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**THE TABAO OF ATULAYAN:  
COMMUNAL USE OF PRIVATE PROPERTY IN THE  
PHILIPPINES**

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**INTRODUCTION**

The purpose of this paper<sup>1</sup> is threefold: first, to describe a low cost, effective fish aggregating device (FAD) technology; second, to examine the factors sustaining the use of this technology without the extensive outside assistance that characterizes the use of FADs in many other developing country contexts; third, to analyze a system of communal use rights with regard to private property. This will be accomplished through an analysis of the deployment and use of *tabao* (the Bicol term for FAD)<sup>2</sup> by fishers from Atulayan Island, Camarines Sur, the Philippines.

FADs are not a new technology in the Philippines. Inexpensive, but effective *payao* (the most widely used Tagalog term for FADs) have been used for decades by both large and small scale Philippine fishers (Murdy 1980; Floyd and Pauly 1984). Some 2000 *payao* were reported to be deployed in several fishing areas in the Philippines in 1981 (Floyd and Pauly 1984). Aprieto (1991) estimates that in 1990 there were some 3000 in Moro Gulf in the southern Philippines alone. By the mid 1980s, evidence began to suggest that commercial net fishers using *payao* were capturing skipjack tuna at such a small size that they were misidentified and reported as scad or frigate mackerel (Floyd and Pauly 1984). The authors conclude that *payao* were apparently contributing to growth overfishing. Aprieto (1991) provides more damaging evidence against *payao* in a paper reporting that about 90 percent of skipjack tuna landed by inshore purse seiners and ringnetters operating around *payao* are quite small (between 16 and 32 cm.).

Not all reports concerning the use of FADs in the Philippines have been negative, however. As an aspect of habitat management associated with the Central Visayas Regional Project, small-scale FADs were placed 3 km from shore for use by handline fishers. Vande Vusse (1991) reports that the daily harvest by 15 fishers at each FAD approximates the daily growth of the fish aggregated. He further notes that if commercial purse seine fishers can be kept away, the FADs can provide a sustainable, as well as profitable fishery for artisanal fishers.<sup>3</sup> Although individual harvests around these FADs are relatively small (average 4 kg per day), the FADs doubled the previous average catches of these fishers (Vande Vusse, personal communication).

### ATULAYAN ISLAND

Atulayan Island is at the mouth of Atulayan Bay in Lagonoy Gulf (Figure 1), which is the largest fishing ground in the Bicol Region of the Philippines. Approximately 42 percent of the more than 20,000 households in the coastal barangays<sup>4</sup> of the Gulf rely on fishing for their livelihood, making it the largest single occupational category (PRIMEX 1993). Barangay Atulayan, the only barangay on the island, is composed of several rows of mostly one or two room nipa huts fronted by a white coral sand beach and backed by steeply rising, tree covered hills. It is one of the seven coastal barangays of the Municipality of Sagnay, and is the only one almost entirely dependent on the fishery for its livelihood. The total population of a little over 800 is divided among 122 households, all of which are classified as fishing households.

There is little room for agriculture, since the island's coast is backed by relatively steep hills and cliffs, but bananas, coconuts, and some greens are grown in relatively small gardens for home consumption, and one small planting of maize exists on a hillside. Many families have several chickens, and a small number raise a few

pigs. The only other economic activity or occupations in the community are around 10 *sari-sari*<sup>5</sup> stores operated by fisher family members, four fish buyers, two primary school teachers, five boat makers, and two enterprising people who charge one peso admission to view video tapes played on generator powered VCRs.

The fishery consists of 79 boats (*baroto*), all double outrigger, plank and/or plywood built, ranging from about 3 to 6 meters in length. About 51 percent are

