



RICE - FISH CULTURE PROJECT
INSTITUTE OF AQUACULTURE

ODA Natural Resources Systems Programme: Aquaculture Research

R6380CB: Addressing technical, social and economic constraints to rice fish culture in Laos, emphasising women's involvement

Project Report Volume 1

Country overview and proposed project structure

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1 Introduction

A visit to Laos Peoples Democratic Republic (PDR) was made by the project co-ordinator and the collaborating social scientist/ NR specialist, in January 1996 with the purpose of planning the first stage of the Lao Rice-Fish Culture project. In particular to conduct project activities 1.1 and 1.2 regarding planning and management and begin exploring specific and contextual issues relating to rice-fish farming, activity 1.3 (see the project logical framework).

The report presents contextual information about the Lao PDR derived from many sources, incorporating the findings of the first visit. The information was collected over a period of 23 days in Lao PDR, including field visits and discussions with a range of government and NGO officials, extension workers and farmers, plus discussions and reading both before and after the visit. It includes an overview of the environment, social, economic and cultural factors, land, water, agriculture and forestry systems, the farming systems in lowland and upland areas of Savannakhet Province, an outline of communication and extension systems in the province and to some extent the country as a whole, and an assessment of the status and development potential for inland fish production. The report is intended to present not only the information gathered during the visit but also to identify important gaps in our knowledge, which could be filled during the first stage of the project.

A suggested research framework with methodologies for conducting systems research is presented.

Planning was undertaken with the Livestock and Fisheries Section (LFS) in the Provincial capital, Savannakhet and field visits were made to two sites in Savannakhet Province:

?? Kantabouli, a lowland district about 35 km from Savannakhet town, with a new community irrigation project, relatively good transport and access to inputs and markets. In particular, a visit was made to Nam Pou, a village whose name means 'fountain', the spring which had been dammed for the irrigation scheme. One day was spent in this district, where village officials and farmers were met, but less detailed information was gathered than in Nong.

?? Nong, a remote upland district near the Vietnamese border, 260km east of Savannakhet, with little institutional development or external assistance, poor access / transport and undeveloped markets. Most of the population is described as 'ethnic minority', being upland Lao. The area was severely affected by the war from 1964 to 1973, with particularly heavy bombing in this district. Population pressure was described as low, but the available farmland is a small proportion of the total land area. Detailed interviews were held with agricultural and district officials, and with farmers. However those interviewed were of one ethnic group only, the Lao Lum which is dominant in the lowlands but a minority in Nong.

2 An overview of the Lao Peoples Democratic Republic

2.1 The Environment in Lao PDR

Laos is the only landlocked country in Indochina, to the east, it borders North and South Vietnam, to the west, Thailand and to the north, China. Burma is located to the north-west of Laos and to the south, Cambodia (see figure 1).

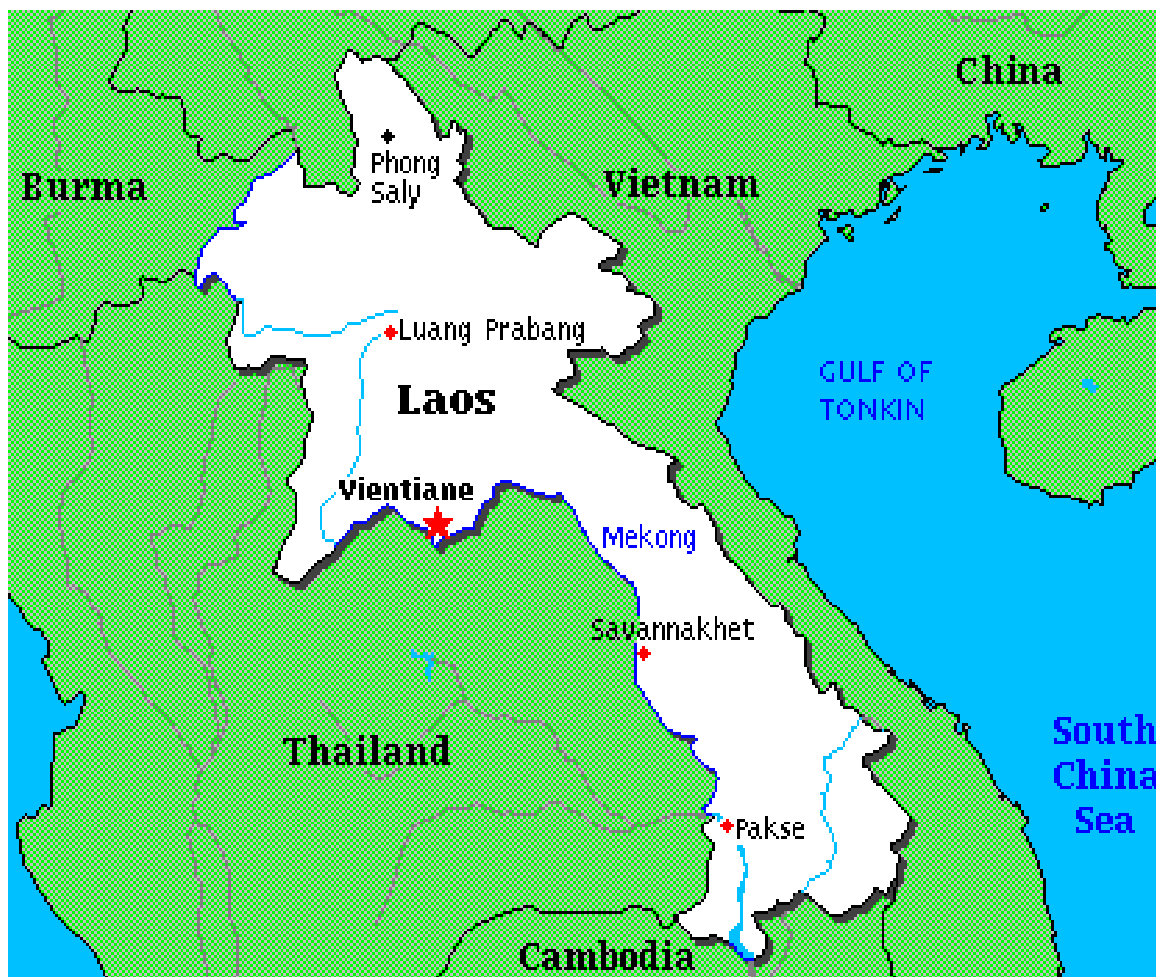


Figure 1: Lao PDR (Microsoft, 1994)

The total area of Lao PDR is 236,800 square kilometres, of which three quarters is mountainous and covered with rainforests. The uplands of the Northern Region stretch from the Vietnam-China border west as far as the Irrawaddy valley in Burma at altitudes ranging from 1000-1500 m; the Annamite Chain (600-1000 m) runs south east as far as Ho Chi Minh, separating the area of Mekong Lao influence from that of the Vietnamese. The plains along the Mekong River valley in Laos stretch from Luang Prabang in the north to the Khong Falls at the Cambodian border, at an altitude of 250 - 300 metres, they are higher than the plains of Champasak and Muong Mai which are less than 100 m above sea level. Lao PDR ranks as one of the biologically richest countries in the region, because a significant share of the country is covered by relatively intact and contiguous original forest with substantial original natural habitats. The country comprises 18 provinces, 133

districts, 11,640 villages and 752,200 households and a population count of 4,605,300 (National Statistical Centre, Lao PDR, 1995).

Most of the valley of the middle Mekong is used for agriculture, principally rice. Currently, Lao PDR has about 3,500 people per thousand hectares of cultivated cropland, compared with 2,567 in Thailand and 10,117 in Vietnam. This ratio is relatively high in Laos, despite being the country with the lowest population density in the region. Although an estimated 40% of the arable land was left barren during the 25 year war (Instituto del Tercer Mundo, 1995), pressure on cultivated land is now increasing, particularly in the north and in rural areas close to towns and communications infrastructure. At the current population growth rate, the population density per hectare of cropland will more than double in the next 25 years (World Bank, 1993).

The climate of Laos is tropical, but wide variations in temperature occur in different areas, chiefly because of variations in elevation. The main climatic features are determined by the monsoons. The annual rainfall for the whole country is 1500 - 2000 mm, with rainfall averaging about 1778 mm/y (about 70 in). The wet summer season prevails from about May to October, when 75 - 90% of rainfall occurs and a dry, cool season extends from about November to February. The remainder of the year is hot and humid. 10-25% of annual rainfall occurs during the six months of dry season (November to April) (Suan Secretariat, 1989; Microsoft Encarta, 1994). The average daily temperature ranges from 29 - 33°C, with a diurnal temperature fluctuation of 10°C. At Vientiane temperatures in April, the warmest month, average 28.9°C (84°F): in January temperatures average 21.7°C (71°F). The average annual temperature (which approximates to the temperature of ground water) is 25-27°C. The average total hours of sunlight per year is 2300 - 2400 hours, or 6.3 - 6.5 hours per day, and the relative humidity is 70 - 85%. (Suan Secretariat, *ibid.*).

The lowlands are subject to disasters such as the 1978 drought and the 1988 flood. Currently, the main environmental problems are intense deforestation and as a result of the latter, dwindling water supplies and a loss of up to 70% of natural habitats (Instituto del Tercer Mundo, 1995).

Savannakhet Province is the largest and most low-lying province in Lao PDR occupying 21,774 km² or just over 9% of the country (Committee for Planning and Co-operation, 1995). Much of the Savannakhet Plain, which borders the River Mekong and one of its tributaries Xe Banghiang, is below 200 m. The central part of the province comprises rolling upland, to the east towards the boarder with Vietnam is highland with mountains and upland valleys. Over one fifth of the country's rice is produced in the province, which harvests the crop from more than 92,400 ha of paddy (Committee for Planning and Co-operation, 1995).

2.2 Socio-Economic And Socio-Cultural Factors In Lao PDR

With a per capita income of US\$230, Lao PDR ranks among the poorest countries in the world. Since 1986, the country has been going through the transition from a centrally planned towards a market economy. Lao PDR's economy remains essentially undiversified and is heavily dependant on the country's natural resource base. Agriculture and forestry account for 60% of GDP and occupy over 85% of the labour force.

Ethnic groups

Lao PDR is characterised by strong ethnic and cultural diversity, which points to the need for a flexible and adaptable natural resource management policy with strong emphasis on local participation. The 1985 census identified 47 distinct ethnic-linguistic groups, which the Committee of Social Sciences' Institute of Ethnography re-categorises into 38 different groups. More commonly, however, the Laotian population is divided into three broad groups based in their origins, time of settlement in the Lao PDR and geographic location of their settlements (World Bank, 1993). These are:

- ?? The **Lao Theung** or Mon Khmer peoples, thought to be the earliest inhabitants of Laos. They are of Austroasiatic descent and speak Mon Khmer languages, though many Mon Khmer tribes have now adopted the Tai based Lao language. Possibly displaced from the lowlands by later Thai migrants, the Mon Khmer groups generally live between 500-1000m elevation on hilly terrain and plateau's and practice swidden rice (in clearings created by slashing and burning, rice is planted in holes in soil fertilized by ashes), root crops (manioc), different vegetables (pepper, beans, cucumbers, etc.) and maize farming with a rotation of fallow and cultivated fields, sometimes on slopes of 45° or more. The Lao Theung account for 25% of the population including the Loven, So and Bru of Southern Laos and their relatives in the north the Lamet and Khmu.
- ?? The **Lao Lum** or Thai groups were the second wave of settlers in Central South East Asia, arriving around 1000 years ago. With a stronger political and organisational structure than the Mon Khmer groups, the Thai groups took control over and displaced the latter, becoming the dominant group in the country. The Lao ethnolinguistic group inhabit the Mekong river valley and those of its tributaries. Between Luang Prabang and Vientiane the Lao population spreads out to cover not only the left bank of the Mekong but over much of northeastern Thailand. More of the Lao people live outside the LaoPDR than within its borders. The Lao Lum, or lowland Lao, cultivate the alluvial plains and mountain valleys where they practice permanent paddy cultivation. However, in areas where lowland is scarce, the Lao Lum have moved into the neighbouring uplands where they practice shifting cultivation either as a supplementary activity to paddy cultivation or as the main agricultural practice. The numerous river valleys of the sparsely populated upland area are points of population concentration that are inhabited largely by Thai groups including the Lao, Black Tai, Red Tai, Tai Neua and others, speaking Thai languages. The Lao Lum account for about 65% of the Laotian population and play a prominent role in the country's political and economic system.
- ?? The **Lao Sun** or Tibeto Burman groups such as Akha, Lolo and Lahu migrated to Laos in the nineteenth century, seeking land away from Chinese control. As the most recent wave of migrants they were forced to settle on space left by their predecessors. They are therefore found on the upper slopes and tops of mountains, generally above 1000m, where they practice pioneering swidden agriculture; on peaks over 3000m the Meo and Yao tribes, which have migrated south from China, raise opium poppies. In contrast to the two other major ethnic-linguistic groups, the Lao Sun are semi-migratory peoples, moving their villages when fields in the vicinity have been exhausted and often predominantly degraded. The Lao Sun account for about 10% - 15% of the population and have assimilated significantly less of the predominant Lao Thai cultural practices and language than the Mon-Khmer peoples.

Although convenient, this classification of the numerous ethnic-linguistic groups into three broad groups conceals important socio-economic and cultural differences between the different sub-groups and encourages simplistic policies towards them. It also tends to provide a simplistic view of agriculture practices (World Bank, 1993).

