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- _ Title of the paper:** **TOWARD AN IMPROVED MANAGEMENT OF
COMMON PROPERTY IN TAM GIANG LAGOON,
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ABSTRACT

Tam Giang lagoon in Vietnam provides sources of living directly or indirectly to about 300,000 inhabitants living around the lagoon in 236 villages within 31 communes. The high population density and high growth rate puts more and more pressure on the resources, particularly increasing overexploitation. The lagoon system is very complex because not only human activities are diverse and intensive but also natural environment displays very high heterogeneity. The marine, inland conditions, the river estuaries, seasonal fluctuation and high range in salinity, and different soil property all combine to form the complex ecosystems. There are difficulties to manage such complex systems for sustainable use.

In 1994, a project "Management of Biological Resources of Tam Giang Lagoon" funded by CIDA/IDRC was developed by a group of Canadian and Vietnamese researchers from Hue region. Research activities, started in 1995, had the objectives to understand the aquatic environment, exploitation, use and the present management of the resources. Participatory data collection was to form the basis on which to build a sustainable management strategy of Tam Giang resources. The research was also to address methodological issues on local participation and community-based activities.

First efforts made by the projects were to involve resource users in the research activities and raise their awareness about resource problems and conflicts in management. The project collected data to serve as a basis from which to establish community-based management of biological resources in the lagoon. The main project activities were to use a participatory research approach with interdisciplinary perspectives in studying the ecological and human systems. Human efforts, which increase competitive ability to exploit lagoon resources, result in conflicts not only among local groups but also between management strategies. Realizing the conflicts is very important to perceive difficulties and challenges in further expanding community-based activities for management of communal resources.

This paper provides information extracted from preliminary research findings to help understand the unique system and highlight issues regarding management of common property in the lagoon. The issues raised include nature of resources, technologies used to exploit these, human behaviour, arrangements for property rights associated with different management strategies, and efficiency and effects of informal and formal rules within the present management.

BACKGROUND

The Tam Giang lagoon, one of the biggest in Asia, is located in ThuaThien Hue province, Vietnam. Its area is about 22,000 ha with a length of 70 km along the coast. About 300,000 inhabitants live around the lagoon in 236 villages from 31 communes and earn their livelihood by directly or indirectly exploiting natural resources in and around the lagoon. There are difficulties to manage such a complex system for sustainable use.

The project "Management of Biological Resources in Tam Giang Lagoon" was developed in 1994 by a group of Canadian and Vietnamese researchers from Hue University of Science (HUS), Hue University of Agriculture and Forestry (HUAF), Dept. of Fisheries of Thua Thien-Hue Province (DoF), Provincial Department of Science, Technology and Environment, Nha Trang Oceanography Institute, Southeast Asian Research Institute and Hai Phong Institute of Oceanography. The project outline was approved by the International Development Research Centre (IDRC, Canada) and the Vietnam Sustainable Economic Development agency (VISED - an IDRC-CIDA Joint Aid Programme for Vietnam) in 1995. It started in July 1995 with a Participatory Rural Appraisal (PRA) training course and exercise in Phu Tan commune. In October 1995, three interdisciplinary research teams were formed to conduct research in three research sites selected.

PARTICIPATORY RESEARCH AND FINDINGS

First efforts of the research projects were to involve resource users in the research activities and raise their awareness about resource problems and conflicts in management. The project collected data to serve as basis from which to establish community-based management of biological resources in the lagoon. The main project activities were to approach participatory research with interdisciplinary perspectives in data collection toward an improved management of biological resources.

