of overfishing on the already declining local population of this fish, is the possibility that the large infestation of water hyacinth near the mouth of the Vurulata River is killing the fish's eggs and larvae. This would be due to the water hyacinth reducing levels of oxygen and nutrients such that survival of *bori* eggs and larvae is affected. Without local information about the annual downstream spawning migrations made by the fish, this potential vulnerability may well have gone unnoticed.

A clear conclusion from the above report is that the *bori* population in the Vurulata River has declined to an alarmingly small size and appears to be in danger of becoming even smaller. This decline would definitely accelerate if the eggs and juveniles died as a result of the declining water quality near the river mouth because of the water hyacinth infestation. At the time, my recommendation to the leaders of the Rarakisi community was to try their best to carefully regulate the harvesting of *bori* in the future. I suggested that the population of the fish would recover most rapidly if all harvesting stopped for a minimum of about three to five years. This suggestion was essentially a wild guess since it is impossible to know anything about recruitment rates for that population without a great deal more work. But after three to five years the locals would at least have a good idea how the population had fared, and could no doubt work out for themselves whether they needed to continue the ban a little longer or relax it. In any case, a lifting of the ban would ideally be accompanied by the kinds of per-family quotas that were proposed as part of a more elaborate resource management program.

This is drawn up by the Michi Community in Marovo Lagoon, as part of a Resource Management Order, which WWF have also been assisting with.

Given the broad distribution of this species, it is clearly able to go to sea, despite spending most of its time in rivers. This means that adults can migrate between rivers, and populations may not be as completely vulnerable as they would be if they were stenohaline freshwater fish. Nevertheless, such migrations may take a long time to occur, which would mean that the recovery of local populations is more likely to be accelerated by local management measures.

The WWF project made a number of inquiries, trying to work with the national government to start a biological control program to kill the water hyacinth. The government responded with enthusiasm, but since the coup in June 2000 this plan has been shelved. In the meantime we noticed that the Rarakisi people wasted no time in taking to the water hyacinth with bush knives, and manually clearing it from the mouth of the river. Given the seriousness with which the Choiseul people tend to treat environmental issues, I have no doubt that they will also do their best to manage populations of this intriguing (and undoubtedly delicious) fish in the future. With some luck and a lot of good communication, perhaps the same village-based fishery management snowball effect that Francis Hickey and Bob recently reported for Vanuatu (in the last issue of this bulletin) will soon take hold in the Solomons and elsewhere. If those of us working in this area can maintain the kind of momentum that Bob so passionately and determinedly generated during his inspiring career, I'm sure it will happen.

References

- Johannes, R.E. 1981. Words of the lagoon: Fishing and marine lore in the Palau District of Micronesia. Berkeley: University of California Press. 245 p.
- Johannes, R.E. 1998. The case for data-less marine resource management: examples from tropical nearshore finfisheries. *Trends in Ecology and Evolution* 13(6):243–246.

Simon Foale

Resource Management in Asia Pacific Program, Research School of Pacific and Asian Studies
The Australian National University, Canberra ACT 0200 Australia.
Email: simonjf@bigpond.com



A giant grouper forever

I first met Bob at FAO, in Rome, in December of 1978, at a small gathering on TURF (Territorial Use Rights in Fisheries). I guess I was one of the youngest participants; at any rate Bob's first impression of me was that I was unbelievably young. (Actually I was 32 years old at that time!) Bob initially came to know me through my paper on the ethnoichthyology of the Lau, Solomon Islands. Since that first time we met again in Osaka, Hong Kong and Bolinao.

Bob's experienced and insightful knowledge on marine biology always inspired me, since I have been interested in the same field as an ecological anthropologist. As he suggested, the discipline is a useful tool for us to talk with cheerful artisanal fishermen, over a glass of beer or local spirits in a coastal hut and other places. We both believed that the approach is also effective in understanding indigenous ecological knowledge retained by local fishermen, (e.g. voices of the lagoon). In the long run, that may help both scientists and policy-makers to pursue collaborative management measures in marine resource use. His philosophy will surely be a bible to direct the future of relevant fields.

Yes, indeed we drank a lot and sang at a karaoke bar in downtown Osaka. That too is important to recall.

And his recent editorial work on live reef fish should further be promoted by those who have shared the work with him, and who loved him. Bob Johannes, surely a giant grouper forever!

Tomoya Akimichi

Research Institute for Humanity and Nature
Kyoto, JAPAN