

**The Co-Management of Mekong River Inland Aquatic Resources  
in Southern Lao PDR**

**By**

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**i) Abstract**

Natural resource "co-management" is the cooperative and participatory process of regulatory decision-making among representatives of user-groups, government agencies and researchers. Between 1993 and 1998 63 villages in Khong District, Champasak Province, southern Lao PDR established co-management regulations to sustainably manage and conserve inland aquatic resources, including fisheries, in the Mekong River, streams, backwater wetlands, and rice paddy fields. Local government has endorsed these regulations, but villages have been given the mandate to choose what regulations to adopt based on local conditions and community consensus. Communities are also empowered to alter regulations in response to changing circumstances. Villagers have widely reported increased fish catches since the adoption of aquatic resource co-management regulations. Improved solidarity and coordination within and between rural fishing and farming villages has also been observed. This paper presents historical information regarding the development of the aquatic resource co-management system in Khong District. While many of the lessons learned from the co-management experience in Khong are applicable to other parts of Laos and the region, unique conditions in different areas will require inventive approaches to meet local needs. Common property regimes can break down in crisis, but experience in Khong indicates that they can also be strengthened in response to resource management crisis.

## 1) Introduction

Natural resource "co-management" can be defined as, "*the collaborative and participatory process of regulatory decision-making among representatives of user-groups, government agencies and research institutes.*" (Jentoft *et al.*, 1998:423). In terms of fisheries, co-management has been heralded as a tool for doing away with the distant, impersonal and insensitive bureaucratic approaches to management, which have dominated aquatic resource management systems in recent history. Co-management supports the decentralisation of management responsibilities to resource user groups, providing them with a certain level of autonomy within an overall institutional and government accepted framework. It provides opportunities for developing cooperative and interactive governance through the direct participation of users in decision-making processes involving natural resources, or through user representation at levels that transcend community boundaries (Jentoft *et al.*, 1998).

Most of the aquatic resource co-management programmes cited in the literature relate to coastal salt-water and brackish water environments (Kuperan and Abdullah, 1994; Davis and Bailey, 1996; Symes, 1996; Pomeroy, 1998; Finlay, 1998). Institutionalised co-management programmes for inland fisheries are apparently much rarer, and when they do exist, they often relate to natural and man-made lacustrine habitats rather than free flowing streams and rivers (Petr, 1985; Ali, 1996; Donda, 1998). The community-based aquatic resource co-management programme in Khong District, Champasak Province, southern Lao People's Democratic Republic (Lao PDR or Laos) addresses issues related to natural inland riverine water bodies and associated wetlands. Aquatic resources managed in Khong are largely sourced from the mainstream Mekong River and its immediate tributaries (Baird, 1994b; Baird, 1996; Baird *et al.*, 1998a).

Between December 1993 and August 1998 a total of 63 villages in Khong District established sets of regulations to conserve and sustainably manage aquatic resources in the mainstream Mekong River, swamps, streams, and paddy fields. Wild-capture fisheries management has been the main focus. Like many other countries in the world, Laos is beginning to embrace the concept of natural resource co-management (Baird, 1994b; Baird, 1996; Noraseng, 1998; Phanvilay, 1998; Baird *et al.*, 1998b).

This paper provides an overview of the aquatic resource co-management system in Khong District, its evolution, and the reasons for its apparent success. The paper presents lessons regarding aquatic resource co-management and considers how applicable they are for other parts of Laos and Southeast Asia.

## 2) Introduction to the Study Area

### 2.1) Siphandone Wetlands and Khong District

Khong is the southern-most district in Champasak Province, Lao PDR, bordering Cambodia to the south (see Figure 1). Khong District is well known in Laos, as it covers most of the area commonly known as "Siphandone", or the "four thousand islands". In this stretch of the Mekong River the waterway widens and diverges into a complex hydrological system of perennial and seasonal islands, channels and wetland forests.

### 2.2) The People of Khong District

Eighty-four of the 136 villages in Khong are situated on islands in the middle of the mainstream Mekong River. Most of the remaining 52 communities are located along the west bank of the Mekong River. On 1 March 1995 Khong had a human population of 11,359 families, comprising 65,212 people (Baird *et al.*, 1998a). The overwhelming majority of the population practice subsistence or semi-subsistence paddy rice agriculture as their primary occupation.

The vast majority of the people in Khong are from the lowland Lao ethnic group (referred to as the "Lao" from this point onwards). They have inhabited the area for at least hundreds of years. Virtually all the inhabitants of Khong are Buddhists. However, Animism has a great influence over the everyday lives of most lowland Lao villagers in Khong. Locals still follow many ancient rituals and customs designed to appease "ghosts" or "spirits" ("*phi*").

People in Khong District have traditionally relied heavily on the aquatic wealth of the Mekong River and her tributaries to supply them with food, and fish has long been the most important source of animal protein in the diet of Khong residents (Baird *et al.*, 1998b). Approximately 94% of the families in Khong participated in wild-capture fisheries for food in 1996, and 56% generated income from selling wild-caught fish. Approximately 78% of the animal protein consumed annually consist of fish products. The average annual catch for a family is about 355 kg, of which 249 kg is consumed (Baird *et al.*, 1998a). Families generate a mean annual income from selling fish of the equivalent of US\$ 100 per year. Thus, fishing is not only the main source of animal protein in Khong, but is also the largest source of cash income (Baird *et al.*, 1998a). However, most Lao people, including those in Khong, consider their main occupation to be farming, not fishing (Fraser, 1974; Baird *et al.*, 1998a). Although male adults are the main fishers in Lao society, children commonly participate in wild-capture fisheries from an early age. Women are generally responsible for fish processing, but also participate directly in certain fisheries (Fraser, 1974; Baird *et al.*, 1998a).

Khong is a rural district. There is no electricity or central water supply system in any of its villages. Most people drink boiled or unboiled water from the Mekong River. There is no sewage system, and very few families own toilets. Agriculture is a largely non-mechanized activity involving the whole family. Many native varieties of rice are grown, and until recently chemical fertilizers and pesticides were rarely applied to crops. Most people live in traditional wood and bamboo houses with either correlated iron or thatch *imperata* grass roofing.

### **2.3) Aquatic Resources Biodiversity in Khong District**

The mainstream Mekong River runs approximately 4,200 km from its origin in Tibet, is the 12th longest river in the world, and is the sixth largest in terms of total annual discharge. It passes through southern China, a small part of Burma, Laos, Thailand, Cambodia and finally southern Vietnam before converging with the South China Sea (Pantalu, 1986a). The Mekong River basin supports one of the most diverse fish faunas in the world, and certainly the most varied in Asia. Probably about 1,200 species of fish occur in Mekong River basin, including brackish water areas, although many have not been taxonomically described or are unknown to science (Rainboth, 1996; van Zalinge *et al.*, 1998 (In Press)).

As of March 1999 192 fish species had been identified from Khong District (Baird, 1998a). Many species seasonally migrate long distances up the Mekong River from as far away as the Great Lake in Cambodia and the South China Sea in Vietnam (Lieng *et al.*, 1995; Roberts and Baird, 1995; Baird, 1998a; van Zalinge *et al.*, 1998 (In Press)). Other species are relatively sedentary (Baird, 1998a).

### **2.4) The Aquatic Resources Co-Management Programme in Khong District**

The Lao Community Fisheries and Dolphin Protection Project (LCFDPP) was established as a small, NGO supported, government project in Khong District in January 1993. Between December 1993 and June 1997 a total of 59 villages requested and received assistance in devising their own unique sets of co-management regulations (Baird *et al.*, 1998a).

In July 1997 the Environment Protection and Community Development in Siphandone Wetland Project (EPCDSWP) took over the responsibilities of the LCFDPP. Between July 1997 and August 1998 an additional four villages established co-management plans and associated regulations, bringing the total to 63 villages with functioning co-management systems for stewarding natural aquatic resources.

## **3) Aquatic Resources Management and Resource Tenure in Khong District**

One of the keys to successfully implementing any aquatic resources co-management programme is understanding natural processes, and how they affect important natural resources. Apart from the resources, it is also important to understand the history of resource-use and management in the region of interest.

### **3.1) Traditional Aquatic Resource Management and Resource Tenure in Khong District**

Up until the 1950s and early 1960s fisheries practices in Khong were largely traditional. Fishing was conducted almost entirely for subsistence purposes, with the exception of a small amount of barter trade for certain high quality preserved fish like "*som pa eun*" and "*pa chao*" (see Baird, 1994a; Baird *et al.* 1998a). The human population of Khong was significantly lower than it is now, and virtually all types

of fishing gears were small-scale and made of local materials. As a result, fish and other aquatic animals were extremely abundant.