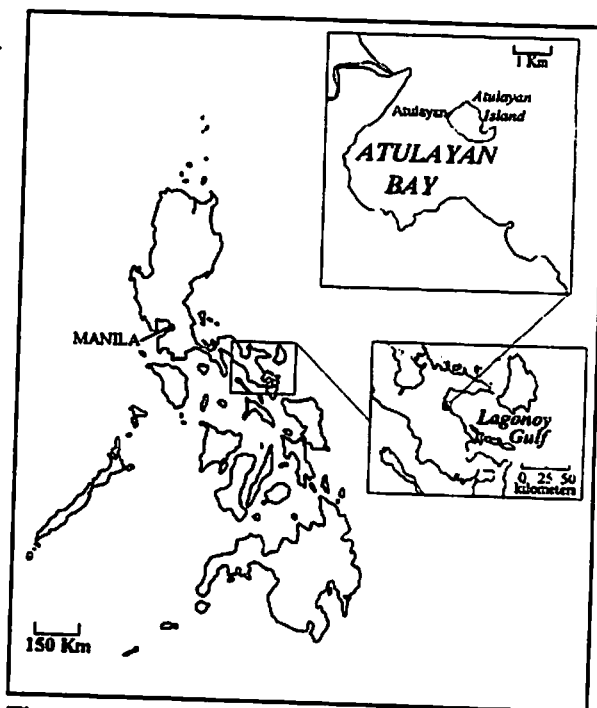


Figure 1. Location of Lagonoy Gulf and Atulayan Bay in the Philippines.

powered by 12 to 16 horsepower, inboard gasoline engines. The rest are powered by paddle or sail. Principal fishing methods are *banwit* (hand line), *og-og* (hand line with multiple hooks & artificial plastic fiber or feather bait), *pana* (spear gun used by diver), *kuralon* (net used to catch *turay* [sardinella species] as well as some other fish at night), and *sarap* (small seine net used to capture bait fish as well as *maripati* [type of sardinella] and *kuyog* [Siganidae fry used for making *bagoong*--fermented fish paste]). Trolling, using *katihanan* (wooden jigging lure with multiple hooks attached, targeting octopus, squid, and cuttlefish) and *rambo* (feather lure, targeting pelagics) is also practiced. For more than a generation Atulayan fishermen have used *tabao* to aggregate fish for handline fishing in both shallow and deep waters. The remainder of this paper explores the *tabao* fishery of Atulayan.

### THE TABAO FISHERY

**Construction and Deployment of *Tabao*** The *tabao* of Atulayan are relatively inexpensive, easy to build and deploy, and effective. The floats are constructed of bamboo or styrofoam or a combination of the two. When bamboo is used, ten to fifteen poles are required, resulting in a float approximately three by one *dupa* (arm span, one *dupa* is approximately 5 feet). The anchor is a large stone of 50 to 250 kilograms, depending on depth. The anchoring cable is 5 strand, one centimeter, multifilament synthetic (polyethylene) rope (trade name and size, Evelon #16). Coconut leaves are attached to the anchor line for several *dupa* at about 15 *dupa* below the surface. The fronds are replaced at monthly intervals. Just below the level of the coconut leaves, the anchor line is knotted (no shackles are used) so that the upper portion, including the leaves and float, can be moved to accommodate net fishers. Total cost for a *tabao* with a bamboo float in 70 *dupa* is reported to be 1000 Pesos (approximately \$40US). A *tabao* deployed at 700 *dupa* costs about 3000 Pesos, most of the increased cost being associated with the anchor line. Costs are borne by individual fishers who are considered the owners of the *tabao*.

Prior to a recent typhoon there were reportedly 10 *tabao* deployed by the fishers of Atulayan. At the time of the research only four remained, three relatively close to the dropoff at the edge of the coral reef, between 70 and 100 *dupa*, and one in deep water at 700 *dupa*. All are located to the north east of the island in Lagonoy Gulf. Those situated close to the reef wall are reported to last about one year. Loss is attributed to abrasion on the dropoff. Those in the deep are said to last three years or more. The fishers of Atulayan have no *tabao* deployed in Atulayan Bay, but several are deployed by fishers from other coastal communities at depths from 20 to 50 *dupa*.

**Use Rights** *Banwit* (handline) fishers have the right to fish around anyone's *tabao*. The owner of the most frequently used *tabao* of Atulayan (70 *dupa*), on the basis of an informal agreement, extracts a fee of 10 Pesos per *bangkulis* (yellowfin tuna). All other *banwit* landings are free of charge. Different owners have different rules. One owner of a *tabao* in the deep (deeper than 500 *dupa*) only charges if more than 20 *baroto* are fishing. Owners, however, collect one-third of the profit from net fishers who use their *tabao*. The net fishers are from other coastal communities.

