
A survey of aquatic animal health problems affecting small-scale aquaculture production and fisheries in Lao PDR

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ABSTRACT

This study presents the results of a survey of aquatic animal health conducted in three provinces of Lao PDR. The objectives of the study were to (1) identify problems with fish disease in Lao PDR, (2) investigate the source and cause of disease and, (3) determine its effect on aquaculture systems.

In total, 163 families were interviewed using a questionnaire; 30-40% reported the occurrence of fish disease. The spread of disease depends on many factors associated with culture in hatcheries and nursing and is more of a problem in integrated than in poly-culture systems. In Oudomxay and Vientiane, fish mortality due to disease was high and often associated with imported seed. Disease occurred mainly in the cool months from around December to April and early rainy season from about May to June. Eight major diseases are prevalent: epizootic ulcerative syndrome (EUS) and diseases caused by *Lernaea*, *Epistylis*, *Trichodinia*, *Oodinium*, *Gyrodactylus*, *Columnaris*, and *Edwardsiella tarda*.

KEY WORDS: Aquatic animal health, fish disease, aquaculture

INTRODUCTION

The number of farmers involved in aquaculture in Lao PDR has increased in recent years. Their methods generally employ extensive culture systems though an ever-increasing number of intensive commercial fish farms now operate near large towns and suburban areas and supply local markets and families with fish.

Farmers report that they often find dead fish in their ponds and this study found mortality rates in some nursing ponds were more than 90% in a number of instances.

Many factors cause the spread of disease including, the illegal importation of aquatic animals, poor knowledge of disease prevention and treatment, poor pond management, high stocking densities, and over-fertilisation.

In October 2002, the Living Aquatic Resources Research Centre (LARReC) and the Department of Livestock and Fisheries Veterinary Laboratory (DLF Vet-Lab), both government organisations, designed a questionnaire to aid in the study of fish disease in three provinces in Lao PDR:

- Vientiane municipality (three districts - Sikhottabong, Naxaythong and Xaythany)
- Oudomxay province (three districts - Houn, Beng, and Xay)
- Champassack province (three districts - Pakse, Paksong, and Pathoumphone)

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We believe that these provinces are representative of the whole country.

The objectives of the study were to:

- Identify problems with fish disease in Lao PDR
- Investigate the source and cause of disease
- Determine its effect on aquaculture systems

METHODS

Between January and July 2003, a team of five LARReC staff and two local researchers interviewed small-scale fish farmers from the regions selected for study. These fish farmers were practising fishpond, rice-fishpond, public and private hatchery, community fishpond, nursery and cage, cultures. The survey team interviewed 163 fish farmers and/or their families (between 40 and 60 from each site) and asked them to complete a questionnaire about their farming practices. The questionnaire, which followed the format of an earlier survey conducted in Savannakhet province (NACA 1999), contained questions about culture techniques, water quality and the prevention and treatment fish diseases.



Figure 1. Small silver carp infected with *Lernaea*

RESULTS

Presence of disease in different culture systems

In Vientiane, parasites, bacteria and fungi that cause disease in tilapia (*Oreochromis niloticus*), silver barb (*Barbonymus gonionotus*), catfish (*Clarias* sp.), common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), big head (*Aristichthys nobilis*), grass carp (*Ctenopharyngodon idella*)

and snakehead (*Channa* sp.) were present in samples from hatcheries, nursing and grow-out ponds (Table 1). The samples also contained fish with epizootic ulcerative syndrome (EUS) along with disease caused by the following organisms: *Lernaea* sp., *Epistylis* sp., *Trichodinia* sp., *Gyrodactylus* sp., *Columnaris* sp., and *Edwardsiella tarda*.

Table 1. Number of infected samples in Vientiane municipality and Oudomxay and Champassack provinces

Culture	Province							
	Vientiane		Oudomxay		Champassack		All provinces	
	N ^o samples	% infected	N ^o samples	% infected	N ^o samples	% infected	N ^o samples	% infected
Fishpond	32	38	48	46	40	35	120	40
Local hatcheries	11	64	6	33	5	80	22	59
Nursing	2	50	1	100	2	0	5	40
Cage culture	5	80	0	0	2	0	7	57
Rice-fishpond	1	0	2	100	3	33	6	50
Community fishpond	0	0	0	0	3	0	3	0
Total	51	45	57	47	55	35	163	42

Notes: 1. In this, and the tables that follow, 'samples' refer to the number of fish farmers interviewed, and '% infected', to the percentage of fish farmers that reported diseased fish. 2. Fish farmers in Vientiane use imported seed for cage culture; this might explain the very high (80%) levels of infection

In Oudomxay, *Lernaea* sp., *Epistylis* sp., *Columnaris* sp., and *E. tarda* were present in samples from hatcheries and nursing ponds; *Columnaris* sp also infected cage cultures in reservoirs and rivers.