The inland fisheries of Khong District have long been identified and managed as commons resources. The people of Khong have traditionally recognised access to fisheries and other aquatic resources as a fundamental right, but it would be a mistake to characterise the fisheries as entirely “open access”. Most of the limits on fishing and other aquatic resource harvesting activities historically imposed by people in Khong were related to reducing personal or societal risk from dangerous spirits (“*phi*”) or creatures like crocodiles (“*khe*”), large sting-rays (“*pa fa lai*”) or even serpents (“*gneuak*”). For example, certain deep-water parts of the Mekong River were traditionally off limits for fishing due to the fear of danger from mysterious creatures and other unknown entities. There was no need for villagers to fish those areas, since it was easy to catch fish in shallow water close to shore. Only in certain cases (e.g. with the management of Mekong River wing and basket filter traps (“*li*” and “*tone*”) in the Khone Falls area in southern Khong District (see Roberts and Baird, 1995 for details) have complex individual and family tenure systems been developed to help divide up limited number of good trap setting sites (Roberts and Baird, 1995).

### **3.2) Changes in Traditional Aquatic Resource Management and Resource Tenure in Khong District**

Over the last few decades there have been many changes in aquatic resource management patterns in Khong District, and Laos as a whole. The human population of Khong has increased rapidly. Lines and nets made of nylon, including mono and multi-filament gillnets, have become extremely common. In fact, gillnets are now the most important type of fishing gear in Khong. Baird *et al.* (1998a) found that approximately 71% of the families in Khong owned at least one nylon gillnet in 1996. Nylon castnets were also owned by 67% of families (Baird *et al.*, 1998a). Nets made of natural fibers are no longer in use anywhere in Khong.

In recent years there have also been significant changes in Khong with regards to fish marketing and consumption patterns. Whereas fish had a low economic value in the past, they now fetch relatively high prices (see Baird, 1994a). In the not so distant past villagers caught fish almost exclusively to feed their families, but economic considerations now have a much greater influence over fish harvesting and management practices. Villagers have also begun to desire more cash to buy consumer goods, which have become more visible due to the expansion of market activities.

The rapid increase in the use of motorised boats over the last decade has significantly increased the mobility of both fishers and fish traders, and has resulted in the increased need to generate cash income in order to cover engine, fuel and maintenance costs. Transportation links between Khong and the commercial centre of Pakse have also changed. Whereas it was extremely difficult to transport fish to market in the recent past, it is now relatively easy to move fish to buyers via passenger buses that run between Pakse and Khong on a daily basis. Finally, widespread access to block ice for storing fresh fish has greatly influenced fish marketing dynamics. Until about a decade ago, ice was virtually non-existent in Khong, but now most fish traders now have coolers, which makes it possible for them to buy fresh fish and transport them on ice to markets in Pakse and even Thailand (Baird, 1994a).

The fisheries management situation in Khong District was in great flux in the early 1990s when co-management organising began. Changes were occurring rapidly, and while most villagers were becoming aware of the over harvesting problems facing their fisheries, only limited action had been taken to reverse the perceived downward trend in aquatic animal populations.

### **4) The Development of the Aquatic Resource Co-Management System in Khong District**

Unlike conventionally science-based approaches to fisheries management, one of the hallmarks of co-management systems are that they recognise that fisheries management is as much a people-management problem as a biological or economic one (Clay and McGoodwin, 1995).

Over the last six and-a-half years the aquatic resource co-management programme in Khong has grown and evolved. After almost a year of initial research into aquatic resource management issues in the southern part of Khong District, the first government recognised village aquatic resource co-management plan was created in Khong for Ban Hang Khone village. Before long, the LCFDPP was receiving requests from numerous village leaders in Khong who were interested in establishing their own village-based aquatic resource co-management systems. The motivation of villagers was mainly based on the

recognition that fisheries resources were in decline and that something needed to be done to stabilise and eventually reverse the trend.

In 1994 the LCFDPP cooperated with Agriculture and Forestry Office (AFO) of Khong District and the Agriculture and Forestry Division (AFD) of Champasak Province to determine how to respond to the great interest shown by villagers in co-management. A process for extending the work of the project was agreed upon.

#### **4.1) The Aquatic Resource Co-Management System Establishment Process in Khong District**

##### **4.1.1) Initiating the Process**

The system for working with villages to establish co-management plans is based on the principle that villages should not be forced or pressured into establishing aquatic resource co-management regulations. Instead, villages should only be assisted in establishing co-management strategies after they have requested assistance in doing so.

The process for establishing aquatic resource co-management systems in villages always begins with the village and its leaders. Communities generally learn about opportunities for establishing co-management systems from neighbouring villages, friends and relatives, or from government officials who visit their communities. If community leaders are interested in establishing a aquatic resource co-management plan, they are required to write a short letter to the Khong District AFO in order to request permission to do so.

##### **4.1.2) Preparing for the Establishment of Aquatic Resource Co-Management Regulations**

Once requests have been received by the district, the AFO compiles them and prepares a letter to the AFD of Champasak Province in order to request official permission for the aquatic resource co-management process to proceed. The district chief and the AFD authorise the letter. Up until 1996 Champasak Province required that the provincial governor also authorise documents related to fisheries co-management, but the government has since decided that it is no longer necessary. This indicates that they have become more comfortable with the process.

During the period in which government permission is being sought, extension workers from the LCFDPP or the EPCDSWP make contact with the village leadership. It is important that communities are provided with advice regarding the process for establishing co-management systems early on. An early start helps ensure that villagers have adequate time to make preparations. Information needs to be collected regarding what village leaders expect to achieve by establishing aquatic resource co-management regulations. Extension workers also need to determine what steps have already been taken at the community level. It is preferable if the whole community is asked to decide on whether co-management regulations should be established prior to a village request for assistance being submitted. However, sometimes village headmen make the decision before the whole community has been consulted.

Therefore, one role of the extension workers is to encourage community leaders who have not consulted with their constituents to do so promptly. Another role is to explain to village leaders what kinds of regulations have previously been established in other villages in Khong, and how the implementation and enforcement of those regulations has developed. The leaders are advised to meet with fellow villagers to draft a list of co-management regulations that the community favours. Advance discussions are important, because villagers feel more comfortable if regulations are discussed and debated within the community before any outsiders become involved. Villagers also need ample time to carefully consider the implications of establishing particular regulations. Co-management is not as much about the regulations established as it is about the communicative and collaborative process through which regulations are formed (Jentoft *et al.*, 1998).

##### **4.1.3) Village Aquatic Resource Co-Management Workshops**

Usually about a month or more is allowed after the extension workers visit a village before a formal aquatic resource co-management workshop is organised in a community. These one-day workshops represent the most important official step in establishing government recognised co-management regulations.

All the adult members of the community are requested to attend formal aquatic resource co-management workshops. However, it is usually not possible for everyone to attend, and it is standard practice for one or two members of each family to participate. Apart from villagers, staff of the LCFDPP or the EPCDSWP and officials from the AFO of Khong District also attend. The district chief or his designated representative and AFD provincial officials sometimes attend. It is also extremely important that village leaders formally invite the village headmen from neighbouring communities to participate, because the success of a village's co-management plan is often predicated on how well the community is able to coordinate and communicate with its neighbours.

Workers from the LCFDPP or the EPCDSWP and AFO officials generally arrive at villages organising co-management workshops the day before they are scheduled to take place. Because community leaders have never organised co-management workshops, they generally appreciate advice. It generally takes a number of hours to make all the necessary arrangements.

Since villages initiate the co-management process, the government of Khong feels strongly that communities should also control workshop proceedings. Government and project guests are required to act mainly as observers and facilitators and not as active participants. Officials are concerned that problems could arise if villages become overly dependent on government support, leading to a lack of village initiative. They want villagers to own the process.

Village headmen chair co-management workshops. A village headman generally opens the proceedings by explaining the main objectives of the workshop. The village headman then explains how the workshop will be organised. AFO officials and LCFDPP or EPCDSWP workers make short presentations regarding the reasoning behind establishing co-management regulations for aquatic resources, and the experiences of other villages in Khong.

The village headman then presents the draft of the co-management regulations developed by the community prior to the workshop. After presenting the draft to the workshop, the community is divided up into two gender groups for open and informal discussions regarding the draft regulations. Apart from considering what regulations to endorse, the groups are also required to consider what level of punishment should be mandated for those who break the regulations. Villagers are free to make recommendations regarding management strategies, but they are not allowed to advocate regulations that either conflict with already established national laws, result in increased degradation to natural resources, or cause serious conflicts between or within communities. The Khong AFO acts as watchdog to ensure such problems do not arise.

There is no definite time limit for how long villagers have to discuss the proposed regulations, but discussions generally last between one and two hours, depending on how much preparation has been conducted prior to the workshop, and the level of internal controversy regarding the management strategies being considered. The discussions, which are not attended by government officials or other guests of the workshop, are generally spirited and lively, and broad villager participation is the norm.