**Sailing to the *Tabao*** The *tabao* at 70 *dupa* is located about one-half hour, by motorized *baroto*, from the landing at Atulayan. Those in the deep are about twice as far. Fishers without motors can request a tow from a motorized *baroto* owner. Frequently, but not always, the tow is associated with the fish buyer. Somewhere around two to three-thirty in the morning, early morning *banwit* fishers start gathering at the buyer's landing to obtain bait (usually *turay* or *tamban*, two

types of sardinella). There is no charge for the bait, but it is provided on the condition that the fisher receiving it will sell his catch to the buyer who provides the bait. One morning, five motorized and 14 unmotorized *baroto* were observed at the landing. Eleven of the unmotorized were towed by one buyer's boat, and three were towed by another buyer's boat. The towing service is also provided on the condition that

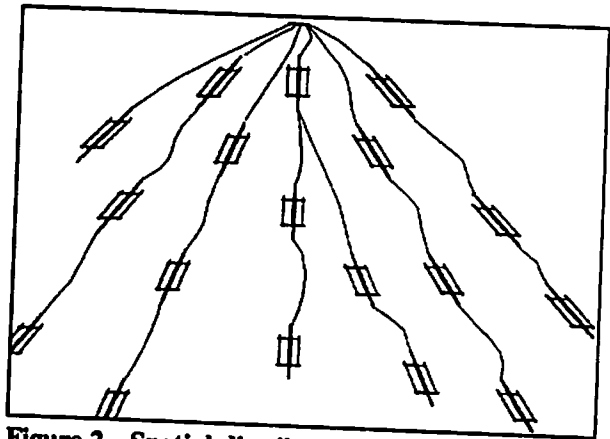


Figure 2. Spatial distribution of fishing boats tied to the fish aggregating device.

the fisher will sell his catch through the owner of the tow boat. If the tower is not a buyer, he may request either that the towed fisher pay for part of the fuel or that the catch be sold to the tower at a small discount, who then sells it to make up the cost of the service.

**Methods: Early Morning Handline Operations** Early morning handline fishing around the *tabao* takes place from approximately 4 AM to 11 AM. Upon

arrival at the *tabao* the fishers either tie their *baroto* to the float or to a boat already tied to it. Linear separation between boats is about one and one-half to three boat lengths (7 to 15 meters), and there can be a number of lines of boats radiating out from the *tabao*. Each *baroto* usually carries one or two fishers. One morning when the authors participated in the operation, there were six lines of boats radiating out and away from the *tabao* toward Atulayan Island, the direction toward which the current was flowing (see Figure 2). A total of 28 *baroto* were fishing around the *tabao* that morning. Reportedly, as many as fifty have fished around this *tabao*.

The handlining operation includes an ingenious deployment of chum along with the baited hook. Fishers carry smoothly rounded, oblong rocks (*palos*), approximately 7 to 8 inches long and 4 to 5 inches in diameter. These rocks, usually near white, are collected along the shore and are probably wave worn pieces of the reef. The bait fish is cut into small pieces. One whole fish or a piece is put on a weighted hook, and other pieces (the chum) are bound to the rock with several wrappings of the fishing line. The fishing line is then tied with a special knot that will release with a jerk of the line. The combination, hook, bait, chum, and line are thrown overboard, and when the fisher judges that it has reached the appropriate depth, the line is jerked. This releases the line wrapped around the rock, which releases a cloud of chopped baitfish as it unwraps, and the weighted, baited hook is deployed within the chum. The rock falls to the bottom where we imagine it is creating a new habitat and grounds for speculation by future archaeologists. This is done an average of 30 times per fisher, per trip, using about one to two kilograms of bait. Local fishers refer to this technique as *wagwag*, the term used to refer to the process of shaking the dust out of a fabric (e.g., clothing, blanket, etc.).

It is a simple handlining operation. No rods or winches are used. The line is kept on a wooden spool, and bringing the fish onto the boat is effected by pulling the line by hand, hand over hand. One fisher showed us blisters resulting from landing a 50 kilogram *bangkulis*. The fish is struck on the head with a wooden club as it is brought into the boat. No ice is used for transportation to the landing or for transporting from the landing to the market; hence, a fish could arrive at market with no cold storage more than ten hours after capture.

Fish targeted by the early morning *banwit* fishers around the *tabao* are *bangkulis*, *hanapos* (*Seriola dumerili*), and large varieties of *baraka'* (*Serranidae* sp.). They also harvest smaller pelagics and coral fish around the *tabao* which are usually kept for home consumption or sold in the barangay to neighbors. *Bangkulis* (yellowfin tuna) is invariably sold, but the innards and sometimes the head are kept for consumption in the home.

