

CHAPTER - 3

AQUATIC ECOLOGY SURVEY

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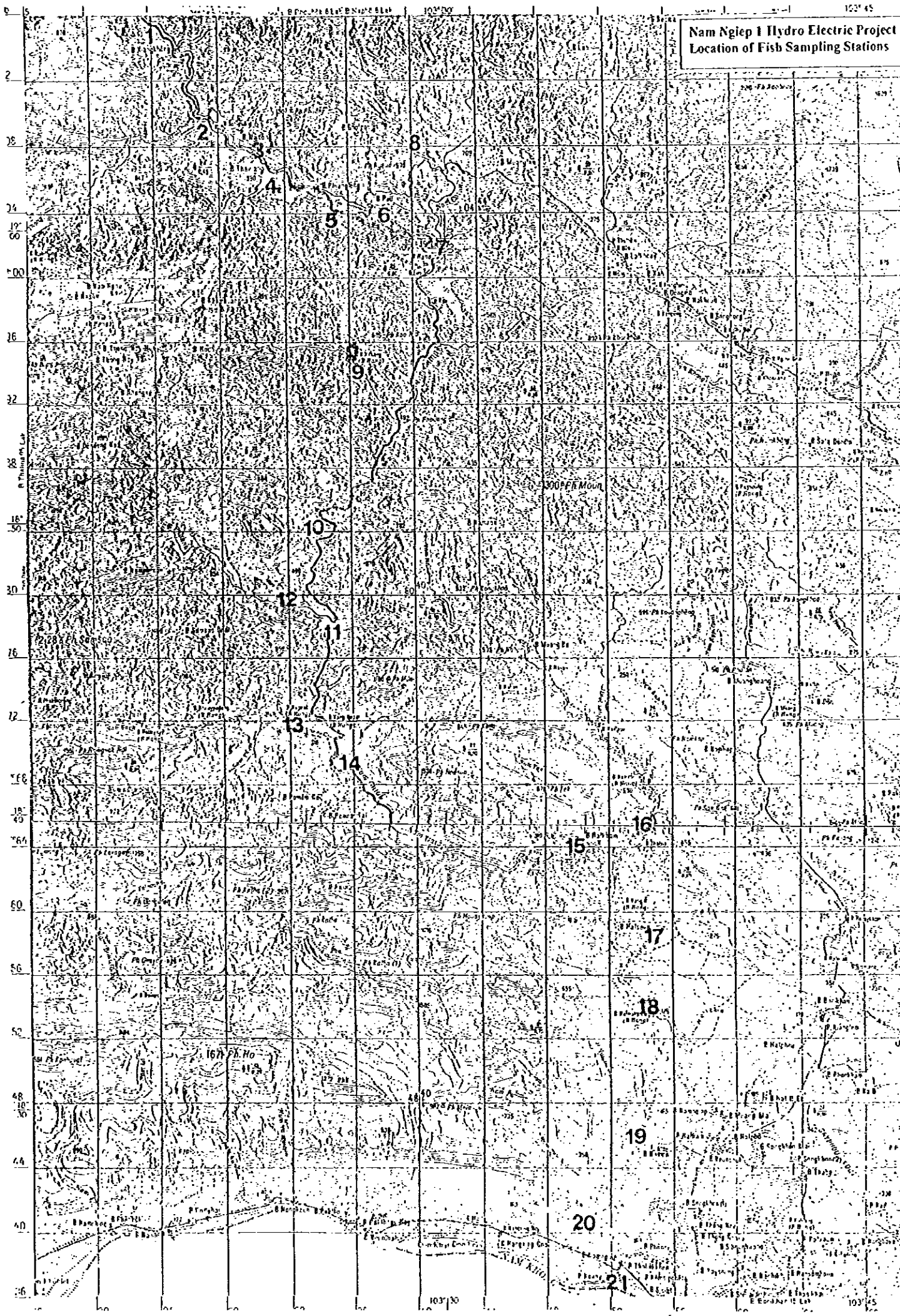
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Nam Ngiep 1 Hydro Electric Project
Location of Fish Sampling Stations

3 AQUATIC ECOLOGY SURVEY

3.1. INTRODUCTION

Fishes are one of the most widely distributed, most easily harvested and cheapest protein sources in tropical area (Kottelat 1997). The inland fishes diversity in Southeast Asia is very high, with about 900 species known from the mainland Southeast Asia (Kottelat, 1989). The total number of species recorded or expected from the Mekong, as inferred from the known zoogeography of southeast Asia, includes about 1200 species, but the actual number of species perhaps is much greater (Rainboth, 1996). Large areas are still not surveyed (Kottelat, 1997).

Very few data on fishes in Lao have been published in the scientific literature. French ichthyologists have published a few scientific papers on fishes with a few species since 1940 and Taki (1974) has compiled a synopsis of fishes of Laos. Since then, some information on fishes of the Nam Ngum reservoirs was collected, and some fish species were identified in certain rivers of Laos, such as Nam Leuk and Nam Mang basin, Nam Theun and Xebang Fai basin. At present, there is a fish species survey on-going in the Mekong basin carried out by Dr. Walter Rainboth, but the result is not yet published. Also Dr. Maurice Kottelat currently compiles Fishes of Lao PDR; it is expected that this publication will be completed in the end of this year (1999). As for fishes in Cambodia about 500 species as been described by Dr. Rainboth (1996). These published papers are used as guideline for this study.

This report presents the observation on fish species obtained from direct fishing and from the fishermen catches during the field investigation. The distribution of fish species along the Nam Ngiep main stream and some of its tributaries at the Upper and Lower Reservoir and Downstream of the proposed dam site are also presented. The first fieldwork was carried out around the end of December 1998 until mid of January 1999 for Upper and Lower Reservoirs and beginning of April 1999 for Downstream. The second fish survey was carried out in the end of July and beginning of August 1999.

3.2. FIELD WORKS

3.2.1. SURVEY AREAS

The fish samples were collected observed and identified from 21 stations along Nam Ngiep River and its tributaries namely Nam Theng, Nam Xong, Nam Chea Rivers, included 9 stations of the Upper Reservoir. In the Lower

Reservoir, there are 5 stations along the Nam Ngiep and its tributaries such as Nam Youk and Nam Phouan rivers. There are 7 Stations at Downstream along Nam Ngiep and its tributaries such as Nam Xao river, Houay Khi Nguak, Nam Pa river and Nam Tek river for the first survey (dry season). The photographs of the sampling stations are presented in Plate I., and its location can be seen on the map attached in this report. Additional information on fish species was obtained through observation at Thavieng market (Ban Phonyeng) and also from the fishermen's catches in the villages of Thavieng Sub-district at the Upper Reservoir and the Lower Reservoir in Muan Hom district, Xaysomboun Special Zone.

The second fish survey was carried out mainly in the tributaries of Nam Ngiep and the floodplain, rice fields and ponds located near to the Nam Ngiep river (in Upper reservoir, Lower Reservoir and Downstream areas).

3.3. STUDY METHODS and TERMINOLOGY

Our survey team collected fishes samples, with the assistants of local fishermen hired by the project by using gill net, cast net, seine net and scoop net. Fishing was also done by closing small channels in the rivers especially in the tributaries of Nam Ngiep. The fish samples were also inspected from the fishermen's catches and market.

It was initially planned to collect fish samples through spot poisoning by sodium cyanate using, but the local authorities did not agree and therefore this method was not used at the Upper and Lower Reservoirs area. However, sodium cyanite was used at the downstream area to obtain maximum species. The captured fish was preserved in 10 % formalin solution.

Choosing of the sampling station was based on the expectation of getting a good representation of fish species living in different river portions such as pools, riffles, rapids and different river beds such as gravelly, rocky, sandy and muddy, also at the different tributaries of Nam Ngiep River.

Actual fish sampling was carried out at about 1-2 km upstream and downstream of the sampling station along the Nam Ngiep River. As for the case of sampling station in the tributaries, sampling started from the confluence going upstream to about 3-5 km. During fish sampling in different stations, some fish species caught by the fishermen in the area were also inspected and collected. These samples were included into the nearest sampling station.

Their local name and when possible by their scientific names and were then photographed. One to two specimens of each species were collected and preserved to confirm their identifications. Unfortunately some species could not be preserved due to their big size, but were photographed.

The identification of fish species in this present report is based on published and unpublished literature available in the areas: Such as Aquatic Biodiversity Study of Nam Mang and Nam San Rivers by Kottelat (1997), Fishes of the Nam Theun and Xe Bangfai basins by Kottelat (1996), Fishes of the Cambodian Mekong by Rainboth (1996), Fishes of Laos by Taki (1974). The Fishes of Southern Lao by Baird (1999). When difficulties in identifying some species turn out, fish biologists working in the area were as well consulted.

The local name of fish species used in this report is based on the name called by the villagers in the Nam Ngiep basin, but for those species which local names do not appear in the report, they will be written as Pa..... (*Puntius jacobusboehlkei*).

As for some species called by the same local name, they will be presented as species 1 species 2... (e.g. Pa Phan1, Pa Phan2...)

For those species, difficult to identify, they will be presented only by their genus followed by "sp." at the end of genus (e.g. *Dangila* sp.). The scientific names of all fish species are presented in italic letter (e.g. *Barbodes gonionotus*).

3.4. RESULTS

3.4.1 General

The list of fish species from direct fishing and observed from the market and from the fishers catches during the field survey are presented in Annex 1 for dry season survey. The additional observed species during the wet season surveys is present Annex 2. The photographs of fish species will be presented as plate 2. The list of fish species reported by fishers, using color fish photographs references will be presented in Annex 4 in this report. Also the fish species, which are considered for possibility to adapt to the reservoir's condition, is present in Annex 3. The distribution of fish bio-diversity is summarized in Table 1 in Chapter 3.7.1. The fish migration issue is discussed in Chapter 3.7.2.

3.4.2 Sampling stations

Fish sampling stations are listed from upstream to downstream of the Nam Ngiep River, and the name of each station will be using the name of the nearest village to define the location of each station as described below:

Upper Reservoir:

- Station 1. Ban Xiengkhong
- Station 2. Nam Theng River
- Station 3. Ban Naxong
- Station 4. Ban Dong
- Station 5. Ban Hatsamkhon

- Station 6. Ban Pou
- Station 7. Nam Chea River
- Station 8. Ban Namlong
- Station 9. Nam Khai River

Lower Reservoir:

- Station 10. Ban Houay Pamom
- Station 11. Ban Sopphouan
- Station 12. Nam Phouan River

- Station 13. Nam Youk River
- Station 14. Ban Sopyouk

Downstream

- Station 15. Confluence of Houay Xay
- Station 16. Nam Xao River
- Station 17. Houay Khinguak
- Station 18. Hatmakphang

- Station 19. Nam Pa River
- Station 20. Nam Tek River
- Station 21. Confluence of
Nam Ngiep with
Mekong River

3.4.3. Fish Biodiversity

3.4.3.1 Upper Reservoir

In the Upper reservoir, the collection of fish samples started below the confluence of Nam Chea upstream to Ban Xiengkhong (station 1) and also in the tributaries of Nam Ngiep. The stations were located in the Thavieng Sub-District of Thathom District, Xaysomboun Special Zone. The character of the river's bottom is gravelly, rocky and sandy with some portion of rapids, riffles and pools. The water is clear and cool, the depth of the river is variable, from several meters at the pools to a few cm on the sand bars especially in the tributaries. The wet season sampling was taken place along the small streams and paddy fields near station 2, station 4, station 6 and station 8. The character and fish species obtained from each station are shown below:

Station No. 1.

The fish samples were collected at riffles and pool in the Nam Ngiep river at about 5-km upstream from Ban Xieng Khong. The river base is composed of gravel with sand. Using gill net, cast-net, seine net and nylon scoop nets collected the fish samples, on the 8th January 1999. The collected fish samples are listed below:

	Local name	Scientific name
1.	Pa Phan2	<i>Schistura sp.2</i>
2.	Pa Phan3	<i>Schistura sp.3</i>
3.	Pa Phan4	<i>Schistura sp.4</i>
4.	Pa It xay	<i>Acantopsis sp.</i>
5.	Pa Bou	<i>Rhinogobius mekongianus</i>
6.	Pa Khing	<i>Onychostoma elongata</i>
7.	Pa Chart 1	<i>Poropuntius carinatus</i>
8.	Pa Chart 2	<i>Poropuntiu laoensis</i>
9.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
10.	Pa Siew3	<i>Rasbora daniconius</i>
11.	Pa Douk	<i>Clarias batrachus</i>
12.	Pa Phao	<i>Labeo erythropterus</i>
13.	Pa Phee	<i>Garra pingi</i>
14.	Pa Khea	<i>Bagarius yarrellii</i>
15.	Pa Pem	<i>Homalopterus smithi</i>
16.	Pa Lat	<i>Mastacembelus armatus</i>
17.	Pa Kang	<i>Channa gachua</i>
18.	Pa Peak Leuang	<i>Puntius sp. (Yellow fins)</i>

Station No.2.

The fish samples were collected at the confluence of Nam Theng and Nam Ngiep and along the Nam Theng River from the confluence upstream at about 3 km. The river base of Nam Ngiep section is sandy with stone, at the gravel base adjacent to the pool, where as in the Nam Theng river is sand base with small pools along the river. Fish samples were caught by using gill net, nylon scoop net and cast net but were also collected from fishers who were fishing in the same area. At the Nam Theng river small channel in the river were closed to collect fish samples. The sampling was taken on the 5th January 1999. The collected fish samples are listed below:

	Local name	Scientific name
1.	Pa Chart 1	<i>Poropuntius carinatus</i>
2.	Pa Chart 2	<i>Poropuntius laoensis</i>
3.	Pa Phao	<i>Labeo erythropterus</i>
4.	Pa Siew 4	<i>Rasbora daniconius</i>

5.	Pa Khing	<i>Onychostoma elongata</i>
6.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
7.	Pa Lang Nam	<i>Mystacoleucus greewayi</i>
8.	Pa Peak Leuang	<i>Puntius sp. (Yellow fins)</i>
9.	Pa Phee	<i>Garra pingi</i>
10.	Pa Khan Heua	<i>Barilius pulchellus</i>
11.	Pa Phan2	<i>Schistura sp.2</i>
12.	Pa Phan3	<i>Schistura sp.3</i>
13.	Pa Phan6	<i>Schistura sp.6</i>
14.	Pa Phan7	<i>Schistura sp.7</i>
15.	Pa It xay	<i>Acantopsis sp.</i>
16.	Pa Kang	<i>Channa gachua</i>
17.	Pa Kot	<i>Mystus nemurus</i>
18.	Pa Deng	<i>Bangana sinkleri</i>
19.	Pa Song	<i>Neolissochilus blanci</i>
20.	Pa Va (Mou)	<i>Bagana berhi</i>
21.	Pa Khea	<i>Bagarius yarrellii</i>
22.	Pa Pem	<i>Homaloptera smithi</i>
23.	Pa Pok (brack spot at caudal)	<i>Puntius sp.</i>
24.	Pa ...	<i>Bangana lippus</i>
25.	Pa Pak	<i>Hypsibabus vernayi</i>

Station No. 3.

The fish samples were collected at the pool of Nam Ngiep River near the confluence of Nam Xong and about 500 m. along the Nam Xong River. The riverbed of Nam Ngiep is rocky and muddy, where as in Nam Xong is gravel base. The fish samples were taken on the 4th January 99 and the collected species are listed below:

	Local name	Scientific name
1.	Pa Phee	<i>Garra pingi</i>
2.	Pa Phao	<i>Labeo erythropterus</i>
3.	Pa khing	<i>Onychostoma elongata</i>
4.	Pa Phan1	<i>Schistura sp.1</i>
5.	Pa Phan2	<i>Schistura sp.2</i>
6.	Pa Phan 3	<i>Schistura sp.3</i>
7.	Pa Phan4	<i>Schistura sp.4</i>
8.	Pa Pem	<i>Homaloptera smithi</i>
9.	Pa Khea (juvenile)	<i>Bagarius yarrellii</i>
10.	Pa it xay	<i>Acantopsis sp.</i>
11.	Pa Chart1	<i>Poropuntius carinatus</i>
12.	Pa Deng	<i>Bangana sinkleri</i>
13.	Pa Soud 2	<i>Hampala macrolepidota</i>
14.	Pa Pao	<i>Tetraodon suvattii</i>

15.	Pa Siew 4	<i>Rasbora daniconius</i>
16.	Pa Siew 2	<i>Rasbora borapetensis</i>
17.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>

Station No.4.