There are few mountain Lao groups in Savannakhet. In the lowland district visited, all the communities are Lao Lum (lowland Lao) except for a few roadside migrants. In Nong, most communities are Lao Theung (upland Lao) except for two villages, which are Put Thai (Lao Lum). These groups co-exist peacefully in Nong, although in the uplands the Put Thai villages are usually in the better locations. Tanaka (1993) found a similar situation in upland villages of Luang Prabang, where the Lao Lum were engaged in more wet rice cultivation than the Lao Theung, who concentrate more on slash-and-burn; Roder *et al.* (1995) also found the Lao Lum more likely than Lao Theung to own paddy and to adopt income-enhancing technologies in the uplands.

A priority of the Lao government is to provide development support to the uplands. This is where the poorest communities are found, having little lowland rice, and ethnic minorities which have been neglected in the past. However, all the farmers encountered during this initial reconnaissance visit were in fact Lao Lum. Whilst it is important to work with and through existing social structures, a positive effort would be necessary to ensure that the hitherto neglected groups can participate in any research.

In Nong the upland Lao groups are themselves diverse, representing 4 language groups: Mank Gong, Ta Ouy, Ja Lee and Ka Tal. Literacy rates in the district were described as between 5 and 10%, and there are only schools in 15 out of 77 villages. Officials reported that the lack of education was an inhibition to development although there is no apparent reason why illiteracy should prevent innovations in rice-fish culture. The Head of District reported no difference between groups, in knowledge of fish - they have the same fishing practices, without experience of raising fish.

Social structure

The villages in Laos are described as having a strongly integrated social structure, with a well-defined sense of mutual responsibility and care for the less well-off. Ireson (1992) describes systems of labour exchange in lowland villages which not only provide economic security but also village solidarity, and says that the ideal of a unified village is still accepted despite political and economic changes. He also points out that these systems help to prevent strong economic stratification, so that although there are wealth differences among families, these differences are not extreme. The sense of mutual responsibility is reported to be even stronger in upland communities. Older people are particularly respected and their example is likely to be followed by other villagers.

Each village is headed by a group of village elders, usually men. The role of president is largely administrative, and decisions are taken by the elders collectively. Most women in a village belong to the women's committee which is linked to the national Women's Union (see below). Although the villages are described as having a strong sense of community responsibility, it has also been suggested that official communication from outside the village is rarely with the community as a whole and that villagers are often prepared to accept the opinions and messages of the village elders. The strong role of elders in leadership with farming practices was emphasised several times during

the visit. This may prove a challenge for community resource planning but will be offset by the responsibility which the elders feel for the whole community. The existence of village committees has been an important point of contact for other participatory research programmes (Schiller, 1994) and may help staff on this project to identify interested experimenters. Lao communities have a tradition of committee decision-making and this has been documented for water management (Ireson, 1990). For both the irrigation schemes visited by the project, there are Water Users' Group which allocate water from the reservoir, and everyone who has land in the command area belongs to the group.

Internal and external migrants and refugees are one component of Lao society which has a less well-defined community structure. Resettlement of refugees along route 9 (which passes east-west across the province linking Thailand and Vietnam) has led to very recent deforestation in areas where families cannot rely on even one crop of rice annually - foraging for bamboo shoots, and cattle herding are important in these areas. In other forest areas internal migrants often of ethnic minorities have settled, again on very marginal land.

Population

Lao PDR's population is small, but growing rapidly and heavily concentrated in the provinces which border the Mekong river and its tributaries, putting increased demands on the natural resources in these areas. In Lao PDR population growth, crude birth and fertility rates are among the highest in the world. Based on the 1990 population count and an average population growth rate of 2.9%, the current population is about 4.5 million. Unlike other developing countries which have rapidly growing urban population, Lao PDR remains predominantly a rural society with only about 15% of the population classified as urban and an estimated urban population growth of about 5.5%. The main urban areas include Vientiane, Savannakhet, Paxsee, Luang Prabang, etc. The remainder of the population lives in over 11,600 villages with an average of about 300 inhabitants.

At the current population growth rate, Lao PDR's population will more than double in the next 25 years and start to put significantly higher pressure on the country's resources, particularly land and forests. Population density per hectare of agricultural land is rapidly approaching the East Asian average. In Savannakhet Province population density has risen from 25 persons/km² in 1985 to 31 in 1995 (Committee for Planning and Co-operation, 1995). Unless the fairly high fertility rates are curbed and agricultural production technologies are adopted which permit to increase yields and stabilise upland production in those upland areas where the fallow period has already significantly shortened, land resource degradation is bound to become a much more significant issues than it is to date. Continued high population growth will also put increased pressure on the country's forest resources, as agriculture will have to expand further into forest lands and demands for available fuel and other wood will increase sharply (World Bank, 1993).

2.3 Land and Water Resources

Topography

Laos is distinguished topographically by a very mountainous area extending north and south throughout most of the country and a small area of lowland on the southern and south-western fringes. The mountainous area, which covers about nine-tenths of the entire country, can be divided into a northern section of heavily forested mountain ranges and plateau's cut by deep, narrow valleys and gorges and a southern section containing more sparsely forested limestone terraces. The maximum elevation is Phou Bia in the north, 2820 m (9252 ft) above sea level. In the south heights reach about 1980 m (about 6500 ft).

Sources of water

The Mekong River, the principal river of Laos, enters in the north-west from Thailand, flows south along the Laos-Thailand border, and enters Cambodia in the south-west. The tributaries of the Mekong River in Laos rise in the mountains and flow through deep valleys. The total drainage area of the Mekong is 795,000 km² of which 77% (or 609,000 km²) lies within the riparian countries of Cambodia, the Lao PDR, Thailand and Vietnam (Interim Committee for the co-ordination of the Lower Mekong Basin, 1992). In an average year an estimated 475,000 million m³ is discharged by the Mekong to the sea (Mekong Committee, 1987). 55% of the volume originates from left bank tributaries in Lao PDR and Cambodia (28% of the drainage area). The discharge pattern reflects the rainfall distribution throughout the year which is dominated by the south-west monsoon. The river begins to rise in May-June and reaches a maximum level between August and October, depending on location. The flow then decreases rapidly until December and afterwards decreases more slowly to reach a minimum level in late March-April just before the onset of the south-west monsoon. At Savannakhet in 1994 the average maximum level of the Mekong ranged from 0.14 m in March to 11.12 m in August (National Statistics Centre, Lao PDR, 1995).

Since Lao PDR is a landlocked country, its water resources, estimated about 719,000 ha, are confined to the River Mekong (200,000 ha), its tributaries (54,000 ha) see table 1, lakes and reservoirs (natural and man-made) (57,000 ha), innumerable ponds (9,000 ha), banded paddy fields (118,000 ha) and swamps (1,000 ha) (Interim Committee for the co-ordination of the Lower Mekong Basin, 1992).

Table 1: The main rivers of the Lao PDR

<u>Name</u>	<u>Location</u>	<u>Length (km)</u>
Mekong	Lao-Thai border	1500 (1865 in total)
Nam Ou	Phongsaly-Luangprabang	448
Nam Ngum	Xiengkhum-Vientiane	354
Nam Sebanghieng	Savannakhet	338
Nam Tha	Luangnamtha-Bokeo	325
Nam Sekong	Saravane-Xekong-Attapeu	320
Nam Sebangphay	Khammuane-Savannakhet	239
Nam Beng	Oudomxay	215
Nam Sedone	Saravane-Champasack	192
Nam Sekhanong	Savannakhet	115
Nam Kading	Borikhamxay	103
Nam Khane	Huaphan-Luangprabang	90

Large dams

In Lao PDR large water storage reservoirs have been established on tributaries of the Mekong, the Nam Ngun (37,000 ha), Nam Sedone (400 ha), Nam Houm (400 ha) and Nam Dong and smaller impoundments elsewhere. Potential major new reservoirs in Lao PDR include High Luang Prabang (77,500 ha), Nam Theun No. 2 (77,500), Nam Ngum No. 2 (11,000 ha) and Nam Ngun No. 3 (Interim Committee, 1988; NEDECO et al., 1988). According to a Bangkok newspaper report (The Nation, p10, Jan. 12, 1996), the Nam Theun 2 scheme involves the construction of a 681 megawatt hydroelectric dam in the Nakai Plateau national biodiversity conservation area in the central Laotian province of Khammoune on the Theun River. The scheme which will produce electricity for Thailand, could raise \$150 million annually and is the first Laotian dam to be built in an inhabited area involving resettlement of 4,326 people from 14 villages. According to the report, logging activity has been heavily promoted in the past 2 years since an international dam consortium decided to proceed with the Nam Theun 2. A final environmental impact assessment will be completed by the World Bank in July prior to a decision to provide a financial guarantee for the scheme.

Small dams

In most of the country the predominant farming system is still rain-fed. Although Savannakhet Province has only 3,400 ha of irrigated rice, this represents almost one fifth of the current area of irrigated rice for Laos (Committee for Planning and Co-operation, 1995). However, in both lowland and upland districts small irrigation schemes have important local effects. For example in the upland village of Ban Nong, a small reservoir had been built seven years ago, with the potential to irrigate 5 ha during the dry season, but 30 ha during the wet season. In the district there are five such reservoirs, typically about 5m deep, most built using both community and government funding. The distribution of water from such irrigation schemes will be an important factor to clarify during the more detailed participatory systems research stage of the project.

Another irrigation scheme, the Nam Pou in Kantabouli District, is an example of a more ambitious small dam scheme. Currently in the final stages of completion, it will have the capacity to irrigate 41 ha during the dry season, but will supply water to 300 ha during the rainy season. Operation of the sluices is simple and locally controlled, and the community has a water users group to decide about opening times. A visit to Nam Pou indicated some of the effects that a change in irrigation may bring to the lowland farming systems. In principle, irrigation increases the scope for dry season paddy, but some farmers prefer to grow upland crops on the irrigated land as they already have experience with them and they are known to require less water (confidence in the provision of water remains to be gained). Others intended to grow dry season paddy as soon as the tertiary canals were built. Doubtless such decisions will change as farmers gain experience with the crops and their markets. However, such options are only available to those with enough labour or machinery (such as hand tractor).

Land and water resources for fish culture

In view of growing limitations on the availability of land and water resources in Laos the concept of integrated culture will become increasingly important. Throughout the country there are problems with decreasing water supply. Such problems are often linked to deforestation, which has increased one-hundredfold over the last 30 years. Other widespread environmental problems also affect the quality and quantity of water supply are dams (including major dams outside the borders of the Lao PDR), industrial wastes and pesticides (mainly in tributaries originating outside Laos) and water

hyacinth (Roberts, 1993). Farmers and NGO staff report the use of explosives and persistence of defoliant used in the war, as possible causes of water pollution, and observed fish diseases which may be linked to chemical pollution.

Clearly water management has a key role in the management both of rice and fish. For example, the prospect of year-round irrigation at Nam Pou (see above) was affecting farmers' decisions about fish management. One couple in the Nam Pou scheme specifically said that they would produce fish when the irrigation water was available. Another, relatively well-off farmer who already had a pond in his paddy, said that if there was sufficient water in the dry season he would raise the bund of his paddy and stock the paddy field with fish.

Especially in the uplands, heterogeneous soil patterns will affect the ability of farmers to manage fish in rice. In Nong, for example, the presence of streams in valleys was used as an indicator of soil suitable for fish culture. Government officials reported some decrease in river water supply, but this does not appear to be a major problem currently in Nong.

Until recently it was not common practice to dig ponds specifically for fish. Ponds were more popular to store water for livestock, although farmers would also catch wild fish in them. However, there is a change in priorities for pond use. In the lowlands, farmers who had dug ponds, had done so principally for water storage, but also planned to stock them with fish. In both districts, unusual circumstances had facilitated the formation of ponds. In Kantabouli, the new irrigation scheme had brought heavy machinery which had been used to help villagers dig new ponds, leading to 40 or 50 new ponds in the village last year, all dug in paddy fields. This suggests that the labour to dig ponds is a major constraint. In Nong, there appeared to be no shortage of ponds, of a standard size (about 2m deep), formed by bomb craters, but most are not stocked. In general it was reported that most farmers in the province would like to dig ponds. Large ponds for supplying fish seed are rare and the few in the area were noted as important for future work in the uplands. An inventory of ponds in Nong district is available with the Head of Agriculture.

2.4 Agriculture and forestry in Laos

Key agricultural products

Agriculture is the principal economic activity of Laos. Rice is the chief food crop. In the late 1980s rice yield was approximately 1 million tonnes annually but was inadequate to meet domestic needs. Other crops then included cassava (about 90,000 tonnes), potatoes (55,000), maize (40,000), pineapple (47,000), tobacco, cotton, coffee, citrus fruits, and cardamom. Livestock breeding has long been important to the economy. In the late 1980s, livestock included about 1.5 million pigs, 1 million water buffalo, and 590,000 cattle, as well as poultry, oxen, elephants and horses (Microsoft Encarta, 1994).

The Ministry of Agriculture-Forestry in conjunction with the Committee for Planning and Co-operation last year published its first synopsis of basic statistics about the socio-economic development of Lao PDR for the last 20 years. According to the most recent government statistics, of the total area planted in 1995 (674,100 ha), over 80% was for rice. Sixty percent of rice is 'seasonal' and 30% upland. Over the last 2 decades the area of irrigated rice has increased from

2,700 ha in 1976 to 18,500 ha in 1995. Nearly 44% of irrigated rice production is found in Vientiane Municipality.

Other crops include: maize (79,400 tonnes), vegetables (186,600) and beans - mungbeans (3,400) and soybeans (7,200), peanut (8,900), tobacco (61,600), cotton (8400), sugarcane (123,000), coffee (10,000) and tea (1,700). In 1995 the nation herd included about 1.192 million buffalo, 1.146 million cattle and 1.724 million pigs (Ministry of Agriculture and Forestry, 1995).

Last year seasonal rice commonly yielded 3.1 tonnes/ha, upland rice 1.54 tonnes/ha and irrigated rice 4.11 tonnes/ha. Total rice production for 1995 was 1.423 million tonnes. The largest rice producing province is Savannakhet accounting for 20% of national production, followed by Champasack (15%) and Vientiane Municipality (c.8%).

