

## HOUSEHOLD SURVEY: QUESTIONNAIRES

FEBRUARY 1982

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## Acknowledgement

This series of reports was produced through the joint efforts of professors and students from four of Thailand's leading universities, Chulalongkorn University Social Research Institute, Chiangmai University Center for Social Sciences, Khon Kaen University Faculty of Agricultural Economics, and Kasetsart University Faculty of Forestry as well as research personnel from Meta Systems, Inc. Together they were responsible for the design, execution and analysis of the baseline survey.

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## Author's Note

The results presented herein are meant for use by researchers working on the Renewable Non-Conventional Energy Project. Use of any of the data in this report should be made with the understanding that the data may be revised in subsequent drafts. Approval should be obtained from U.S. Agency for International Development, Bangkok (Rod MacDonald) or Asia Bureau, Washington (Robert Ichord) before quoting any part of this report.

What is firmly rooted cannot be pulled out;  
What is tightly held in the arms will not slip loose;  
Through this the offering of sacrifice by descendants  
will never come to an end.

Cultivate it in your person  
And its virtue will be genuine;  
Cultivate it in the family  
And its virtue will be more than sufficient;  
Cultivate it in the hamlet  
And its virtue will endure;  
Cultivate it in the state  
And its virtue will abound;  
Cultivate it in the empire  
And its virtue will be pervasive.

Hence look at the person through the person; look  
at the family through the family; look at the hamlet  
through the hamlet; look at the state through the  
state; look at the empire through the empire.

Between yea and nay  
How much difference is there ?  
Between good and evil  
How great is the distance ?

Lao Tzu

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## Errata Sheet

### LIST OF CHANGWAT OF THAILAND

In this report a variety of spellings have been used for the survey Changwat and village. The correct spelling and some of the variants are shown below.

#### Changwat

Buri Ram: Buriram, Burirum

Chanthaburi: Chantaburi

Chiang Mai: Chiangmai, Chaing Mai,  
Cheing Mai

Chon Buri: Chonburi

Kamphaeng Phet: Kamphangphet, Kampaengpet,  
Kamphangphet, Kamphangphet

Khon Kaen

Lampang

Nakhon Ratchisima: Korat

Nan

Petchaburi: Petburi, Petchbura,  
Petchaburi

Roi et: Roi-et, Roi-Et

Si Sa Ket: Srisaket, Sisaket

Udon Thani: Udorn Thani, Udornthani

#### Villages

Bang Rahong: Bangrahong

Maikan Sangkan: Mailand Sangkan

Pa Bhu: Pabhu

Wang Chapou: Wangchapoo

Klong Bon: Klongbon

Nong Wangyao: Nongvangyao

Pa Woe: Paver, Paver

Pa Han: Pahan

Pa Nai: Panai

Si Chiengmai: Srichiengmai,  
Srichaiangmai

San Pa Tong: San Pa Toung

Samkhasantisuk: Sam Kha San Tisuk

Mai Ho Phra: Mae Ho Pra

Nong Buaeng: Nongbuaeang

#### OTHER TERMS

Household - Related individuals living in a house and eating together

House compound - Area around the house which is owned by members of the household and is often demarcated by a fence

Head of household - Male or female leader of the members of the household, usually the owner of the house

Head of village - Phuyaiban

Head of sub-district - Kamnan

Village - Muban

District - Amphoe

Province - Changwat

Errata Sheet (continued)

Phase I - Survey in Petchaburi, Korat, Srisaket, Kamphangphet, and Lampang

Phase II - Survey in Songkla, Chantaburi, Ror-et, Udorn Thani, and Chiang Mai

Phase III - Survey in Nan, Burirum, and Chiang Mai

Delivered heat - The amount of energy content in the fuel burned

Captured heat - In cooking, the amount of heat which is transferred to the cooking vessel

Moisture content - On a wet basis, weight of water as percentage of total sample weight

Heat or energy content - The high heat content of a substance at 0% moisture as measured in a bomb calorimeter