The fish samples were collected at the confluence of Nam Pang downstream of Ban Dong village and along the Nam Ngiep River downstream at about 2 km. The riverbed was pool, gravel base and rapids. Using gillnet, cast net and scoop net and closing the small channel in the river. The sampling was taken on 30 December 1998 and the fish species obtained are listed as following:

	Local name	Scientific name
1.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
2.	Pa Chart1	<i>Poropuntius carinatus</i>
3.	Pa Phee	<i>Garra pingi</i>
4.	Pa Phao	<i>Labeo erythropterus</i>
5.	Pa Bou	<i>Rhinogobius mekongianus</i>
6.	Pa Phan1	<i>Schistura sp.1</i>
7.	Pa Phan2	<i>Schistura sp.2</i>
8.	Pa Phan3	<i>Schistura sp.3</i>
9.	Pa Phan5	<i>Schistura sp.5</i>
10.	Pa Siew 5	<i>Esomus metallicus</i>
11.	Pa Siew 4	<i>Rasbora daniconius</i>
12.	Pa Pok	<i>Systemus orphoides</i>
13.	Pa I Thai	<i>Osteochilus hasselti</i>
14.	Pa Lat	<i>Mastacembelus armatus</i>
15.	Pa It xay	<i>Acantopsis sp.</i>
16.	Pa Kang	<i>Channa gachua</i>
17.	Pa Lang Nam	<i>Mystacoleucus greewayi</i>
18.	Pa Pem	<i>Homaloptera smithi</i>
19.	Pa Lay Kai	<i>Osteochilus waandersii</i>
20.	Pa Nai	<i>Cyprinus carpio</i>
21.	Pa Nin	<i>Oreochromis niloticus</i>
22.	Pa Matt	<i>Trichopsis vittata</i>
23.	Pa Pak	<i>Hypsibabus vernayi</i>

Station No. 5.

The fish samples were taken on the 31st of December 1998 at the conservation pool of Ban Hat Sam Khong, below the confluence of Houi Kaba stream by using gill net and cast net. The fish samples were also collected from the fishers who were fishing at the gravel base river upstream of the village's conservation pool. The fish species obtained are listed below:

	Local name	Scientific name
1.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
2.	Pa Phao	<i>Labeo erythropterus</i>
3.	Pa Sa Nark noi	<i>Raiamas guttatus</i>
4.	Pa Soud2	<i>Hampala macrolepidota</i>
5.	Pa Chart 2	<i>Poropuntius laoensis</i>
6.	Pa Chart1	<i>Poropuntius carinatus</i>
7.	Pa Phee	<i>Garra pingi</i>
8.	Pa Deng	<i>Bangana sinkleri</i>
9.	Pa Bou	<i>Rhinogobius mekongianus</i>
10.	Pa Siew 5	<i>Esomus metallicus</i>
11.	Pa Siew 4	<i>Rasbora daniconius</i>
12.	Pa Ket Kheang	<i>Mystacoleucus marginatus</i>
13.	Pa It xay	<i>Acantopsis sp.1</i>
14.	Pa Phan3	<i>Schistura sp.3</i>
15.	Pa Phan6	<i>Schistura sp.6</i>
16.	Pa Phan8	<i>Schistura sp.8</i>
17.	Pa Phan9	<i>Schistura sp.9</i>
18.	Pa Lat	<i>Mastacembelus armatus</i>
19.	Pa Khing	<i>Onychostoma elongata</i>
20.	Pa I Thai	<i>Osteochilus hasselti</i>
21.	Pa Kheng	<i>Anabas testudineus</i>
22.	Pa Khan Heua	<i>Barilius pulchellus</i>
23.	Pa Keng	<i>Cirrhinus molitorella</i>

Station No. 6.

The fish samples were collected along Nam Ngiep downstream from Ban Pou over 10 km. With the assistance of a group belonging to the Youth Organization of Ban Pou, using gill net, cast net and scoop net. The fish samples were also collected from bamboo traps of the fishers, which were installed at place to place in small channels along the river. The sampling was taken place on the 1st of January 1999 and the obtained materials are listed below:

	Local name	Scientific name
1.	Pa Lat	<i>Mastacembelus armatus</i>
2.	Pa I Thai	<i>Osteochilus hasselti</i>
3.	Pa Keng	<i>Cirrhinus molitorella</i>
4.	Pa Sanark noi	<i>Raiamas guttatus</i>
5.	Pa Chart1	<i>Poropuntius carinatus</i>
6.	Pa Kang	<i>Channa gachua</i>
7.	Pa Phao	<i>Labeo erythropterus</i>

8.	Pa Khing	<i>Onychostoma elongata</i>
9.	Pa tep	<i>Barilius koratensis</i>
10.	Pa Lang Nam	<i>Mystacoleucus greewayi</i>
11.	Pa Phee	<i>Garra pingi</i>
12.	Pa Pem	<i>Homaloptera smithi</i>
13.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
14.	Pa Khea Noi(juvenile)	<i>Bagarius Sp.</i>
15.	Pa Phan1	<i>Schistura sp.1</i>
16.	Pa Phan2	<i>Schistura sp.2</i>
17.	Pa Phan3	<i>Schistura sp.3</i>
18.	Pa Matt	<i>Trichopterus pumila</i>
19.	Pa Katt	<i>Betta smaragdina</i>
20.	Pa Tep	<i>Paracela sp.</i>
21.	Pa Pak	<i>Hypsibabus vernayi</i>

Station No. 7.

The fish samples were collected from Nam Chea (or Nam Chian)*, it is a tributary of Nam Ngiep, about 40 minutes by boat from Ban Pou village. The sampling took place on the 2nd of January 1999 in the Nam Chea River about 5 km from its upstream of its confluence. Its riverbed is small pools, rapids and gavel base, by using cast net, seine net and scoop nets. The obtained fish species are listed below:

	Local name	Scientific name
1.	Pa Soud2	<i>Hampala macrolepidota</i>
2.	Pa Phao	<i>Labeo erythropterus</i>
3.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
4.	Pa Chart1	<i>Poropuntius carinatus</i>
5.	Pa Lang Nam	<i>Mystacoleucus greewayi</i>
5.	Pa Phan1	<i>Schistura sp. 1</i>
6.	Pa Phan2	<i>Schistura sp.2</i>
7.	Pa Phan3	<i>Schistura sp.3</i>
8.	Pa Siew 1	<i>Rasbora atridorsalis</i>
9.	Pa Song	<i>Neolissochilus blanci</i>
10.	Pa Pem	<i>Homaloptera smithi</i>
11.	Pa Kang	<i>Channa gachua</i>
12.	Pa Bou	<i>Rhinogobius mekongianus</i>
14.	Pa Ketkheng	<i>Mystacoleucus marginatus</i>

Station No. 8.

This station is located near Ban Nam Long village. Fish samples were collected along the Nam Long river. Nam Long is a tributary of Nam Chea. The fish samples were collected on the 3rd January 1999, from the pools and

gravel base of Nam Long River in the north of BanNam Long by using gill nets and scoop nets. The obtained fish species are listed below:

	Local name	Scientific name
1.	Pa Soi	<i>Cirrhinus lineatus</i>
2.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
3.	Pa It xay	<i>Acantopsis sp.</i>
4.	Pa Siew 4	<i>Rasbora paviei</i>
5.	Pa Siew 5	<i>Esomus metallicus</i>
6.	Pa Khaomon	<i>Puntius brevis</i>
7.	Pa Chart1	<i>Poropuntius carinatus</i>
8.	Pa Kang	<i>Channa gachua</i>
9.	Eel	<i>Monopterus albus</i>
10.	Pa Douk	<i>Clarias batrachus</i>
11.	Pa Khan Heua	<i>Barilius pulchellus</i>
12.	Pa Song	<i>Neolissochilus blanci</i>
13.	Pa Phan 1	<i>Schistura sp.1</i>
14.	Pa Phan 3	<i>Schistura sp3</i>
15.	Pa Pan 5	<i>Schistura sp5</i>
16.	Pa Phan7	<i>Schistura sp7</i>

Station No. 9.

The fish sampling took place in Nam Khai or sometimes called Nam Mong. It is one of the Nam Ngiep's tributaries. The sampling station is located 30 minutes by foot from BanNakang village. The sampling was conducted on the 6th of January 1999 by using gill net, scoop net and cast net. Fourteen fish species were caught during the sampling as listed below:

	Local name:	Scientific name
1.	Pa Khan Heua	<i>Barilius pulchellus</i>
2.	Pa Siew 5	<i>Esomus metallicus</i>
3.	Pa Siew 3	<i>Rasbora daniconius</i>
4.	Pa Chart 1	<i>Poropuntius carinatus</i>
5.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
6.	Pa Kang	<i>Channa gachua</i>
7.	Pa Khing	<i>Onychostoma elongata</i>
8.	Pa It xay	<i>Acantopsis sp.</i>
9.	Pa Phan1	<i>Schistura sp.1</i>
10.	Pa Phan2	<i>Schistura sp2</i>
11.	Pa Phan3	<i>Schistura sp3</i>
12.	Pa Phan 4	<i>Schistura sp4</i>
13.	Pa Douk	<i>Clarias batrachus</i>
14.	Pa Ketkheng	<i>Mystacoleucus marginatus</i>

3.4.3.2 LOWER RESERVOIR

In the Lower Reservoir, fish samples collection started from downstream from Ban Houay Pamom and moved toward BanSopyouk. Fish samples were also collected in the tributaries. The location of the Lower Reservoir is located in Muang Hom district, Xaysomboun Special Zone. The Nam Ngiep River is getting wider and deeper toward its downstream. The river bottom is gravelly, muddy, sandbars and the water is slightly getting turbid compared to Upper Reservoir. The individual description of the station and fish samples obtained from each station are provided as follows:

Station No. 10.

It is located in the Nam Ngiep River, at the BanHouay Pamom. The fish samples were collected from the riffles and pool by using the gill net cast net and scoop net and some of the specimens were also obtained from the fishers who were fishing in the area. PaKouan xay *Luciocyprinus striolatus* was caught by Dr. S.P. Watson (wild life expert). The sampling took place on the 26th of January 1999 and the fish species obtained are listed below:

	Local name	Scientific name
1.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
2.	Pa Phao	<i>Labeo erythropterus</i>
3.	Pa Chart 1	<i>Poropuntius carinatus</i>
4.	Pa Khing	<i>Onychostoma elongata</i>
5.	Pa Pa Soud2	<i>Hampala macrolepidota</i>
6.	Pa Deng	<i>Bangana sinkleri</i>
7.	Pa Thol	<i>Tor tambroides</i>
8.	Pa Keng	<i>Cirrhinus molitorella</i>
9.	Pa Khea (Leuang)	<i>Bagarius bagarius</i>
10.	Pa Phee	<i>Garra pingi</i>
11.	Pa Dam	<i>Tor Sp.</i>
12.	Pa Phan1	<i>Schistura sp.1</i>
13.	Pa Phan2	<i>Schistura sp.2</i>
14.	Pa Phan3	<i>Schistura sp.3</i>
15.	Pa Phan 4	<i>Schistura sp.4</i>
16.	Pa Phan 5	<i>Schistura sp.5</i>
17.	Pa Phan 8	<i>Schistura sp8</i>
18.	Pa Phan 9	<i>Schistura sp9</i>
19.	Pa bou	<i>Rhinogobius mekongianus</i>
20.	Pa Kouan xay	<i>Luciocyprinus striolatus</i>
21.	Pa Kheung	<i>Hemibagrus wyckoides</i>
22.	Pa Va (Mou)	<i>Bangana behri</i>

Station No. 11.

The fish sampling was carried out on the 25th of January 1999 at the downstream of Ban Sop Phouan and at the confluence of Nam Phouan and Nam Ngiep. Gill net and cast net were used to catch the fish. It was observed by our team that in this particular station, the quantity of the fish catches was more abundant if compare to other stations (the total fish caught weighted 26 kg from 2 and haft hours fishing and the individuals weight ranged from 0.3 to 3 kg.).

	Local name	Scientific name
1.	Pa Chart 1	<i>Poropuntius carinatus</i>
2.	Pa Phao	<i>Labeo erythropterus</i>
3.	Pa Phee	<i>Garra pingi</i>
4.	Pa Kheung	<i>Hemibagrus wyckoides</i>
5.	Pa Keng	<i>Cirrhinus molitorella</i>
6.	Pa Deng	<i>Bangana sinkleri</i>
7.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
8.	Pa Pak	<i>Barbodes gonionotus</i>
9.	Pa Kot	<i>Mystus nemurus</i>
10.	Pa Khao mon	<i>Puntius brevis</i>
11.	Pa It xay	<i>Acantopsis sp.</i>
12.	Pa Bou	<i>Rhinogobius mekongianus</i>
13.	Pa Khor	<i>Channa striata</i>
14.	Pa Lat	<i>Mastacembelus armatus</i>
15.	Pa Khea (Leuang)	<i>Bagarius bagarius</i>
16.	Pa Phan1	<i>Schistura sp. 1</i>
17.	Pa phan3	<i>Schistura sp. 2</i>
18.	Pa Kheo Kai 1	<i>Botia nigrolineata</i>
19.	Pa Kheo Kai 2	<i>Botia modesta</i>
20.	Pa Kheo Kai 3	<i>Botia eos</i>
21.	Pa Vienfai	<i>Barbodes schwanefeldi</i>
22.	Pa Ka gneng	<i>Mystus vittatus</i>

Station No. 12

The fish samples were collected in Nam Phouan River. Nam Phouan is a tributary of Nam Ngiep. The sampling station is located about 5 km upstream from its confluence. The riverbed is gravel with sand in some areas and consists of pools and riffles. The sampling was done late afternoon othe 25th of January 1999 by using gill net, cast net, scoop net and funnel trap. The fish species obtained are listed as following:

	Local name	Scientific name
1.	Pa Phao	<i>Labeo erythropterus</i>
2.	Pa Phee	<i>Garra pingi</i>

3.	Pa Chart 1	<i>Poropuntius carinatus</i>
4.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
5.	Pa Pok	<i>Systemus orphoides</i>
6.	Pa Thol	<i>Tor tambroides</i>
7.	Pa Deng	<i>Bangana sinkleri</i>
8.	Pa Kang	<i>Channa gachua</i>
9.	Pa Douk	<i>Clarias batrachus</i>
10.	Pa Khor	<i>Channa striata</i>
11.	Pa Khaomon	<i>Puntius brevis</i>
12.	Pa Lang nam	<i>Mystacoleucus greewayi</i>
13.	Pa It xay	<i>Acantopsis sp.</i>
14.	Pa Kheng	<i>Anabas testudineus</i>
15.	Pa Pem	<i>Homaloptera smithi</i>
16.	Pa Lat	<i>Mastacembelus armatus</i>
17.	Pa Kheung	<i>Hemibagrus wyckoides</i>
18.	Pa Phan1	<i>Schistura sp. 1</i>
19.	Pa Phan2	<i>Schistura sp. 2</i>
20.	Pa Siew 3	<i>Rasbora daniconius 3</i>
21.	Pa Siew 5	<i>Esomus metallicus 5</i>
22.	Pa Va (Mou)	<i>Bangana behri</i>
23.	Pa Soud 1	<i>Hampala dispar</i>
24.	Pa Nang	<i>Kreptopterus cryptopterus</i>
25.	Pa Lot	<i>Macrognathus siamensis</i>

Station No. 13.

