

# Thailand

## Large Swamp Inland Fisheries Project

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### 1 Project Profile and Japan's ODA Loan

#### 1) Background

This project was planned by the Department of Fisheries, Thailand (referred to as DOF) under the Sixth Five Year National Economic and Social Development Plan (1987~1991). The Five Year Plan placed the emphasis on alleviating rural poverty, and it took improvement of productivity to secure supplies of agricultural, forestry and fisheries products sufficient to meet local demand as one of the means to attain that end. The Department of Fisheries began fisheries development of three lakes situated in poor inland regions (Lakes Bung Borapet, Nong Han and Kwan Phayao) as a way of achieving the Plan's objective in the fisheries sector. These lakes were unable to maintain an adequate water level due to deterioration of weirs and other parts which diminished fish stocks as well as degraded flood control capacity.

#### 2) Objectives

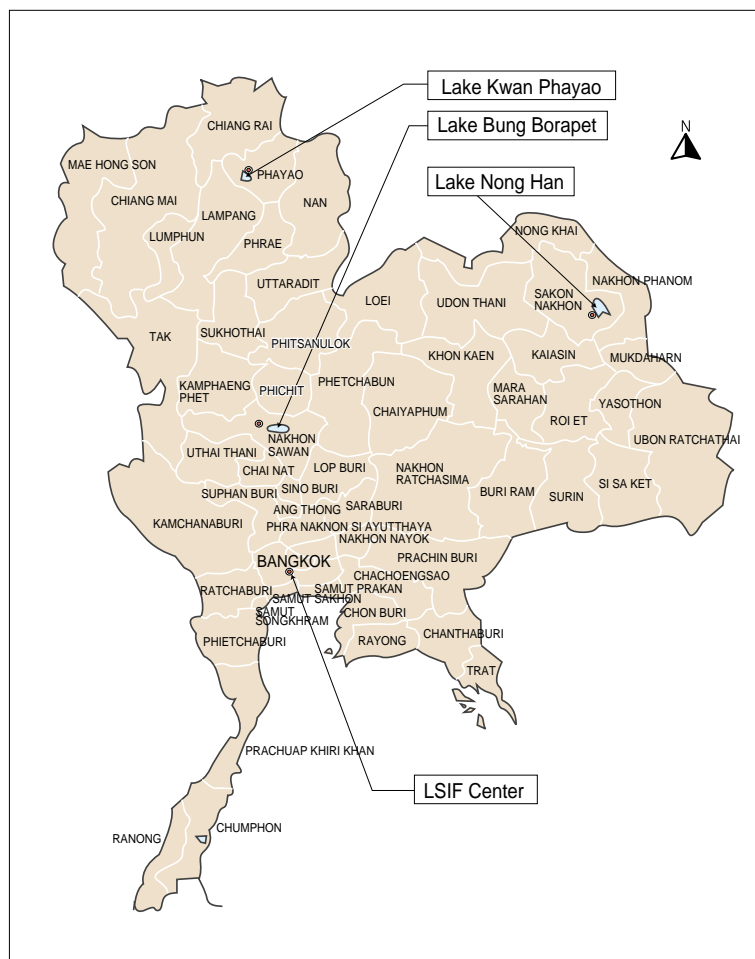
The aims of this project were as follows:

Expanding fish stocks (fish catches) from the lakes by rehabilitating the lakes and increasing releases of nursery fish.

Promoting the fish raising industry in the surrounding area by increasing the production and supply of nursery fish and spreading fish raising skills.

Enhancing water level adjustment functions by rehabilitating the lake, and hence contributing to increased agricultural production.

The ultimate objective of the project, to be attained through reaching the above aims, was to make a long-term contribution to improving the income level and nutrition standards of farming and fishing people in poor inland areas.



### 3) Project Scope

Rehabilitation of the three lakes (construction of weirs and sluice gates, dredging, canal rehabilitation).

Expansion of fishing stations (nursery fish production facilities) in the three lakes.

Construction of water purification lagoons for two of the lakes.

Procurement of equipment for construction and maintenance.

Construction of the Large Scale Inland Fishery Management and Research Center (LSIF Center) at the Department of Fisheries head office in Bangkok.

Consulting services.