Forestry

Forestry has long been a source of national economic benefit in Laos despite the lack of a modern transportation network. The timber cut totalled about 3.9 million cu m (about 137.7 million cu ft) annually in the late 1980s. The forests in the north have produced valuable woods, particularly teak. In 1991 the government, concerned about overcutting in some areas, banned indiscriminate logging. Forest products, however, still form a substantial part of Laotian exports, Benzoin, used in making perfume, is important, as is stick lac, an ingredient of varnish. The export of unprocessed timber is banned, so export figures relate to plywood and sawn wood, however the current rate of logging is unclear from government statistics though is believed by the government to have increased between 1993-5.

Recent dam schemes have resulted in increased logging activities in some areas (see 2 above). For example, the Bolisat Phattana Khet Phudoi - BPKP (Laos' largest logging company) has been granted a logging concession of 300,000 cubic meters per year, 10 times the previous limit, and last year reportedly logged 400,000 cubic meters of the Nakai plateau biodiversity area where a chipboard factory has been constructed in a joint venture between the BPKP and a Hong Kong-based firm. The Japan International Co-operation Agency has been advising on a eucalyptus plantation to feed the factory's 10,000 cubic meters/month capacity (The Nation, Jan. 15 1996).

2.5 Farming systems in Savannakhet Province

Varieties and inputs

Farmers in the province are using HYVs of glutinous rice which have been promoted by IRRI and introduced from Thailand. Where irrigation schemes have been built, some dry season rice has been introduced which is photo-period insensitive, and it was reported that IRRI has a breeding programme for dry season glutinous rice. However, seed is usually obtained by exchange with neighbours, so new varieties are not introduced very frequently. Farmers who live in more remote and unirrigated areas, who were not contacted during this trip, use traditional varieties. It was reported that even those using HYVs tend to maintain high diversity on their farms, using five or six varieties particularly in the uplands. Tanaka (1993) found that farmers prefer to grow deep-water or late-maturing rice in the bottom of depressions, or *nongs*, medium-maturing on the slopes, and early-maturing at higher elevation. District staff are key to the introduction of new varieties, for

example in Nong the Head of Agriculture had brought seed back from a training course in Vientiane. Varieties mentioned as important in Nong were GK10 and TDK1, both from Thailand, the latter having particularly good pest resistance, which is a priority for farmers.

According to Tanaka (1993) few farmers (especially in the uplands) use pesticides or chemical fertiliser although some lowland farmers use low levels of chemical fertilisers. Even amongst farmers near cities, the use of chemical inputs is reported to be limited; with others using fertilisers only on the higher paddy fields (Tanaka, 1993). However, farmers in Khantabouli report the use of locally produced herbicide preparations to control weeds and insects in sticky rice varieties. The use of Furadan (a preparation banned in Laos after its use with water melons resulted in many deaths), imported from Thailand, is also reported to control leaf eaters, systemic and leaf rolling caterpillars and, soaked into wild rice seeds, even crabs. Government policy is to reduce or avoid chemical inputs, and many farmers say they could not afford them. However, faced with crop losses of up to 50% some farmers appear prepared to pay 1500 K per kg for Furadan.

Farmers use buffalo manure as the main fertiliser, and officials in Nong reported that green manures had been promoted on a national training course. IRRI is also interested in promoting *Sesbania rostrata* as a green manure (Schiller, 1994). Instead many use several rice varieties on their farm, maintaining high diversity as protection against insects and pests, and also giving a longer harvest (which requires less labour) by having a range of maturing periods. This is an important aspect of farming systems in Laos which should be explored further during the first stage of the project. If the absence of chemical pesticides is widespread it suggests that the potential for rice-fish culture is higher than in other countries which have adopted the full green revolution package. Both NGO's and IRRI are actively promoting integrated pest management (IPM) but at the same time, commercial organisations may be seeking to promote the use of chemicals. It will be important to be aware of the messages and technologies being promoted by other organisations and to seek to co-ordinate with them to avoid conflict over rice-fish development.

The provision of water as a guaranteed input, via new irrigation schemes, can significantly improve a family's rice self-sufficiency, for those fortunate enough to have paddy land. Upland rice yields are low, around 1.3 t/ha/yr (Fujisaka, 1991), but higher yields were reported for wet rice in the upland valleys. Yields reported for lowland systems are 0.5 t/ha for unfertilised rice on higher ground, increasing to 3 t/ha for fertilised deep-water rice in the depressions (Tanaka, 1993). Further confirmation of these yields and the role of fertilisers in such systems will be sought in the systems research stage of the project. Irrigation is not the only constraint to lowland or dry season rice cultivation. Labour is the principle constraint to some, particularly older couples, who feel unable to take on the work involved in a second rice crop. Another constraint against dry season rice is that cattle wander uncontrolled during that season so damage can be high; even in the uplands fencing and wood were reported to be expensive and for some this was the principal factor preventing them from producing dry season rice.

Systems

95% of all rice production in Laos is rainfed (both in the uplands and the lowlands) including glutinous rice which is the staple food in Savannakhet. Across the whole province, the rainy season

begins in May and has a double peak, in July / August and September / October. The annual rainfall in Savannakhet Province varied between 1080mm and 1710mm (Committee for Planning and Co-operation, 1995). The main rice-growing season is the rainy season; rice is transplanted in May and harvested in August to September, which are the two busiest times of year for the farmers (Ireson, 1992).

The systems in both districts visited (Khantabouli and Nong) are rice-based. Nong District was an area of shifting cultivation until 20 or 30 years ago. Now there are 700ha of permanent lowland rice, and people have started to raise cattle, with a little trade in meat. Improved access and transport in the last few years have contributed to more rapid change, with more potential for marketing of agricultural produce. The farmland in Kantabouli has been settled for at least 200 years and resembles a savanna landscape, with numerous trees planted along the bunds of the paddy fields. These provide fruit, fuelwood and fodder. At the time of the visit the fields were dry, with grazing cattle wander across them, except in irrigated areas or where ponds had been stocked and the surrounding area fenced to prevent access.

In the lowlands, wet rice is cultivated, while upland systems are a mixture of paddy and upland rice grown in swiddens. Irrigation allows some farmers to produce a second crop of rice during the dry season. Lowland rice is usually transplanted although those who are short of labour will broadcast it, with lower yields and more weed problems. Lowland farmers are beginning to grow other dry season crops (watermelon, peanuts, mung beans, soybean), as markets develop.

Much of the agriculture in the uplands is a slash and burn system, with the planting of upland rice followed by root crops and a few upland farmers are trying mung beans in Nong. Government policy is to eliminate slash and burn agriculture by the end of the decade (Fujisaka, 1991), but there are no apparent alternatives for the upland farmers in many cases. The upland areas are particularly vulnerable to crop failure; in more remote parts of Nong it was reported that people still don't have enough to eat. In other areas, recently cleared by resettled refugees, rainfall is insufficient to guarantee an annual crop of rice, and extensive cattle farming is combined with foraging for forest products such as bamboo shoots during the dry season. Ploughing is generally by buffalo in both districts, but the poorest cultivate by hand. Cattle are an important livestock component of both upland and lowland systems.

Although fish-in-rice could raise the net productivity of upland as well as lowland farming communities, it is not clear that those who benefit from more intensive valley-bottom farming will be the same as those who are expected to find alternatives to slash-and-burn. More detailed research on patterns of resource ownership and links between upland and valley-bottom farming in the uplands will be an important component of the first stage of the project.

2.6 Communication and extension systems

Livestock and Fisheries

An understanding of the existing extension and communication systems should indicate how information spreads and what causes farmers to innovate, which will help the project to plan its interaction with both extension workers and farmers in order to bring about effective development in rice-fish culture.

The Livestock and Fisheries Department is based in Viethien with Livestock and Fisheries Sections (LFS's) in the provinces. Savannakhet has stronger institutional capacity than other provinces of Lao PDR in support of the development of livestock and fisheries, a process heavily supported by two years of interaction with the AIT Outreach project. There may be opportunities to replicate the project in other provinces which would result in a more nationally applicable model of participatory technology development, since the institutional challenges would be more typical. One such opportunity would be in Khammuoune Province, where a VSO volunteer will be based from June 1996, as the AIT provincial co-ordinator.

The principal role of the Livestock and Fisheries Section is in extension. Until recently all extension was in veterinary services. There is still a strong focus on vaccination of cattle and intensification of meat production. However since 1994 each district has had at least one official trained in basic aquaculture.

The staff at the district level train and work closely with Village Development Co-ordinators (VDC) - so-called 'model farmers'. The process of becoming a model farmer involves a village chief selecting a 'target farmer' in the village. A target farmer who is technically competent and takes time to share his skills with others is eventually promoted to a 'progressive farmer' before graduating to model farmer status. In addition, short training (3 days to 1 week) is provided widely (5,600 individuals trained between 1992-96) by the DLVF to so called Village Veterinary Workers (VW). The majority of those trained fall into a category referred to as semi-professionals¹. These are reported to be farmers good in 'social matters', well respected within the village. The term VW reflects the former importance of the veterinary role within the department, some VW are trained in fish rearing.

There is no formal procedure for formulating recommendations nor links to research stations. All the active research and extension is taking place through four donor-funded projects, all fish related (see further for details). Two projects (MRAG and IDRC) are principally for research purposes, but the direct involvement of members of the section in the research process mean that the results have high potential to affect the recommendations made by staff. The AIT-Aquaculture Outreach project promotes small-scale aquaculture development in every district of Savannakhet, encouraging the decentralisation of fish production through a "nursing network", and promoting efficient management of district extension services, for example by record-keeping and profit-sharing. The UNDP project is conducting fisheries extension in two districts, using a system based on the development of model farms.

The LFS has officially adopted a needs-based procedure involving selection of interested families, who are then trained in basic aquaculture practices, with follow-up advice as necessary (see Box 1).

¹ > 30 yrs old, with limited education (finished P5-7) mainly rice farmers

Box 1: Aquaculture extension activities using a 4 step process as recommended by the the Livestock & Fisheries Department in Vientiane

- 1 Community needs assessment
- 2 Visit by extension staff to explain importance and techniques involved in the initiative, focusing attention on families interested in adoption
- 3 Arrange training
- 4 Follow up visits

The Livestock and Fisheries Section (LFS) in Savannakhet

The provincial office has a staff of 22 of which 7 are involved in fisheries, 3 extension officers and 4 staff based at Pak Bor fish breeding station. At the District level at least 1 member of the Agricultural Services staff has responsibility for fisheries with basic training in fisheries from AIT or Oxfam in addition to 1.5 -3 years in basic agriculture. A very small number (20) of trained district staff operate in Savannakhet's 13 Districts. Therefore in practice resources are very stretched, with about twenty extension workers at district level, in a province with 13 districts, about 1000 villages and a population of about 700 000. Since 1993 good records have been kept of the numbers of farmers with fish in ponds. There are believed to be 1038 families with 3,114 ponds throughout Savannakhet. A provisional estimate for 1995 raises this figure to 4,153 ponds, and there is evidence of recent private pond building in districts where heavy earth moving machinery is currently engaged in road building. Now there is significant interest in ponds for fish raising (not just water storage), mainly as a secondary activity to rice farming or cattle rearing. The interest in fish culture is believed to stem from the short fall in natural supplies, a resultant increase in fish prices and some available information on fish culture (including Thai TV reception in Western Laos) - see Land and water resources for fish culture above. Mass media are used to advertise the services of the LFS but it is still impossible for staff to reach all the villages in the province, and they are currently working without defined targets.

The extension system is at least in theory quite top down: directives are sent from Vientiane as to which districts the provincial staff should work in. They then contact the Head of District, who will introduce them to Heads of Villages, who will introduce them to suitable families. Those who show interest in the Section's activities are designated 'target families', and training may be given to a group of such families. Reality may be more pragmatic. In principle there is a bias in favour of the poorest, but the Assistant Head of the section suggested that in fact they work more with those who have enough land and food, because they are easier to work with, and the extension officials want to see results for their work.

Both men and women farmers participate in the aquaculture training sessions. In effect however, more men are involved, and Caroline Garaway (MRAG Project) has reported that most staff think it is more useful to work with the men. There are a few women extension workers, one or two at both provincial and district level, but most are men. There were a few women on the Oxfam training course last year.

Provincial staff are seen as having a supervisory role, while the field work is done by the district staff. Usually the provincial staff go to the districts to give advice, and district staff report to them in the field, but a new system is encouraging annual meetings at provincial headquarters. At district level, forestry, livestock and fisheries all share one building so there is good interaction between the sectors.

The extension effort is supported by various inputs and a distribution network. There is a provincial hatchery (Pak Bor Centre) which supplies seed (see further), but AIT is encouraging decentralisation both of spawning (which has been done successfully in 6 out of 7 districts last year) and of seed distribution. For the spawning, distribution is encouraged by giving financial incentives to the district officials who sell on the hormones. Fish stock is given free in the first year, to some families; otherwise they can buy them from the provincial hatchery or from two private hatcheries in Savannakhet, which are run by former students of the Division.

The district staff show considerable commitment and innovation with distribution of fish inputs. The pond below the agricultural office at Nong was stocked from the provincial hatchery; the Head of Livestock and Fisheries had nursed it in a hapa, and later released it to communal ponds and rivers. From here he has experimented with transport of fish in open vessels to help with distribution to the villages. He has given seed to 17 families in 8 villages (about one to two hundred fish each).

Credit is reported to be widely available for small upland farmers through the government credit scheme which makes loans of up to 500 000 kip available, for e.g. pond construction and stocking; irrigation, or (most commonly) to buy buffaloes. Every district has a credit office which works closely with the agricultural services. Farmers are charged 7-10% interest, and the total lent last year was 2 billion kip, expected to increase to 5 billion kip this year. Small projects can be approved by the credit office but larger ones must be assessed by the agricultural services.