Fish sampling was carried out on the 24th of January 1999 along Nam Youk river starting from its confluence with Nam Ngiep and moving upstream about 5 km., using cast nets, gill nets, and scoop nets as fishing gear. The fishing was carried out with the assistance of the fishers from BarSopyouk. The riverbed at the sampling area is composed of gravel and rocks. The fish species obtained are listed below:

	Local name	Scientific name
1.	Pa Khing	<i>Onychostoma elongata</i>
2.	Pa Chart 1	<i>Poropuntius carinatus</i>
3.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
4.	Pa Bou	<i>Rhinogobius mekongianus</i>
5.	Pa Phan 1	<i>Schistura sp.1</i>
6.	Pa Phan2	<i>Schistura sp.2</i>
7.	Pa Phan3	<i>Schistura sp.3</i>
8.	Pa It xay	<i>Acantopsis sp.</i>
9.	Pa Phao	<i>Labeo erythropterus</i>
10.	Pa Lang nam	<i>Mystacoleucus greewayi</i>

11.	Pa Soud2	<i>Hampala macrolepidota</i>
12.	Pa lat	<i>Mastacembelus armatus</i>
13.	Pa Kang	<i>Channa gachua</i>
14.	Pa ..	<i>Puntius jacobusboehlkei</i>
15.	Pa Deng	<i>Bangana sinkleri</i>
16.	Pa Thol	<i>Tor tambroides</i>
17.	Pa Siew	<i>Rasbora sp. (Horizontal red line)</i>
18.	Pa siew 1	<i>Rasbora atridorsalis 1</i>
19.	Pa Siew 2	<i>Rasbora borapetensis 2</i>
20.	Pa Siew 3	<i>Rasbora daniconius 3</i>
21.	Pa Siew 4	<i>Rasbora paviei 4</i>
22.	Pa Siew 5(Nouad)	<i>Esomus metallicus</i>
23.	Pa Tong Kay	<i>Chitala ornata</i>
24.	Pa Seuam	<i>Ompok bimaculatus</i>
25.	Pa Tithin	<i>Homaloptera yunnanensis</i>

Station No. 14. _

The fish sample was taken place in Nam Ngiep River downstream from Ban Sop Youk about 3 km. The fishing was done at the riffles adjacent to the village's conservation pool on the 23rd of January 1999 by using cast nets, gill net, scoop nets and seine nets. The riverbed at sampling area is sandy, muddy and gravelly. The fish species collected are listed below:

	Local name.	Scientific name
1.	Pa Keng	<i>Cirrhinus molitorella</i>
2.	Pa Khing	<i>Onychostoma elongata</i>
3.	Pa Chart 1	<i>Poropuntius carinatus</i>
4.	Pa Chart 2	<i>Poropuntius laoensis</i>
5.	Pa Pak	<i>Barbodes gonionotus</i>
6.	Pa Sakang	<i>Puntioplites falcifer</i>
7.	Pa Lat	<i>Mastacembelus armatus</i>
8.	Pa Kang	<i>Channa gachua</i>
9.	Pa Bou	<i>Rhinogobius mekongianus</i>
10.	Pa Langnam	<i>Mystacoleucus greewayi</i>
11.	Pa Phan1	<i>Schistura sp. 1</i>
12.	Pa Phan2	<i>Schistura sp.2</i>
13.	Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
14.	Pa Deng	<i>Bangana sinkleri</i>
15.	Pa Kheung	<i>Hemibagrus wyckoides</i>
16.	Pa Khea	<i>Bagarius yarrellii</i>
17.	Pa Tong (Khao)	<i>Notopterus notopterus</i>
18.	Pa Thol	<i>Tor tambroides</i>
19.	Pa KaGneng	<i>Mystus singaringan</i>

20.	Pa Khor	<i>Channa striata</i>
21.	Pa I thai	<i>Osteochilus hasselti</i>
22.	Pa Khee lam	<i>Dangila Sp.</i>
23.	Pa Pao	<i>Tetraodon suvattii</i>
24.	Eel	<i>Monopterus albus</i>
25	Pa Kheo Kai 1	<i>Botia nigrolineata</i>
26	Pa Kheo Kai 2	<i>Botia modesta</i>
27.	Pa Kheo Kai 3	<i>Botia eos</i>
28.	Pa siew 1	<i>Rasbora atridorsalis 1</i>
29.	Pa Siew 2	<i>Rasbora borapetensis 2</i>
30.	Pa Siew 3	<i>Rasbora daniconius 3</i>
31.	Pa Siew 5	<i>Esomus metallicus 5</i>
32.	Pa Soud 1	<i>Hampala dispar</i>

3.4.3.3. Downstream

In the Downstream sectors, the collection of fish samples started below the proposed dam site near to confluence of Houay Xay River upstream of Ban Houay Xaykham (station 15) toward downstream up to the Nam Ngiep's confluence with Mekong River (station 21) and also in the tributaries of Nam Ngiep. The stations were located in the Bolikhanh and Pakxan district, Bolikamxay province. The character of the river's bottom is gravely, sandy and muddy with some portion of rapids, riffles and pools. The water is more turbid compared to Upper reservoir section, the depth of the river is variable, from several meters at the pools to a few cm on the sand bars especially in the tributaries. The river is getting wider in this section. The character and fish species obtained from each station are shown below:

Station No. 15.

The fish sample was taken place in Nam Ngiep River upstream of the confluence of Houay Xay River near to Ban Houay Xay Kham about 5 km from the proposed dam site. Fishing was done at the rocky rapid adjacent to the pool by using cast-net and gill-net, fish also collected for the small channel at the Nam Ngiep river by using sodium cyanite on the 5th of April 1999. The riverbed at sampling area is gravelly at channel. The fish species collected are listed below:

Local name	Scientific name
1. Pa Khao	<i>Wallago attu</i>
2. Pa...	<i>Barilius sp</i>
3. Pa..	<i>Garra cambodgiensis</i>
4. Pa...	<i>Osteochilus schlegeli</i>

5. Pa...	<i>Cosmochilus harmandi</i>
6. Pa Leuan fai	<i>Barbodes altus</i>
7. Pa Pien	<i>Scaphognathops sp.</i>
8. Pa Kheelam	<i>Dangila sp.</i>
9. Pa Khor chon	<i>Channa lucius</i>
10. Pa Khao xay	<i>Sikukia gudgeri</i>
12. Pa pe	<i>Euryglossa harmandi</i>
13. Pa Ka	<i>Pristolepis fasciata</i>
14. Pa Tet xa	<i>Nandus nandus</i>
15. Pa Lek xi	<i>Doryichthys deokhatoides</i>
16. Pa Pak	<i>Barbodes gonionotus</i>
17. Pa Sakang	<i>Puntioplites falcifer</i>
18. Pa Mom	<i>Scaphiodonichthys acanthopterus</i>
19. Pa Kheung	<i>Hemibagrus wyckoides</i>
20. Pa Khea	<i>Bagarius yarrellii</i>
21. Pa Tong (Khao)	<i>Notopterus notopterus</i>
22. Pa Thol	<i>Tor tambroides</i>
23. Pa Phao	<i>Labeo erythropterus</i>

Station No. 16

The fish samples were collected from Nam Xao River the tributary of NamNgiep . Fishing was done on the 6th of April 1999 at the riffles adjacent to the pool from its confluence about 5 km. Fish was collected by using sodium cyanite. The obtained fish species are listed below:

Local name	Scientific name
1. Pa Khap khong	<i>Parambassis siamensis</i>
2. Pa Phan 9	<i>Schistura sp</i>
3. Pa Phan1	<i>Schistura sp. 1</i>
4. Pa phan3	<i>Schistura sp. 2</i>
5. Pa Pem	<i>Homaloptera sp</i>
6. Pa Hak Kouay	<i>Acantopsis sp</i>
7. Pa It xay	<i>Acantopsis sp.</i>
8. Pa Khee mouk2	<i>Pseudomystus siamensis</i>
9. Pa Lek xi	<i>Doryichthys deokhatoides</i>
10. Pa ...	<i>Glyptothorax laosensis</i>
11. Pa Tet xa	<i>Nandus nandud</i>
12. Pa sua noi	<i>Systemus partipentazona</i>
13. Pa Sathong	<i>Xenentodon cancila</i>
14. Pa Ka	<i>Pristolepis fasciata</i>
15. Pa Pao	<i>Monotreta leiurus</i>
16. Pa Siew 6	<i>Parachela maculicauda</i>
17. Pa Chi man	<i>Crossocheilus siamensis</i>
18. Pa Cha loi	<i>Crossocheilus sp</i>

19. Pa Phan1	<i>Schistura sp. 1</i>
20. Pa Phan2	<i>Schistura sp. 2</i>
21. Pa Siew 3	<i>Rasbora daniconius 3</i>
22. Pa Siew 5	<i>Esomus metallicus 5</i>
23. Pa Lay kai	<i>Osteochilus waandersii</i>

Station No. 17

The fish samples were collected in Houay Khinguak River tributary of NamNgiep. The sampling station is located about 5 km upstream from its confluence. The riverbed is rocky and consists of rapid and pools. The sampling was done late afternoon on the 7th of April 1999 by using sodium cyanite and scoop net. The fish species obtained are listed as following:

Local name	Scientific name
1. Pa Khap khong	<i>Parambassis siamensis</i>
2. Pa Phan 9	<i>Schistura sp</i>
23. Pa Phan1	<i>Schistura sp. 1</i>
24. Pa phan3	<i>Schistura sp. 2</i>
25. Pa Pem	<i>Homaloptera sp</i>
26. Pa Hak Kouay	<i>Acantopsis sp</i>
7. Pa Sathong	<i>Xenentodon cancila</i>
8. Pa Kadeut	<i>Trichogaster trichopterus</i>
9. Pa Khee mouk 1	<i>Pseudomystus stenomus</i>
10. Pa siew 1	<i>Rasbora atridorsalis 1</i>
11. Pa Siew 2	<i>Rasbora borapetensis 2</i>
12. Pa Khee mouk2	<i>Pseudomystus siamensis</i>
13. Pa Lek xi	<i>Doryichthys deokhatoides</i>
14. Pa ...	<i>Glyptothorax laosensis</i>
15. Pa Tet xa	<i>Nandus nandud</i>
16. Pa seu a noi	<i>Systemus partipentazona</i>
17. Pa Siew 6	<i>Parachela maculicauda</i>
18. Pa..	<i>Osteochilus sarawakensis</i>
19. Pa Chi man	<i>Crossocheilus siamensis</i>

Station No.18

The fish samples were collected at the riffles called Hatmakpang at Nam Ngiep River on the 7th of April 1999 by using cash-net and gill net. The collected fish species are shown below:

Local name	Scientific name
1. Pa Pak	<i>Barbodes gonionotus</i>
2. Pa Sakang	<i>Puntioplites falcifer</i>
3. Pa Mom	<i>Scaphiodonichthys acanthopterus</i>

4. Pa Kheung	<i>Hemibagrus wyckoides</i>
5. Pa Khea	<i>Bagarius yarrellii</i>
6. Pa Tong (Khao)	<i>Notopterus notopterus</i>
7. Pa Thol	<i>Tor tambroides</i>
8. Pa Leuan fai	<i>Barbodes altus</i>
9. Pa Pien	<i>Scaphognathops sp.</i>
10. Pa Kheelam	<i>Dangila sp.</i>
11. Pa Nok Khao	<i>Osteochilus melanopleurus</i>
12. Pa Khao	<i>Wallago attu</i>
13. Pa Pao	<i>Monotreta leiurus</i>
14. Pa Sathong	<i>Xenentodon cancila</i>
15. Pa Phia	<i>Morulius chrysophekadion</i>
16. Pa Keng	<i>Cirrhinus molitorella</i>
17. Pa Chart 1	<i>Poropuntius carinatus</i>
18. Pa Chart 2	<i>Poropuntius laoensis</i>

Station No.19

Fish sampling was carried out on the 8th of April 1999 in Nam Pa River. Nam Pa is a tributary of Nam Ngiep River. The sampling station is located at about upstream of its confluence with Nam Ngiep by using sodium cyanite and scoop nets. The riverbed at the sampling area is composed of sandy and muddy. The fish species obtained are listed below:

Local name	Scientific name
1. Pa Khap khong	<i>Parambassis siamensis</i>
2. Pa Phan 9	<i>Schistura sp</i>
3. Pa Phan1	<i>Schistura sp. 1</i>
4. Pa phan3	<i>Schistura sp. 2</i>
5. Pa Pem	<i>Homaloptera sp</i>
6. Pa Hak Kouay	<i>Acantopsis sp</i>
7. Pa Sathong	<i>Xenentodon cancila</i>
8. Pa Kadeut	<i>Trichogaster trichopterus</i>
9. Pa Khee mouk 1	<i>Pseudomystus stenomus</i>
10. Pa siew 1	<i>Rasbora atridorsalis 1</i>
11. Pa Siew 2	<i>Rasbora borapetensis 2</i>
12. Pa Siew 3	<i>Rasbora daniconius 3</i>
13. Pa Siew 5	<i>Esomus metallicus 5</i>
14. Pa Soud 1	<i>Hampala dispar</i>
15. Pa..	<i>Osteochilus sarawakensis</i>
16. Pa Chi man	<i>Crossocheilus siamensis</i>
17. Pa Tep	<i>Paralaubuca typus</i>

Station No.20

The sampling station is located at Nam Tek River, this is a tributary of NamNgiep River. Fish sampling was carried out on the 8th of April 1999 by using sodium cyanite. The riverbed is sandy and muddy. Fishes were collected at shallow sandbars adjacent to pool. The fish species obtained are listed below:

Local name	Scientific name
1. Pa Sathong	<i>Xenentodon cancila</i>
2. Pa Kadeut	<i>Trichogaster trichopterus</i>
3. Pa Khee mouk 1	<i>Pseudomystus stenomus</i>
4. Pa Khoekai 4	<i>Botia longidorsalis</i>
5. Pa Pao	<i>Monotreta leiurus</i>
6. Pa Khap khong	<i>Parambassis siamensis</i>
7. Pa Phan 9	<i>Schistura sp</i>
8. Pa Phan1	<i>Schistura sp. 1</i>
9. Pa phan3	<i>Schistura sp. 2</i>
10. Pa Pem	<i>Homaloptera sp</i>
11. Pa Hak Kouay	<i>Acantopsis sp</i>
12. Pa It xay	<i>Acantopsis sp.</i>
13. Pa Khee mouk2	<i>Pseudomystus siamensis</i>
14. Pa Lek xi	<i>Doryichthys deokhatoides</i>
15. Pa ...	<i>Glyptothorax laosensis</i>
16. Pa Tet xa	<i>Nandus nandud</i>
17. Pa seuva noi	<i>Systomus partipentazona</i>
18. Pa Siew 6	<i>Parachela maculicauda</i>
19. Pa..	<i>Osteochilus sarawakensis</i>
20. Pa Chi man	<i>Crossocheilus siamensis</i>
20. Pa Lat	<i>Mastacembelus armatus</i>
21. Pa Kang	<i>Channa gachua</i>
21. Pa Kot	<i>Mystus nemurus</i>
22. Pa Khao mon	<i>Puntius brevis</i>
23. Pa Bou	<i>Rhinogobius mekongianus</i>
24. Pa Khor	<i>Channa striata</i>

Station No.21

This station is located at the confluence of NamNgiep with Mekong River. Using gill net and cast net collected the fish samples. Fishing started from confluence toward upstream about 1 km. Fish samples were also obtained from the fishers who fished in the area. The fish samples were collected on the 9th and 10th of April 1999. The fish species obtained are listed below:

Local name	Scientific name
1. Pa Kheo Kai 3	<i>Botia eos</i>

2. Pa Kheo Kai 1
3. Pa Mou
4. Pa Phia
5. Pa Nok khao
6. Pa Khao
7. Pa...
8. Pa Khee lam
9. Pa...
10. Pa...
11. Pa ..
12. Pa Leuan fai
13. Pa yon
14. Pa seam
15. Pa Peek kai
16. Pa ..
17. Pa yon nou
18. Pa Bou gnai
19. Pa Khoun

Botia nigrolineata
Botia sp.
Morulus chrysophekadion
Osteochilus melanopleurus
Wallago attu
Osteochilus schlegeli
Dangila sp
Osteochilus sarawakensis
Cyclocheilichthys sp
Scaphognathops sp
Barbodes altus
Pangasius siamensis
Kryptopterus sp
Kryptopterus sp
Pangasius conchophilus
Pangasius pleurotaenia
Oxyeleotris marmorata
Wallago leeri

3.5. DISCUSSION.

3.5.1. Fish Bio-diversity.

Hundred and thirty-four fish species are observed from the survey areas Annex 1 and 2. Fifty-seven species observed in upper reservoir, out of which there are eight species do not observed in other river sections. Seventy-eight species were observed in Lower Reservoir, out of which sixteen species are not observed in upper reservoir and downstream areas. In the downstream area, there are ninety-one species were observed, out of which forty-five species are not observed in the upper and lower reservoirs (See table 3.5.1 below).