In Champassack, samples from hatcheries and grow-out ponds were found to be infected with *Oodinium* sp., *Epistylis* sp., and *Edwardsiella tarda* which cause disease in common carp, silver barb, tilapia, Indian carp (*Cirrhinus cirrhosus*), rohu (*Labeo rohita*) and silver carp.

Some of the causative factors are briefly discussed below.

Farming systems

Disease rates are significantly higher where integrated fish farming and livestock systems were in operation.

Table 2. Incidence of disease in integrated and non-integrated farming systems

	Culture			
	Integrated		Non-integrated	
	N ^o samples	% infected	N ^o samples	% infected
Vientiane	16	63	35	37
Oudomxay	11	73	46	41
Champassack	2	50	53	34
Total	29	66	134	37

Water source

Levels of infection in culture systems using water from irrigation canals were higher in Oudomxay than in any other province. In Vientiane and Champassack, levels were high in those systems that depended on water from the river.

Table 3. *Incidence of disease related to water source*

	Water source					
	Irrigation		Rain		River	
	N ^o samples	% infected	N ^o samples	% infected	N ^o samples	% infected
Vientiane	30	40	16	50	5	60
Oudomxay	13	69	17	41	27	41
Champassack	12	33	18	17	25	48
Total	55	45	51	35	57	42

Seed source

Farmers in each province noted some differences. In Oudomxay, fish fed on seed imported from China and Viet Nam were twice as prone to infection as those fed seed from the local hatchery.

Table 4. *Incidence of disease related to seed source*

	Seed source					
	Imported		Home-produced		Local hatchery	
	N ^o samples	% infected	N ^o samples	% infected	N ^o samples	% infected
Vientiane	7	71	7	43	37	41
Oudomxay	8	88	11	36	38	42
Champassack	11	27	9	67	35	29
All provinces	26	58	27	48	110	37

Pond preparation

Disease appears to occur most commonly in areas where pond preparation is poor.

Table 5. *Incidence of disease related to pond preparation*

	Pond preparation techniques employed			
	Yes		No	
	Infection rate			
	N ^o samples	% infected	N ^o samples	% infected
Vientiane	48	44	3	67
Oudomxay	30	40	27	56
Champassack	39	28	16	50
All provinces	117	38	46	54

Use of disease prevention techniques

Farmers who employed disease prevention techniques had a lower incidence of disease

Table 6. *Incidence of disease related to prevention techniques*

	Prevention techniques employed			
	Yes		No	
	Infection rate			
	N° samples	% infected	N° samples	% infected
Vientiane	41	37	10	80
Oudomxay	26	39	31	55
Champassack	36	31	19	42
Total	103	35	60	55

Water exchange

The level of disease levels in fish in Vientiane and Oudomxay reared in systems that do not employ water exchange mechanisms were significantly higher than in systems in areas that do . .

Table 7. *Incidence of disease related to water exchange practices*

	Water exchanged			
	Yes		No	
	Infection rate			
	N° samples	% infected	N° samples	% infected
Vientiane	37	38	14	64
Oudomxay	27	33	30	60
Champassack	11	27	44	36
Total	75	34	88	49

Seasonality

Respondents from all three localities reported that disease occurred most commonly during the cool months from about December to April and in the early rainy season from about May to June

CONCLUSIONS

Although farmers are developing intensive methods and aquaculture is on the increase in the larger cities and suburbs of Lao PDR, extensive methods are still most common. This study found that disease occurred in all systems. Aquaculture is expensive particularly as the price of feed constantly fluctuates. Some farmers attempt to reduce costs by raising fish with livestock using an integrated method of production. However, fish raised in this way are particularly prone to disease and poor pond preparation techniques, importation of seed, and high stocking densities further compound the problems. Prevention of disease is essential but this fact is not widely appreciated by farmers and consequently the

incidence of disease is high. As the industry expands, so too will the problems and costs unless action is taken to reverse the trend.

RECOMMENDATIONS

A number of recommendations follow from the results of this study:

- there is an urgent need for an education and prevention campaign (including quarantine techniques) to teach farmers how to improve their management methods
- seed needs to be of the highest quality and must be disease-free
- educational materials that promote the prevention of disease should be produced and broadcast through extension services and on national television
- capacity-building and development of human resources is required in this field
- riparian countries should continue to share information through seminars, workshops and training courses

REFERENCE

NACA (1999) *Aquatic animal health assessment in southern Lao PDR*. Network for Aquaculture Centres in Asia, Bangkok.