Training and obtaining information

There is currently little provision of training in Laos. There are no agriculture degree programmes available yet in Laos but many agriculture officials have studied in the Soviet Union. All district officials have 1.5 - 3 years of training in basic agriculture, and about 20 district officials were trained last year by Oxfam in conjunction with the AIT-Outreach Programme, in basic aquaculture. Other training courses are run at national level, for example the Head of Agriculture in Nong attended a course two years ago in Vientiane which promoted both new rice varieties and ideas to test about green manures (a weed species of Verbenaceae was being promoted).

Training may also be provided through job experience. The Head of Livestock and Fisheries at Nong had studied at Savannakhet Agricultural College (which closed 2 years ago) and was then employed at the provincial hatchery where he gained particular experience in aquaculture.

The number of NGOs operating in Laos has increased dramatically in the last two years, and a national NGO forum has recently been formed with about 20 members. There does not appear to be the usual polarisation between government organisations and NGOs, perhaps because they have been working together since their inception.

Of particular interest to this project are the work of Oxfam, which ran an aquaculture training course for extension workers in 1994, and Padek which promoted rice-fish culture in Champorn District with the Lao Women's Union. Initially one farmer developed a special system for rice-fish culture, which has since been adopted by 16 farmers through a farmer-to-farmer extension process, in the absence of funds for any other kind of extension. Also noteworthy is the work of CIDSE, a well-established French Catholic NGO which has promoted a little rice-fish culture in Sepon, an upland district selected for research by the project team.

The village structure and the importance of the village elders have been described above under social systems. Villages have experience of both government and local organisation. The Lao Women's Union is an example of the former, with links at district and provincial level (see further for details), and experience of collaborating with the DVLS in the past. They have a system of village level training which has great potential for the formulation, testing and dissemination of new ideas. Locally initiated organisations include the water users' committees also described above. The experience of villages with community decision-making and resource management is a promising context for the participatory research planned with the rice-fish culture project.

From the community viewpoint there are various sources of information. Officials and researchers report wide discrepancies in access to information, principally between the upland and lowland districts. Lack of knowledge was identified as a specific constraint to aquaculture development. However in the lowlands even the poorest farmers have some information about how to raise fish. The poorer do not have radios, but in the lowland villages most people have access to a television, whilst there was none in Nong. Thai TV is received in the western part of the province and many people in the lowlands see the agricultural programmes (which include pond culture).

Within the community farmers showed considerable innovation and are experimenting with fish production. Farmers tend to test on a small scale first, e.g. Tong Sa in Nong had irrigated only a small area in the first dry season but planned to expand in the second. Farmers in Nong repeatedly said that many people were releasing fish into ponds just to see what would happen, and a few were trying out stocking of paddy fields with improved species.

2.7 Inland fish production status and development potentials

A survey of fishes of Laos in the Mekong basin during 1969 - 1971 covering the 1,865 km long Laotian stretch and its 14 tributaries and 25-30 perennial water courses recorded some 203 indigenous species (Taki, 1974). The actual estimated fish production is about 30,000 tons of which 19,240 tonnes from inland capture and 10,760 tons from inland culture (using mainly indigenous fish species).

As in other parts of the Lower Mekong Basin, fish has traditionally constituted the major proportion of the animal protein intake of the rural population in the Lao PDR. Fish are the main source of protein in the diet of both lowland and upland communities, and farmers from all wealth categories catch wild fish. In Nong where natural supplies of fish are still relatively abundant farmers reported eating fish once or twice a week; the next most common type of protein is bushmeat, with beef or pork only eaten rarely on special occasions.

A survey conducted by the DLF in 1995 provides a base line for protein consumption and outlines consumption targets for 2000. The results are presented in table 2.

Table 2: Protein consumption in Lao PDR (kg/percap/y)

	<u>1995</u>	<u>2000</u> <u>target</u>	
Rural	fish	7.0	8.0
	pig	5.0	5.0
	poultry	5.0	5.0
	egg	1.5	2.0
	buffalo	1.8	1.2
	cattle	1.2	1.8
	other	1.5	1.0
	Total	22.0	24.0
Urban	fish	8.0	10.0
	pig	8.0	8.0
	egg	6.0	6.0
	poultry	4.5	5.0
	cattle	3.8	3.0
	buffalo	3.0	3.0
	Total	33.0	35.0

These illustrate the discrepancy between rural and urban communities, the importance of fish as a protein source and the importance attached to increasing fish availability to promote increased animal protein intake amongst rural and urban communities.

Different fish species are caught at different times of year according to migration and breeding patterns. Nevertheless estimated levels of consumption have remained a very low 7-8kg/person/year (Singh, 1994; DLF Survey 1995 - see above) and in recent years increasing population pressures and the deterioration of natural habitats have led to shortfall of natural fish stocks.

A shortfall in fish

Over fishing and other unfavourable human interventions are widely perceived to be the main causes that have led to a gradual decrease in catches from natural water. Although the trend and its causes are largely undocumented it is widely observed that wild fish populations are declining (e.g. Roberts, 1993). This is a difficult trend to monitor, in the context of increasing population pressure and little marketing of wild fish. Some figures do exist. The riverine fisheries reportedly declined by 20% in a decade (Csavas 1981). The main reasons were believed to be, environmental destruction, increase in fishing effort, illegal fishing methods, fishing on spawning grounds and lack of management of the resource (Csavas, 1984). Production in lakes and reservoirs declined by 60% in 15 years from an estimated 50 kg/ha in 1975 to about 20 kg/ha in 1988 (Singh, 1990).

The collection of national fisheries statistics is at an early stage, however the declining trend in the capture fisheries in rivers, lakes and reservoirs is a matter of serious national concern. Village heads

recently interviewed in Kathamboulie and Nong Districts (Field notes, Jan. 1996) reported a scarcity of fish in markets, much less bigger fish than 10 years ago and commented that a days fishing activity no longer guaranteed enough fish for a family² meal.

As well as farmers reports of dwindling supplies per family, fish prices are increasing (although according to the National Statistical Centre (1995), they have not increased by as much as rice prices over the last ten years). Frogs are reported to be disappearing even more quickly than fish.

Farmers and NGO workers reported widespread use of explosives (from unexploded bombs) for fishing in upland rivers, although their use has officially been banned. Some decline in water supplies and pollution of rivers with poison was reported, but it will be useful to collect further information on perceptions of environmental change and the effect on fish populations. On the other hand, recent research by an MSc student from Auburn University (Eric Meusch) indicates that irrigation schemes can boost wild fish populations, and it would be useful for the project to collect information from farmers on this aspect of fishery management.

So in general the shortfall in fish is believed to result from a long period without regulation, increase in fishing pressure associated with increase in population pressure and effort (including the use of mono-filament gill netting, poison and explosives) and a reported decrease in surface water. Large quantities of explosives littering the Eastern Lao border (the result of American bombing, on a massive scale, of the Ho Chi Min trail during the Indochinese war), are reported to have been used indiscriminately to remove fish from natural water bodies, an activity believed to have significantly contributed to the decline in fish stocks. Environmental changes in the country such as deforestation (see above), water pollution, indiscriminate use of pesticides (probably small scale and restricted to lowland Laos), discharge of domestic and industrial waste water (probably restricted to Vientiane Municipality), water resource development projects including dam construction (see above) and broad land use are starting to show negative impacts to fish production causing important fish losses which are not easily compensated for. Alongside this, the lack of understanding and information base of the bio-economic parameters affecting the lower Mekong River Fishery, on which resource identification, conservation and community management of the resource depend, contribute to a further deterioration in the situation.

Fishing methods vary according to habitat, water level and species, which are affected by season and migration patterns. Indigenous knowledge about fish ecology and management will be an important resource for the project. Women and men appear follow different fishing methods and patterns (Garaway, 1995). Some knowledge has been documented by Eric Meusch in his forthcoming MSc thesis. Another important source could be the indidgenous aquaculture knowledge of the Tai Dam community, north of Savannakhet in Xiang Kwouang. They migrated from North Vietnam where similar practices are also found. Their aquacultural knowledge includes keeping eggs alive, inducing spawning and fry distribution networks. The project may contribute to this small amount of documented knowledge by exploring knowledge and beliefs in the selected case study sites. Different ethnic groups may have different ecological understanding, fishing and management practices, and even superstitious beliefs and taboos which may affect both the introduction of aquaculture practices and the interaction of the ethnic groups.

² Mean and modal household size is 6 persons (National Geographic Department Vientiane, 1995)

Fish culture

According to the World Bank (1993) fish culture and fishery development, which holds the promise for compensating progressively for the decline in fish production, needs considerable inputs for planned development. The productivity of fish culture in ponds is believed to be about 1,200 kg/ha. Raising fish is not yet widespread and for those who have begun, it is still a secondary occupation for predominantly rice or cattle producers. However several informants indicated that there is strong potential and interest in aquaculture, linked to the observed decline in natural fisheries. In the lowlands fish can be bought locally for stocking, either from the DVLS or from itinerant seed merchants who import fry from Thailand. Species stocked in Nam Pou include common carp, tilapia and silver carp. In the uplands fry only reaches the district offices through the AIT Outreach programme. The District Head of Fisheries in Nong in an early initiative has stocked a small pond by the district agricultural office.

According to some of the farmers interviewed pond management has changed in the last few years; in the lowlands some farmers are adding buffalo manure, inorganic fertiliser and rice bran to their stocked ponds. In the uplands farmers do not yet stock either ponds or paddy fields, but a few have started to release fish caught from the rivers, into their bomb-crater ponds. They report good results even without feeding the fish, at least in the first year. Several farmers were interested in new approaches for example, the Head of Nong District plans to stock his paddy and has raised the bund in anticipation, but is still waiting for the fish.

The main constraints to the development of aquaculture in Laos appear more major in the uplands. Apart from lack of knowledge, money and large ponds for supplying stock, seed fish are the single most important constraint.

The supply of fish seed is being addressed in Savannakhet Province by the Livestock and Fisheries Section in conjunction with AIT Outreach through,

?? the upgrading of Pak Bor seed production (see table 3) farm (built in 1978 by an FAO project, LAO/78/014), using funds derived from the sale of fish seed

?? the development of decentralised seed production and a nursing network.

The latter is facilitated by the existence of a good cold storage chain, with freezers at most District offices in use for vaccines and available for hormone³ storage. Trained District staff sell hormones to farmers in vials (sufficient to induce 1 kg of brood fish @ 250 kip) and perform the injection (@100 kip). The income generated from hormone sales, hiring of hapas⁴ and the sale of fry comes into a fund managed by the District office.

Table 3: Fish seed produced at Pak Bor Seed Production Farm, Savannakhet

<u>Species</u>	<u>Local name</u>	<u>notes</u>
<i>Oreochromis niloticus</i>	Pa Nin	improve variety from AIT

³ Hormones used for induction of fish breeding LHRHa and Pimozide, these are available locally as Superflex (a decongestant nasal spray) and Motilium (an anti nausea)

⁴ Hapa - a fine nylon mesh net bag suspended in a water body to hold fish for spawning or fry rearing

<i>Cyprinus carpio</i>	Pa Nai	inbred line
<i>Puntius goniotus</i>	Pa Pak	
<i>Cirrhinus mrigala</i>	Pa Mrigal	
<i>Labeo rohita</i>	Pa Rohu	
<i>Catla catla</i>	Pa Catla	problems with spawning
<i>Hypthalmichthys molitrix</i>	Pa Silver	problems with spawning
<i>Aristichthys nobilis</i>	Pa Bighead	problems with spawning

Most seed produced is sold 1.5-2 cm long about 2 weeks after the on-set of pond filling. Seed customers are encouraged to become members of a fry trader club and there after receive their 1.5-2 cm seed at 5 kip each. 3 cm seed are sold at 10 kip for stocking. Approximately 650,000 fry were sold last year generating funds sufficient to contribute to a 3 million kip upgrading plan for the Pak Bor seed production station involving the construction of eight new 10 x 8 m nursing ponds and the improvement of other pond facilities.

In Lao PDR, wild fish caught in ponds and paddies (such as snakehead) are highly prized, so their eradication prior to stocking fry (in support of improved fry survival) is therefore considered inappropriate. Instead the problem of predation by piscivores, such as snakehead, is being addressed by an initiative to provide larger seed stock following several weeks of nursing. Seed supply in the uplands of Savannakhet is currently only available from the AIT nursing network which does not have the resources to reach many villages yet, whereas in the lowlands farmers have access to other sources of seed e.g. from Thailand.

Another possible constraint to culture of fish is the preference for the flavour of wild fish over raised, but farmers indicated that the need for increased supply of fish over-rides such preferences. It might however be an incentive to experiment with raising more native species. Chinese carp is apparently popular because it is native and also well known from pond culture, in the lowlands.

Amongst the poorer farmers interviewed, those in the lowlands see fish as a form of security and a low labour option. For example, older women may rely on stocked fish for their future food supply. By deliberately including such people in the project it may be possible to compensate for some of the equity problems identified below, at least in the lowland areas where the poor have access to ponds.

In Laos, paddy fields and ponds are interconnected systems. Both in the lowlands and uplands, ponds and rice fields are connected at least seasonally, and the ponds act as trap ponds or refuges for the fish at times of low water availability. This removes one of the technical constraints of introducing fish to rice, the need for refuges to be dug. However, there is a trade-off, as farmers are not keen on digging the ponds at the lowest point in their paddies, which tends to be the best rice land. To date, a few farmers in the lowlands have stocked ponds, but those who wanted to increase their potential to raise fish plan to stock their paddies. To do this they will raise the bunds around the paddy fields so that more water can be held, and access of fish can be controlled.