Table 3.5.1. Summarized of the Distribution of Fish Bio-diversity within Project areas.

Number of Fish Species Observed	Distribution of Fish Bio-diversity		
	Upper Reservoir	Lower Reservoir	Downstream
Only in upper reservoir area	8		
Only in lower reservoir area		16	
In upper and lower areas	43		
Only in downstream area			45
In lower reservoir and Downstream areas		77	
Total species observed	57	78	91
Total number of fish species observed in the areas	134		

3.5.2. Fish Migration and Spawning.

Construction of the dam will definitely stop migrations of migratory fishes between the upstream and downstream sectors, if the passes facility do not provided. But at present, the information available on fish species and fish migrations information in the proposed reservoir of Nam Ngiep River is very little to have final conclusion and recommendation on this issue. However, The species observed in the survey area (Nam Ngiep basin, upstream of the proposed dam site) have been reported elsewhere in the Mekong basin which are considered undertake migrations such as : *Cirrhinus molitorella* ; *Labeo erythropterus*; *Bangana behri*; *Bangana sinkleri*; *Kreptopterus cryptopterus*; *Mystus nemurus*; *Hemibagrus wyckoides* (

Roberts & Baird, 1995). But the exact timing of the migrations, location and distance travelling route of the migrations is still not known

There is a few species observed from the proposed Upper Reservoir are considered to undertake migrations such as *Bangana behri*; *Bangana sinkleri*; *Labeo erythropterus*, and some more species are recognized for migration in the Lower Reservoir sector such as *Cirrhinus molitorella* ; *Labeo erythropterus*; *Bangana behri*; *Bangana sinkleri*; *Kreptopterus cryptopterus*; *Mystus nemurus*. However, during the first survey in December 1998 to January 1999 fish migration for spawning was reported by the villagers. Most of the species are those of dry season migration species, and normally they do migration in short distance e.g. from the pools to riffles or rocky riverbeds of the same river for spawning. Most of them were reported to take place in the Nam Ngiep River. Those reported species are: *Scaphiodonichthys acanthopterus*, *Poropuntius carinatus*, *Poropuntius laoensis*, *Orychostoma sp.* *Systemus orphoides*, *Neolissochilus blanci*, *Puntius gonionotus*, *Tor sp.* *Hampala macrolepidota*..

The fish communities in the Mekong mainstream support an important fishing activity (commercial and subsistence fisheries). River mouths are the important feeding grounds for many species, they are passage points for migratory species, either when they penetrate the tributaries or move along the river mainstream (Kottelat, 1997). As reported by the fishermen during the field survey, the fish communities in Nam Ngiep River are also similar practices to those Mekong fishes, for instance at Nam Theng, Nam Chea in the Upper Reservoir, also at Lower Reservoir there are two rivers named Nam Phouan, Nam Youk rivers. These tributaries were reported as the main spawning or feeding grounds for many species, especially in the rainy season. But the biological data/information concerning this issue is not available, as mentioned in the previous chapter.

At the downstream area, during our wet season survey the fishermen reported that Pa Koun (*Wallago leerii*) use to breed in Houay Nam Pha near station No 17 (See the map) very year in beginning of September.

After closing of the dam, migratory species may: 1). Disappear for reasons not related with migrations (habitat destruction, overfishing, pollution, etc.); 2) be unable to reproduce because they cannot complete their migrations and then disappear; 3) be able to reproduce without migration or find new migratory routes and spawning sites (Kottelat, 1997)

3.6. Conclusions and Recommendations

The total of 134 fish species have been observed from the direct fishing in the Upper, Lower reservoirs as well as in the Downstream of the proposed Nam Ngiep 1

Hydropower Dam. These fish species have been reported elsewhere in Lao PDR such as Nam Theun basin and some in Nam Leuk, Nam Ngum Reservoir.

There are about 8 species of fishes(may be more) reported by the villagers have not been seen from the direct fishing.It should be further confirmed in the future.

Due to limitation of the information on fish migration in the area and as well as in Lao PDR, more information on fish migration along the Nam Ngiep River should be collected. Therefore, fish migration monitoring program is recommended. The programs should be conducted twice, once in dry season, but the important time should be given to wet season migration, because most of long distance migratory species usually take place in wet season.

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Plate I. Photographs of the Fish Sampling Stations. There are 9 stations of Upper Reservoir and 5 stations of Lower Reservoir Sections.

**Fish Sampling
Station 1.
Ban Xiengkhong
(Upper reservoir
Nam Ngiep River)**

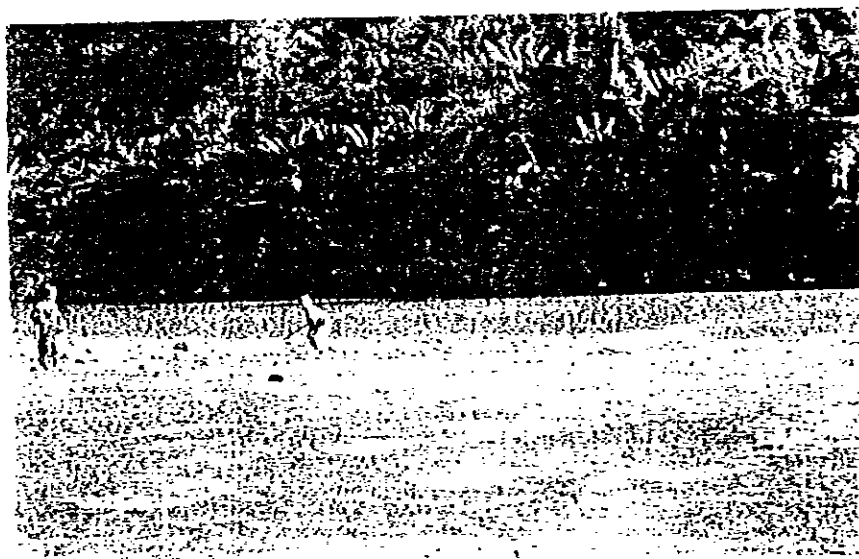


**Fish Sampling
Station 2.
Nam Theng
And its
Confluence
With Nam Ngiep
(Upper Reservoir)**

**Fish Sampling
Station 3.
Nam Xong and
Nam Ngiep river
Near Ban Naxong
(Upper Reservoir)**



Fish Sampling
Station 4.
Confluence of
Nam Pang
Near Ban Dong
(Upper reservoir
Nam Ngiep River)



Fish Sampling
Station 5.
At Conservation
Of Ban Hat Samkhon
In Nam Ngiep
(Upper Reservoir)

Fish Sampling
Station 6.
At Nam Ngiep river
Downstream from
Ban Pou
(Upper Reservoir)



Fish Sampling
Station 7.
Confluence of
Nam Chea/Nam Chian
(Upper reservoir)

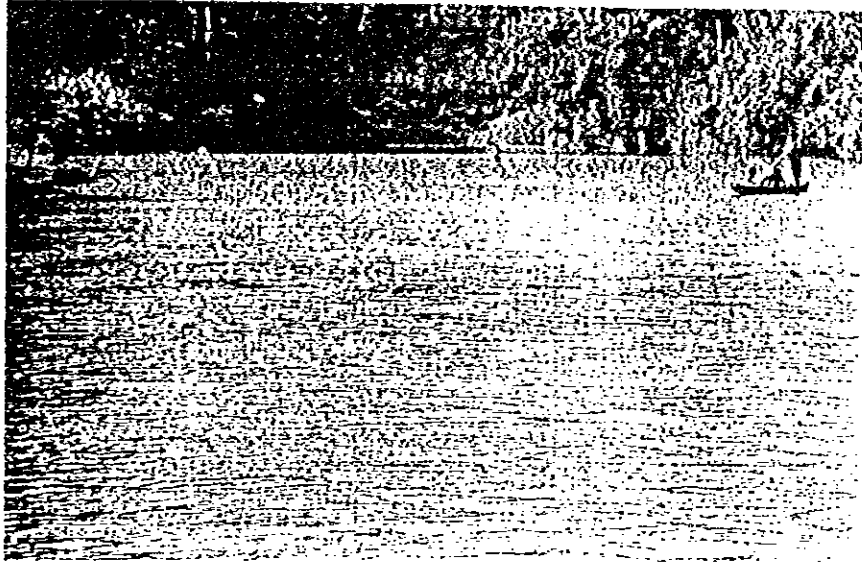


Fish Sampling
Station 8.
At Nam Long River
Tributary of
Nam Ngiep
(Upper Reservoir)

Fish Sampling
Station 9.
At Nam Khai /Nam
Mong river, tributary
of Nam Ngiep river
near Ban Nakang
(Upper Reservoir)



Fish Sampling
Station 10.
Ban Houay Pamom
At Nam Ngiep River
(Lower reservoir)



Fish Sampling
Station 11.
At Nam Ngiep
Downstream from
Ban Soppouane
(Lower Reservoir)

Fish Sampling
Station 12.
At Nam Phouane River,
tributary of Nam
Ngiep river
(Lower Reservoir)

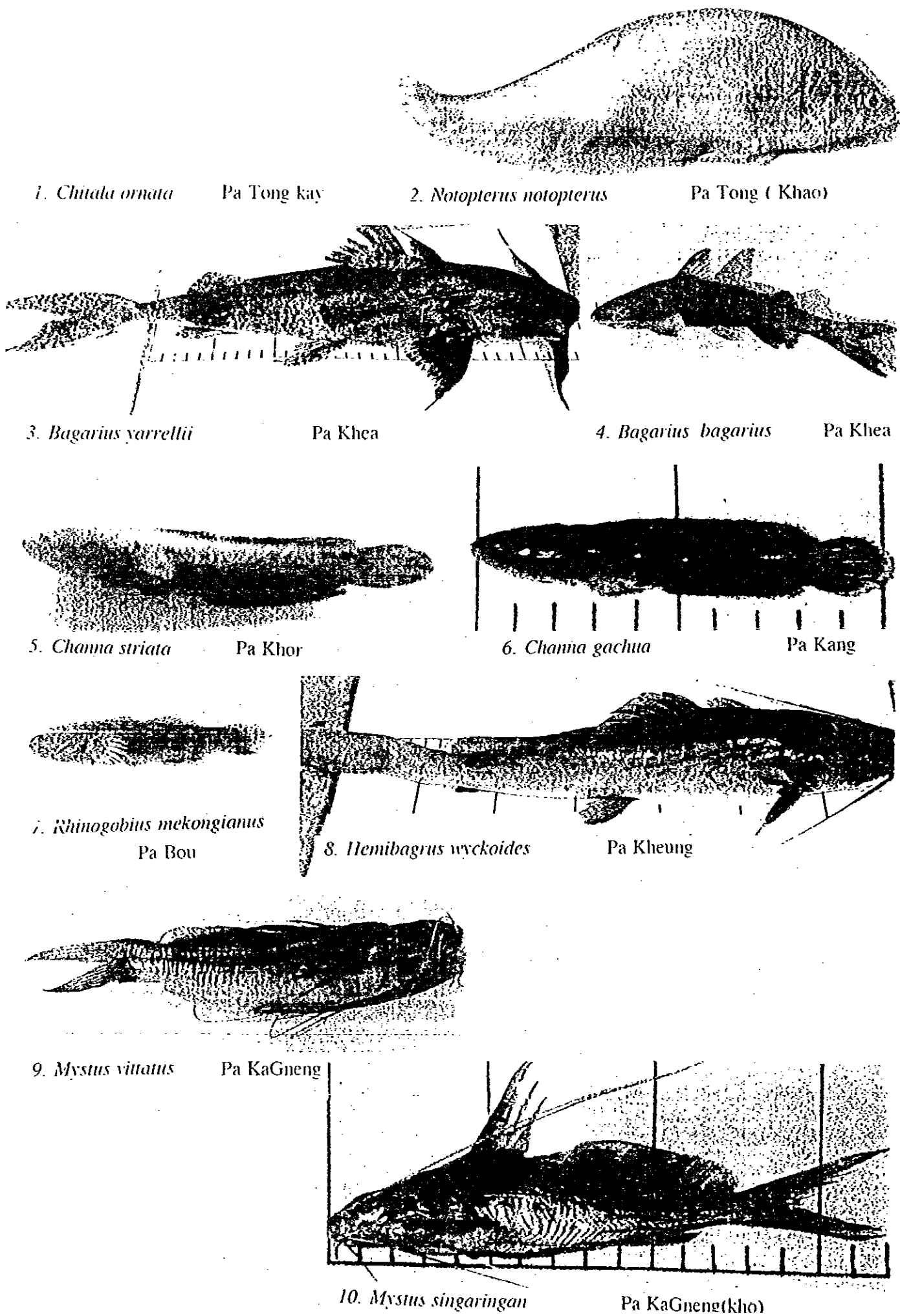


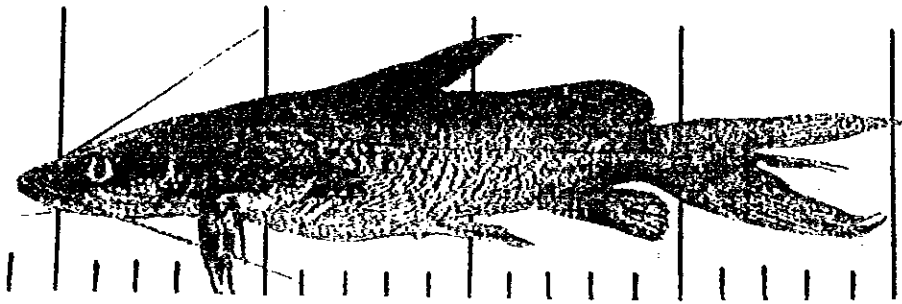
Fish Sampling
Station 13.
At Nam Youk River,
Tributary of Nam Ngiep
River near Ban Sopyouk
(Lower reservoir)



Fish Sampling
Station 14.
At Nam Ngiep
Downstream from
Ban Sopyouk
(Lower Reservoir)

Fig. 1. Bionometrics of fish species obtained from the project areas





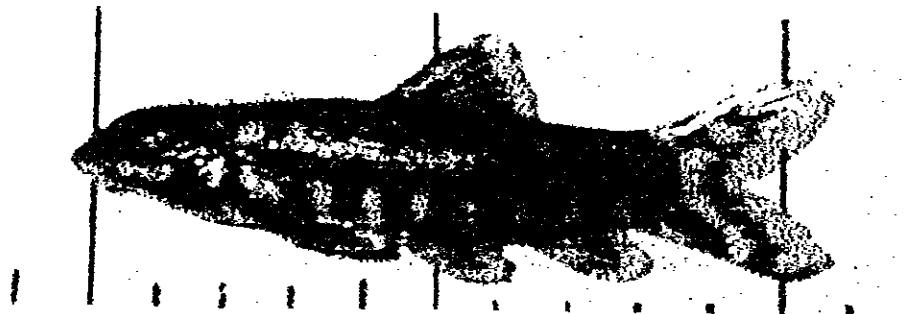
11. *Mystus nemurus*

Pa Kot



12. *Clarias batrachus*

Pa Douk

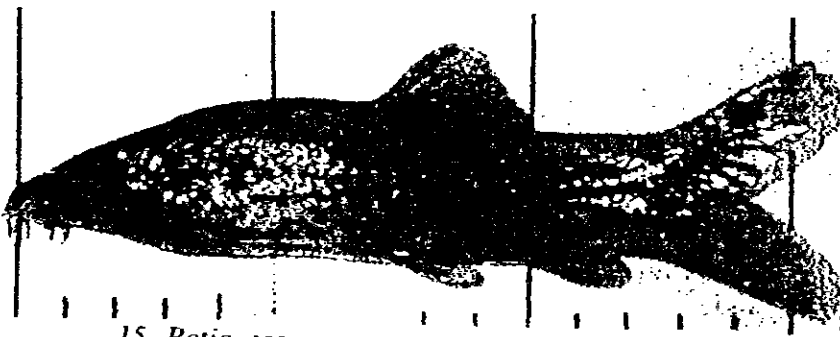


13. *Botia nigrolineata*

Pa Kheo kai 1

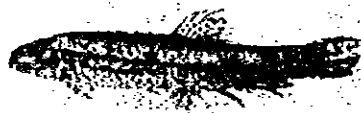
14. *Botia modesta*

Pa Kheo Kai 2



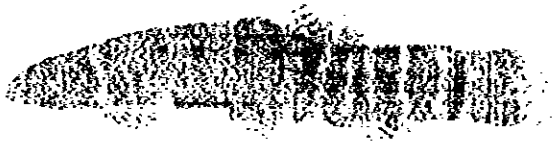
15. *Botia eos*

Pa Kheo Kai 3



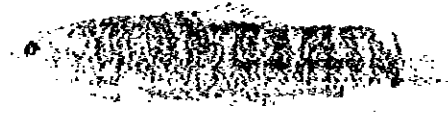
16. *Acantopsis* sp.

