

A preliminary assessment of Mekong Fishery Conservation Zones in the Siphandone area of Southern Lao PDR, and recommendations for further evaluation and monitoring

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INTRODUCTION

The area known as Siphandone in the Lao PDR stretches over approximately 60 km of the Mekong mainstream in the very southern most part of the country, and is adjacent to the border with Cambodia. Numerous mainstream islands are found throughout this region and of the 130 village communities found there, many have established themselves on the larger islands. The largest administrative district in Siphandone is Muang Khong and is home to just over 70,000 people. The main source of income for the Siphandone villagers is from rice farming and capture fisheries.

The area supports some of the most productive fisheries in the Lao PDR, which are targeted for both subsistence and semi-commercial purposes. An export trade exists with Thailand for some of the more valuable fish species, and several of the larger riparian towns in the Lao PDR rely on Siphandone to supply fish and fishery products upcountry. Fish bio-diversity is high in the area, and approximately 200 species are targeted by the riparian population using a wide range of fishing gears. Although some form of fishing activity takes place in most areas all year round, it is often during the periods of annual fish migration that fishing effort intensifies and returns are greatest.

Within the last decade there have been an ever-increasing number of anecdotal reports from local people suggesting a decline in available aquatic resources in the Siphandone area, including fisheries. The reasons for these reported declines are almost certainly complex, perhaps interrelated and as yet poorly understood. It should be noted that reports of a decline in aquatic resources are not confined to the Siphandone area of the Lao PDR only.

The Government of the Lao PDR has expressed considerable concern over the reports of a decline in aquatic resources and has sought ways to halt, and preferably reverse these trends. In 1993, under an endorsed decree, the Lao Government began the process of decentralizing responsibility for managing its nationwide natural resources. Under the decree, local administrative authorities have been encouraged and empowered to play a major role in managing their own local natural resources within a co-management framework. The objective of this was to promote the long-term sustainable use of the natural resource in question. Pomeroy and Williams (1994) define co-management as the sharing of responsibility and authority between the government and local fishers / community to manage a fishery or other natural resource.

In 1993, the Lao Community Fisheries and Dolphin Protection Project (LCFDPP) began working in Khong District, Champassack Province, Lao PDR to promote the sustainable use of aquatic resources within a broadly defined area (Baird *et al*, 1998). One of the specific objectives of the project was to establish village-level Fishery Conservation Zones

(FCZs) that could be managed at a local level, and that would be of direct benefit to the individual villages concerned. It was further anticipated that the cumulative effects resulting from the establishment of individual FCZs would be beneficial to the sustainable use of aquatic resources in the area in general. By July 1997, the LCFDP Project had established 59 FCZs in a total of 54 separate villages using a participatory approach between villagers and the Project. Also in July 1997, and at the termination of the LCFDP Project, the Environmental Conservation and Community Development in Siphandone Wetland Project (ECCDSWP) took over and continued the FCZ program (Baird *et al*, 1999). This latter Project ran for just under 2 years and terminated in April 1999. During the lifetime of the ECCDSW Project, a further 13 sites were established bringing the total number of operational FCZs to 72 at the time of writing this report.

The sequence of events leading to the establishment of each FCZ appears to vary slightly, but has mostly been achieved in one of two main ways. In the majority of cases, either the LCFDP, or the ECCDSW Project has approached a potential village and provided a presentation aimed at promoting the FCZ concept, but with no obligation to adopt it. Secondly, some of the villages that now have their own FCZ appear to have first heard about it, or seen it in operation at another village, and have subsequently invited the Project to visit their community to discuss it.

Although most FCZs can be broadly categorized into "group types", inevitably every one is unique in some respect or other. For this reason, each community is provided with a number of management options and rules concerning their particular FCZ, and it is the community that decides which strategies to adopt or reject. As far as is possible to tell, the process is democratic with the community being asked to raise their hands to signify approval at village meetings. According to our interviews in March 2000, unanimity is rarely achieved, but providing there is a majority "yes" vote the final stage of the institutionalization process takes place. This involves approaching the relevant authorities to legally endorse the FCZ at the district's administrative center.

Since 1993 when the first sites were established, various attempts have been made to evaluate the effectiveness of the FCZs in meeting their intended objectives (Meusch, 1997; Dacanto, 1999). Based on interviews conducted so far, the overwhelming response provided by local communities is positive, but not totally and absolutely so. Whereas this wealth of evidence should not, and must not be ignored, there is a requirement for a complementary scientific assessment of the suitability and appropriateness of the FCZs for the resource-poor communities of Southern Lao PDR (Phounsavath, 2000). This requirement is due to a number of concerns and questions that have arisen following the establishment of a relatively large number of FCZs to date. These mainly relate to the possibilities of intra- or inter-village conflicts over resource use, and possible income reduction or dietary imbalance resulting directly from FCZ-related restrictions placed on traditional fishing grounds and fishing practices. Anecdotal evidence gathered to date suggests that this latter scenario is not the case. However, if it were possible to establish categorically, and without question, that the FCZs are meeting their intended objectives, this would be beneficial to all stakeholders involved.

In March 2000, a further assessment survey of FCZs was carried out by staff of the Provincial Agriculture and Forestry Office (PAFO, Pakse), District Department of Livestock and Fisheries (DLF, Muang Khong), a representative from the Living Aquatic Resources and Research Center (LARReC, Vientiane) and an external advisor. The specific objectives of this survey were to gather up-to-date anecdotal information from villagers where FCZs have been established, and to assess the possibilities for gathering comparative quantitative data at selected sites. The aim of the latter objective is, and will be, to try and provide scientific evidence to support the anecdotal reports received during interviews with

local people.

SURVEY METHODS

Prior to carrying out the fieldwork, it was decided to visit between 20 and 25 different sites. This was in order for the survey information to be broadly comparable with a previous evaluation carried out in July 1997 (Meusch, 97). During the 1997 evaluation, 21 villages and FCZs were surveyed. During the March 2000 evaluation 21 villages with responsibility for 27 different FCZs were surveyed.

Local knowledge, and the experience of District DLF staff were used to decide on the villages to be visited on a daily basis. Whereas the aim was to visit as wide a range of different types of FCZ as possible, emphasis was placed on those sites located over deep holes and depressions in the river bed. The "deep hole" FCZ is the most common type of site established to date. Inevitably, because the FCZs are geographically spread out over a large area, sheer logistics and time constraints within available daylight hours also played some part in the selection of certain sites.

Once at the site, the village chief was asked to participate in an interview together with the deputy village chief (s) and the person responsible for village social affairs. Wherever possible, 2 or 3 local fishers were also asked to join the interview. A list of 27 questions were drawn up prior to beginning the fieldwork (see). These were translated into the Lao language. Introductions and explanations of the purpose of the interview were provided by the Provincial Chief of Livestock and Fisheries. The interviews were conducted by PAFO staff and the LARReC representative. Answers to questions were recorded in Lao and English. Every attempt was made to conduct the interviews in a relaxed and informal manner and interviewees were encouraged to speak freely about their FCZ management experiences. The results of the interviews are provided in the following section.

RESULTS

The following tables (1 to 22) summarize the villager responses to the 27 questions drawn up prior to beginning fieldwork.

Table 1 showing responses given by villagers when asked when their FCZ was established (column 3) and how long it was before a noticeable increase in fish catch was observed (column 6). Column 4 shows when each FCZ was established according to a 1998 CESVI report.

| Village Name | Local name of FCZ | Villager response | CESVI report | Catch increase in year: | Approx. time delay in years |
|--------------|-------------------------------------|-------------------|--------------|-------------------------|-----------------------------|
| Don Peuay | Vang Kosa | 96 | 96 | 99 | 3 |
| Loppadi Chok | Veun Pha | 90 – 91 | 95 | 99 | 4 |
| Don Tholathi | Veun Tholathi | 95 | 94 | 97 | 3 |
| Tha Mak Hep | Veun Don Deua (Veun Don Mouang?) | 90 | 95 | 93 | ? |

| | | | | | |
|-------------------|----------------------------------------------------------|----------|----|---------|-------|
| Tha Kham | Vang Samhong | 90 | 94 | 93 – 94 | ? |
| Kong Keng | Vang Don Gang Hoo (Peo Kong Khven?) | 97 - 98 | 96 | 97 – 98 | 1 – 2 |
| Hat Khi Khouay | Lon Ba Chok (Vang Houa Don Ta Chok?) | 98 | 95 | 00 | 5 |
| Kadan | Vang Pome Dam | 97 | 96 | 99 | 3 |
| Don Tan Tavan Tok | Veun Ka Tow Vang Lon Da Mee (Vang Khan Khi Thout?) | 95 | 94 | ? | ? |
| Don Som | Boung Ta Hoi Boung Va Boung Mouang | 95 | 94 | 98 | 4 |
| Don En | Veun Yang (Vang Pome Deng?) | 94 | 94 | 96- 97 | 2 – 3 |
| Kokpadek | Veun Va Veun Te | 97 | 96 | 99 | 3 |
| Chan | Veun Va | 96 – 97 | 96 | 99 | 3 |
| Oupasa | Veun Koke | 96 – 97 | 96 | 96 – 97 | 1 |
| Than Tha Voke | Veun Tang | 97 – 98 | ? | 99 | 1 – 2 |
| Sen Neua | Pa Nang | 95 | 95 | 99 | 4 |
| Xieng Vang | Vang Chan Hang | 98 | 97 | 99 | 2 |
| Don Houat | Veun Nong Hoi | 96 | 96 | 98 – 99 | 2 - 3 |
| Phiman Phon | Veun Phiman Phon (Khoum Veun Vat Phou Din?) | 94 | 95 | 98 – 99 | 3 – 4 |
| Veun Khao | Vang Khou Feun Vang Don Neh Gohm | 97 | 95 | 99 | 4 |
| Nang Khouat | Vang Ta Vat Vang Kot Houat Wang Ee Yaw | 97 98 | 95 | 00 | 5 |

Clearly there is some discrepancy between villager responses and records from the 1998 CESVI report. Based on these responses, it appears that an increase in fish catch occurs anything between immediately after the FCZ is established up to a period of 5 years. Most responses vary between 1 and 4 years.

Table 2 showing how the FCZs were established.

| Method of establishment | Number (n) and percentage of villages reporting method |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Initial intervention by LCFDP / ECCDSW Projects to introduce concepts of the FCZs at village meetings. Following this, voting and drawing up a proposal for submission to district authorities to proceed with the FCZ | (15) 71% |
| One village hearing about, or visiting another village with an FCZ, and then approaching LCFDP / ECCDSW Projects / district authorities with the view to establishing its own FCZ | (6) 29% |

The majority of the FCZs surveyed in March 2000 were established following initial visits by either the LCFDP / ECCDSW Projects. However, approximately one third of villages appear to have taken the initial steps in establishing their own FCZ.

Table 3 showing which months or seasons when each village recognizes its FCZ.

| FCZ in operation | Number (n) and percentage of villages reporting when FCZ in operation |
|-----------------------------------|-----------------------------------------------------------------------|
| During the whole year | (19) 90 % |
| Only during the dry season months | (2) 10% |

In the majority of cases, the FCZs are in operation for the whole year. A small proportion operate their FCZ during the dry season months only.

Table 4 showing gear restrictions in force within the FCZ boundary.

| Village rules of the FCZ | Number (n) and percentage of villages reporting gear restrictions |
|--------------------------------------|----------------------------------------------------------------------|
| All gears banned within FCZ boundary | (20) 95% |
| Fishing with certain gears allowed | (1) 5% - Gillnets / large hooks banned during dry season months only |

In almost every case, all fishing gears are banned within the FCZ boundary. Only one village operated slightly different rules by allowing the use of small hooks in the FCZ during the dry season.

Table 5 showing villager responses when asked if the FCZ rules / restrictions are followed by everyone, and if there are any conflicts within the village or between other villages over the FCZ.

| Rules and restrictions of the FCZ | Number (n) and percentage of villages reporting following rules and restrictions |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| All rules / restrictions followed by everyone now, but with some infringements in the past | (15) 71% |
| Rules and restrictions still being violated now | (6) 29% |
| Rules and restrictions of the FCZ have now created some conflicts with other villages | (4) 19% |

| | |
|----------------------------------------------------------------------------------------------------------|---------|
| Rules and restrictions of the FCZ have created some conflicts now within the village controlling the FCZ | (2) 10% |
|----------------------------------------------------------------------------------------------------------|---------|

Just over 70% of the villages interviewed reported that everyone was following the rules of the FCZ now, but that there were infringements in the past. Approximately 30% of villages reported that their FCZ rules were still being violated at the present time. About 20% of villages reported that the FCZ, and its rules have created some conflicts with other villages, whereas 10% of villages reported that the FCZ had created some conflicts within their own village.

Table 6 showing villager responses when asked if everyone knew exactly where the FCZ boundary was and how it was marked out.

| The position of the boundary and how it is marked out | Number (n) and percentage of villages reporting how their FCZ is marked out and if everyone knows where it is |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Marked out clearly and everyone knows where the boundary is | (20) 95% |
| Not everyone sure where the FCZ boundary is | (1) 5% |
| Marked out with purpose made signs | (20) 95% |

Almost every village reported that everyone knew where the FCZ boundary was, and that it was marked out with signs. Only one village mentioned that not everyone was sure where the FCZ boundary was.

Table 7 showing who took the decision to establish FCZ.

| The decision to establish the FCZ was made by: | Number (n) and percentage of villages reporting who decided to establish the FCZ |
|------------------------------------------------|----------------------------------------------------------------------------------|
| All villagers at meetings with a show of hands | (21) 100% |
| Others | (0) |

Every village interviewed claimed that it was democratic decision made by villagers.