3 Institutions Collaborating under the Project

3.1 The Lao Government Department of Livestock and Fisheries

The Department of Livestock, Veterinary and Fisheries (DLVF) forms part of the Ministry of Agriculture and Forestry (MAF) in Vientiane. MAF co-ordinate 6 priority Government programmes

- ?? Food security
- ?? Reduction of slash and burn/shifting cultivation
- ?? Development of commercial production (to meet the needs of the growing urban and tourist population)
- ?? Irrigation development
- ?? Research and extension
- ?? Manpower development

There are 3 main types of support provided to farmers

- ?? Policy intervention
- ?? Direct technical support to different classes⁵ of farmers
 1. Small holders
 2. Groups of small holders
 3. Private owners
 4. Farm enterprises
- ?? Research and extension

The current Director General of DLVF, Singkham Phonvisay, implements a policy of decentralised planning, supervision and control. Recent emphasis has been on reduction in staffing levels by nearly half (from 1500) accompanied by upgrading quality via training, in-service training and institutional strengthening. There are currently 16 Departmental staff, 143 Divisional staff and 140 Provincial staff. Implementation control rests with 542 District staff (total 841).

Priority research and development activities for the fisheries sub-sector in the Lao PDR are outlined in a policy statement by the Director General of the Department of Livestock and Fisheries, Ministry of Agriculture and Forestry (see Box 1).

Box 2: National policy and development strategies for the fisheries sub sector (MAF, 1994)

1 Current national agricultural and fisheries development policies will centre around (a) food security, (b) preservation and sustainable management of indigenous natural resources, (c) promotion of diversified production for local processing of cash crops (cattle, fish, small animals, tree crops) and (d) rural development. The key role of DLFS has been reorganised to contribute strongly and actively to rural development and to focus mainly in the provision of a supportive policy environment to enable a strong development of demand driven livestock and fisheries production in the country through small holders and private sector led development of its existing natural resource base and the parallel provision of core support services to advise and monitor industry development at all levels from small holder farming to private and large foreign investments production schemes. Special consideration will be given to the establishment and/or strengthening of those technical support services that aim to support activities in the more rural and remote areas aiming at increasing the employment opportunities and income levels of small farmers and thus improving gradually their standard of living.

⁵ Through a policy of targeting and poverty focus, support is current restricted to 1 & 2

2 Present livestock and fisheries development strategies and action programs are built around the three (southern, central and northern) agro-ecological zones of Laos. The existing DLVS structure provides focus on overcoming the most pressing constraints to livestock and fisheries industry development and is reflected in its major established functional lines of animal health, animal production and fisheries development. The reorganisation of DLVS along consolidated functional lines and with a zonal focus would aim to improve the returns from the scarce resource allocation to this sector. The development strategy of Lao PDR regarding fish has been to conserve the natural resources and develop fish farming, by pursuing a better integration of fish breeding and raising. Priority in the short, medium and long term is given to a reduction of declining harvest and development of fisheries in the rivers and reservoirs as well as to fish farming in ponds and rice fields through the establishment of primary breeding and aquaculture facilities based on the sustainable exploitation of both indigenous and selected suitable exotic fish species. Collectively, these actions could allow the fisheries sub-sector to increase gradually its production figures from the current estimates.

3 In order to achieve the above mentioned development policy and strategies, appropriate action programmes have been developed by DVLS which are program orientated and are geared toward serving long-term and sustainable development of the sub-sector. Major research and development priorities are set by taking into consideration existing development potentials and the need to focus on overcoming the most pressing constraints. The following four main areas of concern identified for the fisheries sub-sector. They are presented in an order of priority.

(a) Aquaculture as the first priority program is widely recognised in Laos as having great potential to offset present declining production trends. Fish ponds in the country are popular because of their multiple uses (eg domestic, irrigation and livestock) at culturing fish in these ponds could provide farming families with an inexpensive and readily available source of nutritious food during the time of year when natural fish are scarce.

(b) Wetland management and reservoir management are increasingly important in the country. It is clearly recognised by the Lao PDR that full participation of the grassroots communities who depend on the fishery and related aquaculture is fundamental to the success and sustainability of any fisheries development programs. It is also recognised that fisheries management should form the basis for all water resources conservation and development, including hydroelectric power, irrigation, wetland management, land reclamation, management of other aquatic wildlife and tourism.

(c) Aquatic resource identification and genetics. As already mentioned above there is an acute need of an increased understanding of the bio-economic parameters of the lower Mekong River fisher, on which community management of the resource will depend. This would guide appropriate fisheries development activities especially for enhanced fisheries development targeting the natural inland water bodies. Appropriate techniques will be used to implement this program to collect the required baseline data (ie CPUF, specific survey using RRA, water quality analysis etc.). (d) Post harvest technology and regulations. There is no reliable information and estimates yet of post-harvest fisheries production in the country that is information on fish transportation/preservation/processing and marketing systems. Indigenous methods of preservation like drying, salting, smoking or preparing fish sauce or fermented fish do exist but these are more family practices and are still very much rudimentary in technique and do often not meet health and hygiene standards. However, market demand for such products in the country are high and current main supplies are dominantly of imported products. Appropriate techniques and production technologies need to be developed to improve the quality and adding higher value to existing traditional products and thus, gradually developing domestic and regional markets). In the fisheries sub-sector the section operates a fish breeding centre at Pak Bor and a production farm. There are currently 4 collaborative projects underway within the section, see Table 4.

3.2 The Provincial Livestock and Fisheries Section, Savannakhet

The main role of the Provincial Livestock and Fisheries Section (LFS) formerly the Provincial Livestock and Veterinary Section has been the collection, dissemination and extension of information relating to the rearing of livestock. Key efforts in the livestock sub-sector include a programme of vaccination for cattle and buffalo, to double numbers vaccinated throughout the province to 40% and to move from traditional extensive cattle rearing practises to a more intensive meat production industry to satisfy demand from a growing domestic and tourist population. Savannakhet Province is well suited for cattle rearing producing more than any other province, a total in excess of 200,000 buffalo and 200,000 cattle.

In response to a perceived need to focus on the fisheries sub-sector the Section was recently renamed and its efforts refocused to include aquaculture and fisheries. This initiative is guided by a National Policy and Development Strategy for the fisheries sub-sector (Box 2).

Table 4: Fisheries Projects in collaboration with the Savannakhet Livestock and Fisheries Section

<u>Donor</u>	<u>Project</u>	<u>Counterparts</u>	<u>Notes</u>
AIT Bangkok, (ODA)	Outreach, Thailand To promote small scale fisheries development in every District	Nick Innes Taylor	Institutional strengthening
MRAG, College, London, UK (ODA)	Imperial Resource management and sampling	Kai Lorenson and Caroline Garoway	community reservoirs
IDRC, Canada	Spawning of natural fish species	?	conservation agenda
UNDP	Integrated aquaculture extension	Mr Kashem	no apparent poverty focus

3.3 The Lao Women's Union (LWU)

According to Mayoury Ngaosyvathn, biographer of Khampheng Boupha (one of the Lao women leaders of the Lao Movement since its foundation to the Second National Congress of the LWU), Lao women have long been shackled by three yokes: social tradition, colonialism and neo-colonialism and their husbands. Although they represent, 'more than half the sky'⁶, over many hundreds of years, women had no opportunity to learn of their rights. A long period of traditional rule favoured men, tradition and law recognised polygamy and required women to follow their husbands. The period of the Siamese invasion, French administration and American interference offered little to Laotians of either gender, but very little indeed toward the development of women. During the struggle for national liberation the Lao Womens' Movement initiated by Khampheng Boupha contributed both to the success of liberation activities and the process of the liberation of women. The history of the movement is summarised in Box 3.

Box 3: A Summary of the history of the Lao Women's Movement

- ?? Women from the Pathet Lao (The Lao Free Land movement) meet with Vietnamese Party and State leaders, including Ho Chi Minh and the Standing Committee of the Vietnamese Womens Union.
- ?? July 20, 1954 Battle of Dien Bien Phu eventually gives rise to the *Geneva Agreement* providing for independent sovereignty and unity of Laos, Vietnam and Cambodia.
- ?? Article 14 of the Geneva Agreement gave two northern provinces, Samneua and Phongsali to the Pathet Lao.
- ?? July 22, 1955 the Noy Khol Khouay Viak Ngam Mae Nying (The Research Committee on Lao Women) established headed by Khamla Vongsak, Khamsouk Vongvichit and Kampheng Boupha.
- ?? The Research Committee draft a statute and programme of action and begin to research Lao society, tradition and custom with special reference to practices and superstitions deleterious to the progress of women and the health of children.

⁶ The first population census in 1985 indicated that nearly 50.98 % of the Lao population were female, in 1995 preliminary indications are of 50.55 % female

- ?? July 6, 1956 The Second Congress of the Pathet Lao gives birth to a new front, Neo Lao Hak Sat (Lao Patriotic Front) incorporating the Research Committee on Lao Women.
- ?? 1958 Kampheng Boupoua becomes first woman to be elected to the Lao National Assembly.
- ?? Alarmed by the left wing Lao Patriotic Front (LPF) and the Patriotic and Neutralist Party (PNP) the United States support the right wing in Laos to overthrow the government of Souvanna Phomma. August 28, 1959 after having been put under house arrest 16 LPF and PNP Deputies are imprisoned at Phonekheng military camp. (Kampheng Boupoua escapes being imprisoned due to pregnancy- a contrast to right wing policies in 1995 Britain which imprison women regardless of pregnancy and handcuff them during labour).
- ?? 1962 the Research Committee on Lao Women became a member of the International Federation of Democratic Women.
- ?? 1965 Research Committee on Lao Women renamed Lao Patriotic Women's Association.
- ?? After the Paris Agreement in 1973 in Laos an accord was signed to promote peace and implement national reconciliation, the National Political Consultative Committee, 3 of its members were women.
- ?? In 1975 national elections were held at local level and on 2 December, 1975 the National Congress of the Peoples Representatives proclaimed the foundation of the Lao PDR and the abolition of the monarchy.
- ?? On 21 March 1984 at the National Congress of Lao Women in Vientiane the LPWA changed its name to the Lao Women's Union.

(after Ngaosyvathn, 1993)

In order to become a member of the Lao Women's Union, one must be female, over 18, familiar with the rules of the Union and make an application to the LWU village representative. Most eligible women are members. Every village has a LWU representative and holds orientation sessions biannually. In addition, training and support are given to village level groups, which may include men but are mostly headed by women. Training since 1990 has included, cloth weaving, raising children, livestock rearing, fish in rice production and silk production. In this regard there is contact with the Agricultural Services sector especially at the District level. As well as representation at the District and village level, the union has representatives at Provincial level and in government.

3.4 The Agricultural Extension and Rural Development Department, University of Reading (AERDD)

AERDD was founded in 1965 and comprises 16 full-time academic staff, 2 full-time researchers and 8 administrative and support staff. It is a member of both the Faculty of Education & Community Studies and the Faculty of Agriculture and Food at the University of Reading. The department has extensive international links and undertakes consultancy and research activities as well as teaching course participants from around the world. A major focus is on rural extension and sustainable natural resource management in developing countries.

The role for AERDD in the project includes support for the exploration of specific and contextual issues relating to rice-fish farming through purposeful and creative interaction between local communities and outside facilitators. This involves meetings and travel throughout Savannakhet Province, the provision of training especially in participatory research methodology and the guidance and analysis of the process of participatory planning, implementation and evaluation at both district and village level.

3.5 The Systems Group, Institute of Aquaculture, University of Stirling

The Institute of Aquaculture was first established in 1971. It is now an international research and post-graduate training centre which is the largest of its kind in the world with about 100 academic, technical and support staff. The institute specialises in Aquatic Pathobiology, Biotechnology and Genetics, Nutrition, the Aquatic Environment and Systems.

The Systems Group continues to develop its consideration of whole systems and the position of aquaculture within the sustainable management of natural resources. The group currently collaborates with institutions in Bangladesh, India, Pakistan Thailand, France and the U.K.

4 Proposed Project Structure

4.1 Introduction

Rice and fish research and development in Asia has been the subject of a series of regional workshops organised by the Asian Rice Farming Systems Network (ARFSN) and the International Centre for Living Aquatic Resources Management (ICLARM) (e.g. Ubon, Thailand, 1988; Munoz, Philippines, 1989 and Subang, West Java, Indonesia, 1993). These have identified the vast potential for rice fish culture and resolved that, of particular importance is socio-economics and adaptive research - knowing farmers needs, resources, constraints and problems (Third Asia Regional Rice-Fish Workshop Rice Fish Culture Research Resolution to donor agencies indicating the progress achieved and outlining the importance and need for research in rice fish, signed by representatives of ODA, CARE, FAO, IRRI, ICLARM, IDRC and others, 1994).

In response to this need this project aims to address technical, social and economic constraints to rice-fish culture in LaoPDR, emphasising womens' involvement, through efforts to understand and describe existing natural resources management systems and communication systems in upland and lowland Laos and through participatory technology development via on-farm research to maximise profit from rice fish systems where appropriate.

Addressing the technical, social and economic constraints to rearing fish in rice fields will be conducted in two stages via a participatory process approach:

- i) through our efforts to understand and describe existing communication systems and farming systems in upland and lowland Laos and the collection of other information, and
- ii) through participatory technology development via on-farm research.

Although by emphasising a participatory approach in planning and executing experiments we will expect the pace of research to be slowed (in comparison to researcher controlled on-station trials) it is hoped that the result will be fruitful in terms of adoption potential and sustainability.

The aim of stage one of the project is to describe qualitatively the farming systems in the districts chosen for the project, with a specific focus on rice-fish systems (both traditional and recent innovations). This will provide the context for participatory experimentation in the second stage of the project. The basic methodology will be a fish-based PRA, beginning with an analysis of the general farming systems and then focusing on issues around fish availability, management and use.