The lagoon as a natural complex ecosystem

The lagoon is long (70km) with an uneven width (from 500m at its narrowest to more than 3 km at its widest), and situated with its length parallel to the coast in a northwest to southeast direction. It is influenced by both marine and inland conditions, moreover the effects are not the same among different locations. The lagoon has two openings to the sea: the main one (Thuan An) is located at the mid-length of the lagoon while the smaller one (Tu Hien) is located at the southeastern end. The two openings in combination with three rivers flowing into lagoon bring different marine and freshwater effects into different locations, especially resulting in a wide range in salinity. The Tam

Giang lagoon, though referred to by that name, is actually composed of a system of lagoon basins, from north to south referred to as: Tam Giang Lagoon, Sam-An-Truyen Lagoon, Ha Trung Lagoon, Thuy Tu lagoon and Cau Hai Lagoon. The northern basin (Tam Giang) is characterized with a dominant freshwater period and a short brackish water period, while Sam-An-Truyen near Thuan An is saline for most of the year.

Fluctuations in lagoon water salinity, in combination with high heterogeneity of surrounding land which is characterized with high range of soil texture, properties, fertility and salinity, create a foundation for complexity. Highly diverse and dynamic fluctuations in aquatic species composition and populations also provide difficulties for those who want to understand the system. For management purposes it takes considerably long time to understand this system. Local indigenous knowledge of the lagoon system, as well as the scientific knowledge acquired from research activities, are limited and not updated to reflect the many changes that are currently taking place.

Participatory research on aquatic resources

An assessment of aquatic species exploitation was conducted in three selected areas representing the central (Sam-An-Truyen), the northern (Tam Giang basin - Quang Thai commune), and the southern (Cau Hai - Vinh Ha commune) parts of the lagoon. This was to address the project objectives and also to provide chances for local participation. Different groups exploiting aquatic lagoon resources were identified as coming from the farming community, fishing community, and fishing-farming community. Fishing and farming-fishing households who are better off have access to farming land and/or fishing grounds by purchasing fishing gears and the rights to fix the gear. The poor households don't have exclusive access to water area - they fish on common grounds using mobile gears such as dragnet, pushnet, motorized dragnet, eel and freshwater macrophyte rakes, and collecting clams by hand.

Aquatic species in the lagoon were identified from 3 ecological groups: freshwater, brackish water and marine water. Seasonal presence of species depends on salinity of lagoon water, especially marine species. Although seasonal and spatial variations of species composition in fishers' catches are high, the main exploited species (in terms of volume) in most of the lagoon are goby, grassfish and grunt fish - all bottom species. The availability of bottom species indicates a diversity and abundance of food in the lagoon bottom layer which is rich in nutrients - a typical feature of such an estuary. Observation also shows an interaction between bottom vegetation cover with distribution, spawning, feeding and growth of aquatic species and birds (which feed on fish and shrimp), creating a diverse ecosystem in the estuary. Through PRA, field trips, observation and interviews, aquatic species composition, production by season and by gears, main exploited species and seasonal presence have been identified and determined. Freshwater macrophyte was found to be an important resource as green manure and mulch for rice seedlings and cash crops and as feed for pigs.

There are 13 main types of gears operated in Tam Giang lagoon, of which fixed gears (such as fish corral, bottom net and fixed lift net) take up large fishing grounds. Density of gears including fixed and mobile is high, it can be described in fisher's word "no space and also no need to set more gears because the fish have no way to escape". For an example, in a farm-fishing village, Trung Lang of Quang Thai commune (Tam Giang basin), with a total 104 households (18 fixed gear fishing families, 21 mobile gear families; and 65 mixed farming-fishing families) and with 1,000 hectares of lagoon area, there are 327 fishing gears of 7 different types operating. The majority of gears are mobile: pushnets (30.27%); dragnets (21.10%); and eel rakes (15.62%). Fixed gears are fewer: Fish corrals (18.04%) and fish aggregating devices (FAD - 4.59%). Both mobile and fixed gears are operated in the lagoon day and night with an average density of 2 boats and 2 mobile gears in 10 ha water area (excluding freshwater macrophytes harvesters, gillnets and noise device).