Table 8 showing the main types of fishing gear in use around the FCZs.

| Type of gear in use around the perimeter of the FCZ | Number (n) and percentage of villages reporting the use of a gear around the FCZ |
|-----------------------------------------------------|----------------------------------------------------------------------------------|
| Fixed or drifted gillnets | (20) 95% |
| Single or multiple hooks | (14) 67% |
| Falling door traps | (1) 5% |
| Castnets | (5) 24% |
| Pushnets | (1) 5% |
| Drag nets | (1) 5% |
| Spears | (1) 5% |
| Bamboo cylinder traps | (1) 5% |

Fixed or drifted gillnets and hooks are by far the most important gears in use around the FCZ perimeter. Castnets are used to some extent, but other gears are only of relatively minor importance.

Table 9 showing approximately how many people fish around the FCZ in the dry season months.

| Numbers of villagers fishing around the FCZ in the dry season | Numbers (n) and percentage of villages reporting fishing intensity around their FCZ |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Less than 10 people / day | (5) 24% |
| Between 10 and 100 people / day | (13) 62% |
| Between 100 and 300 people / day | (3) 14% |

Just over half the villages interviewed reported that between 10 and 100 people fish around the FCZ each day during the dry season. About one quarter of villages claimed this figure was less than 10 people per day, and a small proportion of villages reported that between 100 and 300 people per day fished around the FCZ.

Table 10 showing villager responses when asked how far the effects of the FCZ could be observed away from its boundary (mainly fish surfacing).

| Distance from the perimeter of the FCZ where the effects of it can be observed | Numbers (n) and percentage of villages reporting the distance from the FCZ where the effects of it can be observed |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Only see effects inside the FCZ | (8) 38% |
| Less than 10 m outside FCZ | (7) 33% |
| Between 10 and 50 m outside FCZ | (6) 29% |

Just under 40% of villages reported seeing the effects within the FCZ only. Just over 30%, estimated the effects to reach no further than about 10 m outside the FCZ boundary. About 30% of villages estimated the effects to reach between about 10 to 50 m outside the FCZ boundary.

Table 11 showing villager responses when asked about the fishing pressure in the area before the FCZ was established.

| Fishing pressure in the same area before the FCZ set up | Numbers (n) and percentage of villages reporting fishing pressure in the same area before the FCZ set up |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Only light to moderate pressure | (5) 24% |
| Heavy fishing pressure | (16) 76% |

About a quarter of the villages interviewed reported that the area was only lightly or moderately fished before the FCZ was established. About three quarters of those villages interviewed described the area now designated as an FCZ as being a traditional dry season fishing site, and was heavily fished before the FCZ was established.

Table 12 showing when the area now designated as the FCZ was fished.

| The period when the area was fished before the FCZ was set up | Numbers (n) and percentages of villages reporting when the area was fished before the FCZ was set up |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Fished in both seasons | (12) 57% (Only light fishing with hooks during the wet season) |
| Only fished during the dry season | (9) 43% |

Just over half the villages interviewed said the area now designated as the FCZ was fished during both seasons, but added that fishing was light in the wet season because gillnets could not be used. Just over 40% of the villages interviewed reported that they only used to fish the area during the dry season months.

Table 13 showing responses by villagers when asked if they thought the FCZ was a good initiative for their village.

| Villagers perceptions of their own FCZ as reported by senior village authorities | Numbers (n) and percentages of villages reporting on the suitability of the FCZ for their village |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Virtually all villagers support the FCZ concept | (18) 86% |
| Most villagers support the FCZ concept but a small proportion of villagers have reservations about it | (3) 14% |
| A large proportion of the villagers have reservations about it | (0) |

Eighty six percent of all villages interviewed reported that virtually all people within their village supported the FCZ concept. Fourteen percent mentioned that a small number of people within their village had reservations about it. None of the villages interviewed reported that there were a large number of people who were dissatisfied with the FCZ.

Table 14 showing villager responses when asked if everyone in the village was sure that there were more fish available **because** of the FCZ.

| Villagers observations of the effects of the FCZ | Numbers (n) and percentages of villages reporting their observations on the effects of the FCZ |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Sure there are more fish available in the village now because of the FCZ | (19) 90% |
| Not sure the quantity of fish is affected by the FCZ | (2) 10% |

The vast majority of villages reported that they were sure the FCZ was having a positive effect on the availability of fish in the village. Ten percent of those villages interviewed were not sure that the FCZ was affecting the availability of fish in the village.

Table 15 showing how villagers know that more fish are present as a result of the FCZ.

| Villagers observations and perceptions on the reported increase in fish catch around the FCZ | Numbers (n) and percentages of villages reporting on their observations and perceptions about the increased fish catch |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| See more fish surfacing now inside and just outside the FCZ | (15) 70% |

| | |
|-------------------------------------------------------------------|---------|
| See more fish surfacing inside the FCZ only | (2) 10% |
| Catch more fish now in the areas just outside the FCZ than before | (2) 10% |
| Not really sure there are more fish being caught now | (2) 10% |

Seventy percent of the villages interviewed based their perceptions of an increase in fish numbers on visual observations of fish inside and just outside the FCZ. Ten percent of villages reported seeing more fish surfacing inside the FCZ only. Ten percent of villages reported catching more fish in the areas just outside the FCZ, and a further 10% of villages were not sure that the FCZ was having any major effect.

Table 16 showing villager responses when asked which fish species they thought had locally increased in number as a result of their FCZ.

| The species that were reported by villagers as having increased as a result of the FCZ | Numbers (n) of villages reporting an increase in quantity of certain species close to the FCZ |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Phia (<i>Morulus</i> spp.) | (11) |
| Dtong Kai (<i>Chitala blanci</i>) | (8) |
| Nang (<i>Micronema</i> spp.) | (8) |
| Por / Gae (<i>Pangasius conchophilus</i>) | (7) |
| Nyawn Lang Keo (<i>Pangasius macronema</i>) | (7) |
| Kouang (<i>Bosemania microlepis</i>) | (6) |
| Dtong Kuay (<i>Chitala ornata</i>) | (4) |
| Dtong Na (<i>Notopterus notopterus</i>) | (4) |
| Eun (<i>Probarbus jullieni</i>) | (4) |
| Mak Ban (<i>Cosmochilus harmandi</i>) | (3) |
| Koon (<i>Wallago leerii</i>) | (2) |
| Pawn (<i>Cirrhinus microlepis</i>) | (2) |
| Pak (<i>Hypsibarbus</i> sp. Or <i>Barbodes gonionotus</i>) | (2) |
| Sanghoua (<i>Micronema apogon</i>) | (2) |
| Noo (<i>Helicophagus waandersii</i>) | (2) |
| Va (<i>Labeo erythropterus</i>) | (2) |
| Kung (<i>Mystus wyckioides</i>) | (2) |
| Nang Deng (<i>Hemisilurus mekongensis</i>) | (1) |
| Dto (<i>Channa micropeltes</i>) | (1) |
| Gooan (<i>Channa marulius</i>) | (1) |
| Saee (<i>Mekongina erythrospila</i>) | (1) |
| Koh (<i>Gyrinocheilus pennocki</i>) | (1) |
| Dok Niew (<i>Cyclocheilichthys</i> sp.) | (1) |
| Mak Pang (<i>Tenualosa thiabeaudi</i>) | (1) |

The 9 fish species, or genera, whose Lao vernacular names appear in bold print at the top of Table 16 were the most important species / genera reported as having increased in number as a result of the FCZs. Altogether, 24 species or genera of fish were reported by villagers as having increased in number as a direct result of the FCZs.

Table 17 showing villager responses when asked if they had noticed an increase in juvenile fish in the area, and which species these were.

| The species of juvenile fish reported to have increased in number as a result of the FCZ | Numbers (n) of villages reporting seeing an increase in the number of juvenile fish in the FCZ area |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Not noticed any increase in any species | (7) |
| Dto (<i>Channa micropeltes</i>) | (6) |
| Phia (<i>Morulius</i> spp.) | (3) |
| Gooan (<i>Channa marulius</i>) | (3) |
| Dtong Na (<i>Notopterus notopterus</i>) | (3) |
| Nang (<i>Micronema</i> spp.) | (2) |
| Kouang (<i>Bosemania microlepis</i>) | (2) |
| Kung (<i>Mystus wyckioides</i>) | (1) |
| Por (<i>Pangasius conchophilus</i>) | (1) |
| Ni (<i>Cyprinus carpio</i>) | (1) |
| Soi (<i>Henicorynchus</i> spp.) | (1) |
| Nyawn (<i>Pangasius</i> spp.) | (1) |
| Koon (<i>Wallago leerii</i>) | (1) |
| Dtong Kai (<i>Chitala blanci</i>) | (1) |
| Mak Ban (<i>Cosmochilus harmandi</i>) | (1) |
| Eun (<i>Probarbus jullieni</i>) | (1) |

Seven villages out of the 21 where interviews took place (33%) reported that they had not observed any increase in juvenile fish in or around their FCZ. Six villages (29%) reported seeing an increase in juvenile Pba Dto. A small proportion of villages (14%) reported seeing an increase in numbers of juvenile Pba Phia, Pba Gooan and Pba Dtong Na.

Table 18 showing the reasons given by villagers as to why they thought the population of fish has increased in and around their FCZ.

| The reasons given by the villagers as to why they think the population of fish has increased | Numbers (n) and percentages of villages giving their opinion as to why they think the population of fish has increased |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Fish and environment are not disturbed | (17) 81% |
| FCZ is a dry season deep water habitat for many species | (8) 38% |
| Large rocks and underwater caves present | (6) 29% |
| Large tree trunks and submerged timber present | (3) 14% |
| | |

| | |
|--------------|---------|
| Not sure why | (2) 10% |
|--------------|---------|

The vast majority of villages (81%) considered that low levels of disturbance in the FCZ area was the most important factor. Almost 40% of villagers were of the opinion that large numbers of fish make use of deep holes as a refuge habitat during the dry season. Other important factors were the presence of large rocks, underwater caves and submerged timber. Ten percent of the villages were not sure why the fish population appeared to have increased.

Table 19 showing if villagers considered their FCZ to be placed over a known spawning ground of any fish species, and if so which species.

| The species that are known from past experience to spawn within the present FCZ | Numbers (n) of villages reporting that their FCZ is a known spawning area |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Not known if spawning area for any species | (12) |
| Dto (<i>Channa micropeltes</i>) | (3) |
| Dtong Na (<i>Notopterus notopterus</i>) | (3) |
| Phia (<i>Morulius</i> spp.) | (2) |
| Pawn (<i>Cirrhinus microlepis</i>) | (2) |
| Kouang (<i>Bosemania microlepis</i>) | (2) |
| Gooan (<i>Channa marulius</i>) | (1) |
| Eun (<i>Probarbus jullieni</i>) | (1) |
| Ni (<i>Cyprinus carpio</i>) | (1) |

The majority of villages (57%) did not know if their FCZ was a spawning area for any species. Fourteen percent of villages interviewed reported that their FCZ was placed over known spawning grounds of Pba Dto and Pba Dtong Na. A small number of villages reported that the remaining 6 species in Table 19 were known to spawn within their FCZ.

Table 20 showing the various ways the villagers thought that the FCZs could be improved or better managed.

| Villagers comments on ways which the FCZ might be improved | Numbers (n) of villages reporting on ways to improve the FCZ |
|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Encourage more people to stick to the rules within the village and have dialogue with other villages nearby | (8) |
| Need more FCZ "care-takers" to police the FCZ and catch those breaking the rules | (3) |
| Ask the provincial and district authorities to visit the village and explain rules to villagers | (2) |
| Increase the fines imposed on those breaking the rules | (2) |
| Would like to find a way to stop people stealing fish from the FCZ | (2) |
| Not sure how to improve it but would like to make it better | (2) |
| Net off sections of the FCZ and allow the fish to spawn there undisturbed | (1) |

Place large branches into the water to encourage fish to stay in the area and prevent people from stealing fish

(1)

The most common response provided by villagers (38%) was to encourage more people to refrain from violating FCZ rules. More effective policing, and participation of district and provincial authorities in enforcing rules were other responses given. Increased fines for violation and fish theft prevention were mentioned by a few villages. Some villages were not sure how to improve it, but were keen to find a way.