Most villagers in Khong possess a great deal of knowledge regarding aquatic natural resources. This high level of "traditional ecological knowledge" (TEK) makes it possible for villager discussions to deal with quite detailed and specific aspects of management. It is also difficult for individual villagers to mislead others regarding certain aspects of management because most villagers know enough to easily recognise when somebody is not being truthful. Pomeroy and Carlos (1997) have also pointed out that community members can play an important role in supporting the co-management process due to their indigenous knowledge of local conditions.

When group discussions have ended, the men and women rejoin government officials and other guests in the main meeting area, which is generally the village school or the main hall of the village Buddhist temple. Representatives of each of the two discussion groups present their respective conclusions, including recommendations regarding management regulations proposed by the village, and additional regulations which were not considered in the original draft of the management plan. Men generally concentrate their regulation-making efforts on considering management issues related to large bodies of water and large and valuable fish species. Women tend to focus their attentions on issues related to small water bodies and aquatic-life in streams, ponds and rice paddy fields. This gender related divergence of special interest generally helps balance and broaden the final content of management plans.

After the group presentations, all the participants debate which regulations to adopt. If the recommendations of the women differ from those of the men, or if one or both groups have ideas that

conflict with those of the original proposal, discussions continue until consensus is reached. While Lao villages are not without conflict, they are typically governed by consensus (Ireson, 1995). If disagreements cannot be resolved, the AFO representative generally recommends that the issue be deferred until later, so as to allow time for resolving any differences that remain. Interestingly, nobody has ever suggested that a vote be taken to determine whether a regulation should be adopted. This is probably because villagers do not want to cause rifts within the community by emphasising differences. Consensus, on the other hand, helps maintain village solidarity.

Government officials and LCFDPP or EPCDSWP representatives sometimes comment on various aspects of particular regulations during the final workshop discussions. They may also provide examples of how other villages have approached management issues. This input helps broaden the perspective of villagers. However, outside guests are generally mindful not to impose their viewpoint on the community, or to give the appearance of interfering excessively with the process.

Once a community has agreed upon a set of regulations, the host village headman asks village headmen from neighbouring villages to comment on the appropriateness of individual regulations. Although guest village chiefs rarely object to the decisions of the host community, they sometimes suggest improvements to certain regulations by providing new perspectives. They also occasionally request that certain regulations be altered or scrapped. If a neighbouring village headman is able to justify a particular position, the host village will generally try to adjust its regulations in order to maintain good relations with its neighbours, which is an important cultural norm. However, if a request from a neighbouring village headman is considered unreasonable, or is not based on socially accepted TEK, villagers from the host community generally have no qualms about refuting the idea. The AFO sometimes acts as mediator.

When a final set of regulations has been agreed upon and recorded by villagers, the regulations are read back to all the participants one last time to ensure that documented information is representative of the decisions made by the workshop participants. Any errors in recording particular regulations are corrected as they are read out.

Before the village headman closes the workshop, the district chief generally states that the district endorses the decisions of the community, and supports all village initiatives to improve the management of aquatic resources for the ultimate benefit of local people and the nation. Government support for community-based management is important to villagers, and is certainly a major factor in successful co-management (Jentoft *et al.*, 1998). Support from government both makes it clear to villagers that they are authorised to manage resources, and also helps reduce villager conflict because government support can be cited to justify villager actions and make it clear to other villagers that such actions are not based on personal conflicts or revenge.

Once all members of the village administration and the district have signed the aquatic resource management plan document, it is officially recognised as "village law" (see next section). Four copies of each plan are made. One copy remains with the village, one is filed by the AFO of Khong, one is given to the AFD of Champasak Province, and the LCFDPP or the EPCDSWP keeps one.

Because formalised aquatic resource co-management planning is unfamiliar to villagers who establish new plans, it is generally necessary for villagers to adjust regulations after having tried them out. Changing and adapting regulations is an acceptable and important part of adaptive management (Walters, 1986; Jentoft *et al.*, 1998), and it is important that villages develop the capacity to make well-reasoned changes. Lessons are invariably learned as time passes, and experiences generally indicate whether regulations should be softened or hardened. Village headmen have the right to change regulations, but they are supposed to organise village meetings to get prior approval from the community before alterations are actually made. Village headmen are also supposed to notify the AFO of Khong when changes are made. Experience indicates that while village headmen almost always seek a mandate from their fellow villagers before instituting changes, they rarely inform the AFO. However, they apparently have no intent to keep the changes from the district, and when officials visit, village leaders generally have no apprehensions about informing officials about regulation changes.

Ireson (1995) claims that in general, lowland Lao regulations related to natural resources are directed toward claiming a geographically defined portion of the resource for exclusive use by one's own village, while not limiting the extraction rates of village households. Although villagers in Khong sometimes want to claim resources for their own community's exclusive use, the AFO of Khong has shown considerable wisdom by ensuring that villages do not establish regulations that only discriminate

against other villages. Khong District has a policy that villages are not allowed to restrict outsider-fishing activities unless they are willing to enforce the same restrictions on themselves. However, if a village bans a fishing method in their area of jurisdiction, outsiders are expected to abide by the ban in the same way as local fishers. The "non-discriminatory regulation" policy of the district helps to maintain good relationships between villages. It also helps the co-management programme retain a good reputation amongst villagers. Outsiders are much more willing to abide by the regulations of host villages when they realise that local villagers are abiding by the same regulations. In contrast, Isaac and Ruffino (1998) reported that conflict between fishers in the Amazon has increased as a result of problems related to communities of fishers dividing up the rights to use resources amongst themselves and excluding disadvantaged outsiders.

#### **4.2) Village Law in the Lao Context**

It is important to understand the legal context in which the aquatic resource co-management system in Khong District has been incorporated. From the beginnings of the programme, it was recognised that co-management had more chance of succeeding and being sustainable if it was incorporated into the existing Lao village administrative structure. No attempts were made to establish new levels of bureaucracy at the village level, although certain villages have established their own informal or ad hoc working groups to deal with particular issues. Regulation implementation and enforcement is left up to the community.

From a legal perspective, Khong District administrators consider that the aquatic resource co-management regulations of villages fit well into what is known as "village law", or "*kot labiap ban*" in Lao. The legal system of Lao PDR allows villages to make certain regulations regarding local issues, provided that they do not conflict with national laws or the constitution. However, in the past village regulations have rarely been utilised to deal with natural resource management issues. Instead, "village law" has generally been used for designating regulations related to security issues, or the tying up or releasing of water buffaloes. However, Khong District officials believe that the system accommodates the aquatic resource co-management system well. There is undoubtedly a great deal of yet unrealised potential for utilising "village law" for dealing with other village-related natural resource management issues in Laos.

Obviously a fundamental issue with regards to any aquatic resource co-management programme relates to boundaries of management jurisdiction between villages (Seixas and Begossi, 1998). Surprisingly, over the last five years there have been no major conflicts between villages with regards to village boundaries as they relate to aquatic resources. In fact, villagers appear to have a clear sense of aquatic resource territoriality. Territories are known to help manage conflict and conserve resources (Seixas and Begossi, 1998), and the ease in which the concept of human-territoriality is grasped by the Lao indicates that past management has not been simply "open-access".

#### **4.3) Community Structure**

In Laos, social organisation must be understood first and foremost from the village level. Village structure has long been the foundation of ethnic lowland Lao society. Villages in Laos, perhaps more than any other region in Southeast Asia, can be characterised as self-sustaining communities relatively unconnected with larger political and social units (Ireson, 1996). Lowland Lao rural communities have very limited social and economic stratification (Ireson, 1995). In other words, the sense of social equality and unity between villagers is generally strong. Moreover, shared understandings and the social expectations of neighbours circumscribe the actions and decisions of villagers. High levels of cooperation and mutual dependence between villagers are characteristic of rural communities (Ireson, 1996). The historical remoteness of villages in rural Laos, and the lack of strong central control throughout history, are probably the main reasons why village structure continues to be such an important factor in Laos.

Although conditions are relatively constant within single communities, disparities in wealth and power within villages are growing. These shifts in economic circumstances are greatly influencing the structure of Lao society. Nevertheless, even now concepts related to village identity and solidarity are strongly adhered to by villagers (Ireson, 1996). McCay and Jentoft (1996) have pointed out that one of the keys to successful fisheries co-management programmes is the ability for villagers to speak with one voice. This condition is generally met in Khong where locals strongly identify themselves as belonging to

particular villages, or, when villages are separated geographically, people sometimes associate themselves with certain parts of the village. Villagers generally identify with elected or "natural" leaders in their communities whom they rely on to represent them when dealing with outsiders.

Olomola (1998) has stressed the importance of the cohesiveness of social, kinship, linguistic and cultural interconnections in determining the success of fisheries co-management programmes. Ireson (1996) has pointed out that the social norm of taking care of each other can be significantly jeopardised by factionalism and conflict among cliques in villages. These points help explain why villagers in Laos tend to avoid excessive conflict.