A year of research on 8 types of gears shows that most gears are intended to catch multiple species. There are also gears for single species catch such as eel rake, hook and line (with specific species), however these may also catch other species as by products. The number of species caught varies by gear type, location, and season. The number of exploited species is higher in Sam-An-Truyen lagoon (80 spp.) and lower in Quang Thai (42 spp.) and Vinh Ha commune (Cau Hai - 48 spp). The number of species exploited is higher in the dry season (May, June and July at more than 50 species) and lower in the rainy season (December and January at about 30 species). Number of species exploited by each gear is as follows: fish corral (69 spp.), bottom net (45 spp.), fixed lift net (33 spp.), and motorized dragnet (31 spp.). The number of species caught by mobile gears is lower: pushnet (15 spp.), dragnet (9 spp.), hook and line (9 spp.), and gillnet (6 spp.).

The average daily catch per fish corral unit recorded in Quang Thai is 2.44 kg. Total average daily catch by family operating fixed gears (including for household consumption) is 3.47 kg of which fish is higher (45.53 % by weight) than shrimp (16.43%). Average daily catch by mobile gear fishers is 6.19 kg per household composed largely of small fish (44.36%). In groups of fishers operating both mobile and fixed gears, daily catch is higher at 14.51 kg per household which is composed of 42.7% by weight of caridina (a freshwater Atyidae or small crustacean) and 38.6% of fish.

Lagoon as Common property with different access rights

Customary folk tradition, supported by continuing practices, maintains that surface water bodies such as the lagoon are open access areas. However, management bodies and local people have varied views about access rights to the biological resources of the lagoon. Persistent confusion is due partly to the nature of the mobile and biologically dynamic resources, but a contributing factor has been the historical context, which saw all kinds of traditional access rights subsumed in the period of State collectivization. Collectivization of agricultural land use rights was relatively clear, but rights to the

lagoon resources were also collectivized to some extent. Since the economic reforms in Vietnam in the late 1980's, even this limited collectivization has weakened, leaving a somewhat confused and contradictory access regime to the heavily-used resources of the lagoon. Awareness of these problems is only slowly growing.

Under present land use and tenure policies in Vietnam, only primary agricultural land is allocated to individual farming households for long term use via transferable leasehold titles referred to as long-term land use rights. In practice, not all agricultural land is transferred to households, and degraded, abandoned or shared-use lands remain legally under the jurisdiction of the government. Similarly, the lagoon water areas are not formally allocated by title, and can be argued to be public property under the management of the State.

These common territory or areas in the project research sites consist of all lagoon, submersions around lagoon either abandoned or for fishing or for aquaculture, as well as unproductive lands such as coastal sand dunes, abandoned and forested sandy lands, and non-distributed agricultural land. All these public areas are titled to mainly the local government at the commune level (the lowest in the government structure) and sometimes to state enterprises. Individual farmers or fishers or groups can get access to the public areas for use by winning a contract from the titled authority or owners (i.e. by lease). Most of these leases are short-term instruments. The government encourages the development of unused lands by offering a 3-year tax free benefit for new leases.

Effects on lagoon management

The present ownership of the areas provides fundamentals for management of biological resources which can be simply categorized into aquatic resources (such as fish species diversity, stock), agriculture (crop and genetic diversity), and aquaculture (high value species and natural feed sources).

Agricultural land is presently assigned to the family unit which can decide whether to use the land for agriculture or aquaculture (in the case of coastal land) and what crops or species to plant or culture. This is in contrast with the previous system of cooperatives where all decisions were made by the cooperative (i.e. the state) and only a small portion of land (the family garden) was controlled by the family (referred to as the "5% land").

Though all land is officially still owned by the state, it is still traditionally accepted that "Land is private but water is public" (meaning ownership rights to aquatic resources cannot be alienated). On this basis formal and informal rules regarding aquatic resource exploitation have been developed. Some of the traditional rules are still in effect within the current formal management system. The local people exploit lagoon resources following both the official management and traditional rules. It is very difficult to distinguish effects resulting from official management or traditional rules.

However an example regarding fishing in the lagoon can be simplified to help understand the complex effects.