Table 21 showing the crudely estimated characteristics of each of the FCZs visited in March 2000.

| Village Name | Local name of FCZ | Type of FCZ | Approximate dimensions |
|-------------------|----------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------|
| Don Peuay | Vang Kosa | Moderately deep pool. Sand | 400m x 150m x 24m |
| Loppadi Chok | Veun Pha | Deep pool. Hard rock / sand. | 200m x 150m x 31m |
| Don Tholathi | Veun Tholathi | Moderately deep pool. Hard rock / sand. | 700m x 500m x 25m |
| Tha Mak Hep | Veun Don Deua (Veun Don Mouang?) | Shallow pool. Hard rock / small rocks. | 40m x 60m x 6m |
| Tha Kham | Vang Samhong | Shallow pool. Hard rock / silt. | 200m x 100m x 6m |
| Kong Keng | Vang Don Gang Hoo (Peo Kong Khven?) | Shallow pool. Hard rock / sand. | 100m x 100m x 4m |
| Hat Khi Khouay | Lon Ba Chok (Vang Houa Don Ta Chok?) | Shallow pool. | 30m x 50m x 4m |
| Kadan | Vang Pome Dam | Shallow pool. Hard rock / sand. | 100m x 100m x 6m |
| Don Tan Tavan Tok | Veun Ka Tow Vang Lon Da Mee (Vang Khan Khi Thout?) | Very deep pool. Hard rock / sand. Moderately deep pool. Sand. | 100m x 100m x 70m 80m x 60m x 24m |
| Don Som | Boung Ta Hoi Boung Va Boung Mouang | Moderately deep to shallow pools. Hard rock / sand. | 350m x 10m x 5m 270m x 15m x 7m 300m x 270m x 15m |
| Don En | Veun Yang (Vang Pome Deng?) | Deep pool. Hard rock / sand. | 150m x 100m x 45m |
| Kokpadek | Veun Va Veun Te | Deep pool. Hard rock / silt. | 300m x 300m x 30m |
| | | | |

| | | | |
|---------------|------------------------------------------------|-----------------------------------------|-------------------|
| Chan | Veun Va | Deep pool. Hard rock silt | 300m x 300m x 45m |
| Oupasa | Veun Koke | Deep pool. Sand / silt / little rock. | 200m x 500m x 40m |
| Than Tha Voke | Veun Tang | Moderately deep pool. Hard rock / sand. | 400m x 300m x 18m |
| Sen Neua | Pa Nang | Deep pool. Sand. | 150m x 200m x 32m |
| Xieng Vang | Vang Chan Hang | Shallow pool. Hard rock / sand. | 150m x 200m x 8m |
| Don Houat | Veun Nong Hoi | Shallow pool. Sand | 180m x 400m x 8m |
| Phiman Phon | Veun Phiman Phon (Khoum Veun Vat Phou Din?) | Shallow pool. Sand. | 80m x 100m x 8m |
| Veun Khao | Vang Khou Feun | Deep pools. Sand. | 100m x 100m x 30m |
| | Vang Don Neh Gohm | | 50m x 100m x 25m |
| Nang Khouat | Vang Ta Vat | Shallow pool. Hard rock / clay | 200m x 150m x 6m |
| | Vang Kot Houat | | 150m x 100m x 5m |
| | Wang Ee Yaw | | 50m x 50m x 5m |

Although there are different types of FCZ in Muang Khong district, the majority are established over deep water holes in the river bed. Where dry season water currents are swift, the pool bases are often composed of exposed rock and sand. Where water currents are slower, or sometimes barely perceptible, the bases mostly consist of silt-covered rock, sand, silt and fine muds. According to information obtained during interviews, water depth in the FCZs visited range from 2 to 3 meters in depth up to a maximum of 70 m in depth. Length and width dimensions are quite variable with the largest of FCZs measuring 700 m x 500 m and the smallest ones approximately 30 m x 50 m.

Table 22 showing villager responses when asked if they knew of another site close by with similar characteristics to their FCZ, but not influenced by it.

| The close proximity of another site with similar characteristics to the FCZ | Names of villages where other sites are known |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Another sites exists close by: | 8 villages <ul style="list-style-type: none"> ε Phimanphon (about 150m away, but smaller at 50m x 50m) ε Veunkhao (possibly 2 sites) ε Don Nangkhout (about 200m away) ε Don Houat (about 400m away) ε Oupasa (about 1km away and 200m x 200m) ε Don Nang Som (two sites about 1km away) ε Tha Kham (about 100m away) ε Kong Keng (about 100m away) ε Tha Mak Hep (about 400m away) |
| No other site exists close by: | 13 villages |

Eight villages reported that a similar site to their FCZ was located quite close by where it might be possible to gather comparative data. Thirteen villages reported that no such site existed close by.

DISCUSSION

Co-management of natural resources

In the Lao PDR's relatively distant past, management of natural resources was given a low priority mainly because of limited exploitation pressure and super-abundance of resource. This situation has changed in recent years, and wild capture fisheries in particular have almost certainly suffered a widespread decline within the last decade or so. Rural communities, provincial and district authorities, together with central government are seeking ways to better manage fishery resources to ensure their sustainable and continued use in the future.

Experience from other parts of the developing world suggest that traditional top-down management systems for many wild capture fisheries have not been very successful. In recent times there has been a shift away from the traditional approach, with local people playing an active role in managing their own resource, but at the same time still maintaining dialogue with district and provincial authorities, and ultimately central government. This two-way, bottom-up management system approach has been instrumental in helping to successfully establish the Fishery Conservation Zones in the Siphandone area of Southern Lao PDR. Local people have chosen the specific sites where FCZs have been established based on an intimate knowledge of their immediate surroundings, and generations of accumulated practical fishing experience. They have formulated their own rules and regulations for operating their FCZs, and firmly believe (in most cases) that the FCZs are an aid to the protection and sustained use of their local fishery resources (Tables 2, 4, 5 and 13).

FCZs as dry season refuge habitats for certain species

One of the key factors in the success of many of the FCZ appears to be that they are placed over a "deep hole" or depression in the river bed (Table 21). Based on years of accumulated knowledge, local people know exactly where these "deep holes" are and have developed methods to exploit the fish species found there. It is mainly during the dry season months that the "deep holes" are fished because water currents are generally too strong at other times of the year.

It appears that both migratory and some more sedentary fish species make use of the "deep hole" environment during the dry season months (Table 16). There are probably many reasons why each different species is attracted to this habitat. Some of these might include:

- ε More stable thermal conditions
- ε Greater variety of physical habitat such as caves and submerged timber
- ε Greater protection from predators as a result of reduced light penetration and variety of physical habitat
- ε In some cases, less energy expenditure due to reduced current flow
- ε Perhaps greater concentrations of prey and food items
- ε Spawning habitat for a few species (e.g. *Bosemania microlepis*, Pba Kouang)

Why do the FCZs appear to work?

In order to try and answer this question, the reader is asked to consider the following possible scenarios:

- ε The first is that perhaps the protection afforded by the FCZs really does create an environment in which fish availability (for whatever reason) is greater over a given period than before the site was established as an FCZ (Tables 10, 13 and 14). This leads directly to greater fish landings in the areas around the FCZ perimeter.
- ε The second might be that the fish production from the area is more or less the same as before the site was established, but only appears greater because the harvest is carried out over a protracted period by a large number of people fishing around the FCZ perimeter. If the "deep holes" where many of the FCZs are located really do act as dry season refuge habitats for some Mekong species, without protection they might be "fished out" quickly at the beginning of the dry season. With FCZ protection, many "deep hole" residents may filter out slowly giving the impression that more fish are available.
- ε A third scenario might be that local people perceive that there are more fish present than before because they are not being caught regularly and as such they see them surfacing often in their dry season refuge habitat (Table 15).

The first scenario above suggests that more fish are available as a direct result of the FCZ. This may well be true at sites where the FCZ is located directly over a "deep hole". These sites are widely reported to act as dry season refuge habitats for some Mekong species. It is possible that some migratory species, and certain sedentary types, would accumulate in these areas over the course of the dry season. As a "no take" zone, fish numbers within the FCZ might reach a higher than normal level. This probably does happen to a greater or lesser degree, and may help to partially explain why the FCZs appear to be successful. The only way this can be verified is by recording quantitative data within, or near to, the FCZ and comparing this with data obtained from a non-intervention reference site close by.

It seems less likely that the widely reported increase in fish numbers is directly associated with local recruitment following spawning activity within the FCZ, at least within the same dry season. With one or two notable exceptions, most of the species reported as having benefited from the FCZs are wet season spawners and do not breed during the dry season months (Table 16). However, certain types of FCZ may act as nursery sites for juvenile fish spawned during the previous wet season.

The second scenario suggests that the numbers of fish before and after the FCZ is established is more or less the same, but only appears greater due to an altered harvesting technique. Seventy six percent of the villages interviewed reported that their FCZ site was heavily fished before it was made a "no take" zone (Table 11). With FCZ protection, the fish population would naturally be under less exploitation pressure, and the numbers of fish would probably therefore remain higher over a longer period. Seventy percent of the villages interviewed reported that they saw more fish surfacing inside and just outside the FCZ that before it was declared a "no take" zone (Table 15). It is not known if most, or all, of the fish that move into "deep holes" during the dry season remain there for long periods or are relatively mobile, moving freely in and out. However, it seems likely that there is at least some degree of movement in and out of the "no take" zones. It is possible that it is during these periods of movement that fish are caught around the perimeter of the FCZ. This may give the impression that more fish are available because the harvest takes place over a longer period instead of a quick and rich harvest at the start of the dry season. In this way, perhaps the FCZs act as some kind of natural resource "bank" and might be viewed as analogous to a village rice store which can be gradually used up over a period of time.

Logic dictates that this probably does happen to some degree.

The third scenario is linked to both the first and second and suggests that the FCZs have relatively little conservation effect on stocks overall, and do not really contribute to greater fish landings. Unfortunately, virtually all the evidence to date for the apparent success of the FCZs is based on visual assessments and anecdotal reports only (Table 15). It is just possible that much of the enthusiasm for the FCZs is generated by, and based on these visual sightings, but that in practical terms the FCZ has no particular effect on overall stock numbers. Logic suggests that this is unlikely to be the case, but given the wide range of endogenous and exogenous factors that affect the size and structure of the fish populations in the Siphandone area in any one year, the FCZs may, or may not, have an overall direct conservation effect. This argument does, of course, not take into account the intrinsic value of the FCZs as a valuable conservation awareness tool at the village level, which may be considerable. In practical terms, it will be impossible to verify this issue by any known scientific methods and is not discussed any further here.

Is the overall fish catch in Siphandone inevitably reduced as a result of the FCZs? And does protection at one site mean greater exploitation at another?

Again, in order to try to address these questions, the reader is asked to consider the following scenarios:

- ε Firstly, if the rules and regulations of the FCZs are enforced and followed by more or less everyone as the survey suggests, does this mean that villagers inevitably are therefore catching, consuming or selling fewer fish?
- ε Secondly, if the above scenario is partly or wholly true, do they compensate for this by simply increasing their fishing efforts in other areas not under FCZ protection?

Based on the results of the surveys carried out in 1997 and 2000, the first scenario appears not to be the case. In fact the opposite of this seems to be true. However, the survey carried out in 2000 did receive some reports that the second scenario may be partly true. Again this issue is almost impossible to verify by quantitative methods, but perhaps should be further investigated by anecdotal means during any subsequent surveys. The implication here is that the FCZs can have little overall conservation effect for the Siphandone area if the same numbers of fish are being caught throughout the whole region. However, this is probably an over-simplification of the situation and there may well be other benefits concerned with protecting specialized habitats such as "deep holes".

Is the Marine Protected Area (MPA) experience relevant?

In recent years there has been a worldwide growing interest in the setting up of inshore Marine Protected Areas (MPAs) in order to ensure the continued sustainable use of aquatic resources for local communities and to protect bio-diversity heritage.

Researchers at the University of California (Ocean News, 1999) concluded that "no take" zones in coastal waters can reduce the effects of fishing, better preserve bio-diversity and yet actually yield the same industry-harvest as current fishing-control methods. Scientists from the Florida Keys National Marine Sanctuary (Environmental News Network, 1999) commented "we are surprised how quickly animal populations are responding to these no-take zones". They concluded that the quick return was an indication of the intense exploitation pressure the marine animals were under before the "no take" zone was established. Populations of 3 reef fish species were also compared between "no take" zones and comparable reference sites. In all cases, the highest average abundance of the 3 reef species was observed in the "no take" zone within the first full year of protection.

There are numerous other similar examples of the success of MPAs from other parts of the world.

So, are there any lessons to be learned from the MPAs regarding Mekong FCZs or are these environments and the factors involved so different for there to be no direct comparison or application ?

Table 23 showing a crude comparison between inshore Marine Protected Areas and Mekong Fishery Conservation Zones.

| Feature/Parameters | Marine MPA | Mekong FCZ |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main types of aquatic animals protected / conserved | Mostly non-migratory reef fish and sedentary / sessile animals | Both migratory and sedentary fish |
| Period of protection | Usually all year round | Effectively only during the dry season months |
| Environment | Generally stable | Highly fluctuating over the whole year |
| Bio-diversity | Often highly complex | Comparatively low complexity |
| Physical damage caused by fishing activities | Often highly damaging | Relatively little damage caused |
| Assessment of protective measures | Comparatively easy. Diving in clear water with low current speeds allows direct counting / observation of animals Many animals sedentary / sessile Underwater photography possible Wide choice of reference sites close by | Difficult. Quantitative data only obtained from standardized catch records Migratory and sedentary fish Limited choice of reference sites close by |

The above crude comparison of MPAs and Mekong FCZs suggests that it may be inappropriate to directly compare these two types of conservation area in terms of their effectiveness in protecting aquatic natural resources.

The overall cumulative effect of the FCZs

Although it is probably impossible to accurately assess if the FCZs directly contribute to conservation of fishery resources in the Siphandone area in general, they may well do so. Where an FCZ is established over a known breeding ground for a species that spawns during the dry season (*Bosemania microlepis*, Pba Kouang and *Probarbus jullieni*, Pba Eun) the conservation value can be easily understood and appreciated (Table 19). Such protection for these two large, slow growing species may be particularly relevant considering that both have undergone a dramatic reduction in numbers during the past 20 years or so. Both are migratory species, and are heavily targeted by Siphandone fishers over relatively short periods of time when they assemble in large numbers over their dry season spawning habitat. Although it is not known if individuals of either species "home" to parental spawning grounds, they may do. Of course, the factors that actually control their population size may exert their influences way beyond the boundaries of the FCZs.

If the Mekong's "deep holes" really do represent a specialized dry season habitat as is widely reported and believed, this implies that things are different during the wet season months. The true nature of events that take place at the onset of rains when current speeds, turbidity and water depth increase can only be guessed at. Perhaps the larger individuals of the wet season migratory populations emerge from the "deep hole" habitat and begin their spawning migrations, moving up the mainstream, or in some cases, out onto the floodplains or into tributaries. Probably some species move away from the mainstream currents into backwaters, or into areas of flooded forest for feeding and spawning. Logically, the greater the numbers of spawners that have been able to survive the dry season months (under FCZ protection) the greater will be the potential for spawning and subsequent recruitment. Although this is almost certainly an over-simplification of what actually controls the numbers of recruits in any one year, FCZ protection may have a conservation value by protecting adult spawning populations.