I concur with Ireson (1996) in his assertion that there are three interlocked and mutually reinforcing elements required to maintain Lao village cooperation and solidarity. They are, (1) a village ideology of mutuality, (2) successful events of cooperation, and (3) shallow socio-economic stratification.

## **5) Aquatic Resource Co-Management Plans**

### **5.1) The Co-Management Regulations in Detail**

Between December 1993 and August 1998 63 villages in Khong District established regulations designed to conserve and sustainably manage aquatic resources. The main regulations adopted by villagers in Khong are outlined below. Tables 1 and 2 summarises regulations established by villages in Khong. See Claridge *et al.* (1997) for detailed descriptions and illustrations of Lao fishing gears.

#### **5.1.1) Fish Conservation Zones**

The establishment of Fish Conservation Zones (FCZs) in parts of the mainstream Mekong River have been the most significant co-management initiatives as far as villagers and local government officials in Khong are concerned. FCZs are basically year round or part year "no-fishing zones".

Between December 1993 and August 1998 60 villages established a total of 68 FCZs. All are in operation today. Single villages established some, while others were the result of joint cooperation between two or three communities. The largest FCZ is 18 ha, the smallest is 0.25 ha, and the mean size is 3.52 ha. The deepest FCZ is approximately 50 metres in the dry season, the shallowest is about 2.5 metres, and the mean depth is about 19.5 metres. Villagers in Khong have widely reported that the establishment of FCZs has resulted in increases in the stocks of over 50 fish species. Fish catches have also reportedly increased. However, the fish species that benefit from independent FCZs differ depending on the type of riverine habitat protected within an FCZ. It is also possible that series of FCZs provide accumulated and synergistic benefits for certain migratory fish species (Baird *et al.*, 1998b).

Villager logic for establishing FCZs is based on TEK, which is accumulated through generations of fishing experience and the personal observations of fishers. Fishers believe that large numbers of individual fish species, and especially large ones, congregate in deep parts of the Mekong River at the height of the low-water season. Since the dry season is the main fishing season for most people in Khong (Baird *et al.*, 1998b), and since water levels are reduced 30 fold in the dry season as compared to the wet season (Cunningham, 1998b), it is also the time of year when many fish species are the most vulnerable to harvesting pressures. Villagers believe that by banning or significantly limiting fishing activities in key deep-water areas that serve as dry season refuges and sometimes spawning grounds for fish, the impact of fish harvesting can be reduced.

#### **5.1.2) Bans on Stream Blocking**

One of the most popular regulations adopted by the vast majority of villages in Khong relates to the blocking of small seasonal tributaries of the Mekong River at the beginning of the rainy season ("*tan houay tan hong*"). Every year in June or July small streams and channels come to life with the arrival of torrential rains, and many fish species migrate up the streams and enter inundated wetlands and rice paddy fields to spawn.

Historically, the people of Khong did not obstruct fish migrating from the Mekong River into seasonally inundated areas, but in recent decades there has been an increase in the use of basket traps ("*lop*" and "*say*") and other fishing gears to block streams. Because these fishing gears catch a large percentage of the fish trying to move into seasonal wetlands, a reduction in the recruitment of many fish species has been identified as a problem.

**Table 1. List of Community Aquatic Resource Management Rules established by LCFDPP**

(key to table 2)

1. River fisheries conservation zone - all year ( ⊕⊕/⊕VV means two/three cons. Zones / -⊕ means that part of the local river pool is under conservation)
2. River fisheries conservation zone - part of the year
3. Ban on stream blocking when fish are migrating up them at the beginning of the rainy season
4. Ban on using lights at night to catch frogs in spawning season
5. Ban on chasing fish into nets
6. Ban on destroying flooded forests and forests at the edges of the river
7. Ban on using frog hooks and traps
8. Ban on catching baby rice-field fish and tadpoles
9. Ban on outsiders from sleeping on uninhabited islands at night
10. Ban on over-fishing by outsiders
11. Ban on fishing with lights at night
12. Ban on cast-netting in ponds and rice fields
13. Ban on bamboo shoot collection for fish sale
14. Ban on frog and fish catch in other people s rice fields unless owner gives permission
15. Ban on forest burning and indiscriminate tree cutting
16. Ban on stream blocking when fish are migrating out of them at the end of the rainy season
17. Ban on draining canals to catch fish
18. Ban on digging pits to catch small frogs
19. Ban on putting small frogs on hooks
20. Dates when aquatic resource management rules were established (second date refers to revision of the rules)

**Table 2. Village-level aquatic resources management programmes developed during LCFDP project**

Village	Community aquatic resources management rules																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Hang Khone		⊕	⊕	⊕	⊕	⊕			⊕	⊕	⊕										Dec 93 Dec 94
Hang Sadam	⊕				⊕	⊕				⊕											Dec 93 Dec 94
Houa Sadam	⊕⊕					⊕															Dec 94
Khone Tai		⊕⊕			⊕	⊕															May 94
Khone Neua					⊕	⊕															May 94
Don Sahong					⊕	⊕															May 94
Don Som	⊕⊕⊕				⊕	⊕					⊕										May 94
Don En		-⊕	⊕	⊕	⊕	⊕															May 94
Don Det Oke		-⊕	⊕	⊕	⊕	⊕			⊕	⊕	⊕										Dec 94
Don Det Tok			⊕	⊕	⊕	⊕	⊕	⊕			⊕										Dec 94
Deua Neua	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕			⊕										July 95
Deua Tai	⊕		⊕	⊕	⊕	⊕	⊕	⊕			⊕										July 95
Hang Sang Phai	⊕		⊕	⊕	⊕	⊕															Oct 95
Don Khamao Noi	⊕		⊕	⊕	⊕	⊕															Oct 95
Oupasa	⊕		⊕	⊕	⊕	⊕					⊕										Nov. 95
Tha Pho Neua	⊕		⊕	⊕	⊕	⊕					⊕										Nov. 95
Houa Sen	⊕		⊕	⊕	⊕	⊕	⊕	⊕													Feb. 95
Sen Neua	⊕		⊕	⊕	⊕	⊕	⊕	⊕													Feb. 95
Nok Kok	⊕⊕⊕		⊕	⊕	⊕	⊕	⊕	⊕													July 95
Veun Khao	⊕⊕		⊕	⊕	⊕	⊕			⊕	⊕	⊕										July 95
Nakasang	-⊕		⊕	⊕	⊕	⊕			⊕	⊕	⊕										May 95
Phon Pho	-⊕		⊕	⊕	⊕	⊕		⊕	⊕	⊕	⊕			⊕							May 95
Hat Khi Khouay	⊕		⊕	⊕	⊕		⊕							⊕							July 95
Veun Kham	⊕⊕⊕								⊕	⊕	⊕										Dec 93 Dec 94
Don Sang		⊕	⊕	⊕	⊕	⊕			⊕	⊕	⊕										Dec 94
Don Tholathi	⊕		⊕	⊕	⊕	⊕	⊕	⊕			⊕										Dec 94
Veun Som		⊕	⊕	⊕	⊕	⊕	⊕	⊕			⊕										Feb. 95
Som Tavan Tok		⊕	⊕	⊕	⊕	⊕	⊕	⊕			⊕										Feb. 95
Hang Som	⊕		⊕	⊕	⊕	⊕			⊕	⊕	⊕										May 95
Som Tavan Oke	⊕		⊕	⊕	⊕	⊕			⊕	⊕	⊕										May 95
Tha Kham	⊕		⊕	⊕	⊕	⊕	⊕	⊕			⊕										Feb. 95
Tha Mak Hep	⊕		⊕	⊕	⊕	⊕	⊕	⊕			⊕										July 95
Tha Phao	-⊕		⊕	⊕	⊕	⊕					⊕										Feb. 95
Tha Pho Tai	-⊕		⊕	⊕	⊕						⊕										Feb. 95
Keng Koum	⊕		⊕	⊕	⊕				⊕		⊕										May 95
Don Nang Khouat	⊕⊕		⊕	⊕	⊕	⊕		⊕	⊕	⊕	⊕										Feb. 95 Feb. 96
Nakhone	⊕⊕		⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕										Feb. 95
Khone Noi	⊕		⊕	⊕	⊕	⊕		⊕	⊕	⊕	⊕										Feb. 95
Chok	⊕		⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕					⊕					Feb. 95