Pa It xay



17. *Schistura sp. 1*

Pa Phan1



18. *Schistura sp. 2*

Pa Phan2



19. *Schistura sp. 3*

Pa Phan3



20. *Schistura sp. 4*

Pa Phan4



21. *Schistura sp. 5*

Pa Phan5



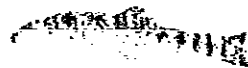
22. *Schistura sp. 6*

Pa Phan6



23. *Schistura sp. 7*

Pa Phan7



24. *Schistura sp. 8*

Pa Phan8

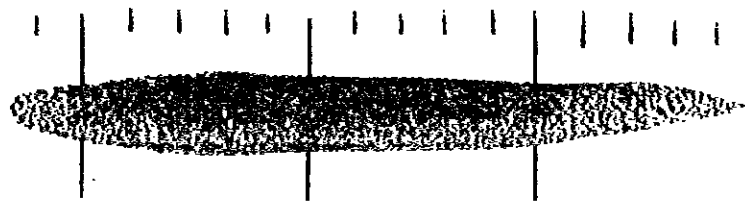


25. *Schistura sp. 9*

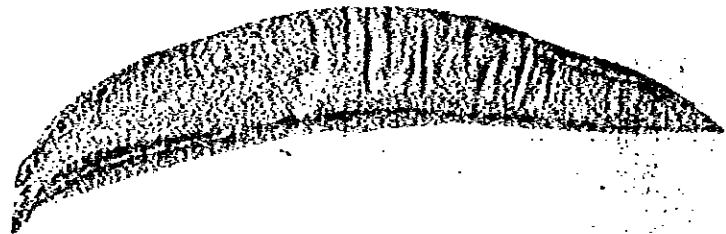
Pa Phan9

26. *Homaloptera smithi*

Pa Pen' tithin



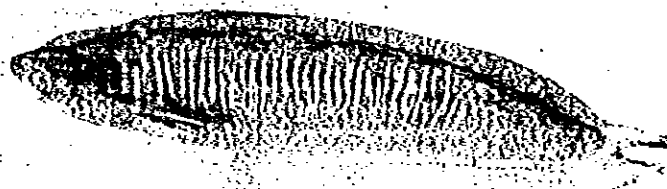
27. *Mastacembelus armatus* Pa Lat



28. *Macrognathus siamensis* Pa Lot



30. *Ompok bimaculatus* Pa Seuan



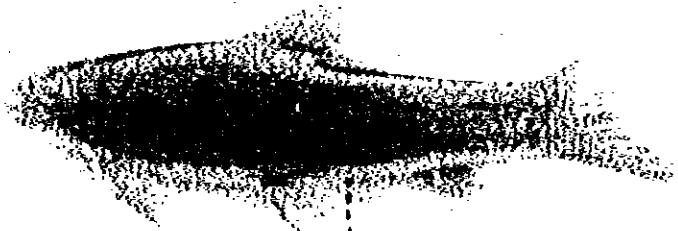
29. *Kreptopterus cryptopterus* Pa Nang



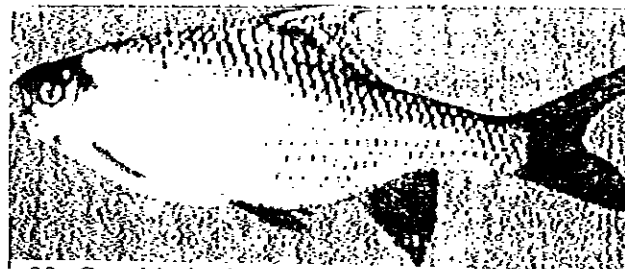
32. *Mystacoleucus marginatus* Pa Ket kheng



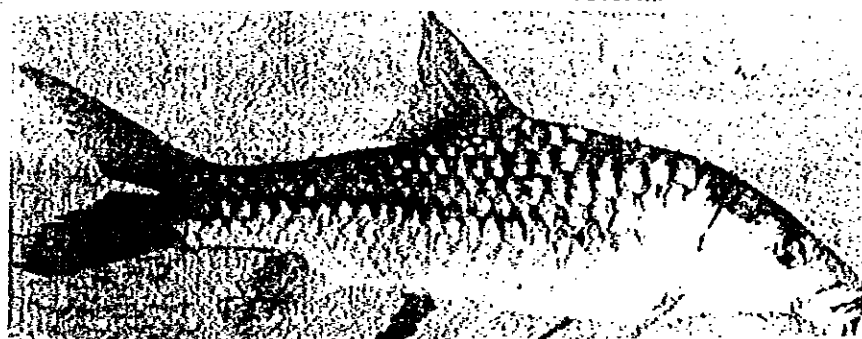
31. *Mystacoleucus greewayi* (Pa Langnam, pellegrin & Fang, 1940)



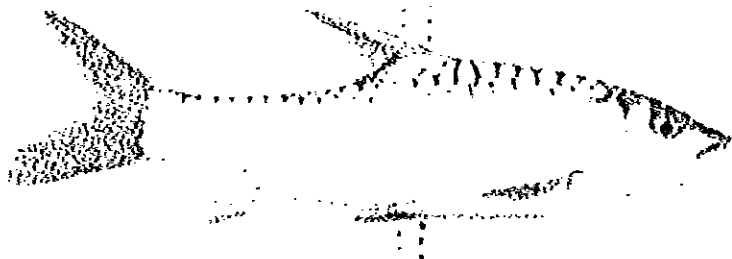
35. *Bangana behri* Pa Va (mou)



33. *Scaphitodonichthys acanthopterus* Pa Mom



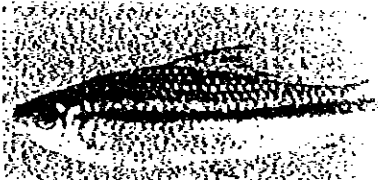
34. *Bangana sinkleri* Pa Deng



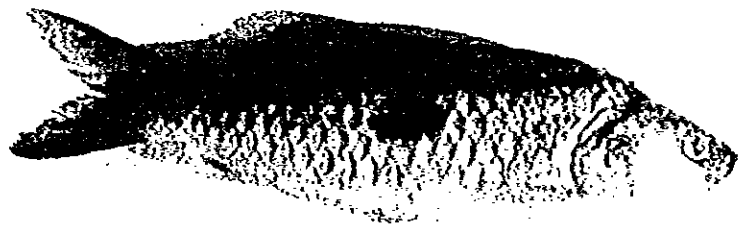
36. *Tor tambroides* Pa Ihol



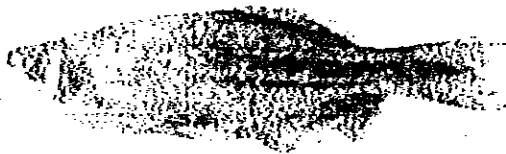
37. *Tor sp.* Pa Dam 38. *Osteochilus hasselti* Pa I thai



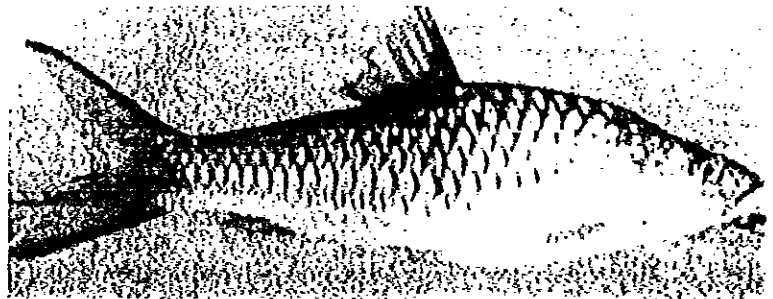
39. *Osteochilus waandersii* Pa Lay kai



40. *Hampala dispar* Pa Soud 1



42. *Rasbora sp. (Horizontal red line)*
Pa Siew

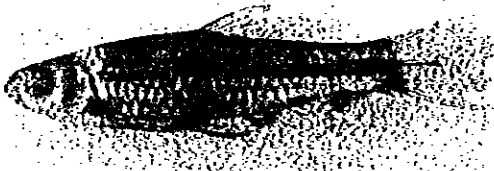


41. *Hampala macrolepidota* Pa Soud 2

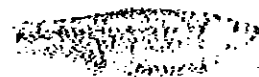


44. *Rasbora borapetensis* Pa Siew 2

43. *Rasbora atridorsalis* Pa siew 1



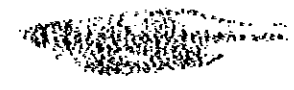
45. *Rasbora daniconius* Pa Siew 3



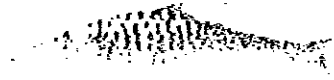
46. *Rasbora paviei* Pa Siew 4



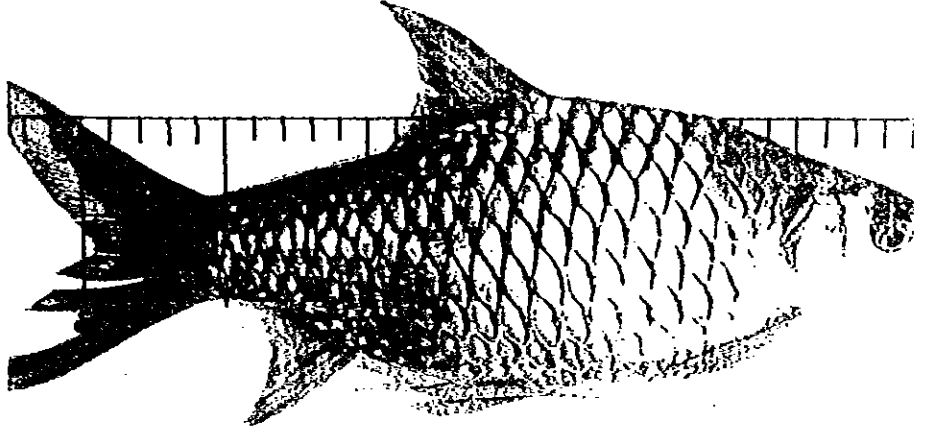
48. *Puntius jacobusboehlkei* Pa.....



47. *Esomus metallicus*, Pa Stew



49. *Puntius brevis*, Pa Khaomon



50. *Puntius sp. (yellow fins)* Pa Peak leuang

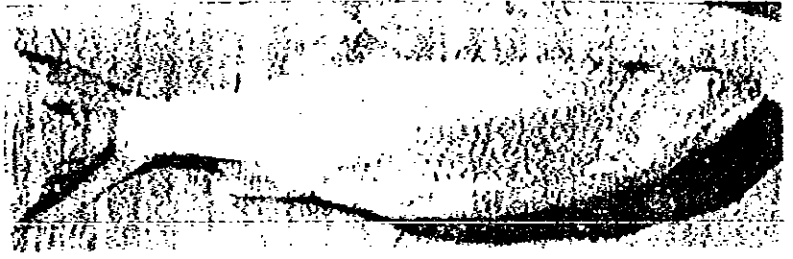


51. *Puntius sp. (black spot at caudal base)* Pa Pok

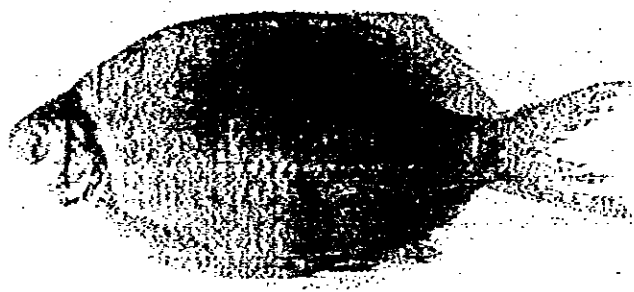
52. *Dangila Sp.* Pa Khee lam



53. *Barilius pulchellus*, Pa Khanheua



54. *Barilius koratensis* Pa Tep

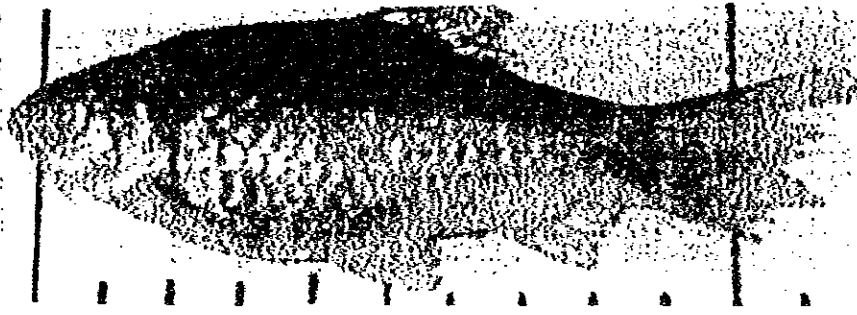


55. *Barbodes schwanefeldi* Pa Vienfai

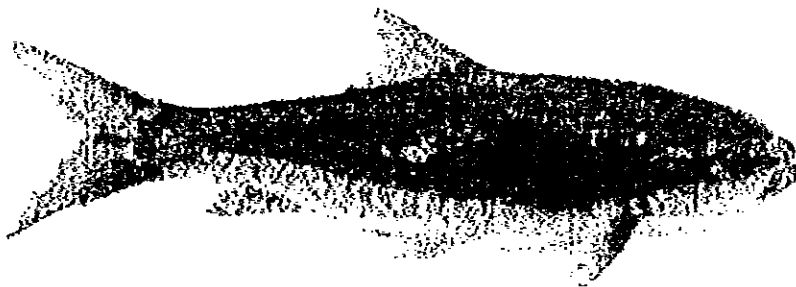


56. *Barbodes gonionotus* Pa Pak

57. *Cirrhinus lineatus* Pa Soi



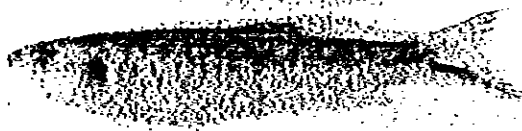
64. *Systomus orphoides* Pa Pok



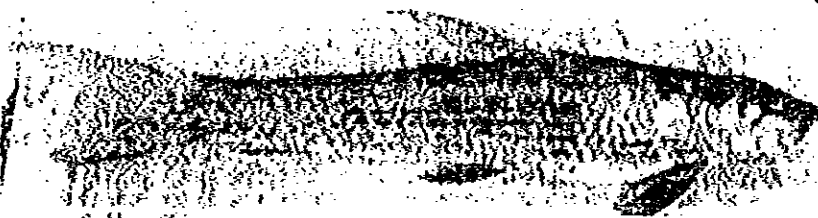
65. *Neolissochilus blanci* Pa Song



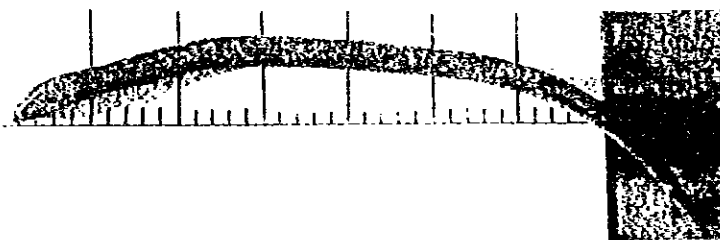
67. *Luciocyprinus striolatus*
Pa Kouan xay