In addition to the above, if the dry season "deep holes" also act as nursery grounds for advanced juvenile stages of some species, as reported in some instances (Table 17), reduced exploitation of these potential recruits may also be of some conservation benefit.

Does the Siphandone FCZ program have application elsewhere?

The area known as Siphandone is unique in many respects; not least of which is that the Mekong is very wide over this section of the river, and is divided up into numerous different channels separated by mainstream islands. For the communities that live within Siphandone, there is often a choice of fishing venue on any one particular day, perhaps with some exceptions. In practice, this means that although fishing may be restricted over local traditional grounds (FCZs), there is usually somewhere else reasonably close by where fishing can be carried out unrestricted. In contrast to this, an FCZ imposed on a traditional fishing area close to a village on a Mekong single-channel tributary may mean that fishers have to travel excessive distances to reach suitable fishing grounds. For this reason, FCZs may not be appropriate for some communities in Southern Lao PDR, particularly those with limited access to alternative fishing grounds. Of course, if it really is true that the FCZs do make more fish accessible for exploitation as reported, this argument becomes somewhat redundant. However, it may prove to be more difficult to establish an FCZ in an area where alternative grounds are not within relatively easy access.

The social impact of the FCZs

Generally speaking, the establishment of the FCZs in the Siphandone area does not appear to have resulted in major intra- or inter village conflicts, but there is some disagreement and misunderstandings both within, and between individual villages (Tables 5 and 13). In some instances, a small proportion of villagers appear to resent not being allowed to fish over their own village's traditional fishing grounds. In other cases, villagers from neighboring communities who once shared a common fishing ground, and now prevented from fishing there, have expressed some dissatisfaction with the FCZ and its rules. Intrinsic in the nature of any conservation effort is that, for whatever reason, not everyone will support it. However, the problem of conflicts arising from the setting up of the FCZs should not be exaggerated.

Apart from any tangible benefits associated with the FCZs, they appear to have promoted a sense of awareness of conservation amongst villagers, and bestowed a sense of pride of ownership. This in turn appears to have led to a further sense of responsibility and renewed interest in the natural resources at their disposal. Even if the FCZs have achieved nothing else, it appears as though they have achieved this.

Ways of improving the FCZs

Without exception, all the villages that were interviewed claimed that they were keen to find ways to improve their FCZ even further (Table 20). Most villages mentioned that they wanted to encourage more people from within their own village, or from outside villages, to follow the FCZ's rules and restrictions. There may be a role here for the provincial and district authorities to become more involved with this, providing a two-way dialogue can be maintained between the communities and the authorities.

Communal fishing days option

One idea that emerged from the March 2000 survey was the option to hold community fishing days over a specific period during the dry season months. This may be thought of as analogous to the "Phaa Pba" (divide fish) activity which some communities use to intensively harvest village back-swamps in NE Thailand and parts of Lao PDR just prior to the start of the wet season. The main objective of the activity is to capture as many fish as possible before they become mobile again and disperse at the onset of the rains. It may be rather contrary to the conservation objective, but at the same time may be acceptable to some community members who do not entirely agree with the FCZ concept.

The challenge of scientific evaluation of the FCZs and effective monitoring

To date, evaluation of the successes and failures of the FCZs has mostly been restricted to recording qualitative information during point surveys at a number of more or less randomly selected sites. Ideally, it would have been preferable to have recorded standardized catch data (CPUE) over a number of years at each potential FCZ site prior to intervention. If this data could have been collected in such a way as to make it directly comparable to post-intervention standardized catch data, this would have provided a firm basis for the scientific evaluation of the FCZs. In reality, this probably never could have been achieved for the following reasons:

- ε Because the FCZs must be regarded as a more-or-less closed system (in the dry season at least) the pre- and post-intervention total effort would have had to be the same for mean CPUE data to be directly comparable. For example, if there were 50 villagers per day fishing the area that is now the FCZ before it was established, there would have to be 50 villagers fishing the area just outside it after it came into operation. That is, if the current objective is to look at fish abundance (weight or numbers). The mean CPUE from 10 fishers (a manageable sampling number) where 50 people are fishing would be expected to be lower than if there were only 20 people fishing. From a practical and social point of view, this would have undoubtedly proven extremely difficult to organize.
- ε Not only would the number of fishers have to be the same, but they would have to be using the same types of gears, and their fishing technique would have to be standardized. This would have been almost impossible given the physical differences inside and outside many of the FCZs.
- ε The fact that pre- and post-intervention data would have to be gathered in, and outside the FCZ respectively, automatically places any direct comparison of data in question.
- ε There are a large number of physical, hydrological and environmental factors which affect the general abundance of the fish populations of Siphandone in any one year. Presumably this directly affects the number of fish that take up refuge in the FCZs. It is likely therefore that data collection would probably have to continue for very many years before any conclusions could be reached or trends observed.
- ε To gather such pre- and post-intervention data would have required a considerable

research effort involving a large number of people.

From a practical point of view, and unfortunately, there does not appear to be a strictly quantitative and scientific way to evaluate the effectiveness of the FCZs now established in Siphandone. However, a method involving quantitative sampling is suggested in the recommendations section of this report which may provide additional insights into the effectiveness of the FCZs. However, it must be understood that the method has its limitations, and these will have to be taken into account during the final analysis of results.

The subject of monitoring the FCZs implies that a baseline situation already exists as a reference point so that positive or negative deviations from the reference point can be measured or quantified in some way in the future. The baseline situation, or reference point (pre-intervention mean CPUE), has never been identified at any of the FCZs so far established. Monitoring of the FCZs does not simply involve recording mean CPUE data at sites where FCZs have already been established. Monitoring, in this situation, means **assessing the effects of intervention**, be they positive or negative. This is only possible if the pre-intervention baseline situation is acknowledged, known or understood. An attempt to obtain a crude estimate of this baseline data will form part of the quantitative data collection program suggested in the recommendations section of this report.

MAIN CONCLUSIONS

- ε The FCZs represent a good example of co-management and have been established democratically with each village deciding on its own operating rules and regulations.
- ε The FCZs have the widespread support of the majority of the villagers in the communities where they are established.
- ε The FCZs have created some intra- and inter-village conflicts and disagreements, but these do not appear to be very serious.
- ε Each FCZ appears to act as a kind of natural resource "bank" whereby "credit" can be withdrawn over an extended period in an equitable manner.
- ε Through the co-management process, the FCZs have created an awareness of the importance of the continued and sustainable use of fishery resources in Siphandone at the village level.
- ε The sense of ownership created by the bottom-up management has been fundamental to the FCZ's success.
- ε The exact reason (s) why the FCZs appear to work still remains unclear although it almost certainly involves the "deep hole" habitat preferences of certain Mekong species during the dry season.
- ε The overall contribution of the FCZs to the continued and sustainable use of aquatic resources in Siphandone cannot be adequately assessed. There may, or may not be a positive effect.
- ε The Assumption that the apparent (and more easily verifiable) success of MPAs is directly applicable to Mekong FCZs is probably not correct.
- ε Caution should be observed in attempting to extend the FCZ concept outside the Siphandone area. FCZ's may not be appropriate for all communities in all locations.
- ε Apart from the issue of intra- or inter-village conflicts, the FCZs do not appear to be causing any harm in any way, and may well be acting to promote the sustainable use of aquatic resources in Siphandone.
- ε There is a requirement for a complementary quantitative assessment of the FCZs, but this cannot be carried out in a strictly scientific way due to the nature of the investigation and the difficulties associated with large river research. However, a revised quantitative data collection program should be initiated to help provide more

information.

RECOMMENDATIONS

The 8 villages that were identified during the March 2000 survey as having a comparable site to the FCZs close by should be re-surveyed over one week in May 2000 (Table 22). The objective of this latter survey will be to identify and select 4 villages where comparative quantitative data can be gathered during the dry season of year 2000 / 2001. The selection of each site will be based on the main criteria given below:

- ε Comparable physical dimensions of the FCZ and the reference site.
- ε The distance and accessibility of the reference site.
- ε The exact nature and type of FCZ and reference site.
- ε The distance the village is away from the route 13 bank and the Project's base at Ban Hat.
- ε The level of co-operation the villagers are willing to provide.
- ε Any previous history of conflicts over fishery resource use.

Once the four villages have been selected, village meetings will be held to explain the objectives of the sampling program and to reach an agreement on the approximate time schedule to begin the work. The sampling program will require four randomly selected fishers from each village. Two of the fishers will be asked to collect data either in, or close by the FCZ using a set of gillnets provided by the Project. The other two will be asked to fish in the same way, close to or within the reference site. This arrangement will be repeated at the other three sampling villages. Data collection will take place on the same dates, using the same gears in all FCZs and their reference sites.

All sixteen participating fishers will each be provided with four fixed gillnets of different mesh sizes. The mesh sizes suggested are: 4 cm, 8 cm, 12 cm and 16 cm. Fishers will be asked to set their nets twice per week on agreed dates. Nets should be set in the late afternoon and any fish caught should be retrieved at dawn. Fishers will be asked to record the total length and weight of each species caught together with the mesh size of the gillnet that was used to catch it. Special data recording forms and training will be provided for the participating fishers by district DLF staff.

A mean weekly overall CPUE will be calculated for each mesh size at each FCZ and its associated reference site. If the records are sound, it should be possible to compare the FCZ and reference site CPUE data and subject it to a basic statistical analysis. Any results should be treated with caution as there are clearly a number of uncertainties associated with the method.

It is recommended that fisher selection and any training be organized nearer the time of data collection. The sampling program should begin around the middle of November 2000 and should continue for as long as possible into year 2001. Fishing conditions may have deteriorated by March 2001 as floating algae weed becomes abundant.

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ITINERARY

Wednesday March 8

Planning meeting held in VTE at LARReC.

Tuesday March 14

Entered Lao PDR.

Wednesday March 15

Flew VTE to Pakse.

Thursday March 16

Planning day. Question sheet preparation and translation. Past document review. Vehicle repairs.

Friday March 17

Travel from Pakse to Muang Khong / Ban Hat. Meeting with district authorities at Muang Khong.

Saturday March 18

To: Ban Don Tolathi Mr Nosai, Mr Pak, Mr Gee.
 Loppadi Chok Mr Pouma
 Ban Don Peuay Mr Sai, Mr Khow, Mr Cumsang

Sunday March 19

To: Ban Thamakhep Mr Seenuan, Mr Supadah
 Ban Kong Keng Mr Suwan
 Ban Thakam Mr Borwadee, Mr Jan, Mr Viankham
 Ban Kadan Mr Kum-la, Mr tae, Mr Bounmi, Mr koun

Monday March 20

To: Ban Don En Mr Boungong, Mr Koulam
 Don Nang Som Mr Ha-see-da
 Ban Hatkhikouay Mr Somsai
 Ban Don Tavantok Mr Bounsom

Tuesday March 21

To: Ban Chan Mr Houg, Mr Tongasuk, Mr Sai
 Ban Oupasa Mr Tongpoun, Mr Bounheng, Mr Cumtun, Mr Boun
 Ban Kokpadek Mr Mee, Mr Serm, Mr See

Wednesday March 22

To: Ban Xiang Vang Mr Bounlong, Mr Sangmon
 Ban Don Houat Mr Pow, Mr Nee
 Ban Thantnvoke Mr Cumpai, Mr Somjit
 Ban Seneua Mr Sisouk, Mr Jan-na, Mr Boun-jan, Mr Khampoui

Thursday March 23

To: Ban Nangkhout Mr Cum-la, Mr Tanbountong
 Ban Veun Khao Mr Zem, Mr Bouncom
 Ban Phimanphon Mr Wat

Friday March 24

Return to Pakse and report writing.

Saturday March 25 to Monday March 27

Summary analysis. Report writing. Round-up meeting / presentation to PAFO staff on Monday.

Tuesday March 28

Return flight from Pakse to VTE / Base at Nong Khai.

A preliminary assessment of Mekong Fishery Conservation Zones in Southern Lao PDR, and recommendations for further evaluation and monitoring



**A preliminary assessment of Mekong Fishery Conservation Zones
in Southern Lao PDR, and recommendations
for further evaluation and monitoring**

Prepared for

**The Living Aquatic Resources and Research Center
Vientiane, Lao P.D.R.**

By

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Introduction

The area known as Siphandone in the Lao PDR stretches over approximately 60 km of the Mekong mainstream in the very southern most part of the country, and is adjacent to the border with Cambodia. Numerous mainstream islands are found throughout this region and of the 130 village communities found there, many have established themselves on the larger islands. The largest administrative district in Siphandone is Muang Khong and is home to just over 70,000 people. The main source of income for the Siphandone villagers is from rice farming and capture fisheries.

The area supports some of the most productive fisheries in the Lao PDR, which are targeted for both subsistence and semi-commercial purposes. An export trade exists with Thailand for some of the more valuable fish species, and several of the larger riparian towns in the Lao PDR rely on Siphandone to supply fish and fishery products upcountry. Fish bio-diversity is high in the area, and approximately 200 species are targeted by the riparian population using a wide range of fishing gears. Although some form of fishing activity takes place in most areas all year round, it is often during the periods of annual fish migration that fishing effort intensifies and returns are greatest.

Within the last decade there have been an ever-increasing number of anecdotal reports from local people suggesting a decline in available aquatic resources in the Siphandone area, including fisheries. The reasons for these reported declines are almost certainly complex, perhaps interrelated and as yet poorly understood. It should be noted that reports of a decline in aquatic resources are not confined to the Siphandone area of the Lao PDR only.