**Table 2. Village-level aquatic resources management programmes developed during LCFDP project (cont.)**

Village	Community aquatic resources management rules																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Phon Than	⊕		⊕	⊕	⊕		⊕	⊕			⊕										Oct 95
Houa Lopakdi	⊕		⊕	⊕	⊕				⊕		⊕										Oct 95
Phiman Phon	⊕		⊕	⊕							⊕										May 95
Sala		⊕	⊕	⊕	⊕						⊕										May 95
Mouang		⊕	⊕	⊕	⊕						⊕										May 95
Tan Tavan Oke	⊕⊕		⊕	⊕	⊕						⊕										Feb. 95
Tan Tavan Tok	⊕		⊕	⊕	⊕						⊕										Feb. 95
Sen Hom	⊕		⊕	⊕				⊕				⊕	⊕	⊕							Feb. 97
Xiang Vang	⊕		⊕	⊕	⊕			⊕			⊕				⊕						Feb. 97
Don Chom	⊕		⊕	⊕				⊕						⊕							Feb. 97
Kok Padek	⊕						⊕	⊕			⊕										May 96
Chan	⊕		⊕	⊕			⊕	⊕									⊕				May 96
Don Houat	⊕			⊕	⊕		⊕	⊕													Feb. 96
Kadan	⊕⊕		⊕	⊕	⊕														⊕		Feb. 96
Khinak	-⊕		⊕	⊕	⊕				⊕		⊕										Feb. 96
Kong Keng	-⊕		⊕	⊕	⊕				⊕		⊕										Feb. 96
Phonsavanh	-⊕		⊕	⊕	⊕				⊕		⊕										Feb. 96
Photak	⊕		⊕	⊕	⊕			⊕			⊕		⊕	⊕							May 96
Lopakdi Kang	⊕		⊕				⊕	⊕											⊕		May 96
Don Peuay	⊕			⊕	⊕		⊕	⊕	⊕												Feb. 96
Frequency	47	10	49	50	51	11	20	29	18	11	40	1	2	6	1	1	1	1	1		

### **Key for Community Aquatic Resource Management Rules**

1. River fisheries conservation zone - all year ( ☹☹/☹VV means two/three cons. Zones / -☹ means that part of the local river pool is under conservation)
2. River fisheries conservation zone - part of the year
3. Ban on stream blocking when fish are migrating up them at the beginning of the rainy season
4. Ban on using lights at night to catch frogs in spawning season
5. Ban on chasing fish into nets
6. Ban on destroying flooded forests and forests at the edges of the river
7. Ban on using frog hooks and traps
8. Ban on catching baby rice-field fish and tadpoles
9. Ban on outsiders from sleeping on uninhabited islands at night
10. Ban on overfishing by outsiders
11. Ban on fishing with lights at night
12. Ban on castnetting in ponds and rice fields
13. Ban on bamboo shoot collection for fish sale
14. Ban on frog and fish catch in other people s rice fields unless owner gives permission
15. Ban on forest burning and indiscriminate tree cutting
16. Ban on stream blocking when fish are migrating out of them at the end of the rainy season
17. Ban on draining canals to catch fish
18. Ban on digging pits to catch small frogs
19. Ban on putting small frogs on hooks
20. Dates when aquatic resource management rules were established (second date refers to revision of the rules)

Villagers believe that if streams are not blocked at the beginning of the rainy season there will be more fish for catching at the end of rainy season when wetlands and rice fields begin to dry out and fish migrate back to the Mekong River. They also appreciate the convenience of being able to catch more fish when working in their rice fields. Although most villagers believe that channels should not be blocked when fish are migrating upstream, most approve of the setting of traps in small streams when fish are migrating out of wetlands at the end of rainy season. This is based on observations that more fish can escape from traps when they are moving downstream, compared to when they are moving upstream. Moreover, fish are not in spawning condition when they are caught at the end of the rainy season. At the end of the rainy season villagers also believe that fish are also big enough to harvest. It is crucial to recognise that most villagers consider early wet season stream blocking not to be a traditional activity.

### **5.1.3) Bans on Water Banging Fishing**

Another regulation that is commonly adopted by villages in Khong relates to the use of 2.5 and 2.8 cm meshed mono-filament gillnets ("*mong soi*") to catch small cyprinids in the dry season, including the ubiquitous species, *Henicorynchus lobatus* ("*pa soi houa lem*"). In recent years some villagers have begun setting small-meshed gillnets in shallow waters and using various kinds of long poles with metal end pieces ("*tho lek*") to bang the water near the nets to chase fish into them.

The main reason many communities have banned the practice is that those who set small-meshed gillnets but do not bang the water are unfairly disadvantaged by the minority of people who bang the water. It is basically a catch equity problem. Villagers also believe that banging the water scares fish away from the general area, resulting in smaller catches for everyone.

### **5.1.4) Bans on Spear Fishing with Lights**

The dry season use of single and triple pronged spears ("*lem*") and powerful battery operated lights ("*mo fai*") to locate and stab fish at night in the Mekong River is another heavily criticised fishing method in Khong District. However, those who use it can catch large amounts of fish. The use of spears and lights to catch fish was introduced in Khong relatively recently, and there are various reasons why it is unpopular. To begin with, only a very small percentage of villagers use the method, and older people almost never fish in this way. Secondly, some people believe the method is too effective in catching large fish that move into shallow waters during the night. Villagers believe the problem is especially significant for species which spawn in the dry season, such as *Chitala blanci* ("*pa tong kai*") and *Channa marulius* ("*pa kouan*").

Probably the most important reason why villagers oppose this fishing method is that those who engage in the fishery are often responsible for stealing chickens, ducks, live fish tied under water, and fishing gears when they pass other villages at night. The desire to not have outsiders passing through their villages at night has compelled many to support the banning of this fishing method.

Villagers in Khong do not seem to have any objections to the daytime use of spears to stab fish hiding amongst submerged vegetation during the rainy season, which they consider to be a traditional activity. Moreover, subsistence oriented rainy season night fish stabbing with lights in rice fields is generally acceptable to villagers, providing that rice plants are not trampled on.

### **5.1.5) Juvenile Fish Conservation**

Another popular regulation established by many villages relates to the management of snakehead fish *Channa striata* ("*pa kho*"). While few people catch and eat the juveniles of this species within the approximately two week period after they are born, some use fine-meshed scoop nets ("*saving*") and wedge-shaped basket scoops ("*sanang*") to catch them for food. Until many villages established regulations banning this practice, juvenile fish harvesting was apparently on the rise due to declines in other fisheries. Many villagers are now well aware that the harvesting of juvenile snakeheads is wasteful because whole schools are easily caught when they are very young. However, once juvenile snakeheads have dispersed and are no longer travelling in schools, villages are allowed to catch them using hooks and lines ("*pet pak*"), castnets ("*he*") and other locally accepted fishing gears

### **5.1.6) Frog Conservation and Sustainable Management**

Khong District has been traditionally blessed with abundant populations of amphibians, including various frog species (*Rana spp.*). Up until just a few decades ago most people in Khong did not eat frogs ("*kop*"), or if they did, it was only on rare occasions. This differs from many other parts of Laos where frogs have long been a staple food. Nevertheless, as fish stocks have declined and human populations have increased, more people in Khong have begun to make frogs a part of their diet. There is also increased demand for frogs in local and distant markets in Pakse and even Thailand. Frog populations have been depleted throughout many parts of mainland Southeast Asia, and some villagers who now live in Khong moved there from northeast Thailand decades ago, largely because fish and frogs populations were already depleted around their former villages.

Whereas frogs had little or no value in Khong only a decade ago, they are now bought by the kilogram, and market prices are relatively high (5,000 kip = US\$ 0.60 wholesale in Khong). The price of medium-sized and large fish is still higher per kg than for frogs, but the gap appears to be narrowing. In northeast Thailand frogs are now more expensive per kg than most common fish species (*pers. comm.*, Iain Craig). To make matters worse, traders are willing to buy frogs regardless of size, which further encourages the harvesting of juveniles. Increased market prices for frogs has certainly brought on increased harvesting. Moreover, the ability of villagers to harvest large quantities of frogs has significantly increased as a result of the introduction of new technologies, the most important being high-powered battery charged lights ("*mo fai*"). Now it is possible to see frogs up to a hundred metres away. Only a decade or so ago resin torches and charcoal lamps limited opportunities for finding frogs at night.

Some villagers favour allowing frog harvesting for subsistence food supply, and banning the selling of frogs year round. Others advocate regulating frog harvesting and allowing the selling of frogs during certain seasons. Generally, villagers believe that the most destructive time of the year to harvest frogs is during their spawning season, which is triggered by the first big rains of the monsoon season. During the frog spawning season, which generally lasts about a week, the amphibians are very vulnerable to capture because they leave their hiding holes and croak loudly. If they are caught before they are able to spawn, reproduction potential for the species is obviously reduced. Therefore, harvesting is often banned during this period.

Frog harvesting is usually allowed during the middle and especially the end of the rainy season when frogs have already spawned and juveniles have had time to grow. Villagers generally favour frog catching at the end of the rainy season because it is sometimes difficult to catch fish in the Mekong River then, and villagers appreciate the convenience of being able to catch a few frogs in their fields when they are tired after working hard harvesting rice. Frogs are also tastier at the end of the rainy season.