### 4) Borrower / Executing Agency

The Kingdom of Thailand / Department of Fisheries

### 5) Outline of Loan Agreement

Loan Amount / Loan Disbursed Amount	¥2,651 million / ¥2,299 million
Exchange of Notes / Loan Agreement	September 1987 / June 1988
Terms and Conditions	Interest rate: 3.0%, Repayment period: 30 years (10 years for grace period), General Untied (Partially untied for consulting services)
Final Disbursement Date	June 1994

## 2 Results and Evaluation

### 1) Relevance

This project was planned on the basis of the alleviation of rural poverty, which was a key strategy of the Five Year Plan in effect at the time of the appraisal, and therefore the planning of the project at that time was relevant in line with the national policies. The objectives of the project still appear to be relevant at the time of the evaluation since the project target areas still have low levels of per-capita GDP relative to other areas of the country, and the third-party evaluation found that the projects had some degree of impact<sup>1</sup> for the alleviation of poverty.

### 2) Efficiency

#### 1. Project Cost

The actual total cost of the project was 4.357 billion, of which 2.297 billion was covered by the ODA loan. The originally planned total cost was 3.199 billion, which means the Yen-based cost overrun was approximately 1.4 times, and the cost in Baht terms was 1.7 times. The cost increase occurred because the cost of construction in Thailand rose sharply, inflating the local currency portion. The Thai government was able to make the necessary budgetary arrangements for additional cost without difficulty.

<sup>1</sup> See 3. 4) for details. The alleviation of poverty can be defined and interpreted in many ways, but in this case, rather than the narrow definition of increasing income levels or decreasing the population in poverty, this project took the broader definition of reduction or elimination of the poverty factors of which poverty is formed. The reason for the choice is that even if improvement is seen in some of the poverty factors, it is in reality hardly possible to break out of the poverty trap because other poverty factors are unchanged and therefore there is no actual change in income levels. In other words, even if the project makes a contribution to the alleviation of poverty, that contribution is often not manifested in the form of direct increased income levels for the poor or reduction of the population in poverty.

## 2. Implementation Schedule

The selection of contractors took a long time, delaying the start of construction by approximately two years, but once it began, the work proceeded as planned.

## 3. Implementation Scheme

The executing agency, the Department of Fisheries, was able to carry out this project smoothly in cooperation with the consultants and contractors.

### 3) Effectiveness

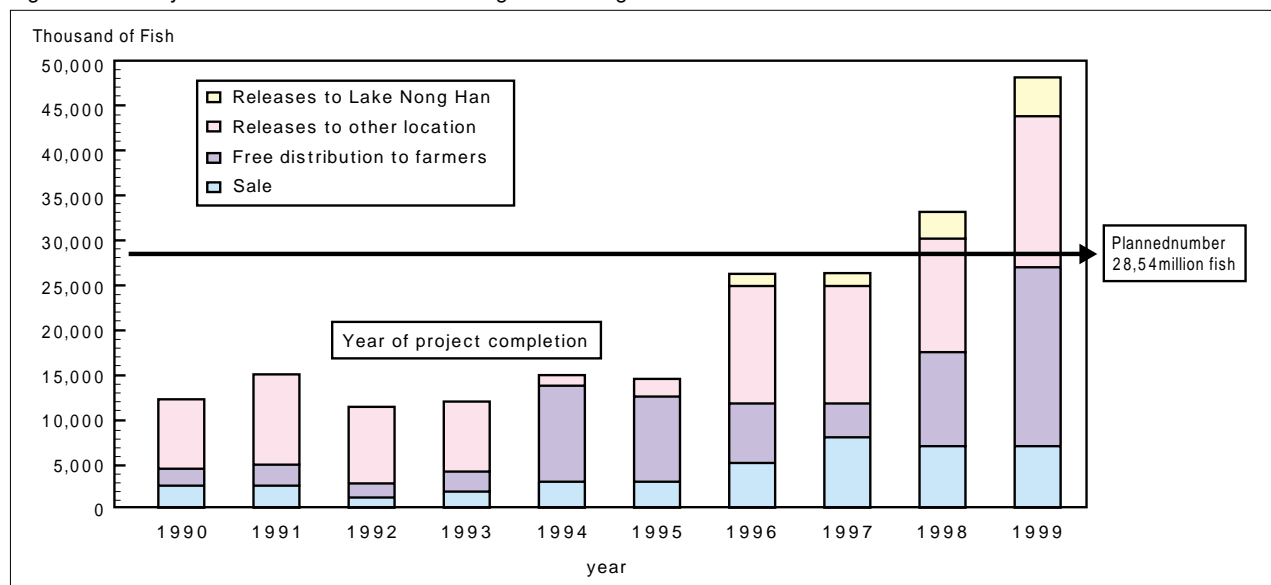
#### 1. Increased Production of Nursery Fish