The Government of the Lao PDR has expressed considerable concern over the reports of a decline in aquatic resources and has sought ways to halt, and preferably reverse these trends. In 1993, under an endorsed decree, the Lao Government began the process of decentralizing responsibility for managing its nationwide natural resources. Under the decree, local administrative authorities have been encouraged and empowered to play a major role in managing their own local natural resources within a co-management framework. The objective of this was to promote the long-term sustainable use of the natural resource in question. Pomeroy and Williams (1994) define co-management as the sharing of responsibility and authority between the government and local fishers / community to manage a fishery or other natural resource.

In 1993, the Lao Community Fisheries and Dolphin Protection Project (LCFDPP) began working in Khong District, Champassack Province, Lao PDR to promote the sustainable use of aquatic resources within a broadly defined area (Baird *et al*, 1998). One of the specific objectives of the project was to establish village-level Fishery Conservation Zones (FCZs) that could be managed at a local level, and that would be of direct benefit to the individual villages concerned. It was further anticipated that the cumulative effects resulting from the establishment of individual FCZs would be beneficial to the sustainable use of aquatic resources in the area in general. By July 1997, the LCFDP Project had established 59 FCZs in a total of 54 separate villages using a participatory approach between villagers and the Project.

Also in July 1997, and at the termination of the LCFDP Project, the Environmental Conservation and Community Development in Siphandone Wetland Project (ECCDSWP) took over and continued the FCZ program (Baird *et al*, 1999). This latter Project ran for just under 2 years and terminated in April 1999. During the lifetime of the ECCDSW Project, a further 13 sites were established bringing the total number of operational FCZs to 72 at the time of writing this report.

The sequence of events leading to the establishment of each FCZ appears to vary slightly, but has mostly been achieved in one of two main ways. In the majority of cases, either the LCFDP, or the ECCDSW Project has approached a potential village and provided a presentation aimed at promoting the FCZ concept, but with no obligation to adopt it. Secondly, some of the villages that now have their own FCZ appear to have first heard about it, or seen it in operation at another village, and have subsequently invited the Project to visit their community to discuss it.

Although most FCZs can be broadly categorized into “group types”, inevitably every one is unique in some respect or other. For this reason, each community is provided with a number of management options and rules concerning their particular FCZ, and it is the community that decides which strategies to adopt or reject. As far as is possible to tell, the process is democratic with the community being asked to raise their hands to signify approval at village meetings. According to our interviews in March 2000, unanimity is rarely achieved, but providing there is a majority “yes” vote the final stage of the institutionalization process takes place. This involves approaching the relevant authorities to legally endorse the FCZ at the district’s administrative center.

Since 1993 when the first sites were established, various attempts have been made to evaluate the effectiveness of the FCZs in meeting their intended objectives (Meusch, 1997; Dacanto, 1999). Based on interviews conducted so far, the overwhelming response provided by local communities is positive, but not totally and absolutely so. Whereas this wealth of evidence should not, and must not be ignored, there is a requirement for a complementary scientific assessment of the suitability and appropriateness of the FCZs for the resource-poor communities of Southern Lao PDR (Phounsavath, 2000). This requirement is due to a number of concerns and questions that have arisen following the establishment of a relatively large number of FCZs to date. These mainly relate to the possibilities of intra- or inter-village conflicts over resource use, and possible income reduction or dietary imbalance resulting directly from FCZ-related restrictions placed on traditional fishing grounds and fishing practices. Anecdotal evidence gathered to date suggests that this latter scenario is not the case. However, if it were possible to establish categorically, and without question, that the FCZs are meeting their intended objectives, this would be beneficial to all stakeholders involved.

In March 2000, a further assessment survey of FCZs was carried out by staff of the Provincial Agriculture and Forestry Office (PAFO, Pakse), District Department of Livestock and Fisheries (DLF, Muang Khong), a representative from the Living Aquatic Resources and Research Center (LARReC, Vientiane) and an external advisor. The specific objectives of this survey were to gather up-to-date anecdotal information from villagers where FCZs have been established, and to assess the possibilities for gathering comparative quantitative data at selected sites. The aim of

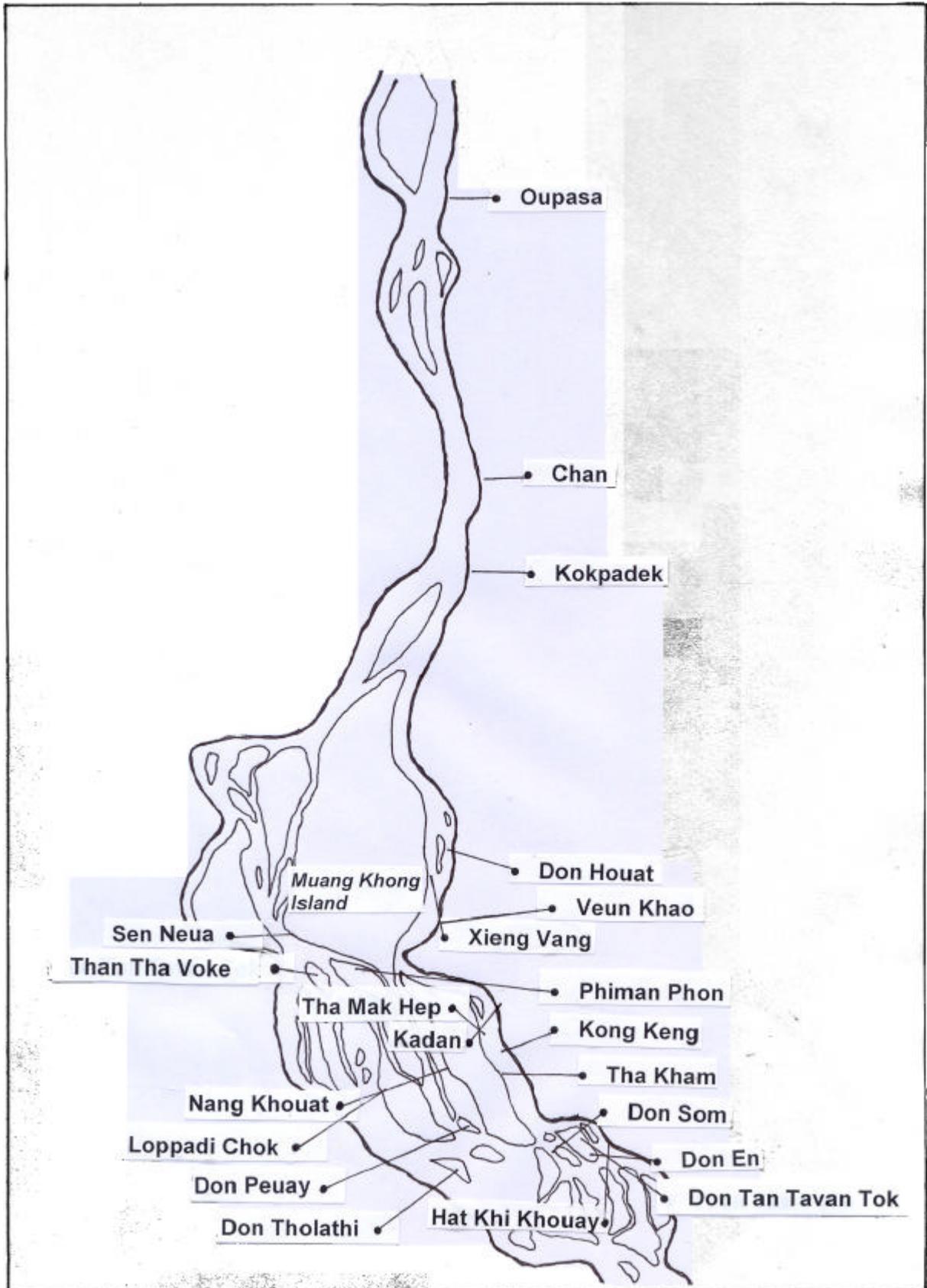
the latter objective is, and will be, to try and provide scientific evidence to support the anecdotal reports received during interviews with local people.

Survey Methods

Prior to carrying out the fieldwork, it was decided to visit between 20 and 25 different sites. This was in order for the survey information to be broadly comparable with a previous evaluation carried out in July 1997 (Meusch, 97). During the 1997 evaluation, 21 villages and FCZs were surveyed. During the March 2000 evaluation 21 villages with responsibility for 27 different FCZs were surveyed.

Local knowledge, and the experience of District DLF staff were used to decide on the villages to be visited on a daily basis. Whereas the aim was to visit as wide a range of different types of FCZ as possible, emphasis was placed on those sites located over deep holes and depressions in the river bed. The “deep hole” FCZ is the most common type of site established to date. Inevitably, because the FCZs are geographically spread out over a large area, sheer logistics and time constraints within available daylight hours also played some part in the selection of certain sites.

Once at the site, the village chief was asked to participate in an interview together with the deputy village chief (s) and the person responsible for village social affairs. Wherever possible, 2 or 3 local fishers were also asked to join the interview. A list of 27 questions were drawn up prior to beginning the fieldwork (see). These were translated into the Lao language. Introductions and explanations of the purpose of the interview were provided by the Provincial Chief of Livestock and Fisheries. The interviews were conducted by PAFO staff and the LARReC representative. Answers to questions were recorded in Lao and English. Every attempt was made to conduct the interviews in a relaxed and informal manner and interviewees were encouraged to speak freely about their FCZ management experiences. The results of the interviews are provided in the following section.



Map of the Muang Khong area showing the 21 villages visited during the March survey.

Results

The following tables (1 to 22) summarize the villager responses to the 27 questions drawn up prior to beginning fieldwork.

Table 1 showing responses given by villagers when asked when their FCZ was established (column 3) and how long it was before a noticeable increase in fish catch was observed (column 6). Column 4 shows when each FCZ was established according to a 1998 CESVI report.

| Village Name | Local name of FCZ | Villager response | CESVI report | Catch increase in year: | Approx. time delay in years |
|-------------------|----------------------------------------------------------|-------------------|--------------|-------------------------|-----------------------------|
| Don Peuay | Vang Kosa | 96 | 96 | 99 | 3 |
| Loppadi Chok | Veun Pha | 90 – 91 | 95 | 99 | 4 |
| Don Tholathi | Veun Tholathi | 95 | 94 | 97 | 3 |
| Tha Mak Hep | Veun Don Deua (Veun Don Mouang?) | 90 | 95 | 93 | ? |
| Tha Kham | Vang Samhong | 90 | 94 | 93 – 94 | ? |
| Kong Keng | Vang Don Gang Hoo (Peo Kong Khven?) | 97 - 98 | 96 | 97 – 98 | 1 – 2 |
| Hat Khi Khouay | Lon Ba Chok (Vang Houa Don Ta Chok?) | 98 | 95 | 00 | 5 |
| Kadan | Vang Pome Dam | 97 | 96 | 99 | 3 |
| Don Tan Tavan Tok | Veun Ka Tow Vang Lon Da Mee (Vang Khan Khi Thout?) | 95 | 94 | ? | ? |
| Don Som | Boung Ta Hoi Boung Va Boung Mouang | 95 | 94 | 98 | 4 |
| Don En | Veun Yang (Vang Pome Deng?) | 94 | 94 | 96- 97 | 2 – 3 |
| Kokpadek | Veun Va Veun Te | 97 | 96 | 99 | 3 |
| Chan | Veun Va | 96 – 97 | 96 | 99 | 3 |
| Oupasa | Veun Koke | 96 – 97 | 96 | 96 – 97 | 1 |
| Than Tha Voke | Veun Tang | 97 – 98 | ? | 99 | 1 – 2 |
| Sen Neua | Pa Nang | 95 | 95 | 99 | 4 |
| Xieng Vang | Vang Chan Hang | 98 | 97 | 99 | 2 |
| Don Houat | Veun Nong Hoi | 96 | 96 | 98 – 99 | 2 - 3 |
| Phiman Phon | Veun Phiman Phon (Khoum Veun Vat Phou Din?) | 94 | 95 | 98 – 99 | 3 – 4 |
| Veun Khao | Vang Khou Feun Vang Don Neh Gohm | 97 | 95 | 99 | 4 |
| Nang Khouat | Vang Ta Vat Vang Kot Houat Wang Ee Yaw | 97 98 | 95 | 00 | 5 |

Clearly there is some discrepancy between villager responses and records from the 1998 CESVI report. Based on these responses, it appears that an increase in fish catch occurs anything between immediately after the FCZ is established up to a period of 5 years. Most responses vary between 1 and 4 years.

Table 2 showing how the FCZs were established.

| Method of establishment | Number (n) and percentage of villages reporting method |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Initial intervention by LCFDP / ECCDSW Projects to introduce concepts of the FCZs at village meetings. Following this, voting and drawing up a proposal for submission to district authorities to proceed with the FCZ | (15) 71% |
| One village hearing about, or visiting another village with an FCZ, and then approaching LCFDP / ECCDSW Projects / district authorities with the view to establishing its own FCZ | (6) 29% |

The majority of the FCZs surveyed in March 2000 were established following initial visits by either the LCFDP / ECCDSW Projects. However, approximately one third of villages appear to have taken the initial steps in establishing their own FCZ.

Table 3 showing which months or seasons when each village recognizes its FCZ.

| FCZ in operation | Number (n) and percentage of villages reporting when FCZ in operation |
|-----------------------------------|------------------------------------------------------------------------------|
| During the whole year | (19) 90 % |
| Only during the dry season months | (2) 10% |

In the majority of cases, the FCZs are in operation for the whole year. A small proportion operate their FCZ during the dry season months only.