Many villages also ban dry season night light frog catching along the edge of the Mekong River. During that season rice fields have dried up and most frogs have retreated to the banks of the river. Villagers believe that it is easy to over harvest frogs during the dry season. Furthermore, like night spear fishing for fish in the Mekong, the method is sometimes linked to thievery.

Many villages ban certain frog catching gears such as frog basket traps ("*say kop*") and frog hooks and lines ("*bet kop*"), because these gears are often used to intensively catch frogs. Some villagers also complain that rice plants are commonly damaged by "*bet kop*". When a frog gets caught on a hook, it sometimes twists the line around clumps of rice stems, killing or damaging the plants.

Still others regulate frog catching by area, with varying restrictions according to designated harvesting zones. For example, Ban Oupaxa bans frog harvesting for selling east of highway 13, but allows commercial harvesting on the west side of the road, where there are no agriculture areas.

Many villages also have regulations regarding the harvesting of tadpoles ("*houak*"). As with regulations banning the harvesting of juvenile *Channa striata* snakeheads, the logic behind not allowing the harvesting of tadpoles is that they are very vulnerable to over harvesting. Moreover, a large number of tadpoles need to be caught to provide enough food for a meal. However, if tadpoles are allowed to grow into frogs their end weight in harvested protein is likely to increase, even when considering natural mortality. Fortunately, most people in Khong do not eat tadpoles anyway, and find them repulsive. However, people in other parts of Laos commonly consume tadpoles. They seem to be most commonly targeted in areas where other aquatic resources are not available or easily accessed, or in areas where population pressures are high. Different ethnic groups also have different food preferences.

A few villages also ban the digging of deep holes or pits in order to attract amphibians at the end of the rainy season. These pits, called "*khoun khiat*" in Lao, are capable of concentrating large numbers

of frogs ("*khiat*") into confined zones when surrounding areas dry out. This makes the frogs very vulnerable to over harvesting. "*Khoum khiat*" are also unpopular because water buffaloes and cattle have been known to accidentally fall into them and die. They are therefore considered a menace to the community.

One village has banned the harvesting of juvenile frogs for baiting longlines ("*phiak*") due to the belief that the too many were being harvested for that purpose.

The regulations adopted by different villages with regards to frog harvesting vary more than for any of the other aquatic resource in Khong.

Apart from wanting to conserve frogs in order to have an easily accessible source of food and income in times of need, villagers commonly express their desire to have frogs in their rice fields to help regulate insect and crab populations. When there are no frogs, damage caused to crops by crabs and insect pests is believed to increase. Therefore, frog harvest zoning by villagers is often based on the particular objective of protecting frogs in rice paddy fields.

#### **5.1.7) Management of Aquatic Animal Harvesting in Rice Paddy Fields**

Some villages regulate the harvesting of fish and frogs in rice paddy fields ("*na*"). This is not only done to protect the animals, but also to reduce the damage done to rice plants by people who trample them while trying to harvest aquatic animals. Many villages specify that harvesters are not allowed to enter other villagers' rice paddy fields until they have received permission from the owners of the fields. The harvesting of frogs and fish in commons areas outside of family owned rice fields is generally not restricted, and frog and fish harvesting in fields is not restricted after rice harvesting, unless other frog harvesting restrictions have been adopted by the village.

#### **5.1.8) Fishing in Other Village Aquatic Resource Management Areas**

Villagers are generally allowed to fish in the resource management territories of other villages. In fact, most lowland Lao people believe that fishing areas should be open to all Lao people. However, most villagers also believe that outsiders should be restricted to the scale and types of fishing activities that they are allowed to participate in when visiting other villages. It is also true that villagers living close by are seen to have more resource-use rights in the host community than those from far away. Kinship links and social status also influence how resource extraction by outsiders is viewed.

Visitors are supposed to follow the management regulations established by host villages. Visitors are also required to harvest aquatic animals in a manner that is in keeping with host village practices. Guests are also supposed to report their arrival and departure from host villages. Some villages do not allow outsiders to sleep on islands out of view of the host village because visitors are often accused of stealing agricultural products cultivated on the islands. In those cases visitors are asked to sleep in the host village or another place agreeable to the host community. Guests are also generally not allowed to spend many days in host village areas if they are fishing for commercial purposes. It is common to allow guests to catch enough fish to fill two or three jars of fish paste ("*pa dek*"), which is considered to be a subsistence right of all Lao people. If more is caught questions may be asked.

#### **5.1.9) Pond Management Regulations**

Villagers in Khong have long managed the harvesting of aquatic animals in natural depressions or ponds ("*nong*"). Some "*nong*" occur in rice paddy fields and others are found in non-agricultural commons areas. The most common traditional practice related to the management of ponds is called "*pha nong*" in Lao. The "*pha nong*" practice restricts aquatic animal harvesting in natural ponds at the beginning and middle of the rainy season. In most cases, harvesting is restricted until near the time when the pond is going to naturally dry out, which varies depending on the pond. Each year, the village headman, a village elder, or an individual owner or guardian of a particular pond announces a day, based on Animist traditions and the lunar calendar, when everybody in the village, and sometimes people from neighbouring villages, are allowed to communally harvest fish from the area. "*Pha nong*" systems are often related to spirits and Animist rituals. For example, in Ban Hat Khi Khouay, Khong District, the village elder responsible for Animist ceremonies in the community manages a large natural pond.

In some cases village leaders, elders and pond owners are given a share of other people's catches as a kind of resource rent. However, individual fishers are generally allowed to take home most of their

catch. Following the designated day for harvesting, everybody is allowed to fish the pond until it dries out.

Nevertheless, there is significant variation in how *"pha nong"* is implemented in different villages in Laos. In some cases absolutely no harvesting is allowed before the designated day. In other cases limited harvesting is allowed. For example, putting hooks and lines (*"pet pak"*) along the outer perimeter of ponds is often permitted, provided that the centre of the pond is not disturbed. In some cases trap fishing and castnetting are permitted around the perimeter as well.

The practice of *"pha nong"* has declined in Khong over the last few decades, and many villages have discontinued the practice altogether. In many cases ponds, which were previously managed under the common property *"pha nong"* system, are now managed by individual families or have become open-access areas. This is unfortunate, as the practice of *"pha nong"* can help build village solidarity, protect fish brood stock, allow juvenile fish a few months to grow before they are harvested.

Despite the advantages of adopting the *"pha nong"* system, it is interesting that only a few villages in Khong have incorporated *"pha nong"* related regulations into their aquatic resource co-management plans. However, some villages, like Ban Don Chome, have designated particular ponds for year round or seasonal protection from harvesting, without referring to the term *"pha nong"*. Many villagers appear to feel that the practice of *"pha nong"* is old-fashioned or too closely linked to Animist practices to warrant reviving. It appears that the government after 1975 discouraged the practice.

Sometimes ponds near Buddhist temples are protected by monks who encourage villagers to rescue fish from them and return them alive to the Mekong River before the ponds completely dry out at the height of the dry season. A good example of this practice exists at Ban Don Det Tavan Oke.

Despite the rich traditions of common property pond management in Khong, there is a general trend towards greater private ownership of ponds in which other villagers are never allowed to harvest aquatic animals. This is probably largely related to the trend in increased social and economic stratification, and related changes in marketing and consumption patterns. It may also be associated with land and resource pressures.

One interesting example of how private ownership of ponds has intensified relates to villager interest in freshwater finfish aquaculture. In Ban Oupaxa one pond was actually fenced off to prevent other members of the community from using it after it had been stocked with non-indigenous fish fingerlings. The act of stocking a small water body with fish fingerlings apparently often results in strong private ownership of all aquatic resources in and around the pond. However, finfish aquaculture is still very rare in Khong.

Other restrictions with regard to fish harvesting also exist in relation to other pond uses. For example, many ponds cannot be fished during the early part of the rainy season because their "owners" have planted lotus flowers in them, and do not want anybody to disturb their crops before they are harvested. However, fishing is not restricted after the lotus seeds have been harvested.

#### **5.1.10) Bans on Explosives, Chemical and Electricity Fishing**

The government of Lao PDR has banned the use of explosives, chemicals and electricity for fishing since 1975. Although these methods are not used in Khong District, they are still commonly used in bordering parts of Cambodia (Casey, 1993; Baird, 1998a) and other parts of Laos (Baird, 1997; Baird, 1998b). Explosives fishing and insecticide poison fishing were also common in Laos prior to 1975 (Fraser, 1974). Many Lao villagers are extremely critical of these fishing practices and believe that they have greatly contributed to declines in fish stocks. Therefore, a number of villages in Khong have reaffirmed their desire to ensure that these destructive methods are totally banned by including a clause in their management regulations reinforcing the government ban on their use.