66. *Raiamas guttatus* Pa Sanark noi



68. *Garra pingi* Pa Phee



70. *Monopterus albus* Eet



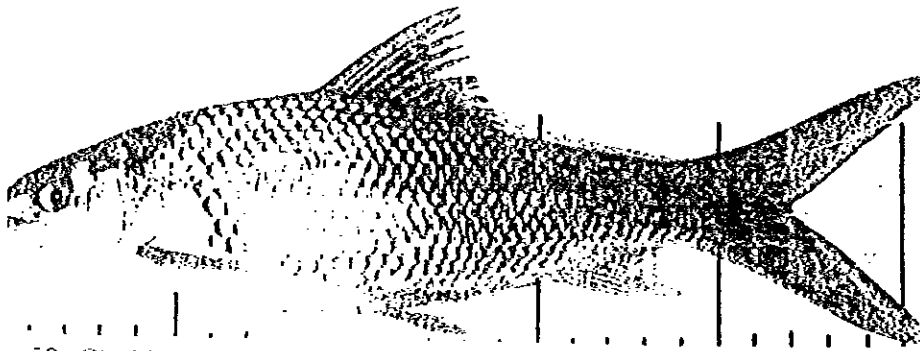
69. *Tetraodon suvattii* Pa Pao



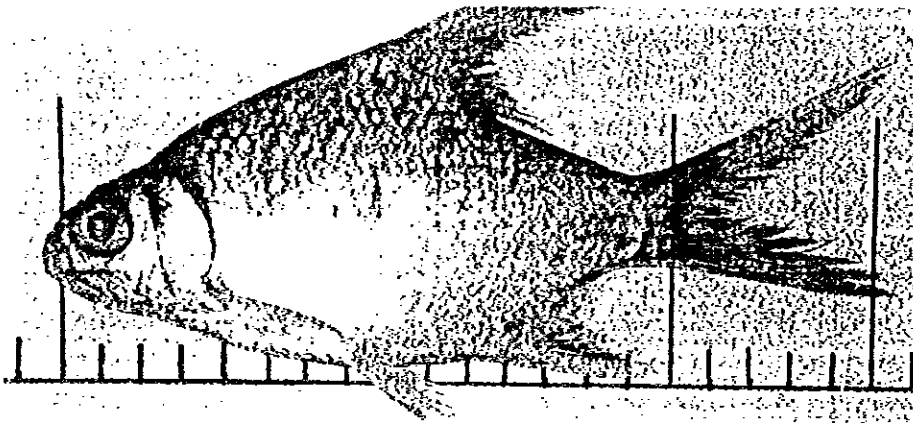
71. *Anabus testudineus* Pa Kheng



72. *Homaloptera yunnanensis*



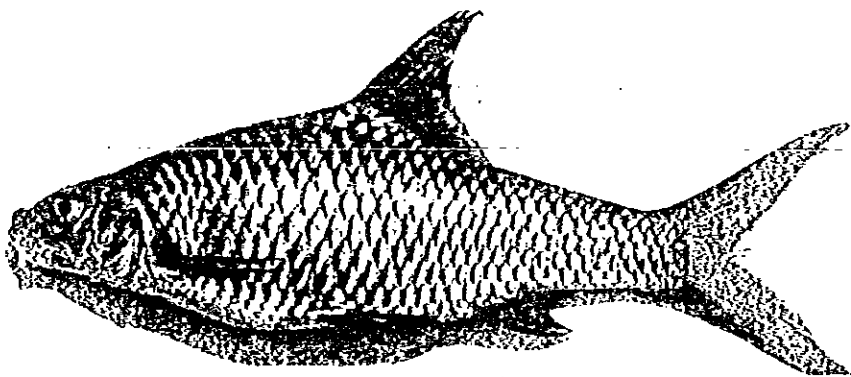
58. *Cirrhinus molitorella* Pa Keng



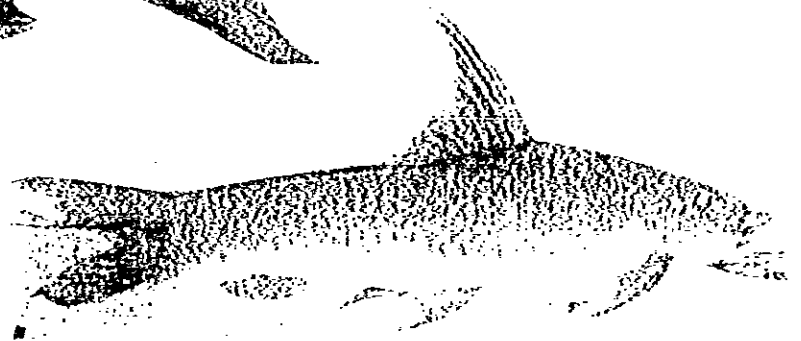
59. *Puntius falcifer* Pa Sakang



60. *Poropuntius carinatus* Pa Chart 1



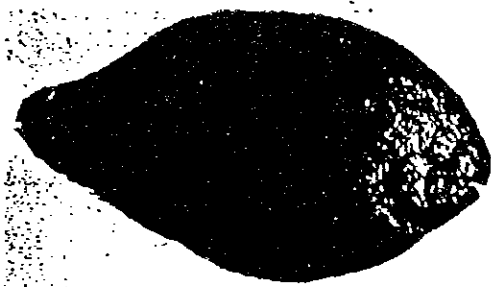
61. *Poropuntius laoensis* Pa Chart 2



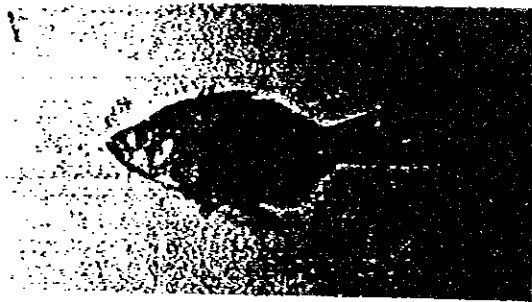
62. *Labeo erythropterus* Pa Phao



63. *Onychostoma elongata* Pa Khing



73. *Euryglossa harmandi* Pa Pe



74. *Parambassis siamensis* Pa Khap Khong



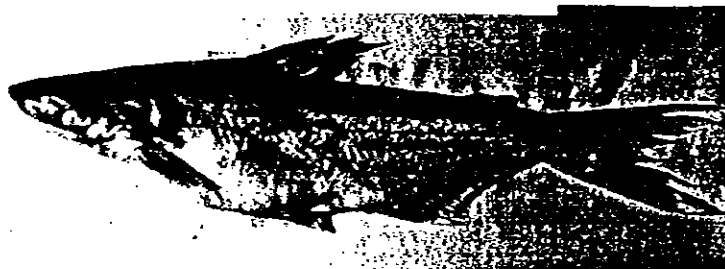
75. *Trichogaster trichopterus* Pa Kadeut



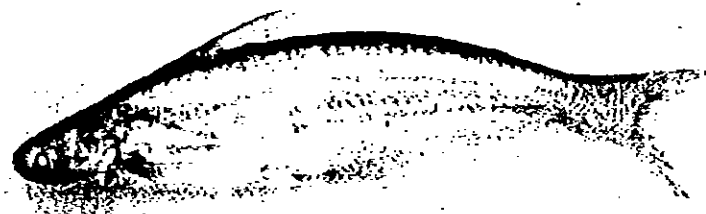
76. *Xenentodon cancila* Pa Sathong



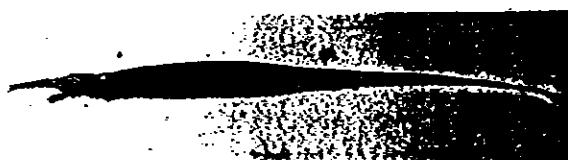
77. *Pangasius siamensis* Pa Yon



78. *Pangasius conchophilus* Pa Souay



79. *Pangasius pleurotaenia* Pa Yon Nou



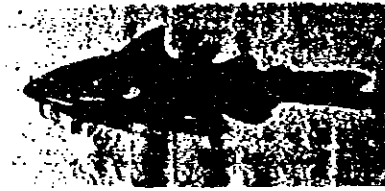
80. *Doryichthys deokhatoides* Pa Lek xi



81. *Nandus nandus* Pa Tel xa



82. *Pritolepis fasciata* Pa Ka



83. *Glyptothorax laosensis* Pa..



84. *Channa lucius* Pa Khor chon



86. *Pseudomystus stenomus*

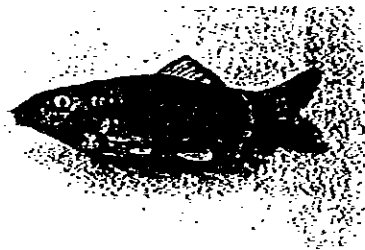
Pa Khee mouk 1



85. *Oxyeleotris marmorata* Pa Bou gnai



87. *Pseudomystus siamensis* Pa Khee mouk 2



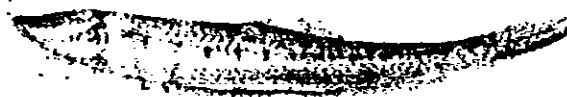
88. *Botia longidorsalis* Pa Kheo Kai 4



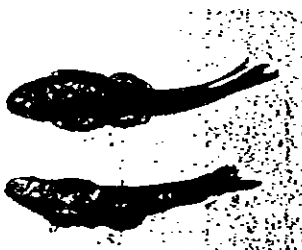
89. *Botia* sp Pa Mou



91. *Schistura* sp. 10 Pa Phan 10



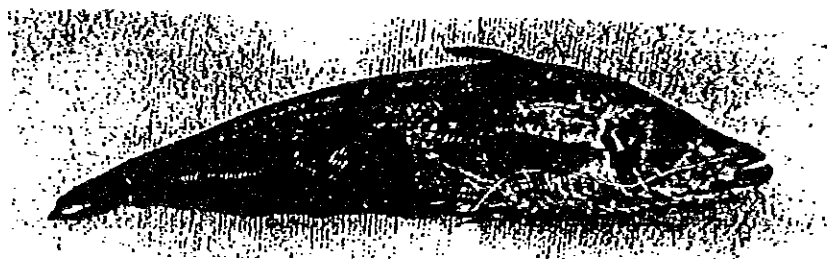
90. *Acantopsis* sp. Pa Hak kouay



92. *Homaloptera* sp Pa Tilhin

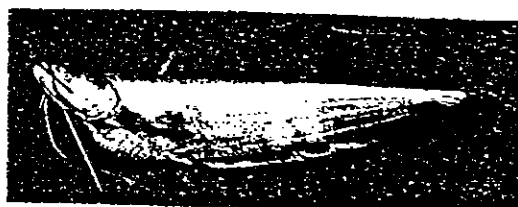


93. *Kryptopterus* sp Pa Seum



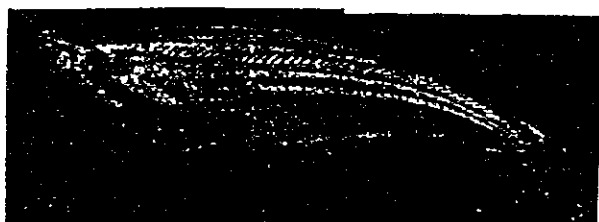
94. *Wallago leeri*

Pa Khoun



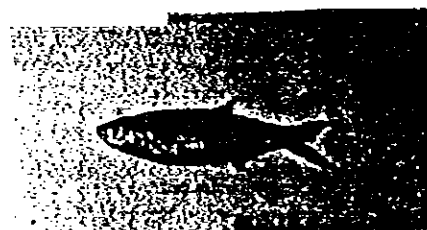
95. *Wallago attu*

Pa Khao



96. *Kryptopterus sp*

Pa Peek kai



97. *Parachela maculicauda*

Pa Siew 6



99. *Barbodes altus*

Pa Leuanfai



98. *Rasbora sp.*

Pa Siew 7



101. *Garra cambodgiensis*

Pa..



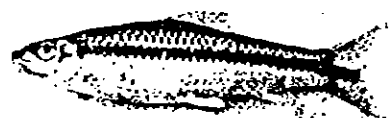
100. *Garra fuliginosa*

Pa Vok



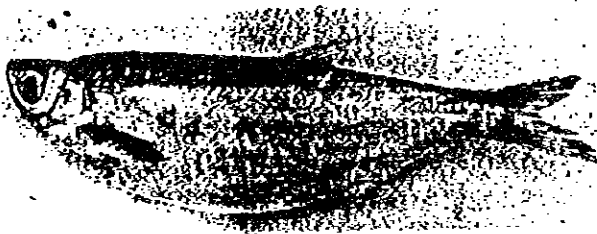
103. *Crossocheilus sp*

Pa Cha loi

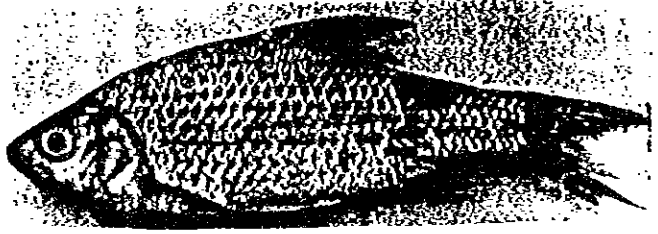


102. *Crossocheilus siamensis*

Pa Chi manh



104. *Paralaubuca typus* Pa Tep



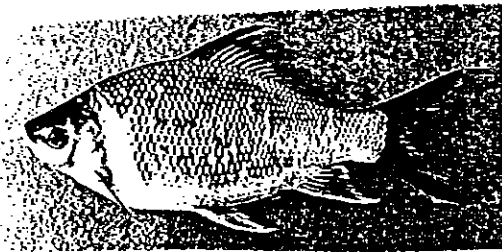
105. *Cyclocheilichthys* sp Pa Dok ngiew



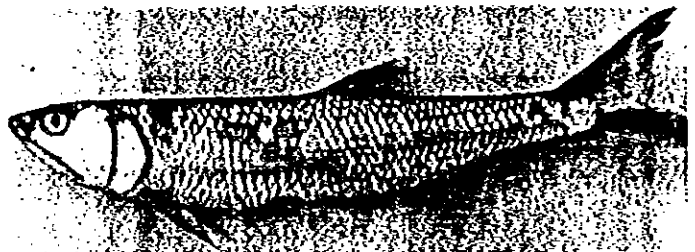
106. *Osteochilus sarawakensis* Pa..



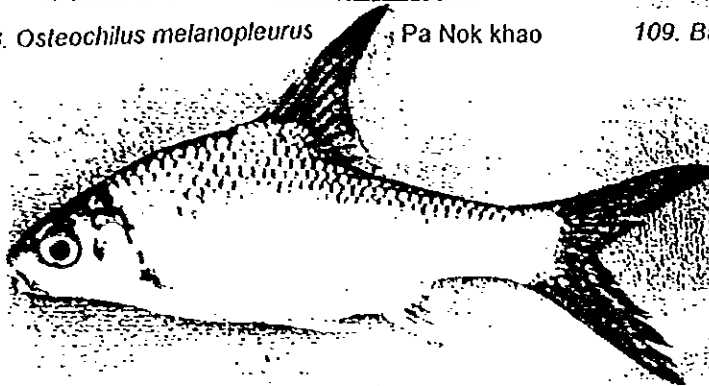
107. *Osteochilus schlegeli* Pa..



108. *Osteochilus melanopleurus* Pa Nok khao



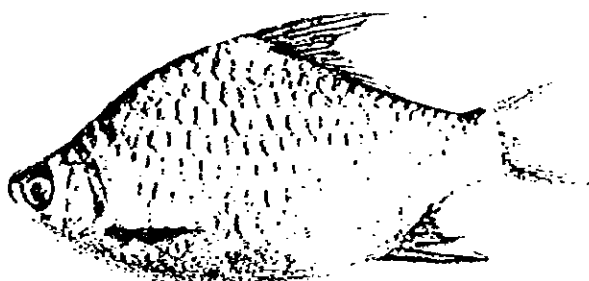
109. *Barilius* sp Pa Vahao



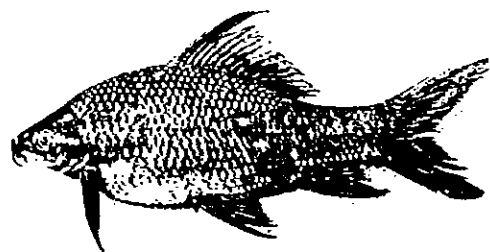
110. *Cosmochilus harmandi* Pa...