1 Unit of electricity - 1 kilowatt-hour, a billing unit used by the Provincial Electric Authority

6 1/4 rai = 2 1/2 acres = 1 hectare

jar lamp - small wick lamps

wick lamp - chimney or hurricane lamps

Rice Products - Straw: residue in field,  
- Stalk: residue from threshing,  
- Husk: shell residue from milling  
- Bran: edible residue from milling

NEA - National Energy Administration of Thailand

NSO - National Statistics Organization of Thailand

PEA - Provincial Electricity Authority

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## Introduction

This report contains six sections. The first is the final household questionnaire as used in Phase II of the survey. The second is the interview schedules used by the survey enumerators as a guideline in their discussions with the village leaders and local officials. The third is the format for the enumerator's essays describing what they had learned from their interview and participation in village life. Also included in the classification scheme used to categorize the enumerator's responses. The fourth section contains data collection forms for the various physical measurements and observations made in conjunction with the household survey. The fifth section contains other questionnaires used to collect specific information from the enumerators and villagers which was not included in the household questionnaire. The sixth section contains some of the results obtained from the documents in the preceding two sections. These results are recorded separately for each survey village.

# 1.0 Questionnaire - Phase II

## 1. BASIC DATA

### 1.1 MEMBER IN HOUSEHOLD

1.1.1 Please indicate the member of people in your household who spend at least half the year living at home

No.	Name	*A Relation ship w/the head of family	*B		*C		Education		*F Able to read or write
			Sex M/F	Age	Marital Status	*D	*E		
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

CODE

\*A

1. head family
2. wife
3. children
4. daughter/son in law
5. relative
6. non-relative
7. other

\*B

1. male
2. female

\*C

1. single
2. married
3. widow
4. separated
5. divorced

\*D

1. not go to school
2. P<sub>1</sub> - P<sub>4</sub>
3. P<sub>5</sub> - P<sub>7</sub>
4. MS<sub>1</sub> - MS<sub>3</sub>
5. MS<sub>4</sub> - MS<sub>6</sub>
6. above MS 6 - University
7. other

\*E

1. yes
2. no

\*F

1. unable
2. fair
3. good

\*G

1. farm worker
2. farm hired labor
3. non farm worker
4. salary
5. government officer
6. other

1.1.4 Check off the duties of each member of the household (above 5 years old)

(use x for yes, - for no)

Duties	No. of member	1 Head Family	2	3	4	5	6	7
1. child care								
2. household work								
3. land preparing								
4. planting								
5. taking care of (plants or crops)								
6. harvesting								
7. threshing								
8. animal husbandy								
9. fish raising								
10. selling food products								
11. handicrafts/ household industry								
12. shopping								
13. gathering fuel								
14. callest water								
15. trading								
16. cooking								
17. other (specify)								

1.1.5 Have you lived in the village all your life ?

yes  no

1.1.6 If not how long have you lived in this village.....years

1.2 Household

1.2.1 Do you own your house ?  yes  no

1.2.2.1 How many years ago was your house built ?.....years.

1.2.1.2 What style is it ?

- on stilts
- one storey on ground
- two storey
- others

1.2.2.3 Who built your house ?

- yourself  hired someone
- with friends  others

1.2.3 House Construction observe the following

Description	Dimension	Materials * A			* B Location
		wall	roof	floor	
1. main house					NA
2. kitchen					
3. store house					
4. pond		NA	NA	NA	
5. latrine	NA				
6. pens					
7. gardens		NA	NA	NA	
8. compound		NA	NA	NA	NA
9. others buildings (specify)					

\* A Material

1. - teak, heave finished woods
2. - common woods
3. - bamboo, rough cut wood
4. - metal sheeting
5. - tiles
6. - bricks
7. - concrete
8. - thatch
9. - earth
0. - wood and other

\* B

1. in the main house
2. attached to the house
3. separated from house
4. ground floor

For the household compound show the physical location of the different and other uses of this space such as gardens, groups of trees, animal pens, etc. Also use an arrow to show which direction is North

2. Possessions

Household

1.  Electric Generator
2.  Car
3.  Motorcycle
4.  Bicycle
5.  Row boat
6.  Motorboat
7.  Radio, Cassette
8.  Television
9.  Electric fan
10.  Refrigerator
11.  sewing machine
12.  electric iron
13.  charcoal iron
14.  thermos