In all fishing communities around the lagoon there are two types of fishers corresponding to two types of fishing gears: fixed (also referred as "Dai Nghe" -big business- such as fish corral and bottom net) and mobile gears (also referred as "Tieu Nghe" -small business - such as manual push net and drag net). These fishers have different access to and control over the public lagoon resources. The fixed gear fishers represent individuals or families who have had long-standing access to these resources and have invested in construction and maintenance of their fishing gears for many years. The existence of the gear itself (including those structures clearly visible above the water) indicate that the fishing ground is already occupied, and these fishers have exclusive rights to harvest from this area. Although exclusive rights are limited with time, seasons, and activities, the location of the gear becomes essentially privately allocated. The fixed gear fishers collectively control access rights for fixed gear over the entire lagoon territory to limit the number of fixed gears. The transfer of a fixed gear ground from one owner to another must not only be officially recognized but also must be informally accepted by the local fishers; and, although each fixed fishing ground is officially assigned to one individual, the fixed gear fishers in one area often choose to rotate their grounds to ensure equitable distribution of resources. These long-standing rights have become acceptable to the local government within whose boundaries the gear is located, and the local government enumerates the fixed gears to collect tax from their owners.

During the feudal times, lagoon fishing grounds were auctioned off annually by the adjacent village authorities. The fixed gear fishers eventually succeeded in getting local authorities to assign exclusive rights (through written or oral statements) and introduce tax collection to replace the auction price. To increase their control and protect their benefits, fixed gear fishers formed a group and requested equal taxation and rights among themselves. Fixed gear fishers who did not register to pay tax were vulnerable to losing their rights when a conflict occurred, i.e. when another fisher interfered or claimed a right to the same area.

The present government has accepted those rights and charges a tax based on the fixed gears which were present in the lagoon at the time it reviewed its management strategy (after liberation in 1975). Fixed gears were registered at all locations around the lagoon over a period of about 4 years - 1976 to 1980. Although the district governments were assumably responsible for registration, they were assisted by commune governments to organize the activity and provide relative information. Fishers were invited to meeting in each village for the registration. This event was concurrent to the formation of cooperatives i.e. agricultural groups, fixed gear fishing groups, and other fishing group. At present, the application of taxes to agricultural land and fixed gear grounds can be seen as evidence of authority.

In Quang Thai, fixed gear areas were initially arranged among the registered fishers and preliminarily approved by the commune government. Final official approval was done by the district authority associated with taxation. Normally the commune government reviews the situation annually (under the district direction) to re-arrange the location of fixed gears and also to accept new applications from fishers, although sometimes, when no conflicts and/or no new applications are made, 2 or more years can elapse before a review. A meeting of all fixed gear fishers (in practice sometimes only key villagers) is then organized to consider new applications for fixed gear location and to make decisions concerning other matters. Based on the results of the meeting, the commune government makes recommendations to the district for official approval.

In principle, under the official management regime, mobile gear fishers can fish anywhere within the local territory, however they must not impede potential benefits to the fixed gear fishers or others using traditional fishing practices. For example, fixed gear fishers informally prohibit any fishing activity at the opening of their fish corrals during periods when tides or currents are most favourable for capturing fish. Mobile gear fishing areas are open to any fishers with priority informally allocated to whomever sets their gear first - ie. Rather than compete intensively, mobile fishers will rather choose an unoccupied area to set their gear. In fact, mobile gear fishers do not limit their activities to their own communal boundaries but fish in lagoon areas outside their territories. They may not even be aware of the communal boundaries.

Human use of lagoon resources

Population growth puts more and more pressure on the lagoon resources. There are about 300,000 residents earning some or all of their livelihood by directly or indirectly exploiting biological resources in and around the lagoon. Under the National Program for Family Planning, the commune government monitors annual population growth rate within its location. In the three communes (or research sites) the responsible officers confirmed that annual population growth rates of fishing communities were higher than 2%, while those of farming were lower than 2%.