**Methods: Overnight handline Operations.** The overnight handline operations are very similar to the early morning except a light (petrol pressure lantern) is used, fewer vessels participate (usually 6 to 7 but up to 20 around one *tabao*), and it is usually conducted around a *tabao* in the deep (deeper than 500 *dupa*). Fishers usually depart in the late afternoon and return between 7 and 11AM the following morning, depending on catch. Crew size is usually one or two, the *wagwag* technique is used, and it is reported that a single *baroto* will use up to 5 kilograms of bait and 100 *palos* (rocks). The overnight fishing operation focuses on *tangigi* (Spanish mackerel), and *bangkulis*, but *lamadang*<sup>6</sup> (dolphin fish), *abubngon* (scad), *kanoos* (squid), and *pundahan* (skipjack tuna) are also frequently caught.

**Methods: Ring netting.** The ring net (*kalansisi*) has been classified as a non-traditional gear by Sagnay municipal ordinance; hence, it is prohibited from fishing in Atulayan Bay which is subject to a local ordinance restricting the bay to "traditional fishing methods" (Sagnay Municipal Ordinance No. 93-006). The *tabao* of Atulayan, however, are outside the bay. There are no ring net owners living in Atulayan, but some live in other coastal communities nearby. As noted above, net fishers sometimes contract with *tabao* owners for fishing rights; hence, some of the *tabao* of Atulayan are sometimes fished with *kalansisi*.

A ring net operation involves the use of two boats to deploy a large rectangular net around a school of fish. The net has a purse line at the bottom, which when pulled, closes the bottom of the net, trapping the fish. Crew size for a single *kalansisi* operation is usually between 10 and 15 (cf. Garces, et al. 1995; BAS N.D.). You cannot set a ring net around a *tabao* connected to the anchoring line; hence, the float and line with the coconut fronds, as well as the school of fish must be separated from the anchor. As described above, the anchor line is knotted just below the coconut fronds. There is a certain amount of slack in the line, and the line is pulled up gradually and unknotted. The helper boat pulls the anchor line out of the way, in the direction from which the current is flowing to keep the net from making contact and possibly abrading the line. A weight is placed below the coconut fronds which are placed back in the water. After a brief period of time the fish reaggregate around the *tabao*. The time taken to unknot and move the anchor line is so brief that the fish hardly disperse. The net is then set around the fish, and the harvest takes place. *Kalansisi* operations usually target pelagics that aggregate near the surface such as *pundahan* (skipjack), other tunas, and mackerel.

**Social Interaction at the Tabao.** Fishing the *tabao* of Atulayan is not a lonely endeavor, with a single vessel and crew facing the empty sea alone. There

is usually more than one boat at a *tabao*, and given the above description of the early morning, handline fishing operation, one would assume a fair amount of social interaction between fishers. Approached from a distance, the group of *baroto* appears to be a community at sea. Within the group constant conversation and banter can be heard. Everyone knows who caught what, but fishing is not the only topic.

Topics range from fishing to the latest gossip in the neighborhood. A fisher in the group who decides to take a catnap while waiting for a catch is a favorite target of pranksters. A classic example of a practical joke at the *tabao* is when a fisher swims to the *baroto* of a napping fisher and tugs the napping fisher's line, causing him to start and frantically pull in his line. The fisher soon realizes that it is not the big fish he was dreaming about a while ago. A more mischievous example occurs when a napping fisher's lines get entangled with another fisher's line. The other fisher pulls his line to get hold of the line of the napping fisher. He frees both his line and the sleeping fisher's, hooks the sleeping fisher's line to a sack of *palos* and lets go of the line and the sack. The napping fisher, feeling the strain, starts pulling his line in and gets his catch of a sack of rocks along with a loud burst of laughter from witnessing fishers. Even a fisher who actually has fish at the end of his line but loses it as he pulls the line in is not spared from the unwanted attention.

Amidst all these pranks and banter, the spirit of goodwill still prevails as exemplified by the authors' observation of bait sharing at the *tabao*. Even as the fishers assemble for bait at the fish buyer's house as early as two o'clock in the morning, just before going out to the *tabao*, one will not miss the constant teasing and haggling when the fish buyer starts distributing the bait. As they prepare to leave, fishers help each other in pushing their *baroto* off the shore. Fishers using unmotorized *baroto* tease each other as they position themselves and as they wait for the motorized *baroto* that will tow them to the *tabao*. And before high noon, fishers at the fish landing relate stories about the morning's fishing operation, about who-caught-what and the-one-that-got-away with no trace of envy.