Farm

1.  rice storehouse
2.  small tractor (2 wheel)
3.  large tractor
4.  rice mill
5.  sprayer
6.  hand water pump
7.  plough
8.  open bucket well
9.  water sprinkler
10.  threshing machine
11.  pickup truck

Other

1.  electric, diesel or gasoline powered, water pump
2.  minibus
3.  animal cart
4.  trailer
5.  push cart
6.  power unit such as kubota
7.  diesel or electric rice mill

3. Employment - Describe the income earning activities of the members of your household who are over 10 years old

note 1

1. farming land, farming in tenured
2. hired agricultural labour,
3. non-agricultural day labour,
4. animal husbandry,
5. trading,
6. craftsman,
7. handicrafts,
8. store-keeper
9. administrative,
10. armed forces,
11. professional,
12. salaried employee,
13. transport,
14. sericulture
15. fish farming
16. fishing
17. other(specify)

note 2

1. winter
2. dry
3. rainy
4. all year

3.2 Labor Exchange

3.2.1 Does your family participate in labor exchange

- yes                       no

3.2.2 Use of labor exchange

- planting                       harvesting  
 threshing                       other agriculture  
 non-agriculture

3.2.3 Amount of labor exchange

Labor out.....workers/day.....days/year

Labor in.....workers/day.....days/year

4. Land

4.1 How many rai of land does this household control? (include all land rented from others, don't include land that is rented to others)

Type of tenure	number of tax rai
4.1.1 owned by household	
4.1.2 rented from other, paying cash	
4.1.3 rented from other, paying by products	
4.1.4 rented from other, both cash & products	
4.1.5 free for use	
4.1.6 other type of tenure, specify	

4.2 Describe the individual plots into which this land is divided.

plot number	number of tax rai	distance from house (km.) or time to walk from house (minutes)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

4.3 Do you have enough land to grow food for your family ?

yes  no

4.4 In the future will your sons and daughters inherit enough land to grow food for their families

yes  no

4.5 Do you want to increase the land you control

yes  no

4.6 Do you want to increase your land

buy..... rai      plant virgin land..... rai  
rent..... rai      other (specify)..... rai

4.7 How much does land cost in your village

padi..... Baht      upland crop..... Baht      orchard..... Baht  
family compound..... Baht

4.8 Do you have enough money to buy

padi                     yes                     no  
orchard                 yes                     no  
upland crop             yes                     no  
family compound       yes                     no

4.9 Does the household control land which is not used for the household compound or for agriculture (include orchard)

yes                     no

4.10 If yes then what is this land used for and why is it not used for agriculture

size of land	use of land	why not used for agriculture
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

5. Agricultural Production and Product Distribution

Type of Crop	area planted (tax rai)	how often planted (per year)	growing period (months)	total production (tons)	exchange for seed fertilizer	use for fodder	exchange for animal equipment rental	exchange for other things	for seed	pay debt	pay rent	sell to trader	consume at home
sticky rice													
plain rice													

	area planted	how often planted	growing period	total production	sell to trader	consume at home	other specify	notice

- Code
- 3. watermelon
  - 4. tobacco
  - 5. corn
  - 6. cassava
  - 7. sugar cane
  - 8. kenaf
  - 9. cotton
  - 10. betel
  - 11. vegetable-beans
- ( rubber, coconut, banana, rango for four crops fill in question 9 )

6. Type of and Amount Equipment Used for Agriculture

Type of Crop code 1	Fertilizer		Pesticide		Insecticide		tractor	animal		labor	
	kind	amount per rai (kg)	kind	amount per rai (kg)	kind	amount per rai (kg)	days per year	number	<u>days</u> year	number/ day	<u>days</u> year
Sticky rice	chemical										
	natural										
regular rice	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										
	chemical										
	natural										