The fishing stations next to the three lakes covered by this project produce nursery fish and work to spread fish raising skills (training of fish breeders etc.). The expansion of their facilities under this project increased their nursery fish production volume (see the following page for details of the Lake Nong Han Station). The nursery fish produced were released into the targeted lakes and into rivers in their provinces, and also contributing to supporting poor farmers by free distribution to farmers' shared breeding ponds.

#### 2. Promotion of Fish Breeding

The increase in nursery fish production and the rise of water level of the lakes due to the rehabilitation expanded the fish breeding business, particularly at Lake Bung Borapet where the number of households breeding fish, the water areas used and the volume of production doubled.

Figure 1 Nursery Fish Production Numbers at Nong Han Fishing Station



Source: Nong Han Fishing Station

#### 3. Expansion of Fish Stocks in the Lakes

Fish catches have been rising in Lake Bung Borapet after the completion of the project, while catches in Lake Kwan Phayao vary from year to year. The data of fish catches from Lake Nong Han was not obtained from the Department of Fisheries. Data on catches is important for the management and conservation of fish stocks in the lakes, thus such data needs to be collected and analyzed in future.

#### 4. Enhanced Water Level Adjustment Functions

The weirs and sluice gates built under this project keep the water below a certain level in times of flood, thereby

reducing flood damage to farmland. At the same time, by keeping the water above a certain level, the facilities are able to safeguard fish stocks and promote the growing of crops in the dry season.

#### 5. EIRR (Economic Internal Rate of Return)

At the time of the appraisal, EIRR was estimated at 12.3%, but the recalculated figure at the time of evaluation was 7.4%. The drop was caused by the increase in actual initial cost (project cost).

### 4) Impact

#### 1. Impact on Beneficiaries

Refer to the third-party evaluation.

#### 2. Environmental impact of the construction works on the lakes

Lake Bung Borapet is home to many types of water fowl, and it has long been famous as a lake with a beautiful natural environment. When the lake was dredged and the water level temporarily dropped, the number of water fowl visiting the lake diminished, prompting criticism against the project in Japan and Thailand. Once the construction was completed and the water level recovered, the water fowl returned. By now the presence of 120~130 varieties of water fowl has been confirmed around the lake.

### 5) Sustainability

The facilities built under this project are maintained by the Fishing Stations, and each station provides the necessary personnel and budget for operation and maintenance of the facilities. The LSIF center carries out a variety of investigative research and makes technical use of the findings.

## 3 Project Impact Evaluation by Third-Party

### 1) Survey Objective

A comprehensive evaluation was conducted to assess what impacts have been made by this project. Also the impact on each beneficiary group, such as fishing people<sup>2</sup> residing around the lake or fish breeders, was studied to gauge its relation with the alleviation of their poverty.

### 2) Survey Method

Of the three regions where projects were carried out, the following surveys were carried out on Nong Han and Bung Borapet. 1. Interview survey at the fishing stations and the provincial offices. 2. Questionnaire survey (covering 320 households in 10 villages near the lakes). 3. Rapid Rural Appraisal (RRA) (Interview and group discussion with villagers from three villages near the lakes).

### 3) Overview of the Impact of this Project

The table below summarizes the impact evaluation results gained from the three surveys listed above.

As the table shows, the project had a positive impact overall. The construction of weirs on Lake Nong Han raised the water level, enabling surrounding farmers to expand the areas of dry season cultivation by pumping water from the lake.

<sup>2</sup> In this report, fishers refers to people who catch fish from the lake. They are further subdivided into full-time fishers, which refers to those fishers who make fishing their main livelihood, and part-time fishers, which refers to those who do not make fishing their main livelihood, but who fish for household consumption or supplementary income in seasons when there is no farming work.