The extent to which the methods are truly participatory will depend on the level of involvement of the community, and will be stronger if the same communities will continue into the experimental stage of the project.

A memorandum of understanding (MoU) was drawn up and signed with the Livestock and Fisheries Section in Savannakhet detailing who would work on the project their input and the allocation of resources to the project. The MoU appears in appendix IV.

Specifically the research will seek information on:

?? basic farming systems; change, and influences on change including information flow;

?? fishing behaviour and knowledge of villagers;

?? knowledge on wild fish populations /yields, habitats and environmental influences

?? gender roles in the above

and will aim to discuss and analyse this information with the villagers.

4.2 General notes on research methods

A cautionary note about PRA

As the use of PRA becomes more popular especially for the diagnostic stage of rural development projects, concerns are being expressed that the methods are used as merely another way to extract information, without changing the biases of researchers or really allowing communities to set the agenda (Theis, 1994). On the other hand there is a risk that PRA methods allow inequities within the community to be perpetuated, because group research in public will not help women, children and the poorest to express their views. If a project aims to address gender or equity issues then it is inevitable that the researchers will structure part of the research agenda. In this project it will be necessary to find a balance between working with the community, and deliberately incorporating the view of the less vocal members of the community.

For example, biases which Theis (1994) encountered during PRA training in Vietnam include:

?? concentrating on paddy

?? concentrating on figures and numbers

?? talking only to men

?? talking only to the educated and officials

?? talking only to adults

?? neglecting the poorest.

It will be useful to consciously avoid these and similar biases during this research.

Another aspect of our own agenda, is that we are offering assistance specifically with aquaculture. We have to be open about this with farming communities to avoid raising expectations of any other assistance, but at the same time it will be important to understand the whole farming system so that we understand how aquaculture development is going to affect the system and the community.

Gender focus

This project has a specific commitment to support women's involvement in rice-fish culture. This will be possible by working with the Lao Women's Union which has strong organisation and contacts with every village. However, in general researchers will need to be made aware of the need

to include women in the research. The women met during this visit were forthcoming and knowledgeable about farming systems, but there is a general tendency to talk to male farmers, or to introduce visitors only to the men. All the officials and village elders met by the project were men. Furthermore, men may tend to underestimate women's involvement in farming and fishing activities. For example, in Nong men initially reported that they did all the fishing, but later revised this opinion, recognising that women also catch smaller fish, scooping them from the banks of rivers and ponds - women also go out in boats but don't use heavy equipment. In order to include women fully in the research, the project staff will need to make a positive effort to seek their views and knowledge. A major focus of the project is on differences in gender perspectives so every research activity needs to be carried out both with women and with men. Some activities may be appropriate in mixed groups but usually it will be better to have discussions with women and men separately. If there are differences between the responses of each, the researchers can explore the reasons with a mixed group.

Qualitative research methods: semi-structured interviewing

The basic research method in this stage of the project is semi-structured interviewing (SSI). This method is different from a formal questionnaire. It allows researchers to refine their questions as they learn more about the issues. They begin with a list of key questions which are held as a mental checklist. The researchers ask about the topics on the list informally and in an open-ended way. They then follow up the response by asking a more specific question.

For example, if the key topic is 'water availability', the researcher could begin by looking at the water resources on the farm and asking the farmer when the pond is full and what she uses the water for. Then if she catches fish from the pond, the researcher could ask where the fish come from and whether she stocks the pond.

Useful questions to bear in mind, with respect to each topic, are:

Who? What? Where? When? How? and Why?

By using these pointers a lot of useful information can be gathered on each topic. This is a better way of carrying out exploratory research than a formal questionnaire, because it means the researchers do not have to guess which are the important questions before they go. They can learn about new topics and ask more questions about them as they proceed with the research.

However there is a risk that SSI is used just to collect information from the villagers. In this project it is important to involve the community as much as possible in the results of the research, so it will be better if the researchers use diagrams whenever possible and discuss the results with the villagers, instead of just leaving with detailed notes which are no use to the community.

More detail is given in the handout about semi-structured interviewing. This method is used as the basis for all PRA research and can be combined with all the tools described below. A particularly useful way of using it is in combination with a **farm walk** or **transect**. During this activity, the researcher walks around the farm with the respondent, asking questions about the crops and natural resources as they go. The questions will be prompted by what the team sees during the walk. If the interviewing is creative, the team can gain a good idea of the farming system.

An initial checklist for this project could be the following:

Box 4: keywords for fish-focused PRA

- ?? rice (varieties and methods of production)
- ?? other crops
- ?? fish (species, source, interactions)
- ?? livestock
- ?? use of agrochemicals
- ?? water (availability, access and management)
- ?? diet
- ?? markets
- ?? gender roles

Bearing in mind the key words listed above, the research can focus on the following areas:

- ?? present *farming systems* and off-farm income-generating activities;
- ?? *information systems* influencing farmers' decisions about farming and fishing activities;
- ?? *changes* in farming systems both in the recent past, and over respondents' lifetimes;
- ?? resource *access and control*;
- ?? farmers *problems and priorities*.

4.3 Selecting the research sites

Defining the variables

The research team has chosen to select two case study sites in each of three districts, two lowland and one upland. To select the villages, a list should be made of the factors which affect farming systems and the role of fish in those systems. The Laotian agricultural officials will be the best judges of these factors, but the list will probably include:

- ?? agroecological zone
- ?? ethnic group
- ?? irrigation facilities and / or
- ?? water table level
- ?? access and markets
- ?? soils
- ?? fish species and seed supply
- ?? availability of extension services.

The six sites should then be chosen to cover a range of these factors, with at least one factor differing between each pair of sites. For example, in the two upland villages, at least one factor other than topography must differ between the two; it could be ethnic group, access or irrigation facility. It is a good idea to define these factors clearly for each case study site, so that they are well characterised and the information gathered in each can be related to these factors.

Avoiding unique sites

It is not possible to generalise from case studies, but they should be representative of widespread conditions in Savannakhet (and other regions of Laos). It is advisable not to choose unique cases, such as villages which have benefited from a rice-fish project or an unusually large irrigation scheme. Similarly it is not recommendable to choose case studies which are the easiest to reach (close to the city or to main roads). They will not be typical of most villages in the province, and will not provide information on the poorest people in the province, which the project aims to help. However if the four lowland cases are likely to be quite similar, one of them could be chosen for its particular conditions, to compare the effect of such interventions with other more representative sites.

Raising expectations and continuing the research

In selecting the villages and agreeing with the communities to do research there, particularly by doing participatory research, the project will inevitably raise the expectations of the participants. It will be important to select sites that can be included in the second, experimental phase of the project. It will be beneficial for the research at this stage if the participants feel involved, but it is also important to avoid bias. It would be recommendable not to give the impression that the project has funds specifically for fish-in-rice - otherwise fish may emerge as an artificially high priority on the community's agenda.

4.4 Selecting the sample within villages

Within each village, the researchers should begin by interviewing **key informants**. These will include village elders, members of the women's union and others who may be able to give an overview of social structure, organisations and custom in the villages, as well as agricultural and fishing practices. For example, key informants could be any NGO workers, and agricultural officials based in the village.

Qualitative research does not require random sampling. The selection of **general informants** will also depend on social structures. Much of the research can best be conducted in groups and wherever possible it would be best simply to ask groups of men and women to meet separately for the research activities. In a few areas of interest, responses may vary according to wealth. A wealth ranking will allow us to use purposive sampling to ask respondents from the different wealth categories to participate in the research.

4.5 Some potentially appropriate PRA tools

Systems diagrams

The method uses diagrams drawn by the respondents, and semi-structured interviewing to explore the following key questions:

?? *what* are the components of your farming systems;

- ?? *what* are the external inputs and outputs;
- ?? *how* are the components linked (internal inputs and outputs);
- ?? *where* are the components and *why*;
- ?? *who* carries out the activities associated with each component and link; and *why*;
- ?? *when* are the activities carried out and *why*.

Before starting to draw a systems diagram with the respondents, it can be helpful to go on a transect walk with them. A transect walk should cross all of the different land types and cropping areas used by the farmer. This will help researchers and respondents to identify the components of the farming system and ask about interactions between them.

The project aims to support women's role in farming so it will be important to make sure that both men and women contribute to the diagram. If the women do not seem to be contributing actively in a mixed group, it would be worthwhile to interview them separately in another group and ask them to draw their own diagram. The differences between the men's diagrams and the women's diagrams can then be discussed.

Seasonal charts

Seasonal charts show the variation in different activities throughout the year. They are a method to show the *what* and *when* components of the farming system, and supplement the systems diagram. The researcher should begin by asking how the respondents divide the year, so that the calendar shows their seasons and is not necessarily based on twelve months. The seasons can be shown on the diagram along with the changes in climate. Appropriate variables to show are cropping seasons, water availability, labour availability or demand, access, fish availability and associated activities, as well as any other activities which the respondent thinks are important. The key words given in box 4 represent a guide to the semi-structured interview around seasonal activities.

Daily activities charts

These are similar to seasonal charts. These charts are particularly useful for showing the different roles of men and women in the livelihood system, and men and women can be interviewed separately. Again the researcher can begin by asking the respondents how they divide their day and what are the main activities.

Wealth ranking

Wealth ranking is a method used to find out about differences in wealth amongst households in a village. The method asks the farmers (or a few selected key informants) to sort the households into different wealth categories, according to the perceptions of the villagers themselves. The method avoids the need to ask intrusive questions about income, and is more realistic because it will reflect the values of the local community.

The method also helps researchers to define *wealth indicators*. These are the signs that a household is in a particular wealth category. For example, if a farmer owns a motorcycle, that might indicate that his family is relatively wealthy. If the family has no land and is employed as farm labour on other farms, that might indicate that they are poorer than the other farmers.

Some knowledge about fish will emerge using the methods already described, and the following questions and methods will help to add detail.

- ?? List local fish and rank them according to local criteria.
- ?? Ask if there are any fish which they will not catch or eat, or which bring bad luck - and why.
- ?? List and rank sources of protein (but first find out how people classify food)
- ?? Map or rank sources of fish.
- ?? Explore the effect of location on fish species (first find out what factors control fish availability by asking where each species can be found and why - then possibly map).
- ?? Explore the effect of irrigation schemes or reservoirs on fish populations.
- ?? Make a seasonal chart of capture periods, related to migration patterns.
- ?? Use a timeline to show change in yields over time.

5. CONCLUDING REMARKS

1. There is no problem with the research being demand-led; demand is high, enthusiasm is widespread and in some cases farmers are ahead of the project in beginning their own experiments. Farmers will be beginning their own trials; the interest of the researchers will be valuable at this stage, as will documentation both of the farmers' research process, their results and their evaluation procedures.
2. Ponds and paddies are not separate systems.
3. Raised fish will help to solve supply problems but not equity problems. It will be important to plan with the whole community to minimise the tendency to help the wealthier farmers, and also to ensure that the natural fish resources are conserved.
4. The social and official system seems well-suited to the approach of farmer participatory research.
5. Particularly good opportunities are given by the lack of pesticide use in some areas, but co-ordination with other development agencies will be important to avoid conflicting recommendations, as has been the case in the Philippines where pesticides won. Contact with IRRI will be important to co-ordinate information on rice varieties and management.
6. The infrastructure for the distribution of inputs for aquaculture is established through the AIT Outreach programme.
7. Working with women is not a cultural problem in Laos, but will require a conscious attempt by researchers to seek them out and incorporate their priorities. Fish supplies nearer to the home may be particularly important to them.
8. Farmers' knowledge will be invaluable in devising strategies for conserving the wild fish populations (which are appreciated by the community) as well as stocking improved varieties.
9. The use of PRA methods for the diagnostic stage of the research is appropriate. However as with all PRA we must be careful to emphasise the need for real participation in decision-making, whilst at the same time balancing it with our own agenda, particularly our focus on women and equity, and our offer of assistance specifically in the field of aquaculture.

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Appendix 1: A Brief History of Laos

The first identifiable inhabitants of what is now Laos were people known collectively as the Kha, who as early as the 5th century AD were living in the country under the suzerainty of the state of Funan. The term Kha means slave and was a term applied to these peoples which more recently has been replaced by the term Lao Thenng (Lao of the mountains and forests) or Mon Khmer peoples. They subsequently came under the domination of the Kingdom of Chenla, an early Khmer Kingdom, and its successor state, centred at Angkor. The Lao and other Tai peoples had been gradually penetrating south from Nanchao (in present day Yunnan) supporting the Kha. By the 12th century they had apparently established their own principalities, although much of this period remains shrouded in legend. The Lao migration received its final impetus from the Mongol destruction of Nanchao in the 13th and 14th centuries.

The mid-14th century saw the unification of the region founding the flourishing state of Lang Xang, the “Land of a million elephants” covering the present north-east Thailand with most of the modern day territory of Laos. The Khmer King at Angkor, Jayavarman Paramesvara (who reigned 1327 - 1353), married his daughter to a Lao prince, Fa Ngum (who reigned 1353 - 1373), and helped him found the independent kingdom with its capital at Muong Swa (present day Luang Prabang). A great warrior, who carried the title Conqueror, he united the Lao principalities and was frequently at war with both the Kingdom of Ayutthaya and Annam. Largely by the efforts of his Khmer Queen, the Lao during his reign adopted Theravada Buddhism.

In the late 18th century the country split into three parts: Champassac, Vientiane and Luang Prabang. By the 19th century, the Thais had established dominion over the Land and Tiao Anuvong, prince of Vientiane, led an ill-fated nationalist rebellion in 1827. In 1892, the French invaded and by 1893, had established a protectorate over Luang Prabang, with the rest of the country becoming part of French Indochina.