7. Livestock

7.1 What type of livestock does the household own and how was it used in the last twelve months

Type	Quantity		use <u>1</u>	number died	number Consumed	number Sold	who <u>2</u> Purchased	why this <u>3</u> Purchaser	number increase		
	now	12 months before							Bought	born	free
elephant											
buffalo											
cow											
goat											
swine											
duck											
hen											
goose											
turkey											
other											
Type	labor caring for animals (man-hours per week)	where are they kept <u>4</u>			type of fodder <u>5</u>			Did you ever buy food for animal			
		S	R	W	S	R	W				
elephant											
buffalo											
cow											
goat											
swine											
duck											
hen											
goose											
turkey											
other											

Note 1

1. work on farm
2. transport
3. consumption
4. sale
5. other (specify)

Note 2

1. village middleman
2. middleman from outside village
3. consumer
4. government
5. factory
6. cooperative, farmers group
7. creditor
8. other (specify)

Note 3

1. relative
2. long term contract
3. provides transport
4. provides credit
5. easy to arrange
6. pays immediately
7. only one purchaser
8. no reason
9. other (specify)

Note 4

1. pen
2. tethered
3. in house compound
4. herded
5. graze on own land
6. graze in village
7. graze in and out of village
8. other (specify)

Note 5

1. rice bran
2. rice husk
3. broken rice
4. rice
5. corn
6. processed feed
7. straw
8. grass
9. hay
10. other

7.2 Have you ever used animal dung ?

If yes, for what ?

Type of animal	* yes or no	used for
elephant		
buffalo		
cow		
goats		
swine		
duck		
chicken		
goose		
turkey		
other		

Code A 1. yes

2. no

B 1. fertilizer for own use

2. fertilizer for sale

3. fuel for own use

4. fuel for sale

5. others (specify)

8. Fish (from last 12 months)

8.1 Does the household have a fish pond

yes                       no

If yes

8.2 How long have you had the fish pond.....years.

How many fish ponds do you have.....

8.3 What is the approximate size of the pond (meter)

	<u>First pond</u>	<u>Second pond</u>	<u>Third pond</u>
Length	.....	.....	.....
width	.....	.....	.....
depth	.....	.....	.....

What kind of fish and what are these fish used for?

Type of fish	consump- tion/Kg.	sell	
		quantity /Kg.	price

8.4 Who do you sell the fish to ?

- middleman (out of village)
- neighbour
- market
- small industry
- middleman (in the village)
- others (specify)

8.5 Do you feed the fish ?

- yes
- no

If yes then what types of feed are used and what are their source.

Type of feed	Source *

- Source \*
- 1. market
  - 2. household agriculture
  - 3. trader or middleman
  - 4. others (specify)

9. Orchards - Trees

9.1 Does the family have any land outside the family compound that is used for growing trees ?

yes                      no

9.2 If yes then how much area is used for growing these trees

..... tax rai

9.3 If yes then indicate the type of trees grown, their use and the approximate number of trees of each type

Area	Type of trees			used (x for yes)			
				cash crop	fuel wood	home consumption	other (specify)
padi field or upland							
orchard							
origin land							

9.4 For trees grown for cash crop, how much was earned in the last twelve months ?

Type of tree	earning in last twelve months (Baht)

**9.5 Gardens**

Describe the types of trees and plants grown within the household compound.

Are these plants and trees used to produce fuel, fodder, food or cash crops other(specify)

Is the product sold, consumed by the members of the household or both

Type of tree or plant	approximate number in Compound	use of products; are they						
		consumed by household	sold	both	used for food	used for fodder	used for fuel	other uses (specify)



Note 1

1. at home
2. in village market
3. in some subdistrict (TAMBON)
4. in the some district
5. in the some province
6. other (specify)

Note 2

1. village middleman
2. middleman outside village
3. consumer
4. government
5. industry
6. co-operative
7. creditor

Note 3

1. relative
2. long term contract
3. provides transport
4. in debt, provides credit
5. convenient
6. pays immediately
7. no choice
8. no reason
9. other (specify)

11. Income

11.1 Indicate the sources of income and the amount of income earned by members of your household.

Source	Approximate Income
1. home industry	
2. hired agricultural labor	
3. hired non-agricultural labor	
4. sale of goods outside home	
5. salaried labor	
6. rental of land	
7. rental of equipment	
8. rental of animals	
9. middleman	
10. military	
11. real estate	
12. pension	
13. other (specify)	