Table 4 showing gear restrictions in force within the FCZ boundary.

| Village rules of the FCZ | Number (n) and percentage of villages reporting gear restrictions |
|--------------------------------------|-----------------------------------------------------------------------------|
| All gears banned within FCZ boundary | (20) 95% |
| Fishing with certain gears allowed | (1) 5% - Gillnets / large hooks banned during dry season months only |

In almost every case, all fishing gears are banned within the FCZ boundary. Only one village operated slightly different rules by allowing the use of small hooks in the FCZ during the dry season.

Table 5 showing villager responses when asked if the FCZ rules / restrictions are followed by everyone, and if there are any conflicts within the village or between other villages over the FCZ.

| Rules and restrictions of the FCZ | Number (n) and percentage of villages reporting following rules and restrictions |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| All rules / restrictions followed by everyone now, but with some infringements in the past | (15) 71% |
| Rules and restrictions still being violated now | (6) 29% |
| Rules and restrictions of the FCZ have now created some conflicts with other villages | (4) 19% |
| Rules and restrictions of the FCZ have created some conflicts now within the village controlling the FCZ | (2) 10% |

Just over 70% of the villages interviewed reported that everyone was following the rules of the FCZ now, but that there were infringements in the past. Approximately 30% of villages reported that their FCZ rules were still being violated at the present time. About 20% of villages reported that the FCZ , and its rules have created some conflicts with other villages, whereas 10% of villages reported that the FCZ had created some conflicts within their own village.

Table 6 showing villager responses when asked if everyone knew exactly where the FCZ boundary was and how it was marked out.

| The position of the boundary and how it is marked out | Number (n) and percentage of villages reporting how their FCZ is marked out and if everyone knows where it is |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Marked out clearly and everyone knows where the boundary is | (20) 95% |
| Not everyone sure where the FCZ boundary is | (1) 5% |
| Marked out with purpose made signs | (20) 95% |

Almost every village reported that everyone knew where the FCZ boundary was, and that it was marked out with signs. Only one village mentioned that not everyone was sure where the FCZ boundary was.

Table 7 showing who took the decision to establish FCZ.

| The decision to establish the FCZ was made by: | Number (n) and percentage of villages reporting who decided to establish the FCZ |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------|
| All villagers at meetings with a show of hands | (21) 100% |
| Others | (0) |

Every village interviewed claimed that it was democratic decision made by villagers.

Table 8 showing the main types of fishing gear in use around the FCZs.

| Type of gear in use around the perimeter of the FCZ | Number (n) and percentage of villages reporting the use of a gear around the FCZ |
|-----------------------------------------------------|----------------------------------------------------------------------------------|
| Fixed or drifted gillnets | (20) 95% |
| Single or multiple hooks | (14) 67% |
| Falling door traps | (1) 5% |
| Castnets | (5) 24% |
| Pushnets | (1) 5% |
| Drag nets | (1) 5% |
| Spears | (1) 5% |
| Bamboo cylinder traps | (1) 5% |

Fixed or drifted gillnets and hooks are by far the most important gears in use around the FCZ perimeter. Castnets are used to some extent, but other gears are only of relatively minor importance.

Table 9 showing approximately how many people fish around the FCZ in the dry season months.

| Numbers of villagers fishing around the FCZ in the dry season | Numbers (n) and percentage of villages reporting fishing intensity around their FCZ |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Less than 10 people / day | (5) 24% |
| Between 10 and 100 people / day | (13) 62% |
| Between 100 and 300 people / day | (3) 14% |

Just over half the villages interviewed reported that between 10 and 100 people fish around the FCZ each day during the dry season. About one quarter of villages claimed this figure was less than 10 people per day, and a small proportion of villages reported that between 100 and 300 people per day fished around the FCZ.

Table 10 showing villager responses when asked how far the effects of the FCZ could be observed away from its boundary (mainly fish surfacing).

| Distance from the perimeter of the FCZ where the effects of it can be observed | Numbers (n) and percentage of villages reporting the distance from the FCZ where the effects of it can be observed |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Only see effects inside the FCZ | (8) 38% |
| Less than 10 m outside FCZ | (7) 33% |
| Between 10 and 50 m outside FCZ | (6) 29% |

Just under 40% of villages reported seeing the effects within the FCZ only. Just over 30%, estimated the effects to reach no further than about 10 m outside the FCZ boundary. About 30% of villages estimated the effects to reach between about 10 to 50 m outside the FCZ boundary.

Table 11 showing villager responses when asked about the fishing pressure in the area before the FCZ was established.

| Fishing pressure in the same area before the FCZ set up | Numbers (n) and percentage of villages reporting fishing pressure in the same area before the FCZ set up |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Only light to moderate pressure | (5) 24% |
| Heavy fishing pressure | (16) 76% |

About a quarter of the villages interviewed reported that the area was only lightly or moderately fished before the FCZ was established. About three quarters of those villages interviewed described the area now designated as an FCZ as being a traditional dry season fishing site, and was heavily fished before the FCZ was established.

Table 12 showing when the area now designated as the FCZ was fished.

| The period when the area was fished before the FCZ was set up | Numbers (n) and percentages of villages reporting when the area was fished before the FCZ was set up |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Fished in both seasons | (12) 57% (Only light fishing with hooks during the wet season) |
| Only fished during the dry season | (9) 43% |

Just over half the villages interviewed said the area now designated as the FCZ was fished during both seasons, but added that fishing was light in the wet season because gillnets could not be used. Just over 40% of the villages interviewed reported that they only used to fish the area during the dry season months.

Table 13 showing responses by villagers when asked if they thought the FCZ was a good initiative for their village.

| Villagers perceptions of their own FCZ as reported by senior village authorities | Numbers (n) and percentages of villages reporting on the suitability of the FCZ for their village |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Virtually all villagers support the FCZ concept | (18) 86% |
| Most villagers support the FCZ concept but a small proportion of villagers have reservations about it | (3) 14% |
| A large proportion of the villagers have reservations about it | (0) |

Eighty six percent of all villages interviewed reported that virtually all people within their village supported the FCZ concept. Fourteen percent mentioned that a small number of people within their village had reservations about it. None of the villages interviewed reported that there were a large number of people who were dissatisfied with the FCZ.

Table 14 showing villager responses when asked if everyone in the village was sure that there were more fish available **because** of the FCZ.

| Villagers observations of the effects of the FCZ | Numbers (n) and percentages of villages reporting their observations on the effects of the FCZ |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Sure there are more fish available in the village now because of the FCZ | (19) 90% |
| Not sure the quantity of fish is affected by the FCZ | (2) 10% |

The vast majority of villages reported that they were sure the FCZ was having a positive effect on the availability of fish in the village. Ten percent of those villages interviewed were not sure that the FCZ was affecting the availability of fish in the village.

Table 15 showing how villagers know that more fish are present as a result of the FCZ.

| Villagers observations and perceptions on the reported increase in fish catch around the FCZ | Numbers (n) and percentages of villages reporting on their observations and perceptions about the increased fish catch |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| See more fish surfacing now inside and just outside the FCZ | (15) 70% |
| See more fish surfacing inside the FCZ only | (2) 10% |
| Catch more fish now in the areas just outside the FCZ than before | (2) 10% |
| Not really sure there are more fish being caught now | (2) 10% |

Seventy percent of the villages interviewed based their perceptions of an increase in fish numbers on visual observations of fish inside and just outside the FCZ. Ten percent of villages reported seeing more fish surfacing inside the FCZ only. Ten percent of villages reported catching more fish in the areas just outside the FCZ, and a further 10% of villages were not sure that the FCZ was having any major effect.

Table 16 showing villager responses when asked which fish species they thought had locally increased in number as a result of their FCZ.

| The species that were reported by villagers as having increased as a result of the FCZ | Numbers (n) of villages reporting an increase in quantity of certain species close to the FCZ |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Phia (<i>Morulus</i> spp.) | (11) |
| Dtong Kai (<i>Chitala blanci</i>) | (8) |
| Nang (<i>Micronema</i> spp.) | (8) |
| Por / Gae (<i>Pangasius conchophilus</i>) | (7) |
| Nyawn Lang Keo (<i>Pangasius macronema</i>) | (7) |
| Kouang (<i>Bosemania microlepis</i>) | (6) |
| Dtong Kuay (<i>Chitala ornata</i>) | (4) |
| Dtong Na (<i>Notopterus notopterus</i>) | (4) |
| Eun (<i>Probarbus jullieni</i>) | (4) |
| Mak Ban (<i>Cosmochilus harmandi</i>) | (3) |
| Koon (<i>Wallago leerii</i>) | (2) |
| Pawn (<i>Cirrhinus microlepis</i>) | (2) |
| Pak (<i>Hypsibarbus</i> sp. Or <i>Barbodes gonionotus</i>) | (2) |
| Sanghoua (<i>Micronema apogon</i>) | (2) |
| Noo (<i>Helicophagus waandersii</i>) | (2) |
| Va (<i>Labeo erythropterus</i>) | (2) |
| Kung (<i>Mystus wyckiioides</i>) | (2) |
| Nang Deng (<i>Hemisilurus mekongensis</i>) | (1) |
| Dto (<i>Channa micropeltes</i>) | (1) |
| Gooan (<i>Channa marulius</i>) | (1) |
| Sae (<i>Mekongina erythrospila</i>) | (1) |
| Koh (<i>Gyrinocheilus pennocki</i>) | (1) |
| Dok Niew (<i>Cyclocheilichthys</i> sp.) | (1) |
| Mak Pang (<i>Tenualosa thiabeaudi</i>) | (1) |

The 9 fish species, or genera, whose Lao vernacular names appear in bold print at the top of Table 16 were the most important species / genera reported as having increased in number as a result of the FCZs. Altogether, 24 species or genera of fish were reported by villagers as having increased in number as a direct result of the FCZs.

Table 17 showing villager responses when asked if they had noticed an increase in juvenile fish in the area, and which species these were.

| The species of juvenile fish reported to have increased in number as a result of the FCZ | Numbers (n) of villages reporting seeing an increase in the number of juvenile fish in the FCZ area |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Not noticed any increase in any species | (7) |
| Dto (<i>Channa micropeltes</i>) | (6) |
| Phia (<i>Morulius</i> spp.) | (3) |
| Gooan (<i>Channa marulius</i>) | (3) |
| Dtong Na (<i>Notopterus notopterus</i>) | (3) |
| Nang (<i>Micronema</i> spp.) | (2) |
| Kouang (<i>Bosemania microlepis</i>) | (2) |
| Kung (<i>Mystus wyckioides</i>) | (1) |
| Por (<i>Pangasius conchophilus</i>) | (1) |
| Ni (<i>Cyprinus carpio</i>) | (1) |
| Soi (<i>Henicorynchus</i> spp.) | (1) |
| Nyawn (<i>Pangasius</i> spp.) | (1) |
| Koon (<i>Wallago leeri</i>) | (1) |
| Dtong Kai (<i>Chitala blanci</i>) | (1) |
| Mak Ban (<i>Cosmochilus harmandi</i>) | (1) |
| Eun (<i>Probarbus jullieni</i>) | (1) |

Seven villages out of the 21 where interviews took place (33%) reported that they had not observed any increase in juvenile fish in or around their FCZ. Six villages (29%) reported seeing an increase in juvenile Pba Dto. A small proportion of villages (14%) reported seeing an increase in numbers of juvenile Pba Phia, Pba Gooan and Pba Dtong Na.

Table 18 showing the reasons given by villagers as to why they thought the population of fish has increased in and around their FCZ.

| The reasons given by the villagers as to why they think the population of fish has increased | Numbers (n) and percentages of villages giving their opinion as to why they think the population of fish has increased |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Fish and environment are not disturbed | (17) 81% |
| FCZ is a dry season deep water habitat for many species | (8) 38% |
| Large rocks and underwater caves present | (6) 29% |
| Large tree trunks and submerged timber present | (3) 14% |
| Not sure why | (2) 10% |

The vast majority of villages (81%) considered that low levels of disturbance in the FCZ area was the most important factor. Almost 40% of villagers were of the opinion that large numbers of fish make use of deep holes as a refuge habitat during the dry season. Other important factors were the presence of large rocks, underwater caves and submerged timber. Ten percent of the villages were not sure why the fish population appeared to have increased.

Table 19 showing if villagers considered their FCZ to be placed over a known spawning ground of any fish species, and if so which species.

| The species that are known from past experience to spawn within the present FCZ | Numbers (n) of villages reporting that their FCZ is a known spawning area |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Not known if spawning area for any species | (12) |
| Dto (<i>Channa micropeltes</i>) | (3) |
| Dtong Na (<i>Notopterus notopterus</i>) | (3) |
| Phia (<i>Morulius</i> spp.) | (2) |
| Pawn (<i>Cirrhinus microlepis</i>) | (2) |
| Kouang (<i>Bosemania microlepis</i>) | (2) |
| Gooan (<i>Channa marulius</i>) | (1) |
| Eun (<i>Probarbus jullieni</i>) | (1) |
| Ni (<i>Cyprinus carpio</i>) | (1) |

The majority of villages (57%) did not know if their FCZ was a spawning area for any species. Fourteen percent of villages interviewed reported that their FCZ was placed over known spawning grounds of Pba Dto and Pba Dtong Na. A small number of villages reported that the remaining 6 species in Table 19 were known to spawn within their FCZ.

Table 20 showing the various ways the villagers thought that the FCZs could be improved or better managed.

| Villagers comments on ways which the FCZ might be improved | Numbers (n) of villages reporting on ways to improve the FCZ |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Encourage more people to stick to the rules within the village and have dialogue with other villages nearby | (8) |
| Need more FCZ “care-takers” to police the FCZ and catch those breaking the rules | (3) |
| Ask the provincial and district authorities to visit the village and explain rules to villagers | (2) |
| Increase the fines imposed on those breaking the rules | (2) |
| Would like to find a way to stop people stealing fish from the FCZ | (2) |
| Not sure how to improve it but would like to make it better | (2) |
| Net off sections of the FCZ and allow the fish to spawn there undisturbed | (1) |
| Place large branches into the water to encourage fish to stay in the area and prevent people from stealing fish | (1) |

The most common response provided by villagers (38%) was to encourage more people to refrain from violating FCZ rules. More effective policing, and participation of district and provincial authorities in enforcing rules were other responses given. Increased fines for violation and fish theft prevention were mentioned by a few villages. Some villages were not sure how to improve it, but were keen to find a way.