During World War II, Japan occupied Laos, and a pro-independence movement arose in Vientiane, led by three native princes Petsarath, Suvana Fuma, leader of the National Progressive Party and his half brother, Tiao Sufanuvong, head of the Neo Lao Issara, (Laos National United Front). In September 1945, Sufanavong set up a provisional government, declaring independence and promulgating the constitution of “independent Laos” in spite of the protests from King Sisavang Vong, reigning since 1904. However, by early 1946, the country was again under French occupation. The Pathet Lao provisional government sought refuge in Bangkok, where the Pathet leaders organised the anti-colonialist struggle through the Lao Issara or “free Laos” movement.

On July 19 1949, the Franco-Laotian Convention recognised Laotian independence “as part of the French Union”. The Pathet Lao leaders saw this as mere formal independence and refused to recognise it. Suvana Fuma opted for negotiation, but the opposition coalition decided on active resistance. Military victories led to a new treaty in 1953.

Differences between Sasorith, Suvana Fuma, government and the Pathet Lao, were reconciled in November 1957. An agreement was reached, whereby the latter would participate in the political life of the country under the name “Neo Lao Haksat” (Laotian Patriotic Front), led by Tiao Sufanuvong. The May 1958 elections were won by the left worrying the US. Suvana Fuma’s ruling

party joined forces with the independent party to form the so called Laotian People's Demonstration, together achieving a small majority. They formed a centre-left coalition government led by "neutralist" Suvana Fuma, with Sufanavong as Planning Minister. The US were strongly opposed and threatened to cut economic aid. This destabilised the government, and in August the leaders of the Committee for the Defence of National Interests took over. A military offensive against the Pathet Lao drove Sufanuvong from the Capital, forcing him into Guerrilla action in the forests. In 1959, the army gained central control, while the Pathet Lao controlled the strategic northern provinces and the central plain of jars. General Fumi Nosavang, the former defence minister, and his troops seized Vientiane on December 13 1960, driving out Pathet Lao troops. A massive air raid left 1,500 dead and forced Vientiane to surrender.

The Thai and US supported Revolutionary Anti-Communist Committee, headed by Fumi Nosavang and Prince Bun Um claimed legitimacy to govern. On December 20 1960, however, Princes Suvana Fuam and Sufanuvong declared their intention of forming a national unity government. The "neutralists" joined forces with the Pathet Lao and launched successful joint military campaigns. In 1961 in Geneva, Britain and the Soviet Union initiated negotiations for a peaceful solution, and on January 19 1962 a final agreement was signed for a national unity government.

Meanwhile growing US intervention in Indochina resulted in the internationalisation of the Vietnam war. Air raids on Laotian territory increased to 500 missions per day by 1970 and in nine years, Laos was subject to a greater amount of bombings than the whole of Europe during World War II.

The Pathet Lao declared an armistice in 1973, and the Vientiane government formed a new cabinet, including Pathet Lao members, with a Council of Ministers headed by Suvana Fuma. After the US defeat in Vietnam, right-wing groups lost the support they had been getting from the US. In 1975, the national unity cabinet gave way to a majority of Neo Lao Haksat ministers, and on December 1, a peaceful movement put an end to the monarchy and a People's Democratic Republic was proclaimed. The Lao People's Revolutionary (Communist) Party (LPRP) came to power with Sufanuvong as president. It is the only legal political party in Laos.

Following the overthrow of the monarchy in 1975, entrepreneurs and state bureaucrats left the country en masse, ruining the economy and crippling public administration. Although the Lao People's Democratic Republic was proclaimed in 1975, its first constitution was not enacted until 1991. Under the 1991 constitution, executive power is vested in a president chosen by the National Assembly for a five-year term. The President is assisted by the prime minister, who chairs the Council of Ministers. The Council of Ministers performs the administrative functions of the government. Legislative power resides in the National Assembly. The members of the National Assembly are elected to five year terms by the general populace. Justice is administered by the supreme court and by the people's court. Laos is divided into 16 provinces and the municipality of Vientiane. Provinces, towns, and villages are administered by People's Revolutionary Committees that receive orders from the Central Committee of the Lao People's Revolutionary Party.

Laos has no state social services. The country has a high infant mortality rate, and many urban areas lack modern sewerage and water facilities. Among the country's major health problems are malaria, parasitic diseases, and dysentery, as well as respiratory infections. In the mid-1980s only one doctor was available for every 6500 people. Health services, co-ordinated by the Ministry of

Public Health, include about 9800 hospital beds as well as mobile health units. Military service is by conscription for a period of at least 18 months. In the late 1980s the army had 52,500 members, the navy 650, and the air-force 2000, with 34 combat aircraft. The government has nationalised banks and reorganised the public sector.

Rice production rose from 700,000 tons in 1976 to 1,200,000 tons in 1981, when grain, self-sufficiency was achieved. For access to the sea and to reduce dependence on Thailand, a road was constructed to the Vietnamese port of Danang, and an oil pipeline to Vietnam's refineries.

In 1986 Phumi Vengvichit became president. In November, Kaysone Phomvihane was re-elected secretary general of the PPRL, subsequently becoming prime minister. A bloody border war with Thailand, at the end of 1987 resulted in a great loss of life, but ended rapidly in a cease-fire. In 1988 diplomatic relations were renewed with China, and in early 1989 co-operation agreements were signed with the US, which granted a symbolic \$10 million to combat the cultivation and trafficking of opium. The changes in Eastern Europe resulted in the suspension of all Soviet economic aid to Laos, and trade fell by 50%.

In 1991, the poor economic situation was exacerbated by floods and pest infestations in a quarter of the country's farmlands. Consequently over 200,000 tons of rice were imported to feed the population. Also in 1991, Thailand and Laos agreed to a repatriation plan for 60,000 Laotian refugees by 1994, also signing a Co-operation and Security Treaty. Thai investments were meanwhile concentrated in banking and trade. Laos has also put a lot of effort into establishing closer ties with China. In September 1991, a 70 year old Kaysone Phomvihane was named president. Upon his death a year later, Prime Minister Khamtay Sifandon assumed interim presidency of the country and the party (PPRL).

In December 1992, legislative elections were called; only the PPRL and a few independent government authorised candidates took part. This essentially represented a continuation of the one-party system. Anti-government demonstrations were banned, and scores of government opponents were imprisoned.

The Supreme Assembly of the People met in February 1993, and named Nuhak Fumsavanh president of the republic and Khamtay Sifandon leader of the PPRL. Major free-market orientated reforms were introduced, but without drastically changing the political system. In 1993, Prince Suvana Fuma was authorised to return to the country in an unofficial capacity to represent foreign companies.

Following IMF suggested strategies, the country managed to bring down the inflation rate - averaging 46% in the 80s to an annual rate of 10% meanwhile the GDP grew by 7%. It is estimated that part of that economic "growth" results from the introduction into the market of products and activities previously not accounted and not from an actual increase in production.

The USAID (United States Agency for International Development) approved a US\$9.7 million loan to build roads in several regions of the country, arguing that access to markets would improve life conditions.

Deforestation has become a serious environmental problem. The timber felled increased from 6,000 cubic meters in 1964 to over 600,000 in 1993. That year, the government began to restrict timber exports. As a result of this, there was an increase in the illegal felling of trees, and in 1993 half of all timber was logged illegally. In March 1994, the World Bank extended a loan given to Laos for reforestation, at an initial value of US\$8.7 million. A number of international environmental organisations have criticised the project as it gives the funds directly to the government, with little or no participation from the local communities and for placing emphasis in commercial tree plantations, an activity that could further endanger the forests and the livelihood of its inhabitants.

In April 1994, the “Bridge of Friendship” was inaugurated over the Mekong River, uniting Laos and Thailand and accelerating regional economic integration.

Appendix II: Lao PDR Fact and Figures

SOCIETY

Peoples:	60% of Laotians are descendants of the Lao ethnic groups who inhabit the western valleys. The inhabitants of the mountains account for more than one-third of the total population, while 5% are of Chinese and Vietnamese origin.
Religions:	Over 90% are Buddhist: the rest practice local traditional religions.
Languages:	Lao (official); minor ethnic group languages and French.
Political Parties:	The Lao People's Revolutionary Party (PPRL). Marxist-Leninist is in power. It originated in the old Neo Laotian Haksat.
Social Organisation:	The Patriotic Youth and the Association of Patriotic Women. The National Liberation Front based in the Meo ethnic minority, wages guerrilla warfare and is accused of receiving Chinese support.

THE STATE

Official Name:	Sathalanalat Passathipatai Passasson Lao.
Administrative Divisions:	16 provinces, sub-divided into municipalities.
Capital:	Viangchan, 377,409 inhabitants (1985)
Government:	Republic following the socialist model. Nuhak Fumsavanh president since November 1992. Khamtay Sifandon prime minister since August 1991. Legislature: Supreme Assembly of the People.
National Holiday:	December 2 Proclamation of the Republic 1975
Paramilitaries:	100,000 members of the Self-defence Military Forces.

DEMOGRAPHY

Urban:	19%
Annual Growth:	28% 1991 - 1994
Children per woman:	6.5 (1992) Fertility high until 40 yrs
Life expectancy at birth:	50 years 9mainly due to high infant mortality of 118 per 1000 births
Average age of marriage:	19 for women a few years older for men
Population growth rate:	2.6 % from crude birth and death rates of 41 and 15 per 1000

HEALTH SERVICES

Physician	One for every 4,380 inhabitants (1990)
Under five mortality	148 per 1,000 (1991)
Calorie consumption:	111% of required intake (1988 -90)
Safe Water:	35% of the population has access (1988 -90)

COMMUNICATIONS

Newspapers	-
TV Sets	6 per 1000 inhabitants
Radio receivers	125 per 1,000 inhabitants. (1991)
Books:	109 new titles in 1990

GENDER

Issues surrounding gender vary greatly among different ethnic groups. Lao Lum have a more favourable environment for women than the Lao Theung mainly as a result of a matrilineal tradition where a couple reside in the household of the wife's parents therefore female inheritance of land is common. Lao Theung and Lao Sung have a patrilineal tradition men enjoy more status and polygamy is practised.

In rice cultivation women transplant rice, weed and transport paddy to threshing areas. Men are responsible for land preparation often with the use of buffalo, spraying and mechanical threshing. Women tend to be responsible for small animals e.g. pigs and chickens whilst men deal with large animals, cattle buffalo and horses. Women look after vegetable growing and collection of natural products. Small-scale trade locally is usually carried out by women, men are engaged less frequently but over longer distances.

ECONOMY

Per capita GNP:	\$250 (1992)
Currency:	712 new kips = \$1 (1991)
Agriculture production:	100 in 1979 - 81, 106 in 1992 (per capita)
General Imports:	44,000 metric tons (1992)
Food import dependency:	6% (1988 - 90)
Fertiliser Use:	28 kgs per ha (1992)
Annual deforestation:	1.0%
Imports:	\$241 million (1992)
Exports:	\$91 million (1992)
External Debt:	\$2.0 billion. \$444 per capita (1992)
Debt Service:	6% of exports (1992)
Private foreign investment:	\$59 million (1991)
Development Aid received:	\$131 million (1991) \$31 per capita. 13% of GNP ENERGY
Consumption's:	35 kgs of Coal Equivalent per capita yearly 32% imported.
Major Source:	hydroelectric (1990)

Appendix IV

Itinerary inception visit to Lao PDR January 1996

<u>Date</u>	<u>activity</u>	<u>persons met</u>
11.1.96	GH and Anna Lawrence travel to Thailand	
12.1.96	Arrive Thailand, project planning workshop.	
13.1.96	Provisional activity plan for yr1 finalised.	
14.1.96	Mission itinerary planned	
15.1.96	Travel to NE Thailand meeting with AIT Outreach Udon Thani	
16.1.96	Travel to Laos. Meeting with LFS, Savannakhet	Nick Innes Taylor (Outreach Lao country manager), Mr Bountanome (Head of Fisheries sub-section Savannakhet Province) Mr Boutiene (Ass. Head of LFS)
17.1.96	Field visits Khanthaboulie/ Nam Phou irrigation devel./ Pak Bor fish station and training centre	Somboon (Extension Officer, Khanthaboulie District office)
18.1.96	Meeting with LWU, Meeting with Eric Meusch	Mr Sommano Phounsavath (Director of Agric. Services, Savannakhet), Mrs Banjai Saengkamyong (Provincial LWU representative) Tingkham Bayawong (Agricultural specialist, LWU) Boonyuan Titphutawong (Admin. Officer, LWU) Lamporn Phanvillai (Savannakhet office manager, LWU) Erik Meusch MSc student (Auburn, USA) working in Savannakhet
19.1.96	Travel to Mung Nong via Outumpom, Atsaphangtong and Sepon Districts	
20.1.96	Field visits in Nong to fish in rice farms	Mr Gong (Head of Nong District) Mr Powong (Head of Agric Services Nong), Mr Kykow (Head of L&F Nong), Mr Tong Sa (farmer Ban Nong), Mr Se Tong (Village head, Ban Nong)
21.1.96	Travel to Vientiane. Meeting with Duangchith AL to Bangkok	Duangchith Litdamlong (Head of Provincial Livestock and Fisheries Section)
22.1.96	Meeting with IRRI. Meeting with Min of Ag & Forest. Visit to Nong Teng seed station. Field visits with UNDP.	Singkham Phonvisay (DG Dept. Livestock, Veterinary and Fisheries, Min of Ag and Forestry), John Schiller (IRRI programme manager, Vientiane) Mr Juanich (UNDP project manager), Mr Bounngang (Model UNDP farmer Nongteng North), Mr Oun (Model UNDP farmer, Tongpang village)
23.1.96	Travel to Savannakhet. Meeting with Duangchith.	
24.1.96	Meeting with Duangchith. Meeting with LWU	
25.1.96	Travel to Bangkok	
26.1.96	Meeting with members of	Peter Edwards (Prof AIT), Harvey Demaine (Head of AIT)

staff AIT
27.1.96 Travel to UK

Outreach), Mr Parisacle Pavongviengicham (DDG DLF)

Appendix III: Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE DEPARTMENT OF LIVESTOCK- FISHERIES , MINISTRY OF
AGRICULTURE - FORESTRY, LAO PDR

AND

THE INSTITUTE OF AQUACULTURE, UNIVERSITY OF STIRLING
SCOTLAND

JANUARY 1996

THE AIT OUTREACH PROGRAMME LAO PDR RICE-FISH CULTURE - LAO PDR PROJECT: ADDRESSING TECHNICAL, SOCIAL AND ECONOMIC CONSTRAINTS TO RICE FISH CULTURE IN LAOS EMPHASISING WOMENS' INVOLVEMENT

This Memorandum details the agreements and conditions required for the implementation of the rice-fish culture - Lao PDR Project, a component of the AIT Outreach Programme for Lao PDR which will be jointly undertaken by the Department of Livestock and Fisheries and the Institute of Aquaculture, University of Stirling.