#### **5.1.11) Miscellaneous Regulations**

There have also been various other regulations established in individual or small groups of villages in Khong. No two villages have ever adopted the exact same set of co-management regulations. The ability for the system to adapt regulations to meet specific circumstances is one of its greatest strengths. Examples of unique regulations adopted by villages in Khong include the limiting of bamboo shoots harvesting for sale in Ban Senhom, the creation of a seasonally protected man-made pond in Ban Khinak, the limiting of the number of gillnets that can be used per family per day in Ban Tha Kham; and

the banning of flooded forest tree cutting on sand islands near Ban Don Det Tavan Tok. Many villagers have also adopted regulations designed to protect riverine forests, which they recognise as being important aquatic habitat.

### **6) Implementation of Aquatic Resource Co-Management Systems**

Different villages in Khong District rely on different strategies for implementing their respective aquatic resource co-management systems. Considering the relative remoteness of many communities, and a long tradition of only limited government influence over village affairs in Laos (Ireson, 1996), variations between villages are not surprising. However, the overall framework under which all villages in Khong operate is basically the same. The methods used by individual villages are largely dependent on the values and personalities of village inhabitants, the ecological conditions near the village, and the views of village headmen and other community leaders. Factors related to the customary practices and the social norms of individual communities are also important. For example, some villagers are more accustomed to stricter interpretations of regulations, while others are used to a more relaxed attitude to regulation enforcement but a greater emphasis on village awareness raising. Local realities and pragmatism are important factors influencing the implementation of village aquatic resource co-management strategies.

It is generally up to the village headmen to organise regulation implementation. Most communities rely on a mixed strategy that includes enforcement of regulations and awareness raising. It appears that both factors are equally important. On the one hand, villagers are generally critical of village leaders whom they believe have not been stringent enough enforcing regulations. However, villages that enforce regulations effectively but fail to emphasise awareness raising tend to have problems maintaining systems over a long period of time. If villagers are not convinced that having regulations are beneficial, they are unlikely to abide by the regulations when enforcement becomes lax.

Yet regulation enforcement is generally only emphasised by villages at initial stages of implementation. The pattern in Khong has often been that villages hand out a few warnings and fines in the first year of regulation implementation in order to let everybody know that the village is serious about implementing the regulations. They then find that by the second year much less regulation enforcement is required. By then locals are usually familiar with the regulations, and have come to clearly understand why they have been adopted. But villagers are also effective enforcers of regulations when necessary. In Ban Kokpadek and Ban Chan, the villages' FCZ has so many fish in it that there is now a great deal of incentive for people to illegally fish there. It is possible to make large amounts of money by gillnetting in the area for just a short period of time. Therefore, both villages have organised patrols to watch over the FCZ during the dry season. In Kokpadek seven groups of four or five people have been organised by the village without any outside support. Each of the groups is responsible for watching over the FCZ for one day a week, resulting in 24 hr protection. In Ban Don Tholathi villagers were smart enough to recognise that poachers might be setting gillnets and longlines in their FCZ without using bobbers, in order to avoid detection. They therefore developed a method for finding and removing unmarked gillnets and longlines. Every few days an anchor is dragged through the FCZ (at mid-water level). Any unmarked fishing gears are snagged and confiscated. Other villages have also learnt from Ban Tholathi and adopted similar methods. In Ban Tha Kham, villagers have tied clumps of twigs and thorns onto stone weights and set them at mid-water level in their FCZ to discourage poachers from fishing in the area.

Villagers are pragmatic people. Seeing is believing. Therefore, they tend to feel more positive about co-management regulations if they begin to see positive results. Fortunately, villagers often report increases in fish stocks and catches outside of FCZs even after just a year of implementation, as well as positive results from other regulations as well. If regulations are not working, villagers tend to alter or abandon them. It is encouraging that the system is still dynamic and running strong after over five years. Many villages claim that they plan to continue implementing their co-management systems into the future, regardless of whether there is a project supporting their work or not. This is certainly a very positive sign, and indicates that the regulatory framework is likely to be sustainable over the long-term. Yet some villages probably continue to require support because they are still learning how to effectively implement their plans. However, many villages and sub-districts in Khong have developed inventive processes for addressing problems and resolving conflicts within and between villages which have helped

improve the efficiency of management. Regular community discussions about co-management has been identified as a key factor in reducing conflict and improving management conditions.

### **7) Punishment for Regulation Violators**

The Khong District recommended system for punishing regulation violators requires that first time violators receive a warning at the sub-village level. Second time violators receive a warning at the village level and also sign a document in which they agree not to break the regulations again. Third time violators are to be fined 5,000 kip and/or have their fishing gear confiscated. Fourth time violators should be sent to the district so that legal charges can be laid against them.

However, there is more to punishing violators than meets the eye. The Khong AFO recommends that only the first person who violates a particular regulation be considered as a first time offender. The logic is that if every person is not fined until he or she has been caught violating a regulation three times, hundreds of individuals in a village could theoretically violate a regulation and only receive warnings. By the time fines started kicking in the resource would be depleted! Therefore, the first person who violates a regulation is considered a first time violator, and the second person to violate the same regulation in the same village is considered to be a second time violator, and so on.

While the four tiered punishment system has been adopted by most villages in the district with co-management regulations, the system is generally adapted by village leaders to meet local conditions. For example, 5,000 kip was worth about US\$ 7 in 1993 and 1994, but the value of the Lao kip has declined dramatically in recent years. Today 5,000 kip is worth just US\$ 0.60. Therefore, many villages have had to raise their fines. For example, Ban Phiman Phon recently decided that fines of 5,000 kip should be increased to 50,000 kip. Other villages have done the same, and more adjustments are expected in the near future.

It is interesting and somewhat surprising that common villagers often advocate heavier fines than village headmen or district officials. It appears that most villagers feel strongly that those who violate regulations and hurt the interests of the whole community should not be let off lightly. However, most village headmen are hesitant about issuing large fines or imposing heavy punishment. Handing out punishment as community work is an option that is sometimes utilised. Enforcing regulations is especially difficult for headmen when relatives are involved. In some cases deputy headmen have had to enforce regulations with regards to the relatives of chief headmen.

Apart from fines, most villages also confiscate any aquatic animals illegally harvested by regulation violators. Although only small amounts of money are normally generated from collecting fines from violators, it is important that whatever is collected becomes the property of the whole community and is used for communal activities agreed upon in village meetings in which all families are represented. However, it is often quite acceptable to communities for funds to be used to buy gasoline for those who are responsible for patrolling FCZs. Villager satisfaction is generally based on the communicativeness of the village headman.

In some cases, those responsible for catching violators are given a portion of the fine money collected as an incentive to help enforce regulations. Many villages have altered their co-management plans so that confiscated fishing gear is given to those who are responsible for catching offenders. Although this system of rewarding enforcement could potentially be abused by vengeful or dishonest individuals, there have been no reports of problems in Khong so far. Instead, most think the system works well.

Village leaders are almost always extremely reluctant to invoke the fourth stage of the punishment measures recommended by the government. Headmen generally do not want to send violators to the district as long as they are able to control the situation themselves, which is virtually always the case. Therefore, village headmen have always opted for continually repeating stage three of the punishments (fines and confiscation) rather than moving on to stage four. Nevertheless, stage four remains a final option for village leaders in case other strategies fail. Village headmen generally have no qualms about using their discretion when deciding how to punish regulation violators. The severity of punishment generally depends on the will of individual village administrations and the overall opinion of the community.

Regulations are often enforced more leniently with regard to outsiders than they are when it comes to host villagers. It is generally assumed that residents are more aware of village regulations than outsiders, and therefore have less excuses for breaking them. If regulation violating villagers are from far

away, they are initially assumed to be ignorant of the regulations of the host village. Therefore, they are generally let off lightly and warned at least once before fines begin to kick in.

Village chiefs sometimes also send word to outside violators' home villages. Maintaining good village to village relations is important, because rivalries and bad feelings between villages can lead to conflicts and social problems damaging to communities. Experience in Khong has demonstrated that it is preferable when punishments against outside violators are enforced by the headmen from the home villages of the violators. If the host village headman imposes a punishment, there is a risk that the punished outsiders, and others from their villages, will resent the regulation enforcing village. Village to village conflicts arising from the enforcement of co-management regulations are extremely undesirable in the Lao context, and this indigenous conflict resolution method seems to be efficient in reducing them.

Some villages virtually never resort to fining violators, but are glad to have that option available. Most would rather solve their problems through exerting social pressure on those who do not respect the will of the community. Fortunately, powerful social mechanisms act as strong disincentives to those who might be inclined to violate village regulations in Khong. Therefore, the overall use of fines as a primary deterrent is low in Khong. Social forces represent a more powerful force.

### **8) Monitoring and Evaluation**

Monitoring and evaluation are important aspects of any natural resource management programme. One of the roles of the LCFDPP and later the EPCDSWP has been to assist villagers and local government in monitoring and evaluating village aquatic resource co-management systems in Khong District. This has included assessing increases in aquatic animal stocks in cooperation with villages, and evaluating whether regulations have been effectively, equitably and fairly enforced. Khong District officials also play an important role in these monitoring and evaluation activities.