12. Fuel

12.1.1 Describe the types of fuel used in the household for cooking, lighting, or home industry

	kerosene	charcoal		firewood	sawdust	rice husk	gas	other (specify)		
		wood for charcoal	charcoal							
1. where is fuel obtained <u>a</u>										
2. availability in market <u>b</u>										
3. is part sold or traded										
4. is fuel dried yes or no										
5. how is fuel dried <u>c</u>										
6. average storage time for fuel (weeks)										
7. where is fuel stored <u>c</u>										

- other
1. diesel
  2. coconut branch
  3. coconut shell
  4. other agricultural residue

Note a

1. collect from own property
2. collect from other's property
3. collect from village public land
4. obtain from traders
5. buy in market
6. others (specify)
7. not used
8. collect from property and buy from market or trader
9. collect from village public land and buy from market or trader
0. collect from other and buy from market or trader

Note b

1. all of the time
2. unavailable less than 3 days per month
3. unavailable less than 1 week per month
4. unavailable less than 2 week per month
5. not available

Note c

1. in open air
2. under shelter without walls, ground floor.
3. under house eaves
4. inside store room (cottage)

12.2 How often do you collect fuel and from where ?

Type of fuel <sup>1</sup>	Number of times collected per month *			Method of transport <sup>2</sup>	distance to source (km)	average time to get fuel	averages number of persons per trip
	Summer	Rainy	Winter				

- <sup>1</sup>
1. firewood
  2. wood for charcoal
  3. padi husk
  4. coconut branch
  5. coconut shell
  6. other small branches
  7. other agricultural residues
  8. others (specify)

- <sup>2</sup>
1. carry by hand
  2. cart
  3. tractor
  4. bicycle
  5. animal
  6. boat
  7. other (specify)

\* use 1 if collected during a season (but less than once a month)

Part II Type of Energy used.

12.3.1 If use fire wood or charcoal

kind of wood that is most use .....

kind of wood that is least used .....

other kind of wood that is used .....

12.3.2 What type of tree do you grow

type 1       type 2       mixed       other

12.3.3 Do you have your own wooded area

yes       no

12.3.8 What part of the tree is used as a fuel ?

- leaves
- small dead branches
- large dead branches
- green wood, branches
- trunks, dead wood
- root, deadwood
- root, greenwood
- bark
  
- other

12.4 Attitude and Opinion about energy

12.4.1 You think that in present, the fuel you have it

more enough       enough       not enough

12.4.2 In the future do you want the fuel supply to

not increase       increase       increase a lot

12.4.3 What kind of fuel do you want in the future ?

firewood       charcoal       biogas  
 dung       other (specify)

12.4.4 If Government supports development of energy sources will you

participate       not participate  
 not certain

12.4.5 How do you want the Government to help you ? By providing source of

land       ideas       both

12.4.6 Do you have any problem concerning type of fuel material ?

yes, often       yes       no

12.4.7 Concerning the cost of fuel do you think that it is

not expensive       expensive       very expensive

**Local Interest in Participation**

12.5 Which of following would you be willing to contribute to the construction of an energy system to produce your first and second choices?

- money(will buy the system)
- labor and materials
- time for operation and maintenance
- Produce(part of increased agricultural/industrial production due to new energy source)

**Local Valuation of New Energy**

12.6 which do you like best

electricity(domestic use)

biogas

firewood,charcoal

**13 Food,Cooking,and Stove Design**

13.1 How much of the following foods did you cook in the last week (if possible measure typical quantity in plastic bag)

Type of food	average quantity kg./day	does this vary by season	if yes than in which season is more consumed
sticky rice			
regular rice			

1. How many times is cooking done each day.....
2. How much time is spent cooking each day.....hours
3. Does this change with season  yes  no
4. How does it change with season.....why.....
5. Are foods cooked which are consumed by people who are not members of the household  yes  no

What foods and what percentage are cooked for others

Type	family consume	seed	half/half	other

6. If yes then are these foods

- sold       exchanged       given for charity  
 other (specify)

7. What kind of food is cooked for others ? \_\_\_\_\_

8. Is water boiled before being consumed     yes       no

Why do you boil water ?