Since Lake Nong Han has a small number of full-time fishers or fish breeders, the economic impact was not so great, but surrounding households consume large amounts of fish from their catches, which means that the fish catch is beneficial as a source of cheap protein. Around Lake Bung Borapet, there was a great benefit for fishers and fish breeders, and farmers with land around the lake also benefit. Residents in this area catch fish as a cheap protein source as well.

Project impact	Around Lake Nong Han	Around Lake Bung Borapet
Increase in fish stocks in the lake		
Promotion of fish breeding around the lake		
Increase in fish consumption		
Alleviation of flooding		
Promotion of agriculture around the lakes due to the stable supply of water for crops		
Expansion of job opportunities		
Standard of living improvement around the lakes		
Water quality improvement	?	

The evaluation criteria are as follows:

- : Impact has been fully confirmed through secondary data and interviews with the executing agency and beneficiaries.
- : Impact has been confirmed through secondary data and interviews with the executing agency and beneficiaries, but the scale of the impact is small or is partially impeded by some factor.
- : Impact has been confirmed through secondary data and interviews with the executing agency and beneficiaries, but there are major impeding factors, and beneficiaries perceive no benefit or a negative impact.
- ?: Impact not confirmed by the survey.

#### 4) Impact of this Project on Alleviation of Poverty

When the plan for this project was drawn up, the ultimate objective was improvement of the incomes and nutrition of farming and fishing people in poor inland areas through increased fish catches. Thus the project did not directly target the poor, but by eliminating factors of poverty, namely income instability and inadequate nutrition, it was expected to have a poverty alleviation impact. This evaluation examines how the project was of use in alleviating poverty factors around each of the lakes.

##### 1. Lake Nong Han

In the area around Lake Nong Han, around 70% of the surveyed households were low income households with total income of less than 40,000 Baht<sup>3</sup>. The impact of the project on poor households defined by the villagers themselves in the RRA survey is evaluated below. The 14 households defined as poor by the villagers were small-scale farmers mainly producing rice, landless farmers (agricultural laborers who are not even renting land), fishing people, the elderly, households unable to earn any income due to illness etc. Seven out of 14 poor households were fishers.

The greatest beneficiaries among the poor households were the small-scale farmers who owned land near the lake. They gained a stable supply of water from the lake which enabled them to increase their income by growing crops in the dry season. Landless farmers and some of fishers were able to increase their income through agricultural laboring

<sup>3</sup> The poverty line set by the Thai government is 911 Baht/ person/ month, from which one can infer that the population in poverty below that poverty line is large in the surveyed villages.

for the dry season crop. Many households among the farmers around the lake catch fish for home consumption, thus the release of fish to the lake provided them with a source of cheap food. On the other hand, some fishers said their incomes had fallen because fish were smaller and some varieties previously found in the lake had disappeared, thus there was little realization of project impact for that group. In this area, the lake is lower than the surrounding area, which means that water must be pumped to the fish breeding ponds. The cost of investment in the pumps and paying for the electricity discourages households from breeding fish on a commercial basis and there has been no impact in the form of increased income from fishing.

## 2. Lake Bung Borapet

In the area around Lake Bung Borapet, around 20% of the surveyed households were low income households with total income of less than 40,000 Baht. Majority of the 41 households defined as poor by the villagers were small-scale farmers, mainly growing rice, but there were also many full-time fisher households (19) and fish breeders in the group. Compared to Lake Nong Han, Lake Bung Borapet has abundant fish stocks, including large fish, and there are many full-time fishers. Releases of fish to the lake directly has been supporting their livelihoods. Some farmers have started using the stable water supply from the lake to grow crops in the dry season, although not on the scale seen around Lake Nong Han. In some cases the farmers relocated due to the rising water level began fish breeding. As a result it appears that landless farmers have been able to increase their means of earning income by laboring for farmers in the dry season or fish breeders. Many households around Lake Bung Borapet catch fish for their own consumption, and the release of fish to the lake has a role in providing low-income households with a cheap food.

## 3. Support for the Poor by Providing Nursery Fish

The main purposes of the nursery fish production in the fishing stations was initially the sale and release, but it is now also functioning as a support operation for various regional development projects in cooperation with other agencies, and some of their works are contributing to the alleviation of poverty. In one of these projects, the fishing stations work with the Department of Elementary Education to support the provision of school meals. Under this project, spare space within elementary schools in poor areas is used to grow crops, dairy and fish, and the products are used for school meals. The fishing stations provide nursery fish free of charge and train teachers and pupils in fish breeding techniques. In Sakon Nakhon Province, where Lake Nong Han is located, 174 schools are breeding fish with the assistance of the fishing station.