**Fish Buyers and Fish Marketing.** As noted above, fishers are often tied to buyers through the provision of bait or towing services. This relationship does not appear to be exploitative. There are several buyers in Atulayan; hence, there is opportunity for competition. The buyers also live in a small community, having daily face-to-face interaction with the fishers and their families--a situation not conducive to exploitative relationships. Through time, these buyers have established practices that most participants perceive as fair. Profit per kilo is usually between 5 and 10 Pesos. It was reported that it is unusual for there to be a

disagreement over prices paid for fish, and that it is not a good practice to offer too low a price. It was stressed, however, that in the very unusual situation where the fisher feels the price offered is too low, he can sell elsewhere.

While buyers usually obtain sole buying rights from fishers through the provision of bait, there are times that fishers can easily obtain bait themselves. This is during the period of full moon when bait fish are easily caught. During this time, buyers go out to harvesting areas to buy fish directly from fishers at sea. Buyers performing this activity are referred to as *bangal*. The buyer from Atulayan ties up to the *tabao* along with the fishers, and when fish are caught, the *bangal* makes an offer for the fish. If the price is acceptable, the fisher sells to the *bangal*. If not, he sells elsewhere. Prices paid by *bangal* at the *tabao* are about 5 percent higher than those paid at the fish landing.

The fish caught at the *tabao* of Atulayan are not sold in the international marketplace. Post harvest handling and distribution are impacted by the lack of cold storage and inadequate transportation links. Hence, the fish are consumed in Atulayan or sold in the local marketing center of Tigaon (the municipality just north of Sagnay). As noted above, no ice is used for transportation to the landing or for transporting from the landing to the market; hence, a fish could arrive at the Tigaon market, having no cold storage in a tropical climate, more than ten hours after capture. The potential for bacterial growth results in fish of questionable quality for further distribution into the national or international marketplace. The *tabao* of Atulayan, hence, contribute to local nutrition and income.

#### DISCUSSION AND CONCLUSIONS

Exposure to development assistance projects where international FAD "experts" frequently advocate expensive, high technology FADs, and bemoan the fact that seemingly efficient deployments are not replaced by target populations leads one to believe that there is something wrong with the "high-tech" approach. Observation of traditionally and sustainably used FADs in Indonesia (see Pollnac 1994 and the chapter by Zerner this book) and the Philippines reinforces this belief. FADs can and do work, and they can be financed, built, and maintained by small-scale fishing communities. Fishers of Atulayan would not use their own funds to build, deploy, and fish around *tabao* if this were not so.

The *tabao* of Atulayan exist because they are truly appropriate technology, in the fullest sense of the concept. If we focus only on handliners, they appear to be sustainable. It could be argued that the resource sustainability aspect of appropriate technology might sometime in the future be violated by *kalansisi* operations, based on evidence from elsewhere in the Philippines (Aprieto 1991;



Floyd and Pauly 1984). Otherwise, the technology is simple, inexpensive, and easy to deploy with readily available materials.

Compare the *tabao* of Atulayan with the "high-tech" FADs deployed by many international development assistance projects which are described elsewhere in this volume. The *tabao* of Atulayan are relatively inexpensive. One large *bangkulis* would more than pay for the *tabao* deployed at 70 *dupa*, and many are caught at this *tabao*. A 50 kilogram *bangkulis* earns a fisher over 1500 Pesos, and the *tabao* cost only 1000. The technology is also appropriate because it contributes to the nutrition of the people of Atulayan, Sagnay, and Camarines Sur. Many other internationally assisted FAD projects are directed at producing high value fish for export while local people eat imported canned mackerel, mutton flaps, or turkey tails (cf. chapter on Samoa by Gates, Pollnac and Gates).

Appropriate technology is sustainable because it is such that it can be purchased or built, deployed, used, and maintained by intended users. It is appropriate because it is cost effective and provides something the users and their community need and want (e.g., income and high quality food) and does not degrade either the environment or the resource. Confronted with undeniably appropriate technology, private individuals will invest in it as they have with respect to the *tabao* of Atulayan.<sup>7</sup> Given these considerations it is easy to understand why there is sustained use of FADs in Atulayan in contrast to international development assistance projects where the technology is frequently unnecessarily complex and beyond the economic and technical capacity of the local users. The high cost of the "high-tech" FADs frequently requires outside or government financing; the deployment is usually conducted by government agencies with the assistance of foreign "experts"; and the product is almost always directed at the export market rather than local nutrition with most of the income generated being accumulated by elite owned and operated export firms rather than local fishers and fish dealers.