Table 21 showing the crudely estimated characteristics of each of the FCZs visited in March 2000.

| Village Name | Local name of FCZ | Type of FCZ | Approximate dimensions |
|---------------------|----------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------|
| Don Peuay | Vang Kosa | Moderately deep pool. Sand | 400m x 150m x 24m |
| Loppadi Chok | Veun Pha | Deep pool. Hard rock / sand. | 200m x 150m x 31m |
| Don Tholathi | Veun Tholathi | Moderately deep pool. Hard rock / sand. | 700m x 500m x 25m |
| Tha Mak Hep | Veun Don Deua (Veun Don Mouang?) | Shallow pool. Hard rock / small rocks. | 40m x 60m x 6m |
| Tha Kham | Vang Samhong | Shallow pool. Hard rock / silt. | 200m x 100m x 6m |
| Kong Keng | Vang Don Gang Hoo (Peo Kong Khven?) | Shallow pool. Hard rock / sand. | 100m x 100m x 4m |
| Hat Khi Khouay | Lon Ba Chok (Vang Houa Don Ta Chok?) | Shallow pool. | 30m x 50m x 4m |
| Kadan | Vang Pome Dam | Shallow pool. Hard rock / sand. | 100m x 100m x 6m |
| Don Tan Tavan Tok | Veun Ka Tow Vang Lon Da Mee (Vang Khan Khi Thout?) | Very deep pool. Hard rock / sand. Moderately deep pool. Sand. | 100m x 100m x 70m 80m x 60m x 24m |
| Don Som | Boung Ta Hoi Boung Va Boung Mouang | Moderately deep to shallow pools. Hard rock / sand. | 350m x 10m x 5m 270m x 15m x 7m 300m x 270m x 15m |
| Don En | Veun Yang (Vang Pome Deng?) | Deep pool. Hard rock / sand. | 150m x 100m x 45m |
| Kokpadek | Veun Va Veun Te | Deep pool. Hard rock / silt. | 300m x 300m x 30m |
| Chan | Veun Va | Deep pool. Hard rock silt | 300m x 300m x 45m |
| Oupasa | Veun Koke | Deep pool. Sand / silt / little rock. | 200m x 500m x 40m |
| Than Tha Voke | Veun Tang | Moderately deep pool. Hard rock / sand. | 400m x 300m x 18m |
| Sen Neua | Pa Nang | Deep pool. Sand. | 150m x 200m x 32m |
| Xieng Vang | Vang Chan Hang | Shallow pool. Hard rock / sand. | 150m x 200m x 8m |
| Don Houat | Veun Nong Hoi | Shallow pool. Sand | 180m x 400m x 8m |
| Phiman Phon | Veun Phiman Phon (Khoum Veun Vat Phou Din?) | Shallow pool. Sand. | 80m x 100m x 8m |
| Veun Khao | Vang Khou Feun Vang Don Neh Gohm | Deep pools. Sand. | 100m x 100m x 30m 50m x 100m x 25m |
| Nang Khouat | Vang Ta Vat Vang Kot Houat Wang Ee Yaw | Shallow pool. Hard rock / clay | 200m x 150m x 6m 150m x 100m x 5m 50m x 50m x 5m |

Although there are different types of FCZ in Muang Khong district, the majority are established over deep water holes in the river bed. Where dry season water currents are swift, the pool bases are often composed of exposed rock and sand. Where water currents are slower, or sometimes barely perceptible, the bases mostly consist of silt-covered rock, sand, silt and fine muds. According to information obtained during interviews, water depth in the FCZs visited range from 2 to 3 meters in depth up to a maximum of 70 m in depth. Length and width dimensions are quite variable with the largest of FCZs measuring 700 m x 500 m and the smallest ones approximately 30 m x 50 m.

Table 22 showing villager responses when asked if they knew of another site close by with similar characteristics to their FCZ, but not influenced by it.

| The close proximity of another site with similar characteristics to the FCZ | Names of villages where other sites are known |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Another sites exists close by: | 8 villages <ul style="list-style-type: none"> • Phimanphon (about 150m away, but smaller at 50m x 50m) • Veunkhao (possibly 2 sites) • Don Nangkhout (about 200m away) • Don Houat (about 400m away) • Oupasa (about 1km away and 200m x 200m) • Don Nang Som (two sites about 1km away) • Tha Kham (about 100m away) • Kong Keng (about 100m away) • Tha Mak Hep (about 400m away) |
| No other site exists close by: | 13 villages |

Eight villages reported that a similar site to their FCZ was located quite close by where it might be possible to gather comparative data. Thirteen villages reported that no such site existed close by.

Discussion

Co-management of natural resources

In the Lao PDR's relatively distant past, management of natural resources was given a low priority mainly because of limited exploitation pressure and super-abundance of resource. This situation has changed in recent years, and wild capture fisheries in particular have almost certainly suffered a widespread decline within the last decade or so. Rural communities, provincial and district authorities, together with central government are seeking ways to better manage fishery resources to ensure their sustainable and continued use in the future.

Experience from other parts of the developing world suggest that traditional top-down management systems for many wild capture fisheries have not been very successful. In recent times there has been a shift away from the traditional approach, with local people playing an active role in managing their own resource, but at the same time still maintaining dialogue with district and provincial authorities, and ultimately central government. This two-way, bottom-up management system approach has been instrumental in helping to successfully establish the Fishery Conservation Zones in the Siphandone area of Southern Lao PDR. Local people have chosen the specific sites where FCZs have been established based on an intimate knowledge of their immediate surroundings, and generations of accumulated practical fishing experience. They have formulated their own rules and regulations for operating their FCZs, and firmly believe (in most cases) that the FCZs are an aid to the protection and sustained use of their local fishery resources (Tables 2, 4, 5 and 13).

FCZs as dry season refuge habitats for certain species

One of the key factors in the success of many of the FCZ appears to be that they are placed over a "deep hole" or depression in the river bed (Table 21). Based on years of accumulated knowledge, local people know exactly where these "deep holes" are and have developed methods to exploit the fish species found there. It is mainly during the dry season months that the "deep holes" are fished because water currents are generally too strong at other times of the year.

It appears that both migratory and some more sedentary fish species make use of the "deep hole" environment during the dry season months (Table 16). There are probably many reasons why each different species is attracted to this habitat. Some of these might include:

- More stable thermal conditions
- Greater variety of physical habitat such as caves and submerged timber
- Greater protection from predators as a result of reduced light penetration and variety of physical habitat
- In some cases, less energy expenditure due to reduced current flow
- Perhaps greater concentrations of prey and food items
- Spawning habitat for a few species (e.g. *Bosemania microlepis*, Pba Kouang)

Why do the FCZs appear to work ?

In order to try and answer this question, the reader is asked to consider the following possible scenarios:

- The first is that perhaps the protection afforded by the FCZs really does create an environment in which fish availability (for whatever reason) is greater over a given period than before the site was established as an FCZ (Tables 10, 13 and 14). This leads directly to greater fish landings in the areas around the FCZ perimeter.
- The second might be that the fish production from the area is more or less the same as before the site was established, but only appears greater because the harvest is carried out over a protracted period by a large number of people fishing around the FCZ perimeter. If the “deep holes” where many of the FCZs are located really do act as dry season refuge habitats for some Mekong species, without protection they might be “fished out” quickly at the beginning of the dry season. With FCZ protection, many “deep hole” residents may filter out slowly giving the impression that more fish are available.
- A third scenario might be that local people perceive that there are more fish present than before because they are not being caught regularly and as such they see them surfacing often in their dry season refuge habitat (Table 15).

The first scenario above suggests that more fish are available as a direct result of the FCZ. This may well be true at sites where the FCZ is located directly over a “deep hole”. These sites are widely reported to act as dry season refuge habitats for some Mekong species. It is possible that some migratory species, and certain sedentary types, would accumulate in these areas over the course of the dry season. As a “no take” zone, fish numbers within the FCZ might reach a higher than normal level. This probably does happen to a greater or lesser degree, and may help to partially explain why the FCZs appear to be successful. The only way this can be verified is by recording quantitative data within, or near to, the FCZ and comparing this with data obtained from a non-intervention reference site close by.

It seems less likely that the widely reported increase in fish numbers is directly associated with local recruitment following spawning activity within the FCZ, at least within the same dry season. With one or two notable exceptions, most of the species reported as having benefited from the FCZs are wet season spawners and do not breed during the dry season months (Table 16). However, certain types of FCZ may act as nursery sites for juvenile fish spawned during the previous wet season.

The second scenario suggests that the numbers of fish before and after the FCZ is established is more or less the same, but only appears greater due to an altered harvesting technique. Seventy six percent of the villages interviewed reported that their FCZ site was heavily fished before it was made a “no take” zone (Table 11). With FCZ protection, the fish population would naturally be under less exploitation pressure, and the numbers of fish would probably therefore remain higher over a longer period. Seventy percent of the villages interviewed reported that they saw more fish surfacing inside and just outside the FCZ that before it was declared a “no take” zone (Table 15). It is not known if most, or all, of the fish that move into “deep

holes” during the dry season remain there for long periods or are relatively mobile, moving freely in and out. However, it seems likely that there is at least some degree of movement in and out of the “no take” zones. It is possible that it is during these periods of movement that fish are caught around the perimeter of the FCZ. This may give the impression that more fish are available because the harvest takes place over a longer period instead of a quick and rich harvest at the start of the dry season. In this way, perhaps the FCZs act as some kind of natural resource “bank” and might be viewed as analogous to a village rice store which can be gradually used up over a period of time. Logic dictates that this probably does happen to some degree.

The third scenario is linked to both the first and second and suggests that the FCZs have relatively little conservation effect on stocks overall, and do not really contribute to greater fish landings. Unfortunately, virtually all the evidence to date for the apparent success of the FCZs is based on visual assessments and anecdotal reports only (Table 15). It is just possible that much of the enthusiasm for the FCZs is generated by, and based on these visual sightings, but that in practical terms the FCZ has no particular effect on overall stock numbers. Logic suggests that this is unlikely to be the case, but given the wide range of endogenous and exogenous factors that affect the size and structure of the fish populations in the Siphandone area in any one year, the FCZs may, or may not, have an overall direct conservation effect. This argument does, of course, not take into account the intrinsic value of the FCZs as a valuable conservation awareness tool at the village level, which may be considerable. In practical terms, it will be impossible to verify this issue by any known scientific methods and is not discussed any further here.

Is the overall fish catch in Siphandone inevitably reduced as a result of the FCZs ? And does protection at one site mean greater exploitation at another ?

Again, in order to try to address these questions, the reader is asked to consider the following scenarios:

- Firstly, if the rules and regulations of the FCZs are enforced and followed by more or less everyone as the survey suggests, does this mean that villagers inevitably are therefore catching, consuming or selling fewer fish ?
- Secondly, if the above scenario is partly or wholly true, do they compensate for this by simply increasing their fishing efforts in other areas not under FCZ protection ?

Based on the results of the surveys carried out in 1997 and 2000, the first scenario appears not to be the case. In fact the opposite of this seems to be true. However, the survey carried out in 2000 did receive some reports that the second scenario may be partly true. Again this issue is almost impossible to verify by quantitative methods, but perhaps should be further investigated by anecdotal means during any subsequent surveys. The implication here is that the FCZs can have little overall conservation effect for the Siphandone area if the same numbers of fish are being caught throughout the whole region. However, this is probably an over-simplification of the situation and there may well be other benefits concerned with protecting specialized habitats such as “deep holes”.

Is the Marine Protected Area (MPA) experience relevant ?

In recent years there has been a worldwide growing interest in the setting up of inshore Marine Protected Areas (MPAs) in order to ensure the continued sustainable use of aquatic resources for local communities and to protect bio-diversity heritage.

Researchers at the University of California (Ocean News, 1999) concluded that “no take” zones in coastal waters can reduce the effects of fishing, better preserve bio-diversity and yet actually yield the same industry-harvest as current fishing-control methods. Scientists from the Florida Keys National Marine Sanctuary (Environmental News Network, 1999) commented “we are surprised how quickly animal populations are responding to these no-take zones”. They concluded that the quick return was an indication of the intense exploitation pressure the marine animals were under before the “no take” zone was established. Populations of 3 reef fish species were also compared between “no take” zones and comparable reference sites. In all cases, the highest average abundance of the 3 reef species was observed in the “no take” zone within the first full year of protection. There are numerous other similar examples of the success of MPAs from other parts of the world.

So, are there any lessons to be learned from the MPAs regarding Mekong FCZs or are these environments and the factors involved so different for there to be no direct comparison or application ?

Table 23 showing a crude comparison between inshore Marine Protected Areas and Mekong Fishery Conservation Zones.

| Feature / Parameters | Marine MPA | Mekong FCZ |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main types of aquatic animals protected / conserved | Mostly non-migratory reef fish and sedentary / sessile animals | Both migratory and sedentary fish |
| Period of protection | Usually all year round | Effectively only during the dry season months |
| Environment | Generally stable | Highly fluctuating over the whole year |
| Bio-diversity | Often highly complex | Comparatively low complexity |
| Physical damage caused by fishing activities | Often highly damaging | Relatively little damage caused |
| Assessment of protective measures | Comparatively easy. Diving in clear water with low current speeds allows direct counting / observation of animals Many animals sedentary / sessile Underwater photography possible Wide choice of reference sites close by | Difficult. Quantitative data only obtained from standardized catch records Migratory and sedentary fish Limited choice of reference sites close by |

The above crude comparison of MPAs and Mekong FCZs suggests that it may be inappropriate to directly compare these two types of conservation area in terms of their effectiveness in protecting aquatic natural resources.