We the undersigned, agree that this document will form a Memorandum of agreed conditions on Project Implementation.

Mr Duangchit Litdamlong
Head of Livestock - Fisheries Section,
Division of Agricultural Services
Savannakhet Province

Dr Graham Haylor
Rice - Fish culture - LaoPDR project co-ordinator,
Institute of Aquaculture

Main aims of the project

The purpose of the project is: To increase understanding of the technical, social and economic constraints to rice-fish culture in LaoPDR, emphasising women's involvement, through investigation of resource management and communications systems and participatory research with the goal to maximise profit from rice fish systems.

There are 3 intended outputs:

- 1 Identification of technical, social and economic constraints to the rearing of fish in rice fields in LaoPDR achieved via understanding and description of existing resource management systems and communication systems in some upland and lowland areas of Laos.
- 2 Individual and institutional capacity to undertake research on rice fish culture strengthened.
- 3 Development of sustainable local resource use strategies in rice-fish systems for small-scale, poverty focused aquaculture, emphasising the role of women achieved via on-farm research and through participatory technology development.

Parties involved in the project

- ?? Department of Livestock and Fisheries.
- ?? Provincial staff from the Agricultural Services.
- ?? Provincial staff from the Lao Women's Union.
- ?? Staff from Department of Agricultural Extension and Rural Development, University of Reading.
- ?? Staff from the Institute of Aquaculture, University of Stirling.

How the project will be funded

Funds for project activities will be in addition to those provided by both the Lao Government and the Asian Institute of Technology Outreach Lao PDR. The total additional annual allocation for disbursement in Lao PDR in US\$ is shown in the table below.

1. Summary of commitments administered by Lao Project Manager \$US

	year 1	year 2	year 3	Total
Per diem for Lao Govt. staff	1,872	1,872	922	
Motor cycles (3)	4,950			
Other (workshops, training, fuel,...)	2,267	2,267	1,000	15,150

The above table represents a summary of *estimated* allocations.

How funds will be managed

1. **The Stirling contribution** - Funds required in Lao for the payment of travel expenses, per diems, fuel, office running costs, equipment, etc. will be made available through the established accounting.

To draw on the fund, each project staff should obtain authorised payment of a *cash advance* from the fund via the standard procedures (i.e. all expenditure accounted for). Only senior project staff will be eligible to request cash advances.

The Stirling project co-ordinator will be responsible for the reimbursement of the fund. Claims for reimbursement of this fund will be made to Stirling on a quarterly basis once all outstanding in-country cash advances have been cleared.

If at any time during the project the amount of money in the fund is insufficient for the level of expenditure, the fund may be increased if this is agreed to by all parties involved.

2. The Lao Government contribution - The contribution by the Lao Government will be mostly staff time and office support and the management of this contribution will be the responsibility of the officials who are designated as *project staff*. A list of project staff will appear in each *quarterly office report* (for further details of this report see Appendix 1).

For each person working with the project, training will be available.

How activities will be decided

Project activities will be discussed and decided at three levels:

The first level - A broad outline of the activities to be undertaken during the project are contained in the project document. This may be reviewed if it is unanimously agreed to do so during the annual tripartite review.

The second level - Approximately every 12 months a planning workshop will be held to interpret, review and elaborate the broad activities described in the project document. The main output of these workshops will be a ***project activity plan*** which will guide project staff at each office in determining the ***specific activities***

The third level - The day-to-day activities of the project (the *specific activities*), will be planned during ***quarterly review & planning meetings*** held at each project office every three months. Apart from planning new activities, these meetings will also review progress during the last three months and reschedule outstanding commitments. The *project activity plan* devised during the six-monthly planning workshops will provide the framework for these meetings.

In order to ensure that project objectives are fulfilled, it is important that all activities identified at the second and third levels **clearly** contribute towards the objectives and outputs as stated in the project document (the first level). Staff proposing activities which require a broadening of project objectives or which will lead to additional outputs, should first consult with the Stirling project co-ordinator and senior Lao Government counterpart.

To assist project staff in identifying activities during the first few months of the project, a first draft of the *project activity plan* has been prepared and is contained in Appendix 2. The activities listed in

the chart **are not** comprehensive and additional activities will be added following the first planning workshop.

How the project will be monitored and evaluated

Project activities and progress will be monitored and evaluated on a regular basis in two ways:

✍ Project staff in each office will undertake reviews of completed and current activities during the *quarterly review and planning meetings* held every three months at each project office. The results of these reviews will be published in the *quarterly office reports* (see Appendix 2 for further details on project meetings and reports)

✍ At intervals *field visits* will be arranged for project staff. The main purpose for these field trips will be familiarise staff who are not based in the field with field activities. During these visits, the staff will be expected to evaluate project progress and to produce a summary report suitable for circulation to organisations and individuals not directly connected with the project.

MoU APPENDIX 1

DETAILS OF MEETINGS AND REPORTS

☞ Meetings & Workshops

Name of meeting	Purpose of meeting	Venue	Frequency and scheduling	Participants	Outputs	Notes
Quarterly review & planning meeting	1. review progress since the last meeting; 2. discuss overall project objectives ; direction and outputs so far; 3. plan activities for the next three months	Workshops will be held in each of the project offices.	Every three months - will require one working day	Head of district Lao project manager, Head of Fisheries, LWU provincial co-ord.	<i>Quarterly office report</i> - see table below for details on format	The workplans devised during the annual planning meetings should be used as a guide in preparing the quarterly plans
Annual planning workshop	1. discuss project objectives and overall achievements so far; 2. plan the broad activities to be undertaken during the next 12 months	One of the project offices	Every year. The meeting will require one working day but should be scheduled to coincide with the field visits of relevant project staff.	All available project staff, Project co-ordinator, Depart of Livestock representative.	<i>Project activity plan</i> - see table below for details on format	For details on field visits of overseas staff, see the table below

* Head of the Livestock and Fisheries Section

☞ Reports

Name of report	Group or individuals responsible for producing report	Frequency and timing of report	Main sections in report	Circulation
Project activity plan	Project staff who attend the Planning Workshop	Every year - the report should be drafted during the workshop	<ol style="list-style-type: none"> 1. A Gantt chart of completed, current and planned activities. 2. Guidance notes on the implementation of planned activities. 3. A table showing (a) task name; (b) task completion date; (c) staff responsible ; (d) project objective to which task relates. 4. Estimate of financial requirements if these will be considerably above normal office running costs 	Senior staff at all project offices, Provincial Governors, Deputy Director-General of the Department of Livestock, Outreach library.
Quarterly office report	Project staff at each project office	Every three months	<ol style="list-style-type: none"> 1. A report on the progress of completed and current activities. 2. A activity plan giving details of specific activities to be undertaken during the next three months. 3. Details of expenditure during the last three months and an estimate of <i>cash advances</i> required for the next three months. This section is the <i>Quarterly Financial Report</i>. 	Copy to each project office, Outreach library (<i>Note: full details on the format and content of this report will be forwarded to each office</i>)
Donors progress report	project co-ordinator	Once every 3 months	Format will vary according to donor	Donor organisations supporting the project, Outreach library.

MoU APPENDIX 2

Project Activity Plan

Activities
<p>1.1 An initial planning workshop in LaoPDR involving all key participants, the recruitment of Lao speaking researcher (at MSc. Level) and detailed agreement on the allocation of DLVS manpower and other resources to the project and facilitation by Outreach Lao.</p> <p>1.2 Development and management of regular contact between a full time Lao speaking researcher with DLVS extension staff and identified project farmers in at least four selected representative upland and lowland areas with identified rice fish potential, facilitated by Outreach Programme manager, supported by logistic and occasional technical support by AERDD and IoA.</p> <p>1.3 An exploration of specific and contextual issues relating to rice-fish farming through purposeful and creative interaction between local communities and outside facilitators in order to understand the characteristics and dynamics of the agro-ecological system and to define priority problems and potential technological options for local experimentation This activity will be co-ordinated by the AERDD, Reading researcher based in Lao-PDR, in conjunction with her Lao research counterpart, IoA, facilitated by Outreach and in conjunction with DLVS. Methodologies will include surveys at different levels of decision making (government, sectoral, local technicians) and relevant research and training establishments, complemented by case studies of current and potential rice fish farming locations. The process will involve: interviews with officials, semi-structured interviews with farmers, the selection of case study sites for participatory research and using PRA techniques (in particular: mapping, timeline analysis, pairwise ranking, communication mapping and seasonal analysis) to explore access to resources, variations in farming systems, changes in resource use, sources of ideas and inputs, potential lines of information and product flow, seasonal and other constraints. The role of women in rice fish culture will be a particular focus of the work.</p> <p>1.4 A broad sweep of the wider institutional base, international networks and published data documenting all the rice fish activities in S.E. Asia by region, type, species, socio-economic group of operators, sources of funding, nature and level of support, production, markets, etc. From secondary sources, key informants and postal survey co-ordinated by the IoA.</p> <p>1.5 A book containing a selection of the case studies and discussion papers will be prepared from the workshop, with versions published in Lao and English and edited by the principal researchers.</p> <p>2.1 Short training courses in <i>Identification of research needs, On-farm research trial design</i></p> <p>2.2 Follow up to training courses and training workshop on <i>Participatory methods</i></p> <p>2.3 Study tour to Vietnam for intermediate users (extension workers) to broaden their experience of aquaculture research and extension systems.</p> <p>2.4 Workshop conducted in Lao PDR co-ordinated by DLVS and facilitated by Outreach Lao, in conjunction with IoA and AERDD. The workshop will be in two phases, the first to examine researchable constraints to rice-fish development in LaoPDR, S.E. Asia and to document and discuss the issues and the second to plan the participatory research phase. The aim is to involve the farmers groups, men and womens groups, extensionists, government and NGO staff, academics and development workers associated with the project.</p> <p>3.1 Following the second phase of the workshop, group meetings in each selected community will engage in defining the exact nature of the farmer trials through discussion amongst farmers and all those directly involved. This will take place in Lao-PDR co-ordinated by DLVS and facilitated by Outreach, in conjunction with AERDD and IoA. The meetings are likely to focus on the researchable constraints to issues such as: fry acquisition (sources, availability, timing, resource issues, economics, others), field preparation (configuration/man-days, effect on rice production, dike cropping, high temperature, harvesting refuge, others), stocking (rates, size at stocking, species/composition, see acquisition and markets, others) risk management (heat, predators-frogs, birds, other, water management - flood/drought, cropping period, others) rice management (IPM, pesticide use, economics, other) feeding (availability, azolla, duckweed, on farm inputs/other uses, economics, others), soils (drainage, fertility, fertilisers, economics, others), profit (degree to which income can be increased, net returns, expenditure, return on investment, available capital, others), others</p> <p>3.2 A Strategic programme of demand led farmer centred rice-fish research for S.E. Asia conducted in Lao PDR (as defined in 3.1). On farm research will be supported and monitored by full time Lao speaking researcher with DLVS extension staff in at least four selected representative upland and lowland areas, facilitated by Outreach Programme manager, supported by logistic and occasional technical support by AERDD and IoA.</p> <p>3.3 Research reports and final reports, peer review papers and articles will be produced and promotional pathways for the outputs of the research will be identified in conjunction with end and intermediate users</p>

MoU APPENDIX 3

TOR for key staff

Lao Project Manager

General terms of reference: Coordinate and manage Stirling inputs into the project.

Specific terms of reference:

- ? Coordinate and manage field activities.
- ? Liaise between Lao project staff and Stirling.
- ? Manage and Coordinate the Stirling financial contribution in Lao PDR
- ? Coordinate the preparation of the *project activity plan* which will be updated each year
- ? Prepare 3 monthly accounts and progress reports

Counterpart - Vientiane

General terms of reference: Facilitate project implementation and evaluate project progress.

Specific terms of reference:

- ? Arranging visas.
- ? Monitor, evaluate and report on project activities every year.

Head of Provincial Fisheries Sub-Section

General terms of reference: Supervise the technical aspects of project implementation.

Specific terms of reference

- ? Assist the Lao project manager with the technical aspects of project.
- ? Train and advise district level staff .

Provincial Technicians - 2 positions

General terms of reference: Support and advise District level staff

Specific terms of reference

- ? Train and support the District level staff.
- ?? Liase with the Lao Women's Union

Local Consultant - (short term input)

Specific terms of reference

- ?? Assist the District and Provincial staff in report writing (hard copy & copy on floppy disk) and preparing for presentation of the field results.
- ?? Assist with translation between Lao and English so that all written output is produced in both languages.
- ?? Assist with the planning and preparation of the workshop scheduled for January 1997

Provincial LWU Coordinator

General terms of reference: Coordinate LWU inputs into the project

Specific terms of reference

- ?? Train and support district level staff of the LWU
- ?? Liase with Provincial staff of the Livestock and Fisheries