- health       tradition       other (specify)

9. How much water do you boil each day \_\_\_\_\_ liters

10. Does the amount of water boiled change     yes       no  
reason \_\_\_\_\_

13.2 How often do you and your family eat these foods

List	Do you eat these yes/no	frequency of consumptions			
		every day	2-6 times per week	1 time a week	rarely
1.Beef					
2.pork					
3.chicken					
4.duck					
5.vegetable					
6.beans					
7. fresh- water fish					
8. salt- water fish					
9.mushroom					
10.bamboo					
11.eggs					
12.fruit					
13.others (specify)					

yes = x

no = -

13.3 How do you cook the following foods ?

methods type of food	boil	curry	steam	barbecue	fry	raw	roast	other
rice								
glutinous rice								
vegetables								
meats								
fish								

13.4 What type of fuels are used for cooking during the different season

Type of fuel \*

Type of food	wet season		winter season		dry season	
	first fuel	second fuel	first fuel	second fuel	first fuel	second fuel
1.boiling rice						
2.boiling water						
3.other cooking						

- \* 1 - charcoal
- 2 - firewood
- 3 - kerosene
- 4 - gas
- 5 - electric
- 6.- paddy husk
- 7 - straw
- 8 - dung
- 9 - biogas
- 10 - coconut branch
- 11 - other (specify)

13.5 What type of stoves are used for cooking?

Stoves	boiling rice	boiling water	cooking vegetables	other (specify)
1. 3 rock				
2. portable bucket stove				
3.one port clay stove				
4. multiple port clay stove				
5.paddy husk cooker				
6.kerosene wick				
7.kerosene pressure				
8.electric rice cooker				
9.electric hot. plate				
10.gas stove				
11.biogas burner				
12.other (specify)				

13.6 Does your household use different cooking fuels in different seasons?

yes  no

13.7 What is the reason for selecting different cooking fuels

season	fuel	reason <u>1</u>
rainy		
winter		
summer		

Note 1

1. easiest to collect
2. readily available in market
3. must purchase, no time to collect
4. agricultural residues readily available
5. least expensive
6. desirable cooking properties
7. other fuels are not convenient
8. other fuels preferable but not available
9. other(specify)

13.8 How many people eat at each meal ?

1<sup>st</sup> meal.....2<sup>nd</sup> .....3<sup>rd</sup> meal.....

13.9 Does your household own any of the following types of energy producing units

1. electrical generator  yes  no
2. charcoal kiln  yes  no
3. biogas digester  yes  no
4. windmill  yes  no
5. battery, rechargeable  yes  no
6. other (specify)

13.10 What type of cooking fuel do you use now

wood  charcoal  other(specify)

13.11 In the past what type of cooking fuel did your parents use

wood  charcoal  other(specify)

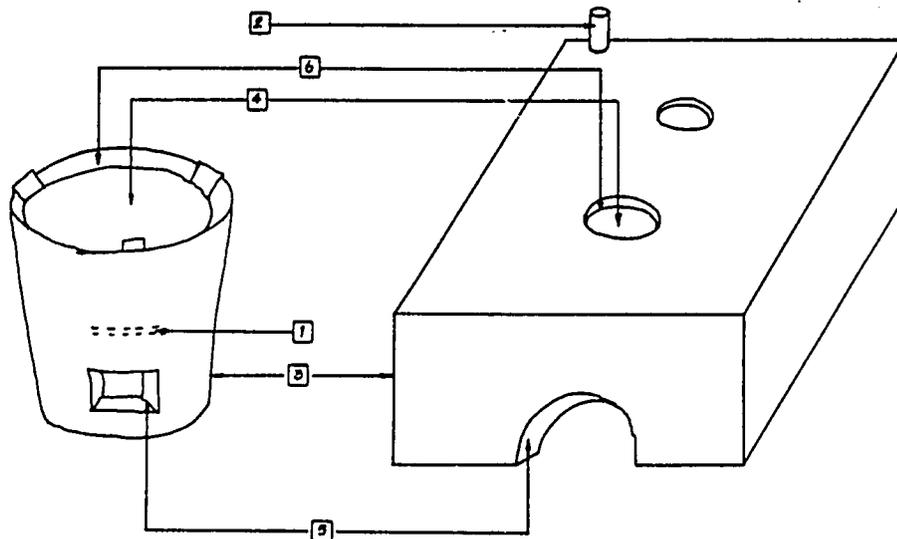
13.12 In the future what type of cooking fuel will your children use