The overall cumulative effect of the FCZs

Although it is probably impossible to accurately assess if the FCZs directly contribute to conservation of fishery resources in the Siphandone area in general, they may well do so. Where an FCZ is established over a known breeding ground for a species that spawns during the dry season (*Bosemania microlepis*, Pba Kouang and *Probarbus jullieni*, Pba Eun) the conservation value can be easily understood and appreciated (Table 19). Such protection for these two large, slow growing species may be particularly relevant considering that both have undergone a dramatic reduction in numbers during the past 20 years or so. Both are migratory species, and are heavily targeted by Siphandone fishers over relatively short periods of time when they assemble in large numbers over their dry season spawning habitat. Although it is not known if individuals of either species “home” to parental spawning grounds, they may do. Of course, the factors that actually control their population size may exert their influences way beyond the boundaries of the FCZs.

If the Mekong’s “deep holes” really do represent a specialized dry season habitat as is widely reported and believed, this implies that things are different during the wet season months. The true nature of events that take place at the onset of rains when current speeds, turbidity and water depth increase can only be guessed at. Perhaps the larger individuals of the wet season migratory populations emerge from the “deep hole” habitat and begin their spawning migrations, moving up the mainstream, or in some cases, out onto the floodplains or into tributaries. Probably some species move away from the mainstream currents into backwaters, or into areas of flooded forest for feeding and spawning. Logically, the greater the numbers of spawners that have been able to survive the dry season months (under FCZ protection) the greater will be the potential for spawning and subsequent recruitment. Although this is almost certainly an over-simplification of what actually controls the numbers of recruits in any one year, FCZ protection may have a conservation value by protecting adult spawning populations.

In addition to the above, if the dry season “deep holes” also act as nursery grounds for advanced juvenile stages of some species, as reported in some instances (Table 17), reduced exploitation of these potential recruits may also be of some conservation benefit.

Does the Siphandone FCZ program have application elsewhere ?

The area known as Siphandone is unique in many respects; not least of which is that the Mekong is very wide over this section of the river, and is divided up into numerous different channels separated by mainstream islands. For the communities that live within Siphandone, there is often a choice of fishing venue on any one particular day, perhaps with some exceptions. In practice, this means that although fishing may be restricted over local traditional grounds (FCZs), there is usually somewhere else reasonably close by where fishing can be carried out unrestricted. In contrast to this, an FCZ imposed on a traditional fishing area close to a village on a Mekong single-channel tributary may mean that fishers have to travel excessive distances to reach suitable fishing grounds. For this reason, FCZs may not be appropriate for some communities in Southern Lao PDR, particularly those with limited access to alternative fishing grounds. Of course, if it really is true that the

FCZs do make more fish accessible for exploitation as reported, this argument becomes somewhat redundant. However, it may prove to be more difficult to establish an FCZ in an area where alternative grounds are not within relatively easy access.

The social impact of the FCZs

Generally speaking, the establishment of the FCZs in the Siphandone area does not appear to have resulted in major intra- or inter village conflicts, but there is some disagreement and misunderstandings both within, and between individual villages (Tables 5 and 13). In some instances, a small proportion of villagers appear to resent not being allowed to fish over their own village's traditional fishing grounds. In other cases, villagers from neighboring communities who once shared a common fishing ground, and now prevented from fishing there, have expressed some dissatisfaction with the FCZ and its rules. Intrinsic in the nature of any conservation effort is that, for whatever reason, not everyone will support it. However, the problem of conflicts arising from the setting up of the FCZs should not be exaggerated.

Apart from any tangible benefits associated with the FCZs, they appear to have promoted a sense of awareness of conservation amongst villagers, and bestowed a sense of pride of ownership. This in turn appears to have led to a further sense of responsibility and renewed interest in the natural resources at their disposal. Even if the FCZs have achieved nothing else, it appears as though they have achieved this.

Ways of improving the FCZs

Without exception, all the villages that were interviewed claimed that they were keen to find ways to improve their FCZ even further (Table 20). Most villages mentioned that they wanted to encourage more people from within their own village, or from outside villages, to follow the FCZ's rules and restrictions. There may be a role here for the provincial and district authorities to become more involved with this, providing a two-way dialogue can be maintained between the communities and the authorities.

Communal fishing days option

One idea that emerged from the March 2000 survey was the option to hold community fishing days over a specific period during the dry season months. This may be thought of as analogous to the "Phaa Pba" (divide fish) activity which some communities use to intensively harvest village back-swamps in NE Thailand and parts of Lao PDR just prior to the start of the wet season. The main objective of the activity is to capture as many fish as possible before they become mobile again and disperse at the onset of the rains. It may be rather contrary to the conservation objective, but at the same time may be acceptable to some community members who do not entirely agree with the FCZ concept.

The challenge of scientific evaluation of the FCZs and effective monitoring

To date, evaluation of the successes and failures of the FCZs has mostly been restricted to recording qualitative information during point surveys at a number of more or less randomly selected sites. Ideally, it would have been preferable to have

recorded standardized catch data (CPUE) over a number of years at each potential FCZ site prior to intervention. If this data could have been collected in such a way as to make it directly comparable to post-intervention standardized catch data, this would have provided a firm basis for the scientific evaluation of the FCZs. In reality, this probably never could have been achieved for the following reasons:

- Because the FCZs must be regarded as a more-or-less closed system (in the dry season at least) the pre- and post-intervention total effort would have had to be the same for mean CPUE data to be directly comparable. For example, if there were 50 villagers per day fishing the area that is now the FCZ before it was established, there would have to be 50 villagers fishing the area just outside it after it came into operation. That is, if the current objective is to look at fish abundance (weight or numbers). The mean CPUE from 10 fishers (a manageable sampling number) where 50 people are fishing would be expected to be lower than if there were only 20 people fishing. From a practical and social point of view, this would have undoubtedly proven extremely difficult to organize.
- Not only would the number of fishers have to be the same, but they would have to be using the same types of gears, and their fishing technique would have to be standardized. This would have been almost impossible given the physical differences inside and outside many of the FCZs.
- The fact that pre- and post-intervention data would have to be gathered in, and outside the FCZ respectively, automatically places any direct comparison of data in question.
- There are a large number of physical, hydrological and environmental factors which affect the general abundance of the fish populations of Siphandone in any one year. Presumably this directly affects the number of fish that take up refuge in the FCZs. It is likely therefore that data collection would probably have to continue for very many years before any conclusions could be reached or trends observed.
- To gather such pre- and post-intervention data would have required a considerable research effort involving a large number of people.

From a practical point of view, and unfortunately, there does not appear to be a strictly quantitative and scientific way to evaluate the effectiveness of the FCZs now established in Siphandone. However, a method involving quantitative sampling is suggested in the recommendations section of this report which may provide additional insights into the effectiveness of the FCZs. However, it must be understood that the method has its limitations, and these will have to be taken into account during the final analysis of results.

The subject of monitoring the FCZs implies that a baseline situation already exists as a reference point so that positive or negative deviations from the reference point can be measured or quantified in some way in the future. The baseline situation, or reference point (pre-intervention mean CPUE), has never been identified at any of the FCZs so far established. Monitoring of the FCZs does not simply involve recording mean CPUE data at sites where FCZs have already been established.

Monitoring, in this situation, means **assessing the effects of intervention**, be they positive or negative. This is only possible if the pre-intervention baseline situation is acknowledged, known or understood. An attempt to obtain a crude estimate of this baseline data will form part of the quantitative data collection program suggested in the recommendations section of this report.

Main conclusions

- The FCZs represent a good example of co-management and have been established democratically with each village deciding on its own operating rules and regulations.
- The FCZs have the widespread support of the majority of the villagers in the communities where they are established.
- The FCZs have created some intra- and inter-village conflicts and disagreements, but these do not appear to be very serious.
- Each FCZ appears to act as a kind of natural resource “bank” whereby “credit” can be withdrawn over an extended period in an equitable manner.
- Through the co-management process, the FCZs have created an awareness of the importance of the continued and sustainable use of fishery resources in Siphandone at the village level.
- The sense of ownership created by the bottom-up management has been fundamental to the FCZ’s success.
- The exact reason (s) why the FCZs appear to work still remains unclear although it almost certainly involves the “deep hole” habitat preferences of certain Mekong species during the dry season.
- The overall contribution of the FCZs to the continued and sustainable use of aquatic resources in Siphandone cannot be adequately assessed. There may, or may not be a positive effect.
- The Assumption that the apparent (and more easily verifiable) success of MPAs is directly applicable to Mekong FCZs is probably not correct.
- Caution should be observed in attempting to extend the FCZ concept outside the Siphandone area. FCZ’s may not be appropriate for all communities in all locations.
- Apart from the issue of intra- or inter-village conflicts, the FCZs do not appear to be causing any harm in any way, and may well be acting to promote the sustainable use of aquatic resources in Siphandone.
- There is a requirement for a complementary quantitative assessment of the FCZs, but this cannot be carried out in a strictly scientific way due to the nature of

the investigation and the difficulties associated with large river research. However, a revised quantitative data collection program should be initiated to help provide more information.

Recommendations

The 8 villages that were identified during the March 2000 survey as a having a comparable site to the FCZs close by should be re-surveyed over one week in May 2000 (Table 22). The objective of this latter survey will be to identify and select 4 villages where comparative quantitative data can be gathered during the dry season of year 2000 / 2001. The selection of each site will be based on the main criteria given below:

- Comparable physical dimensions of the FCZ and the reference site.
- The distance and accessibility of the reference site.
- The exact nature and type of FCZ and reference site.
- The distance the village is away from the route 13 bank and the Project's base at Ban Hat.
- The level of co-operation the villagers are willing to provide.
- Any previous history of conflicts over fishery resource use.

Once the four villages have been selected, village meetings will be held to explain the objectives of the sampling program and to reach an agreement on the approximate time schedule to begin the work. The sampling program will require four randomly selected fishers from each village. Two of the fishers will be asked to collect data either in, or close by the FCZ using a set of gillnets provided by the Project. The other two will be asked to fish in the same way, close to or within the reference site. This arrangement will be repeated at the other three sampling villages. Data collection will take place on the same dates, using the same gears in all FCZs and their reference sites.

All sixteen participating fishers will each be provided with four fixed gillnets of different mesh sizes. The mesh sizes suggested are: 4 cm, 8 cm, 12 cm and 16 cm. Fishers will be asked to set their nets twice per week on agreed dates. Nets should be set in the late afternoon and any fish caught should be retrieved at dawn. Fishers will be asked to record the total length and weight of each species caught together with the mesh size of the gillnet that was used to catch it. Special data recording forms and training will be provided for the participating fishers by district DLF staff.

A mean weekly overall CPUE will be calculated for each mesh size at each FCZ and its associated reference site. If the records are sound, it should be possible to compare the FCZ and reference site CPUE data and subject it to a basic statistical analysis. Any results should be treated with caution as there are clearly a number of uncertainties associated with the method.

It is recommended that fisher selection and any training be organized nearer the time of data collection. The sampling program should begin around the middle of November 2000 and should continue for as long as possible into year 2001. Fishing conditions may have deteriorated by March 2001 as floating algae weed becomes abundant.

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Itinerary

Wednesday March 8

Planning meeting held in VTE at LARReC.

Tuesday March 14

Entered Lao PDR.

Wednesday March 15

Flew VTE to Pakse.

Thursday March 16

Planning day. Question sheet preparation and translation. Past document review. Vehicle repairs.

Friday March 17

Travel from Pakse to Muang Khong / Ban Hat. Meeting with district authorities at Muang Khong.

Saturday March 18

To: Ban Don Tolathi Mr Nosai, Mr Pak, Mr Gee.
Loppadi Chok Mr Pouma
Ban Don Peuay Mr Sai, Mr Khow, Mr Cumsang

Sunday March 19

To: Ban Thamakhap Mr Seenuan, Mr Supadah
Ban Kong Keng Mr Suwan
Ban Thakam Mr Borwadee, Mr Jan, Mr Viankham
Ban Kadan Mr Kum-la, Mr tae, Mr Bounmi, Mr koun

Monday March 20

To: Ban Don En Mr Boungong, Mr Koulam
Don Nang Som Mr Ha-see-da
Ban Hatkhikouay Mr Somsai
Ban Don Tavantok Mr Bounsom

Tuesday March 21

To: Ban Chan Mr Houng, Mr Tongasuk, Mr Sai
Ban Oupasa Mr Tongpoun, Mr Bounheng, Mr Cumtun, Mr Boun
Ban Kokpadek Mr Mee, Mr Serm, Mr See

Wednesday March 22

To: Ban Xiang Vang Mr Bounlong, Mr Sangmon
Ban Don Houat Mr Pow, Mr Nee
Ban Thantnvoke Mr Cumpai, Mr Somjit
Ban Seneua Mr Sisouk, Mr Jan-na, Mr Boun-jan, Mr Khampoui

Thursday March 23

To: Ban Nangkhouat Mr Cum-la, Mr Tanbountong
Ban Veun Khao Mr Zem, Mr Bouncom
Ban Phimanphon Mr Wat

Friday March 24

Return to Pakse and report writing.

Saturday March 25 to Monday March 27

Summary analysis. Report writing. Round-up meeting / presentation to PAFO staff on Monday.

Tuesday March 28

Return flight from Pakse to VTE / Base at Nong Khai.