Monitoring has been done formally and informally. A considerable amount of effort has been put on management capacity building at the village and local government levels. Recently, eight villages with FCZs have conducted participatory research and analysis of catch-per-unit-effort fisheries data collected by villagers as a means for considering the biological, ecological and management implications of village FCZs. The information generated through this exercise has helped to strengthen TEK and management capacity. Important quantitative data is also available. Villagers have been encouraged to self-evaluate their co-management systems and analyse ways in which improvements can be made.

### **9) Promoting the Conservation and Sustainable Use of Natural Resources**

It is useful if natural resource co-management programmes are complimented by non-formal education activities at the village and the local government levels. The LCFDPP and the EPCDSWP have supported a number of environment oriented awareness raising activities over the years. A number of calendars, posters, cartoon books, handbooks, brochures and videos promoting the conservation and sustainable use of natural resources have been produced and distributed in Khong over the years. The projects have also worked closely with teachers and students to support various environmentally oriented education activities (see Baird *et al.*, 1997). Although not emphasised in this paper, the importance of these activities in terms of strengthening co-management systems should not be underestimated.

### **10) Discussion**

The ability of villagers to effectively use and adapt TEK has been one of the main reasons communities in Khong have been relatively successful with managing aquatic resources (Cunningham, 1998a and 1998b). Because TEK is a dynamic rather than a static system, villagers are able to integrate new information with already existing TEK to improve their capacity for managing resources.

It is interesting that community-based management strategies for tropical riverine fisheries tend to differ fundamentally from approaches adopted by their respective governments. While community initiated fisheries management in the Mekong River in southern Laos and the Amazon River in Brazil emphasise restricting fishing effort during the low water season, when fish are most concentrated and vulnerable, government legislation in Brazil, Laos and Cambodia focuses on implementing seasonal closures during the spawning season, despite the natural protection afforded to fish by flooding (Isaac and Ruffino, 1998; van Zalinge *et al.*, 1998; Baird *et al.*, 1999).

The willingness and ability of villagers to adjust resource management strategies to meet local conditions has also been a critical reason why the aquatic resource co-management programme in Khong has been a success in the eyes of villagers. Having the freedom and ability to be flexible with regards to management approaches is one of the biggest advantages of decentralised management systems. It encourages dynamic adaptive management and keeps regulations relevant.

Certainly experiences in Khong have shown that it is at least as critical to understand kinship, religious, linguistic, social, economic, political and cultural factors that affect natural resource management practices than it is to understand biological and ecological processes. However, this is not to say that biological and ecological factors are not of immense importance. It is just that complex management problems require inventive people with a broad understanding of a variety of issues and processes. Management requires an inter disciplinary and integrated approach. Because villagers generally have an integrated and holistic way of viewing nature, they have a lot of natural potential to come up with good management ideas, provided they are given the support and encouragement they need.

Social indicators from Khong are strong. Outside cultural influences have been relatively few, and Khong people almost all have the same first language. Most people consider themselves to be Buddhists, and kinship links in communities are often extensive and complicated. Khong also has relatively few problems related to community rifts arising from vast differences in occupation, class and wealth. Finally, almost the whole population of Khong come from the same ethnic group. All the above factors certainly help to explain why co-management systems in Khong have largely been successful. However, the Relationships between communities in other parts of Laos are likely to be more complex and therefore require more consideration.

Interestingly, but not surprisingly, there also appears to be an association between villages which have done an outstanding job with implementing their aquatic resource management plans, and relatively remote villages with a high level of community spirit and solidarity. It appears that activities and conditions that increase solidarity at the village level also indirectly benefit community-based natural resource management. When solidarity increases as a result of co-management, there are also many spin-off benefits in terms of community development. These benefits are clear to the Khong District government, and that is one important reason why the local government in Khong views co-management as being an integrated part of their "community development" strategy.

Another important factor linked to the success of the co-management system in Khong relates to the emphasis that has been put on developing close working relationships with district authorities. While it is true that central and provincial agencies have more authority over broad policy issues, day to day management activities invariably are the responsibility of district governments. Without their support, recognition at higher levels of government is unlikely to result in the successful implementation of management strategies. This is not to say that provincial and central government agencies do not have important roles to play, but their limitations need to be recognised.

Many natural resource managers have used the "tragedy of the commons" (Hardin, 1968), "the prisoner's dilemma" (Dawes, 1973) and "the free rider" (Olson, 1965) models to justify centralised natural resource management structures (Ostrom, 1990). Natural resource management theory based on the assumption that individuals do not generally act for the good of the whole have resulted in a perceived need for impartial agents of authority with National or collective rather than personal or local interests at heart. Unfortunately, these conclusions have often resulted in a vast underestimation of the experiences and capacity of local bodies to sustainably manage natural resources, especially at the village level. At the same time, the capacity of central authorities to effectively manage resources has generally been overestimated. In many cases the result has been the creation of a costly and ineffective bureaucracies. Often the increased role of centralised authority in managing resources has resulted in the traditional local management authority losing influence over management decisions related to the resource (Kuperan and Abdullah, 1994). One only has to consider the state of fisheries around the world to see the weaknesses of centralised fisheries management systems. It is now generally recognised that centralised management systems for natural resources, including fisheries, have failed more often than they have succeeded. The three models above have come under heavy criticism (Ostrom, 1990; Kuperan and Abdullah, 1994; Jentoft *et al.*, 1998).

The central authority in Laos responsible for wild-capture fisheries management has historically been very weak or even non-existent in remote areas like Khong. This factor has certainly contributed to

the relative ease in which fisheries co-management has been accepted in Khong. In the eyes of local authorities, there was not really any competing centralised fisheries management system to obstruct the establishment of a co-management system, and therefore there was not much to lose by abandoning ideas of centralised management. Co-management has also been attractive because it is much less costly to the state (Cunningham, 1998a and 1998b). This is important since Khong District generates almost no economic rent from fisheries, except for a licensing fee from traders, and considers fisheries to be a fundamentally important commons resource that all Lao people should have access to for subsistence purposes.

Another fundamentally important problem with "the tragedy of the commons", "the prisoner's dilemma" and the "free rider" models is that they all fail to consider institutional arrangements in terms of the "imbeddedness" perspective. Humans are not fully "rational" beings. Instead, human behaviour is embedded in social relations. People do not only make decisions with individual gain in mind, and even when they do, the perception of gain is defined by cultural and social forces rather than simply individual benefits. The role of people in social groups, communities and organisations fundamentally influences the decisions of individuals. Individuals often conceptualise choices that result in "we" decisions being taken rather than "I" decisions (Jentoft *et al.*, 1998). As is generally the case in Khong, individuals often identify themselves as an unseparable part of a community, which is symbolised by the village institution. Most villages in Khong have been established for a long time, and most people were either born in the villages they live in or have moved into them from nearby villages as a result of marriage. Therefore, most people consider village problems to be problems for themselves as individuals. As long as the feeling of community remains strong, collective decisions are likely to dominate.

### **11) Concluding Remarks**

In recent history Khong District has been faced with dramatic changes in fishing and fish marketing practices. The initial result has apparently been declines in fish and frog stocks due to over harvesting and destructive resource-use patterns. However, experience in Khong has illustrated that common property regimes do not always just break down when faced with crisis. In the case of Khong, many villages have responded by strengthening their management systems to ensure that aquatic resources are managed more sustainably. People have recognised that collective organising is necessary to address increasingly important issues regarding the management of natural resources.

It is clear that the aquatic resource co-management programme in Khong has largely been successful in improving management strategies and practices related to aquatic animal harvesting. The main successes, as viewed by Khong District and villagers, have been (1) increased village solidarity, (2) increased natural resource management capacity at the government and village levels, and (3) observed and/or perceived increases in fish and frog stocks and catches.

Yet it is much less clear how useful the lessons from Khong are in terms of managing aquatic resources in other parts of Laos and the region. Certainly social conditions in Khong are quite amenable to supporting successful fisheries co-management. What about other parts of Laos where the history of community change has been more tumultuous and unstable, and where social, religious, kinship, ethnic and linguistic conditions are less homogenous? Certainly not all of the lessons from Khong are applicable to other parts of Laos or other countries in the region, but recent experiences in Khong at least indicate that co-management is a viable option for at least some parts of the country, as well as other countries in the Mekong River basin.

Provided that co-management systems remain flexible and can adapt to social and institutional circumstances unique to particular areas, they represent an important option for improving the management and equitable distribution of natural resources. Natural resource co-management systems that allow for the full participation of villagers and government should receive increased attention and support. The process of developing appropriate aquatic resource co-management systems in Lao PDR is off to a strong start, but is still evolving and much more work remains to be done.

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