Together with pressure on lagoon resources used for local critical needs, urban and long distance market demands have direct effects on exploitation. The pressures of international export markets are more recent, since the Vietnamese economic liberalization policies ("doi moi") introduced in 1986, and are growing in strength, particularly in the past several years. Improvement in access to urban and international markets (a result of government economic policy liberalization) and investment in the processing and freezing industry provided incentives to increase catches, especially those of exportable resources such as crabs, shrimps and high valued fishes. In Thua Thien Hue province total capacity of this industry (state and private) for marine and lagoon produce is 6,000 tones per year excluding small household businesses which provide services for long distance marketing of aquatic produce.

In order to increase their competitive ability to exploit lagoon resources, people have developed different strategies. These strategies frequently result in unsustainable exploitation of fisheries or destruction of fish habitat. For example, in the past local materials were used exclusively in the production of fishing gear, but starting in 1985 these materials were rapidly replaced by industrial products (e.g. polyethylene nets). With the availability of various mesh sizes, fishers competed with each other to use smaller and smaller mesh sizes, harvesting juvenile fish before reproductive age and diminishing stock sizes. When mesh sizes could not get smaller, some fishers adopted electric fishing. The fishers use portable batteries, prods and high voltage transformers to shock the fish for catch. In spite of this technique being officially banned, because of the indiscriminate mortality caused to non-target species and its danger to users, it remains relatively popular. The introduction of motorized vessels, in the late 1960s, also increased competition and exploitation of resources.

These innovations, though they make considerable contributions to increasing catches, have resulted in reductions in the size of species at catch and in the stock of many species. Particularly high-value species have become almost extinct in some parts of the lagoon. In Quang Thai, exportable species (e.g. greasybacked shrimp, eels, local carp and rabbitfish), which were harvested in the lagoon three years ago, are no longer caught. Their disappearance might also have been influenced by anthropogenic changes to the environment (see conflict sections).

Another strategy adopted by resource users is to apply for exclusive rights to land or lagoon area for fixed fishing gears, net enclosures, or aquaculture ponds. There are both informal and formal rules for making these arrangements through community and government channels. Exclusive rights may result in negative impacts on the lagoon aquatic resources and also result in conflicts among the local people because the access to resources is reduced. There are two aspects associated with the present property rights assignment that support the above argument: (1) Over-exploitation can be expected because the owner must increase economic returns to cover investment costs and taxes; and (2) Because of the government's support of aquaculture development, these rights will result in parcelling the lagoon into small privatized sections disrupting the lagoon's natural ecology. These practices will potentially degrade both natural habitats and populations of lagoon aquatic resources, especially aquatic species.

Aquaculture Development as a critical strategy

Though exclusive rights of lagoon areas are normally not government practice, aquaculture development has become a priority of the provincial government. With no restrictions or limitations regarding places or areas for aquaculture development, it has reached beyond sustainable limits in Sam-An-Truyen lagoon which also has the highest density of fishing activities. A boom in aquaculture in the lagoon in recent years indicates that considerable exclusive rights have been assigned. At present, the provincial authorities plan to increase the area under aquaculture by 15 to 20 % annually

without considering its impact. The process of privatization of lagoon area will result in serious impacts by reducing fish stocks and fishing grounds. Both reductions will force fishers to increase fishing effort in terms of efficiency of gear, time spent fishing and the number of family members, in turn, reducing resources even further.

Aquaculture in Tam Giang lagoon developed later than in other areas of Vietnam. It was initiated in 1987, by the state company which built a dike to enclose 100 ha of ponds for seaweed culture. In the early 1990s, aquaculture expanded rapidly with an annual increase, in the years 1991 to 1995, of 30% on average. In 1996 and 1997, this rate decreased to 15-20 % per year with less pond construction and increases in net enclosures. It is still too soon to determine the long term impacts of aquaculture, moreover there have been very few efforts to address this problem. Due to the relatively high initial economic returns, managers and local authorities are loathe to ask too many questions.

At present, aquatic resources cultured include seaweed, shrimp, crab and fish. Most of the species used are native to the lagoon. A high diversity of aquaculture pond systems have been developed with following dimensions: earth pond and net enclosure; mono-species culture and polyculture; and extensive, improved extensive and semi-intensive culture. The water areas under culture are under different types of ownership: state enterprise, commune ventures, private ventures (derived from the rights for long term use), and open access areas claimed or occupied by individuals.