112. *Sikukia gudgeri* Pa Khao xay



111. *Scaphognathops* sp Pa Pien



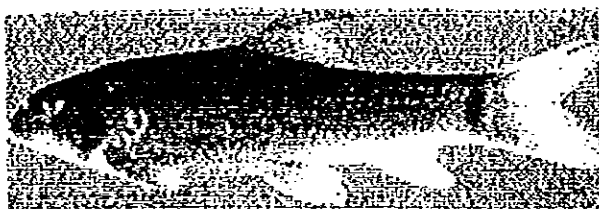
113. *Morulus chrysophekadion* Pa Phia



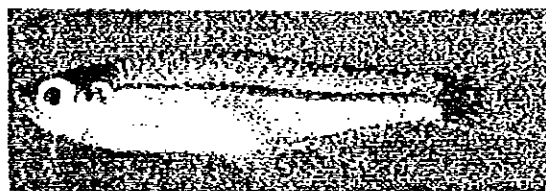
114. *Systemus partipentazona* Pa Seu noi



115. *Monotreta leirus* Pa Pao



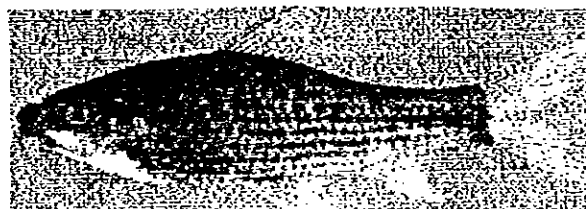
116 *Bangana lippus* Pa...



117 *Rasbora rubridosalis* Pa Siew



118 *Hypsibabus vernayi* Pa Pak (yellow anal fin)



119 *Osteochilus striatus* Pa Khee khom



120 *Garra theunensis* Pa Saak



121 *Mystus rhegma* Pa Kayeng



122 *Osphronemus exodon* Pa Menh



123 *Tixotes microlepis* Pa Meo



124 *Trichopsis vittata* Pa Matt



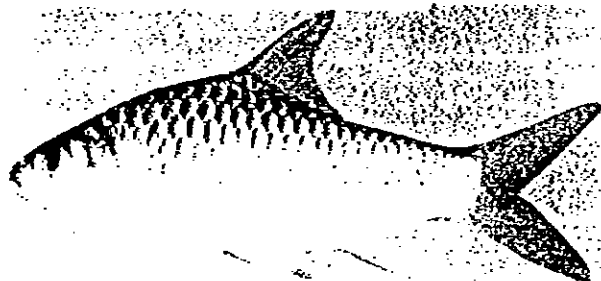
125 *Trichopsis pumila* Pa Matt



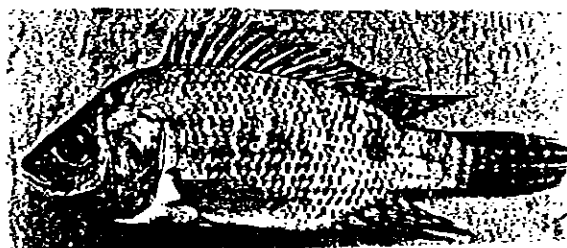
126 *Danio* sp. Pa Siew



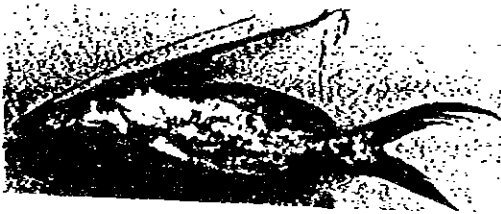
127 *Rasbora trilineata* Pa Siew



128 *Hypsibabus wetmorei* Pa Pak (red anal fin)



129 *Oreochromis niloticus* Pa nin



130 *Heterobagus sp.* Pa Kayeng



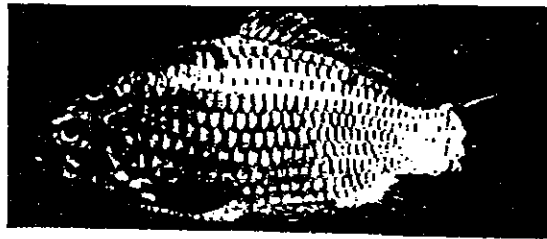
131 *Belodontichthys dinema* Pa Khop



132 *Parachela sp.* Pa Tep



133 *Betta smaragdina* Pa Katt



134 *Cyprinus carpio* Pa nai

Table 1 : List of fish species observed from 21 sampling stations along Nam Ngiep river, in dry season survey.

FAMILY	SCIENTIFIC NAME	LOCAL NAME	COLLECTED IN NAM NGIEP			REPORTED FROM		
			Upper Reservoir	Lower Reservoir	Down stream	N. Ngum Reservoir	N.Theun2 .Hinboun	Fish Ponds
NOTOPTERIDAE	<i>Chitola ornata</i>	Pa Tong kay		*				
	<i>Notopterus notopterus</i>	Pa Tong (Khao)		*	*	*	*	*
SOLEIDAE	<i>Euryglossa harmandi</i>	Pa Pe			*			
AMBASSIDAE	<i>Parambassis siamensis</i>	Pa Khap Khong			*			
BELONTIDAE	<i>Trichogaster trichopterus</i>	Pa Kadeut			*			
	<i>Xenentodon cancila</i>	Pa Sathong			*	*	*	
PANGASHIDAE	<i>Pangasius siamensis</i>	Pa Yon			*	*		*
	<i>Pangasius conchophilus</i>	Pa Souay			*			
	<i>Pangasius pleurotaenia</i>	Pa Yon Nou			*			*
SYNGNATHIDAE	<i>Doryichthys deokhatoides</i>	Pa Lek xi			*		*	
NANDIDAE	<i>Nandus nandus</i>	Pa Tet xa			*			
	<i>Pritolepis fasciata</i>	Pa Ka			*	*		
SISORIDAE	<i>Bagarius yarrellii</i>	Pa Khea	*	*	*	*	*	
	<i>Bagarius bagarius</i>	Pa Khea Leuang	*	*				*
	<i>Glyptothorax laosensis</i>	Pa..			*		*	
CHANNIDAE	<i>Channa striata</i>	Pa Khor		*	*	*		*
	<i>Channa lucius</i>	Pa Khor chon			*			
	<i>Channa gachua</i>	Pa Kang	*	*	*	*		
ELEOTRIDAE	<i>Oxyeleotris marmorata</i>	Pa Bou gnai			*			*
GOBIIDAE	<i>Rhinogobius mekongianus</i>	Pa Bou	*	*	*			
BAGRIDAE	<i>Henibagrus wyckoides</i>	Pa Kheung		*	*			
	<i>Mystus vittatus</i>	Pa KaGneng		*				
	<i>Mystus singaringan</i>	P.KaGneng(kho)		*		*	*	
	<i>Mystus nemurus</i>	Pa Kot	*	*	*	*		*
	<i>Pseudomystus stenomus</i>	Pa Khee mouk1			*			
	<i>Pseudomystus siamensis</i>	Pa Khee mouk2			*		*	
CLARIIDAE	<i>Clarias batrachus</i>	Pa Douk	*	*		*		*
COBITIDAE	<i>Botia nigrolineata</i>	Pa Kheo kai 1		*	*		*	
	<i>Botia modesta</i>	Pa Kheo Kai 2		*			*	
	<i>Botia eos</i>	Pa Kheo Kai 3		*	*		*	
	<i>Botia longidorsalis</i>	Pa Kheo Kai 4			*			
	<i>Botia sp</i>	Pa Mou			*			

FAMILY	SCIENTIFIC NAME	LOCAL NAME	COLLECTED IN NAM NGIEP			REPORTED FROM		
			Upper Reservoir	Lower Reservoir	Down stream	N. Ngum Reservoir	N.Theun2 .Hinboun	Fish Ponds
	<i>Acanopsis sp.</i>	Pa Hak kouay			*			
	<i>Acanopsis sp.</i>	Pa It xay	*	*	*			
BALITORIDAE	<i>Schistura sp.1</i>	Pa Phan1	*	*	*			
	<i>Schistura sp.2</i>	Pa Phan2	*	*	*			
	<i>Schistura sp.3</i>	Pa Phan3	*	*	*			
	<i>Schistura sp.4</i>	Pa Phan4	*	*				
	<i>Schistura sp.5</i>	Pa Phan5	*	*				
	<i>Schistura sp.6</i>	Pa Phan6	*					
	<i>Schistura sp.7</i>	Pa Phan7	*	*				
	<i>Schistura sp.8</i>	Pa Phan8	*	*				
	<i>Schistura sp.9</i>	Pa Phan9	*	*	*			
	<i>Schistura sp.10</i>	Pa Phan10			*			
	<i>Homaloptera smihi</i>	Pa Pem/ tithin	*	*	*		*	
	<i>Homaloptera sp</i>	Pa Tithin			*			
	<i>Homaloptera yunnanensis</i>	Pa Tuhin		*			*	
MASTACEMBELIDAE	<i>Mastacembelus armatus</i>	Pa Lat	*	*	*	*		*
	<i>Macrognathus slameensis</i>	Pa Lot		*				*
SILURIDAE	<i>Kreptopterus cryptopterus</i>	Pa Nang		*		*	*	
	<i>Ompok bimaculatus</i>	Pa Seum		*		*		*
	<i>Kryptopterus sp</i>	Pa Seum			*			
	<i>Wallago leeri</i>	Pa Khoun			*	*		
	<i>Wallago attu</i>	Pa Khao			*	*		*
	<i>Kryptopterus sp</i>	Pa Peek kai			*			
CYPRINIDAE	<i>Mystacoleucus greenayi</i>	Pa Langram	*	*	*	*	*	
	<i>Mystacoleucus marginatus</i>	Pa Ket kheng	*			*	*	
	<i>Scaphiodonichthys acanthopterus</i>	Pa Mom	*	*	*		*	
	<i>Bangana sinkleri</i>	Pa Deng	*	*		*		
	<i>Bangana behri</i>	Pa Va (mou)	*	*				
	<i>Tor tambroides</i>	Pa Thol		*		*		
	<i>Tor sp.</i>	Pa Dam		*				
	<i>Osteochilus hasselti</i>	Pa I thai	*	*	*		*	
	<i>Osteochilus waandersii</i>	Pa Lay kai	*		*		*	
	<i>Hampala dispar</i>	Pa Soud 1	*	*	*	*	*	*
	<i>Hampala macrolepidota</i>	Pa Soud 2	*	*		*	*	
	<i>Rasbora sp. (Horizontal red line)</i>	Pa Siew		*		*		
	<i>Rasbora atridorsalis</i>	Pa siew 1	*	*	*		*	
	<i>Rasbora borapetensis</i>	Pa Siew 2	*	*	*		*	

FAMILY	SCIENTIFIC NAME	LOCAL NAME	COLLECTED IN NAM NGIEP			REPORTED FROM		
			Upper Reservoir	Lower Reservoir	Down stream	N. Ngum Reservoir	N.Theun2 .Hinboun	Fish Ponds
	<i>Rasbora daniconius</i>	Pa Siew 3	*	*	*		*	
	<i>Rasbora pavai</i>	Pa Siew 4	*	*			*	
	<i>Esemus metallicus</i>	Pa Siew 5	*	*	*		*	
	<i>Parachela maculicauda</i>	Pa Siew 6		*	*	*	*	
	<i>Rasbora sp.</i>	Pa Siew 7			*		*	
	<i>Puntius jacobusboehkei</i>	Pa....		*				
	<i>Puntius brevis</i>	Pa Khaomon	*	*	*	*		*
	<i>Puntius sp. (yellow fins)</i>	Pa Peak leuang	*					
	<i>Puntius sp. (black dot)</i>	Pa Pok	*					
	<i>Dangila Sp.</i>	Pa Khee lam		*	*	*		
	<i>Barilius pulchellus</i>	Pa Khanheua	*	*			*	
	<i>Barilius sp</i>	Pa Khan heua I	*		*			
	<i>Barbodes schwanefeldi</i>	Pa Vienfai		*		*	*	
	<i>Barbodes gonionotus</i>	Pa Pak		*		*	*	
	<i>Barbodes altus</i>	Pa Leuanfai			*	*	*	
	<i>Cirrhinus lineatus</i>	Pa Soi	*					
	<i>Cirrhinus molitorella</i>	Pa Keng	*	*	*	*	*	*
	<i>Puntioplites falcifer</i>	Pa Sakang		*	*		*	*
	<i>Poropuntius carinatus</i>	Pa Chart 1	*	*	*			
	<i>Poropuntius laoensis</i>	Pa Chart 2	*	*	*		*	
	<i>Labeo erythropterus</i>	Pa Phao	*	*	*			
	<i>Onychostoma elongata</i>	Pa Khing	*	*			*	
	<i>Systemus orphoides</i>	Pa Pok	*	*		*		
	<i>Neolissochilus blanci</i>	Pa Song	*					
	<i>Raiamas guttatus</i>	Pa Sarark noi	*				*	
	<i>Luciocyprinus striolatus</i>	Pa Kouan xay		*				
	<i>Garra pingi</i>	Pa Phee	*	*				
	<i>Garra fuliginosa</i>	Pa Vok			*			
	<i>Garra cambodgiensis</i>	Pa..			*		*	
	<i>Crossocheilus siamensis</i>	Pa Chi manh			*		*	
	<i>Crossocheilus sp</i>	Pa Cha loi			*			
CYPRINIDAE	<i>Paralaubuca typus</i>	Pa Tep			*		*	
	<i>Cyclocheilichthys sp</i>	Pa Dok ngiew			*	*	*	*
	<i>Osteochilus sarawakensis</i>	Pa..			*		*	
	<i>Osteochilus schlegeli</i>	Pa..			*			
	<i>O. melanopleurus</i>	Pa Nok khao			*	*	*	*
	<i>Barilius sp</i>	Pa Vahao			*		*	

FAMILY	SCIENTIFIC NAME	LOCAL NAME	COLLECTED IN NAM NGIEP			REPORTED FROM		
			Upper Reservoir	Lower Reservoir	Down stream	N. Ngum Reservoir	N.Theun2 .Hinboun	Fish Ponds
	<i>Cosmochilus harmandi</i>	Pa...			*			
	<i>Scaphognathops sp</i>	Pa Pien			*	*	*	
	<i>Sikukia gudgeri</i>	Pa Khao xay			*		*	
	<i>Morulius chrysophekadion</i>	Pa Phia			*	*		*
	<i>Systemus partipentazona</i>	Pa Seua noi			*			
TETRAODONIIDAE	<i>Tetraodon suvatii</i>	Pa Pao	*	*			*	
	<i>Monotreta leiurus</i>	Pa Pao			*			
SYNBRANCHIDAE	<i>Monopterus albus</i>	Eel	*	*		*	*	
ANABANTIDAE	<i>Anabus testudineus</i>	Pa Kheng	*	*		*		*

Table 2. List of the additional species of fish observed during wet season survey

Scientific name	Local name	Collected in Nam Ngiep			Reported from		
		upper Reservoir	Lower Reservoir	Down stream	N.Ngum Reservoir	N.Theun2	Fish ponds
<i>Bangana lippus</i>	Pa...	*	*			*	
<i>Danio sp.</i>	Pa Siew		*	*		*	
<i>Rasbora rubridosalis</i>	Pa Siew		*	*		*	*
<i>Rasbora trilineata</i>	Pa Siew		*	*			*
<i>Hypsibabus vernayi</i>	Pa Pak (yellow anal fin)	*	*	*		*	
<i>Hypsibabus wetmorei</i>	Pa Pak (red anal fin)		*	*		*	
<i>Osteochilus striatus</i>	Pa Khee khom			*		*	
<i>Parachela sp.</i>	Pa Tep	*	*	*			
<i>Garra theunensis</i>	Pa Saak		*			*	
<i>Heterobagus sp.</i>	Pa Kayeng		*	*			*
<i>Mystus rhegma</i>	Pa Kayeng		*	*		*	*
<i>Cyprinus carpio</i>	Pa nai	*			*		*
<i>Osphronemus exodon</i>	Pa Menh			*	*	*	
<i>Belodontichthys dinema</i>	Pa Khop		*	*		*	*
<i>Tixotes microlepis</i>	Pa Meo			*		*	
<i>Trichopsis vittata</i>	Pa Matt	*	*	*		*	*
<i>Trichopsis pumila</i>	Pa Matt	*	*	*		*	*
<i>Betta smaragdina</i>	Pa Katt		*	*		*	*
<i>Oreochromis niloticus</i>	Pa nin	*			*		*
		7	14	15	3	14	10

Note: The fish species observed in wet season survey are recored only the new species, as listing in the above Table.