wood  charcoal  other (specify) \_\_\_\_\_

13.13

\* Look at the stove with the owner and describe the material used for

	metal	clay	cement	wood	brick	stone
1. fuel grate						
2. chimney or flue						
3. outer surface						
4. inner surface						
5. between the inner and outer surface						
6. rim of cooking port						



How old is this stove \_\_\_\_\_ years

How much longer can this stove be used \_\_\_\_\_ year

Are there cracks in the stove  yes  no

If yes, where 1 2 3 4 5 6 (circle number as shown in drawing)

- If yes, are they
- few and small
  - many but small
  - few and large
  - many and large

13.14 What problems does this stove have

Type stove	Safety <u>1</u>	Operation <u>2</u>
3 rock		
portable bucket		
one port clay		
multiple port clay		
paddy husk cooker		
kerosene wick		
kerosene pressure		
electric rice cooker		
electric hot plate		
gas stove		
biogas burner		

Note 1

- 1.smoke in eyes
- 2.kitchen fires
- 3.roof fire
- 4.burning people
- 5.other(specify)

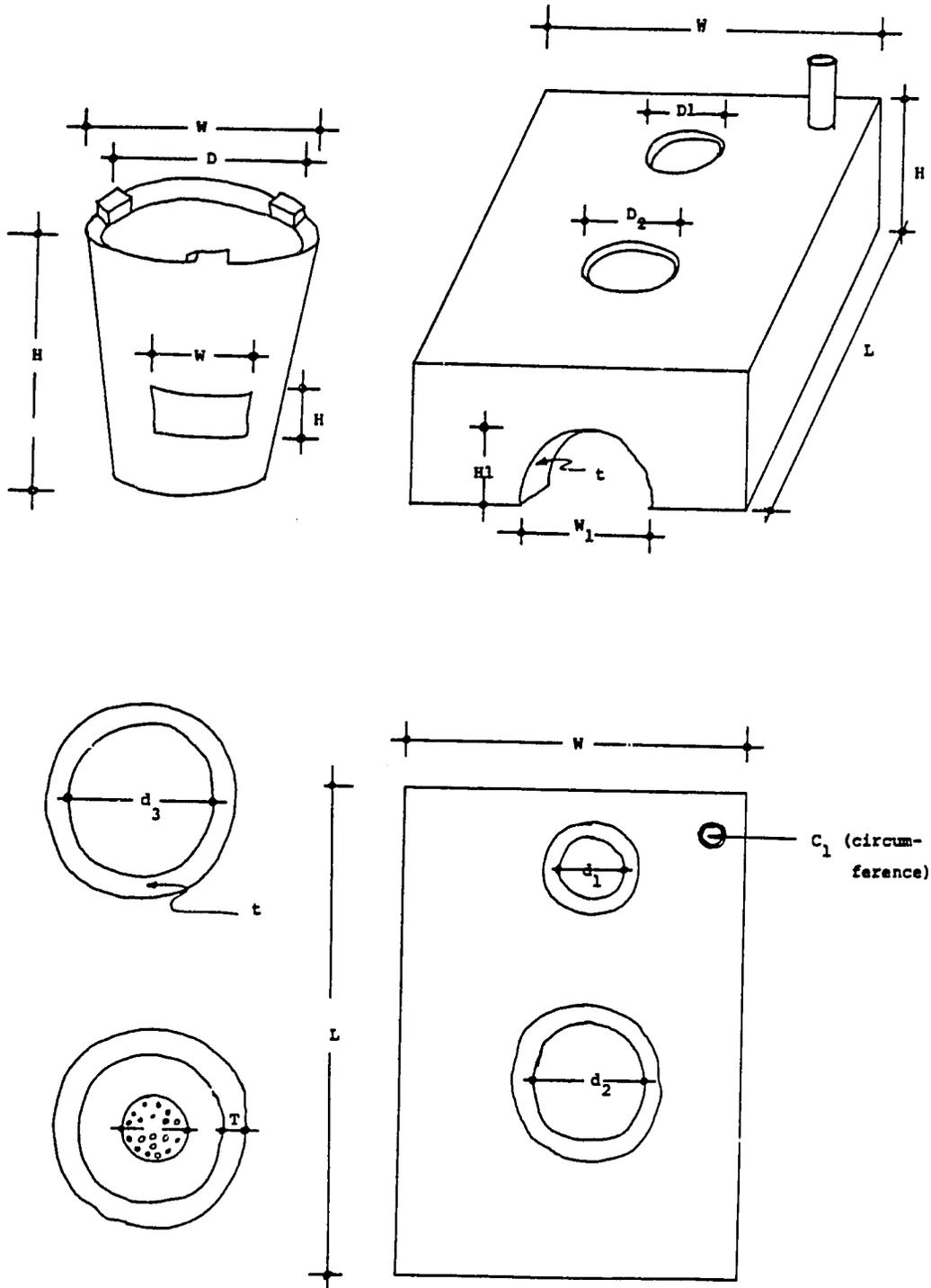
Note 2

- difficulty in
- 1.removing ash
  - 2.starting fire
  - 3.extinguishing fire and saving fuel
  - 4.controlling heat
  - 5.standing,sitting or kneeling
  - 6.other

Describe how the heat is controlled on this stove ?

Type of stove	heat controlled	
	increase	decrease

13.15 If the type of stove used in this house is a design that you have not seen before or if you are conducting a stove experiment please record the height, length, width, thickness and size of openings of the stove. The diagram below shows how to measure these dimensions for two typical designs



13.16 Which of the following cooking fuels are familiar to you?

Type of fuel	Don't know	know but have not seen	know and have seen
biogas			
kerosene			
electricity			
LPG			
others			

13.17 Is any part of the house heated during the winter season

yes  no

13.18 If yes