The state enterprise ownership is managed officially by the provincial government to favour development of state economic sectors. Communal ownership enables the commune level government to control areas with a potential for aquaculture. Private ownership is derived from the conversion (with flooding) of official household-controlled agricultural land (eg. rice fields) into ponds. Open access areas are occupied by individuals when they enlarge their fishing grounds and replace fixed gears by net enclosures. In this way, fixed gear fishers develop aquaculture in their fishing grounds even though the rights are very restricted and enforced, mainly by traditional rules.

Although the water area rights are different among aquaculture systems there is no differentiation in operations and management. These include both individual households and community groups. Not all coastal communities can have access to potential aquaculture areas. Only individuals or groups, who are wealthy and enterprising are able to win contracts for water area use.

Conflicts

Due to weaknesses of the present management in dealing with the above complex systems and practices, conflicts among strategies and among user groups are becoming more and more critical.

Socially, among these groups conflicts occur as a result of a lack of respect among groups because of differences in customs, traditions and life styles. The conflicts among user groups consist of:

Mobile fishers vs. Fixed fishers

In general, water area and aquatic species are considered open access for all fishers. However, fixed gear fishers have rights (though limited) to their own fishing grounds. Mobile gear fishers have very limited rights to fish (limited by time and specific location) in those grounds. Unequal shares to fishing grounds lead to unequal benefits among fishing groups which results in conflicts. Other conflicts occur among fishers because of use of illegal gears (e.g. Electric fishing) by certain groups and also because of gear efficiency (e.g. Fixed gear fishers claim that mobile fishers use small mesh sizes that overexploit resources).

Farming groups vs. fishing groups

Different groups living around the lagoon have access to different natural resources. The farmers want to fish but in return, refuse to share their land with the fishers who want to practice farming. The fishers want to have land holding and, as well, compete to gain a higher share of fishing grounds and water area for aquaculture. This problem is also related to high population increases, i.e. the land and lagoon area remain constant while the number of farmers and fishers exploiting these areas is constantly increasing. In other words, high unemployment results in increasing competition for resources.

Settled groups vs. Sampan groups (people are living on boats in the lagoon)

For a long time, there have been people living on boats in the lagoon and in the rivers. Although they are not part of a racial minority, their lifestyle, after many generations, have given them unique characteristics. With their boats, they are mobile and earn their living by fishing however the decrease in natural fish resources have also degraded their livelihoods. In 1985, an unexpected typhoon killed many sampan people living on the lagoon. Poverty and threats from natural disasters are forcing them to abandon their lifestyle and attempt settling on land. The government encourages and supports them to settle on land but do not provide appropriate land nor assistance because farmers and fishers, already settled, do not want to lose land nor increase their crowded population. Attempts at settlement have resulted in conflicts between sampan people and existing communities.

These conflicts among different user groups are somewhat different from conflicts among strategies in management of the lagoon resources, as user groups and management strategies overlap. Researchers identified some of these distinctions and made efforts to describe strategic conflicts for the benefit of local officials and resource users who might not have recognized or perceived conflicts in this way before. Strategic conflicts consist of:

Aquaculture vs. Fishery

Privatization of water area for aquaculture (ponds and net enclosures) has reduced the public area available for fishing. This has caused some serious conflicts including damage to aquaculture structures by fishers.

Agriculture vs. Aquaculture

In Phu Tan, the conversion of marginal rice lands into aquaculture and the construction of ponds required the destruction of a dike which protected agricultural lands from saline intrusions. Though adjacent rice fields were thought to be protected by an embankment formed by the main road, saline intrusion did affect them.

Agriculture vs. Fishery

In the northern part of the lagoon, salinity fluctuation has decreased. This is correlated to a decrease in the diversity of aquatic species. Physical modification of the lagoon, by the construction of a dyke to improve agriculture, may have affected circulation of seawater and nutrients. The villagers claim that before Cua Lat dike was rebuilt to prevent salt water from leeching into the nearby rice fields, salinity in the lagoon area was higher. Fish catches were higher and some exportable species such as tiger prawn were still available. At present these species are no longer caught.