Finally, how can we explain communal access to the *tabao* of Atulayan which are technically private property? Perhaps it has something to do with the fact that they are deployed in what is viewed as communal property. Perhaps the owners, low technology fishers themselves, realize that they cannot catch all the fish aggregating around their *tabao*, and the goodwill they earn by charging either nothing or a nominal fee comes at little or no expense. Perhaps this goodwill inhibits the development of invidious comparisons of access and catch which might lead to jealousy and destruction of *tabao* which are extremely difficult to monitor.

The degree of cooperation manifested in the use of the *tabao* and the relatively strong ties that seem to exist between the fishers of Atulayan appears anomalous in light of the common characterization of fishers as "independent

types" (Pollnac 1988). For example, Poggie (1980), in an analysis of data from southern New England, contends that this characteristic helps marine capture fishers psychologically adapt to their occupation. The decisions they have to make in the face of uncertainty have immediate effects with respect to safety of the vessel and its crew as well as success of the hunt. These decisions have to be made independently, with little or no time for consultation and deliberation due to the nature of their work and the rapidly changing nature of the sea. Poggie (1980) further suggests that an independent personality characteristic is related to and selected by the techno- environmental fact that because of the nature of their work, most capture fishers are physically removed from the help and support of land based society.

In addition to the mechanisms that promote psychological independence of individuals, there are also environmental and socioeconomic reasons why capture fishing firms (independent vessels) manifest a great deal of independence in the form of relative autonomy. The difficulty of boundary maintenance in the marine environment has resulted in most fishing societies treating the open ocean as a common property resource (cf. McCay and Acheson 1987). Species mobility also militates against establishment of firm boundaries. Even in cases where some system of sea tenure exists, it is most commonly communal in nature—the resource can be exploited only by fishers from a specific village or social group within the community (cf. Acheson 1975; Ruddle and Johannes 1985; Pollnac 1984). Hence, in most fisheries the first vessel that arrives over a school of fish and deploys its gear has rights to the spot until the crew wishes to move elsewhere. Vessels are in constant competition to get to the best spots first and keep them secret if possible. This competitive spirit contributes to the independent nature of fishers.

Two of the factors cited above as important in selecting for the characteristic of independence among fishers are absent in the system of *tabao* fishing in Atulayan: physical removal from help and support and competition over fishing spots. The community of vessels at the *tabao*, as described above, provides a social and physical matrix of support uncommon in marine fisheries; hence, isolation from land-based society is a less salient factor. Further, the *tabao* are the fishing spots where the fish aggregate, and the fishers concentrate at the *tabao*; therefore, competition over finding the spot where the highly mobile prey are located is relatively meaningless. Therefore, communal access to the *tabao* of Atulayan, whatever its origin, has reduced or eliminated some of the factors posited as contributing to the psychological trait of independence among capture fishers, facilitating a high degree of social solidarity. This high degree of social solidarity probably provides impetus to continue the institution of communal access

to the privately deployed *tabao* of Atulayan--a system of positive feedback sustaining an apparently positive institution.

In sum, we have described the *tabao* of Atulayan as appropriate technology in the fullest sense of the concept. We identified the characteristics that led us to classify the *tabao* as appropriate and suggest that is these factors which have sustained the use of this technology without the extensive outside assistance that characterizes the use of FADs in many other developing country contexts. Finally, we provided several suggestions concerning factors leading to communal use rights of the privately owned *tabao*.

## NOTES

1. Information concerning the *tabao* of Atulayan was collected while the authors were conducting research in Atulayan concerning aspects of the human ecology of the coral reefs of Atulayan Bay. The research was financially supported by USAID/R&D, Washington D.C. Logistic support was provided by the International Center for Living Aquatic Resources Management (ICLARM), Manila and The Coastal Resources Center of the University of Rhode Island.
2. All non-English terms used in this paper are Sagnay dialect of Bicol unless otherwise noted. This does not apply to scientific names attached to fish, which are Latin.
3. While conducting research in the Central Visayas in November 1995, we were told by some staff formerly associated with the Central Visayas Regional Project that some of the fishers associations sold purse seiners the rights to use the FADs for a portion of the catch.
4. Barangay is the Tagalog term for the lowest level of political organization in the Philippines. It can be translated as "village". The term is so commonly used in English when discussing or writing about the Philippines, that it is routinely not put in italics and pluralized with "s".
5. The Tagalog term for very small stores which stock small amounts of day-to-day items like noodles, spices, cigarettes, matches, etc. Size rarely exceeds 9 square meters and is frequently smaller.
6. Also referred to as *lamadan*.
7. This does not mean that individuals will not invest in technology which can destroy the resource. For example, the commercially fished *payao*, blast fishing, etc.

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