Table 3. List of fish species possible adaptation to the reservoir condition
Base on species found in Nam Ngum reservoir

Scientific name	Local name	Observed in N.Ngum Reservoir	Observed in N.Ngiep	Possible adaptation to reservoir
<i>Chitala ornata</i>	Pa Tong kay		*	*
<i>Notopterus notopterus</i>	Pa Tong (Khao)	*	*	*
<i>Parambassis siamensis</i>	Pa Khap Khong	*	*	*
<i>Nandus nandus</i>	Pa Tet xa		*	*
<i>Pritolepis fasciata</i>	Pa Ka	*	*	*
<i>Channa striata</i>	Pa Khor	*	*	*
<i>Channa lucius</i>	Pa Khor chon		*	*
<i>Channa gachua</i>	Pa Kang		*	*
<i>Oxyeleotris marmorata</i>	Pa Bou gnai		*	*
<i>Hemibagrus wyckoides</i>	Pa Kheung	*	*	*
<i>Mystus vittatus</i>	Pa KaGneng		*	*
<i>Mystus singaringan</i>	Pa KaGneng(kho)	*	*	*
<i>Mystus nemurus</i>	Pa Kot	*	*	*
<i>Clarias batrachus</i>	Pa Douk	*	*	*
<i>Mastacembelus armatus</i>	Pa Lat		*	?
<i>Kreptopterus cryptopterus</i>	Pa Nang		*	*
<i>Ompok bimaculatus</i>	Pa Seuam	*	*	*
<i>Kryptopterus sp</i>	Pa Seum	*	*	*
<i>Wallago leerii</i>	Pa Khoun	*	*	*
<i>Wallago attu</i>	Pa Khao	*	*	*
<i>Kryptopterus sp</i>	Pa Peek kai	*	*	*
<i>Osteochilus hasselti</i>	Pa I thai	*	*	*
<i>Osteochilus waandersii</i>	Pa Lay kai		*	*
<i>Hampala dispar</i>	Pa Soud 1	*	*	*
<i>Hampala macrolepidota</i>	Pa Soud 2	*	*	*
<i>Puntius brevis</i>	Pa Khaomon/Pabee	*	*	*
<i>Puntius sp.(yellow fins)</i>	Pa Peak leuang		*	*
<i>Dangila Sp.</i>	Pa Khee lam	*	*	*
<i>Barbodes schwanfelfdi</i>	Pa Vienfai	*	*	*
<i>Barbodes gonionotus</i>	Pa Pak	*	*	*
<i>Barbodes altus</i>	Pa Leuanfai	*	*	*
<i>Cirrhinus lineatus</i>	Pa Soi		*	*
<i>Cirrhinus molitorella</i>	Pa Keng	*	*	*
<i>Puntioplites falcifer</i>	Pa Sakang	*	*	*
<i>Labeo erythropterus</i>	Pa Phao/Pa va	*	*	*
<i>Systemus orphoides</i>	Pa Pok		*	*
<i>Paralabuca typus</i>	Pa Tep		*	*
<i>Cylocheilichthys sp</i>	Pa Dok ngiew	*	*	*
<i>Osteochilus melanopleurus</i>	Pa Nok khao	*	*	*
<i>Scaphognathops sp</i>	Pa Pien	*	*	*
<i>Sikukia gudgeri</i>	Pa Khao xay		*	?
<i>Morulius chrysophekadion</i>	Pa Phia	*	*	*
<i>Tetraodon suvattii</i>	Pa Pao		*	?
<i>Monotreta leiurus</i>	Pa Pao	*	*	*

Table 3. Continue...

Scientific name	Local name	Observed in N.Ngum Reservoir	Observed in N.Ngiep	Possible adaptation to reservoir
<i>Rasbora rubridorsalis</i>	Pa Siew		*	?
<i>Rasbora trilincata</i>	Pa Siew		*	?
<i>Hypsibabus vernayi</i>	Pa Pak (yellow anal fin)	*	*	*
<i>Hypsibabus wetmorei</i>	Pa Pak (red anal fin)	*	*	*
<i>Osteochilus striatus</i>	Pa Khee khom		*	*
<i>Parachela sp.</i>	Pa Tep		*	*
<i>Heterobagus sp.</i>	Pa Kayeng		*	*
<i>Mystus rhegma</i>	Pa Kayeng		*	*
<i>Cyprinus carpio</i>	Pa nai	*	*	*
<i>Osphronemus exodon</i>	Pa Menh	*	*	*
<i>Belodontichthys dinema</i>	Pa Khop		*	*
<i>Oreochromis niloticus</i>	Pa nin	*	*	*

Table : List of fish species reported by villagers, by using the Fish Photographs references

Scientific name	Local name	Upper Reservoir	Lower Reservoir	Down stream	Field observation
<i>Chitala ornata</i>	Pa Tong kay		*	*	*
<i>Chitala blanci</i>	Pa Tong lai			*	
<i>Notopterus notopterus</i>	Pa Tong (Khao)		*	*	*
<i>Macrochirichthys macrachorus</i>	Pa Hangfa	*		*	
<i>Gyrinocheilus aymonieri</i>	Pa Dampha	*	*	*	
<i>Gyrinocheilus pennocki</i>	Pa Dampha	*	*	*	
<i>Oreoglanis delacouri</i>	Pa Tithin			*	
<i>Hemibagrus filamentus</i>	Pa Kot Mo	*	*	*	
<i>Euryglossa harmandi</i>	Pa Pe		*	*	*
<i>Parambassis siamensis</i>	Pa Khap Khong			*	*
<i>Trichogaster trichopterus</i>	Pa Kadeut	*	*	*	*
<i>Xenentodon cancila</i>	Pa Sathong	*	*	*	*
<i>Pangasius siamensis</i>	Pa Yon			*	*
<i>Pangasius conchophilus</i>	Pa Souay			*	*
<i>Pangasius pleurotaenia</i>	Pa Yon Nou			*	*
<i>Doryichthys deokhatoides</i>	Pa Lek xi			*	*
<i>Nandus nandus</i>	Pa Tet xa		*	*	*
<i>Pritolepis fasciata</i>	Pa Ka		*	*	*
<i>Coius undecimradiatus</i>	Pa Sua			*	
<i>Bagarius yarrellii</i>	Pa Khea	*	*	*	*
<i>Bagarius bagarius</i>	Pa Khea Leuang	*	*	*	*
<i>Channa striata</i>	Pa Khor	*	*	*	*
<i>Channa lucius</i>	Pa Khor chon		*	*	*
<i>Channa gachua</i>	Pa Kang	*	*	*	*
<i>Oxyeleotris marmorata</i>	Pa Bou gnai			*	*
<i>Rhinogobius mekongianus</i>	Pa Bou	*	*	*	*
<i>Hemibagrus wyckoides</i>	Pa Kheung	*	*	*	*
<i>Mystus vittatus</i>	Pa KaGneng		*	*	*
<i>Mystus singaringan</i>	Pa KaGneng(kho)		*	*	*
<i>Mystus nemurus</i>	Pa Kot	*	*	*	*
<i>Pseudomystus stenomus</i>	Pa Khee mouk1		*	*	*
<i>Pseudomystus siamensis</i>	Pa Khee mouk2		*	*	*
<i>Clarias batrachus</i>	Pa Douk	*	*	*	*
<i>Botia nigrolineata</i>	Pa Kheo kai 1		*	*	*
<i>Botia modesta</i>	Pa Kheo Kai 2		*	*	*

Annex 4 (Cont..)

Scientific name	Local name	Upper Reservoir	Lower Reservoir	Down stream	Field observation
<i>Botia eos</i>	Pa Kheo Kai 3		*	*	*
<i>Botia longidorsalis</i>	Pa Kheo Kai 4		*	*	*
<i>Botia sp</i>	Pa Mou		*	*	*
<i>Botia beauforti</i>	Pa Kheo Kai		*	*	
<i>Botia helodes</i>	Pa Kheo Kai		*	*	
<i>Channa micropeltes</i>	Pa Do		*	*	
<i>Acantopsis sp.</i>	Pa Hak kouay	*	*	*	*
<i>Acantopsis sp.</i>	Pa It xay	*	*	*	*
<i>Schistura sp.1</i>	Pa Phan1	*	*	*	*
<i>Schistura sp.2</i>	Pa Phan2	*	*	*	*
<i>Schistura sp. 3</i>	Pa Phan3	*	*	*	*
<i>Schistura sp. 4</i>	Pa Phan4	*	*	*	*
<i>Schistura sp. 5</i>	Pa Phan5	*	*	*	*
<i>Schistura sp. 6</i>	Pa Phan6	*	*	*	*
<i>Schistura sp.7</i>	Pa Phan7	*	*	*	*
<i>Schistura sp. 8</i>	Pa Phan8	*	*	*	*
<i>Schistura sp. 9</i>	Pa Phan9	*	*	*	*
<i>Schistura sp. 10</i>	Pa Phan10	*	*	*	*
<i>Homaloptera smithi</i>	Pa Pem/ tithin		*	*	*
<i>Homaloptera sp</i>	Pa Tithin		*	*	*
<i>Homaloptera yunnanensis</i>	Pa Tihin		*	*	*
<i>Mastacembelus armatus</i>	Pa Lat	*	*	*	*
<i>Macrognathus siamensis</i>	Pa Lot	*	*	*	*
<i>Kreptopterus cryptopterus</i>	Pa Nang			*	*
<i>Ompok bimaculatus</i>	Pa Seuam			*	*
<i>Kryptopterus sp</i>	Pa Seum			*	*
<i>Wallago leeri</i>	Pa Khoun		*	*	*
<i>Wallago attu</i>	Pa Khao		*	*	*
<i>Kryptopterus sp</i>	Pa Peek kai			*	*
<i>Mystacoleucus greewayi (pellegrin</i>	Pa Langnam	*	*	*	*
<i>Mystacoleucus marginatus</i>	Pa Ket kheng	*	*	*	*
<i>Scaphiodonichthys acanthopterus</i>	Pa Mom	*	*	*	*
<i>Bangana sinkleri</i>	Pa Deng	*	*	*	*
<i>Bangana behri</i>	Pa Va (mou)	*	*	*	*
<i>Tor tambroides</i>	Pa Thol	*	*	*	*
<i>Tor sp.</i>	Pa Dam	*	*		*
<i>Osteochilus hasselti</i>	Pa I thai	*	*	*	*

Annex 4 (Cont..)

Scientific name	Local name	Upper Reservoir	Lower Reservoir	Down stream	Field observation
<i>Osteochilus waandersii</i>	Pa Lay kai		*	*	*
<i>Hampala dispar</i>	Pa Soud 1	*	*	*	*
<i>Hampala macrolepidota</i>	Pa Soud 2	*	*	*	*
<i>Rasbora sp.(Horizontal red line)</i>	Pa Siew	*	*	*	*
<i>Rasbora atridorsalis</i>	Pa siew 1	*	*	*	*
<i>Rasbora borapetensis</i>	Pa Siew 2	*	*	*	*
<i>Rasbora daniconius</i>	Pa Siew 3	*	*	*	*
<i>Rasbora paviei</i>	Pa Siew 4	*	*	*	*
<i>Esomus metallicus</i>	Pa Siew 5	*	*	*	*
<i>Parachela maculicauda</i>	Pa Siew 6	*	*	*	*
<i>Rasbora sp.</i>	Pa Siew 7	*	*	*	*
<i>Puntius jacobusboehlkei</i>	Pa.....	*	*		*
<i>Puntius brevis</i>	Pa Khaomon	*	*	*	*
<i>Puntius sp.(yellow fins)</i>	Pa Peak leuang	*	*	*	*
<i>Puntius sp.(black spot at caudal base Pa Pok (black spot)</i>			*	*	*
<i>Dangila Sp.</i>	Pa Khee lam	*	*	*	*
<i>Barilius pulchellus</i>	Pa Khanheua	*	*	*	*
<i>Barilius sp</i>	Pa Khan heua l	*	*	*	*
<i>Barbodes schwanefeldi</i>	Pa Vienfai		*	*	*
<i>Barbodes gonionotus</i>	Pa Pak	*	*	*	*
<i>Barbodes altus</i>	Pa Leuanfai			*	*
<i>Cirrhinus lineatus</i>	Pa Soi		*	*	*
<i>Cirrhinus molitorella</i>	Pa Keng		*	*	*
<i>Puntioplites falcifer</i>	Pa Sakang			*	*
<i>Poropuntius carinatus</i>	Pa Chart 1	*	*	*	*
<i>Poropuntius laoensis</i>	Pa Chart 2	*	*	*	*
<i>Labeo erythopterus</i>	Pa Phao	*	*	*	*
<i>Onychostoma elongata</i>	Pa Khing	*	*	*	*
<i>Systemus orphoides</i>	Pa Pok	*	*	*	*
<i>Neolissochilus blanci</i>	Pa Song	*	*	*	*
<i>Raiamas guttatus</i>	Pa Sanark noi	*	*	*	*
<i>Luciocyprinus striolatus</i>	Pa Kouan xay	*	*	*	*
<i>Garra pingi</i>	Pa Phee	*	*	*	*
<i>Garra fuliginosa</i>	Pa Vok			*	*
<i>Garra cambodgiensis</i>	Pa manh	*		*	*
<i>Crossocheilus siamensis</i>	Pa Chi manh			*	*
<i>Crossocheilus sp</i>	Pa Cha loi	*	*	*	*

Annex 4 (Cont..)

Scientific name	Local name	Upper Reservoir	Lower Reservoir	Down stream	Field observation
<i>Paralaubuca typus</i>	Pa Tep	*	*	*	*
<i>Cyclocheilichthys</i> sp	Pa Dok ngiew	*	*	*	*
<i>Tenualosa thibaudeaui</i>	Pa Makphang		*	*	
<i>Himantura chaophaya</i>	Pa Phalai			*	
<i>Osteochilus melanopleurus</i>	Pa Nok khao			*	*
<i>Barilius</i> sp	Pa Vahao	*	*	*	*
<i>Cosmochilus harmandi</i>	Pa...		*	*	*
<i>Scaphognathops</i> sp	Pa Pien	*	*	*	*
<i>Sikukia gudgeri</i>	Pa Khao xay	*	*	*	*
<i>Morulus chrysophekadion</i>	Pa Phia		*	*	*
<i>Systemus partipentazona</i>	Pa Seu noi			*	*
<i>Tetraodon suvattii</i>	Pa Pao	*	*	*	*
<i>Monotreta leirus</i>	Pa Pao	*	*	*	*
<i>Monopterus albus</i>	Eel	*	*	*	*
<i>Anabus testudineus</i>	Pa Kheng	*	*	*	*
<i>Bangana lippus</i>	Pa...	*	*	*	*
<i>Danio</i> sp.	Pa Siew	*	*	*	*
<i>Rasbora rubridosalis</i>	Pa Siew	*	*	*	*
<i>Rasbora trilineata</i>	Pa Siew	*	*	*	*
<i>Hypsibabus vernayi</i>	Pa Pak (yellow anal f	*	*	*	*
<i>Hypsibabus wetmorei</i>	Pa Pak (red anal fin)	*	*	*	*
<i>Osteochilus striatus</i>	Pa Khee khom	*	*	*	*
<i>Parachela</i> sp.	Pa Tep	*	*	*	*
<i>Garra theunensis</i>	Pa Saak	*	*		*
<i>Heterobagus</i> sp.	Pa Kayeng			*	*
<i>Mystus rhegma</i>	Pa Kayeng			*	*
<i>Cyprinus carpio</i>	Pa nai	*		*	*
<i>Osphronemus exodon</i>	Pa Menh			*	*
<i>Belodontichthys dinema</i>	Pa Khop			*	*
<i>Tixotes microlepis</i>	Pa Meo			*	*
<i>Trichopsis vittata</i>	Pa Matt		*	*	*
<i>Trichopsis punila</i>	Pa Matt		*	*	*
<i>Betta smaragdina</i>	Pa Katt			*	*
<i>Oreochromis niloticus</i>	Pa nin	*			*
Total	142	84	113	139	130

Sources : Interviewed with the local fishermen and village's authorities at the Project Areas.