Other participatory action research

Along with studies on aquatic resources and fishing activities, research on other aspects regarding management and livelihood are being conducted. These include monitoring the impact of aquaculture development; a study on freshwater plant resources in Quang Thai to understand its harvest and use, standing stock, regeneration, and habitat. Other activities included participatory research on improving agricultural productivity involving different local groups such as women raising pigs using local resources as feed, individual farming households planting peanuts to diversify cropping patterns and improve soil fertility, and individual and community planting trees to improve water retention of soil. Social studies have focussed on a historical perspective of formal and informal rules and management of lagoon resources, and on building people's capacity for community-based management through a community-imposed ban on electric fishing in Quang Thai.

Engaging Local Government in community-based management: lessons from an electric fishing ban

The first intervention in management dealt with a ban on destructive and illegal gear practices to protect communal property (lagoon resources). On first contact with the community, the villagers identified, as their major management issue, the practice of electric-shock fishing by community members and outsiders within their territorial waters. Facilitated by the project researchers, this problem was clarified and potential solutions developed by the community which organized to

establish a self-management committee. By taking the initiative and using the credibility of the research project to design interventions, the community was able to convince the commune government to support them in their efforts to enforce a ban on electric fishing. This ban was seen as the first success by the community in the management of their own common property. This specific situation provided lessons and helped highlight challenges in expanding the research.

Establishment of improved management of communal resources is complicated and also creates conflicts. Therefore, besides improvements in community support and participation, government at different levels should be involved to ensure the effectiveness, legitimacy and sustainability of management actions proposed by user groups. In Vietnam, particularly at the first stage of establishing community-based aquatic resource management, involvement of local government is crucial for success. The ban of electric fishing was initiated under conditions which made the activity easier to implement including the following:

1) The ban was supported by government law and, especially, the provincial government was making efforts to enforce the ban throughout the province. Therefore the commune government strongly supported the activity in both dealing with the violators and in providing the local guards and protecting them when threats were made against them.

2) As most the electric fishers were from outside the implementing fishing community, the ban was mainly against outsiders resulting in equal benefits for most local fishers, or at least few of the local fishers suffered losses as a result of the ban. Therefore it was easier for the villagers to organize themselves and contribute to the activity.

CONCLUSIONS

The above lessons also help highlight the most difficult challenge, which is to deal with existing conflicts. It is difficult to plan well and implement the research activities aimed at solving conflict in the system. The researchers, even though aware of the conflicts, lack the knowledge, skills and experiences required to help communities to manage conflicts and to change attitudes and behaviour. The resource users may understand the conflicts but they may not implement any changes because these would result in losses to their livelihoods.

Another lesson was in regard to the chance of success of community-based activities. The establishment of community-based management is possible if the initiative is appropriate. A small scale, specific activity which equally benefits all villagers is a very useful first application. The project gained some positive results in a small community of less than 100 households. Our experience in

communal resource management has been gained through several small separate activities (e.g. ban of electric fishing, use of peanuts and inter-cropping to diversify farm output, and tree planting) which were not integrated into one large or generalized formula / system but rather arose in response to local opportunities and constraints, through a participatory approach.

Further expansion of participatory research activities for management of communal resources may encounter the following difficulties:

- Local government support will likely decrease if the regulation to be enforced is not a government law but based on local rules. Improvement in a community's responsibility and confidence is crucial.
- Future activities may result in losses not only to outsiders but also some community members. The benefit resulting from the activities may not be equal for all involved - some will gain more and others might lose - at least in direct and immediate benefits. Consensus and support among villagers might decrease. It is very important to identify people responsible and capable of leadership and to select strategies capable of relative rapid success.
- In conditions where there is less responsibility assumed by the local government and less support from part of a community, effective solutions to deal with threats made by uncooperating fishers (locals and outsiders) should be identified as a prerequisite to any further expansion of activities.

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