## 5) Lessons Learned and Recommendations

### 1. Lessons Learned (for JBIC, Department of Fisheries and Thai Government)

- Policies to alleviate poverty through the promotion of fish breeding

This project is an example of making an effective linkage between nursery fish production and various regional development projects. By increasing nursery fish production capacity, the stations have come to have roles in supporting local projects such as promoting fish breeding in newly irrigated areas, promoting compound farming, supporting school meals in elementary and junior high schools and kindergartens, and releasing fish into communal reservoirs. In particular, the work of the stations in breeding fish in schools and supplying the fish catch for school meals is of direct benefit to children from poor households who may not have access to adequately nutritious meals. That is an effective example of combining fish production with anti-poverty measures.

- The importance of cooperation with other agencies

Lateral cooperation with other agencies is important in regional development projects. Under this project, the functions of the fishing stations, such as technical training and nursery fish production, were made available to a

number of diverse agencies such as the Royal Department of Irrigation, the Department of Rural Development, the Department of Land Development, the Department of Community Development and the Department of Elementary Education, which worked independently or cooperatively on various projects. Many of the projects, such as the school meal supply project in Sakon Nakhon Province, were proposed by the royal family and implemented by government agencies. This is unmistakably one aspect which encourages cooperation between multiple agencies. It would be difficult for the production of nursery fish, in isolation, to have certain impact for regional stimulus, but cooperation with other agencies enabled it to exert a greater impact.

- Collection of baseline information

In cases where it is necessary to grasp the change in the lifestyles of beneficiaries as the impact of a project, like the one aiming to alleviate poverty, it would be desirable to conduct the social survey to grasp the needs of intended beneficiaries and gather information on the beneficiary region prior to the start of the project. This is important for setting benchmarks in anticipation of future impact evaluation, and also for accurate targeting at the planning stage. For the implementation scheme of social survey, JBIC could give the executing agency proposals and instructions at the project formation stage. However, it is important for the executing agency to have ownership of the survey, so another approach would be for the executing agency to lead the survey after the loan agreement is signed. If the alleviation of poverty is made a main project objective, it is important to conduct a social survey to identify the elements of poverty in the target area. First the anticipated beneficiary regions and groups for the project would be defined, and then the degree of poverty in the regions and groups be examined.

## 2. Recommendations (for Department of Fisheries and Thai Government)

- Prohibition of fishing to strengthen resource management

According to the survey, the size of fish and the catch per person are said to be larger in Lake Bung Borapet than in Lake Nong Han. This appears to be strongly influenced by the fishing prohibition periods and zones enforced on Lake Bung Borapet. Measures should be considered to protect fish stocks in Lake Nong Han as well by, for instance, setting no-fishing zones and building fish raising pools next to the lake.

- The potential for participatory resource management

Nocturnal fishing during no-fishing seasons and fishing by illegal methods such as electric shocks are widespread. These practices threaten the sustainability of fish stocks. The participation of fishers and neighboring farmers is essential to make the practice of no-fishing seasons and zones more effective. There are no fishers' organizations on either of the lakes, but the fishers have common needs and problems, such as illegal fishing, rising prices of gasoline for boats, water weed removal and cargo collection on lake jetties. The existence of shared problems is a valuable factor for the effective formation of organizations, and the participatory resource management could be enhanced through such problem solving process. Some of the fishers are also saying that the local people should participate themselves, rather than leaving matters in the hands of the Department of Fisheries. Therefore, this approach would be worthwhile to consider.

- Environmental improvement in Lake Nong Han

Lake Nong Han has been suffering water pollution from urban household waste water discharges, which causes excessive proliferation of water weed (water hyacinth) which impedes the passage of boats. To combat the problem, this project built water purification lagoons and procured weed removal machinery, but according to the residents around the lake and the staff of the fishing station, there is no apparent improvement in water quality. The fishers are particularly concerned about the adverse impact of water pollution on fish stocks. Basic water quality data such as BOD and COD are not being gathered and kept in any sustained way at Lake Nong Han, making it

impossible to check the current state of the water and compare it before and after the project. The Department of Fisheries has been asking for funding of the survey related to dredging and weed clearance, but first it is necessary to carry out continuous monitoring to get an accurate grasp of water quality, and then to study the remedial measures with investigation of pollution causes.

## Comparison of Original and Actual Scope

### 1) Project Cost

Project Content	Original	Actual	Difference
1. Lake Bung Borapet	Rehabilitating works of lakes Construction and rehabilitation of weirs Rehabilitation of sluice gates Dredging and canal rehabilitation	Same as left	
	Improvement of fishing promotion facilities Expansion of fishing stations Construction of monitoring tower	Same as left	
	Improvement of circumferential roads	Same as left	
2. Lake Nong Han	Rehabilitating works of lakes Construction of weirs Enlargement of sluice gates Dredging and canal rehabilitation	Same as left	
	Improvement of fishing promotion facilities Expansion of fishing stations Improvement of fish landing quay	Same as left	
	Construction of water purification lagoons	Same as left	
3. Lake Kwan Phayao	Rehabilitating works of lakes Rehabilitation of sluice gates Rehabilitation of canal	Same as left	



Project Content	Original	Actual	Difference
3. Lake Kwan Phayao	Improvement of fishing promotion facilities Expansion of fishing stations	Same as left	
	Construction of water purification lagoons	Same as left	
4. Construction of LSIF Center	Six-storied	Eight-storied	Expanded at the expense of the executing agency
5. Procurement of Equipment and Materials	Related equipment and materials of lakes and fishing stations One inspection boat 9 outboard boats One bulldozer 18 vehicles 3 waterweed reapers	Nine vehicles were added to the plan on the left	Equipment highly important for work was added within the limit of funding
	Research equipment and materials for the survey center 30 fishing nets 6 fish feed grinders 6 microscopes of various types etc.	Other than the equipment on the left, the following were added. Five computers One wooden flat-bottomed boat (for survey work)	Equipment highly important for work was added within the limit of funding
6. Consulting service	156M/M	Same as left	

Source: JBIC and Department of Fisheries materials.

## 2) Implementation Schedule

Year	1988	1989	1990	1991	1992	1993
Construction works Bung Borapet						
		6		6		
Nong Han						
		6		6		
Kwan Phayao						
		6		6		
Procurement of equipment	8			2		
			4			9
Consulting	7			9		
		9				12

### 3) Project Cost

( Unit Foreign currency : ¥million Local currency: million Baht )

Item	Original (at the time of appraisal)		Actual		Difference ( - )	
	Foreign currency	Local currency	Foreign currency	Local currency	Foreign currency	Local currency
Construction works						
Bung Borapet	402	55	402	205(52)	±0	+150
Nong Han	447	62	400	204(52)	47	+142
Kwan Phayao	230	37	267	136(34)	+37	+99
Sub-total (for ODA loan portion)	1,079	154 (144)	1,069	545 (138)	10	+391 ( 6)
Procurement of equipment	496	36	462	9	34	27
Administration fees		10		18		+8
Consultant	205	14	122	7( )	83	7
Total (for ODA loan portion)	1,780 (1,780)	236 (144)	1,653 (1,653)	579 (138)	127 (127)	+343 ( 6)
Contingency (for ODA loan portion)	79	22				
Total of ODA loan	1,859	144				

Note: The cost of building the LSIF Center is included in the construction costs for Lake Bung Borapet.

Source: JBIC materials, PCR

Exchange rates Original: 1 Baht = ¥5.5 (May 1987)

Actual: 1 Baht = ¥4.67 (Average rate over the disbursement period)



Sluice Gate on Lake Bung Borapet  
(Completed in 1992)



Sluice Gate on Lake Nong Han  
(Completed in 1992)



School Meals Service Project (Sakon Nakhon)



Tomato Cultivation Near Lake Nong Han



Fishes Caught from Lake Bung Borapet



Fishes Caught from Lake Nong Han





Questionnaire Survey  
(near Lake Bung Borapet)



Questionnaire Survey (near Lake Nong Han)



Interview with a Village Committee  
(near Lake Bung Borapet)



Interview with a Group of Fishers  
(near Lake Nong Han)



Interview with a Fish Breeder  
(near Lake Bung Borapet)



Interview with a Poor Household  
(near Lake Nong Han)