during which season	how many days in this season	How much ** (kg.)	fuel type *
rainy			
winter			
summer			

\*\* ask respondent to gather an average amount of fuel for heating for one day and measure this amount

- \* 1. fuel wood
- 2. charcoal
- 3. gas
- 4. other

14. Lighting

14.1 What type of lighting do you use in your household

	number	number of hours used each day	notice
1.wick kerosene			
2.small jar kerosene			
3.pump kerosene			
4.gas lighting			
5.flashlight			
6.fluorescent			
7.incandescent			
8.candle			
9.other(specify)			

14.2 How much kerosene is used each week for lighting? (Liters)

.....

14.3 What activities are performed at night using this lighting?

- reading,writing,studying
- sewing,household shores
- handicrafts,or farm related work
- socializing
- movement
- night work
- other(specify)
- eating

14.4 What type of lighting is preferred

Type	order of preference (1 <sup>st</sup> to 5 <sup>th</sup> )	reason <u>1</u>
kerosene wick		
kerosene pressure		
candle		
incandescent		
fluorescent		

1

1. better light
2. easier to use
3. less expensive fuel
4. less expensive lamp
5. other (specify)

14.5 If the house has electricity answer the following questions

- What is the capacity of hook up ?.....amperes
- How many kilowatt hours (or units) are consumed each month ? .....
- What is the electricity cost?.....per month  
.....per kilowatt-hour (or unit)

To whom is payment made?

- self generated
- PEA
- Bank
- Co-operative
- others(specify)

15. Credit

15.1 Have you or a member of your household ever borrowed money from

- |  |                                 |  |
|--|---------------------------------|--|
| <input type="checkbox"/> relative        | <input type="checkbox"/> friend | <input type="checkbox"/> wealthy person  |
| <input type="checkbox"/> mill owner      | <input type="checkbox"/> trader | <input type="checkbox"/> middleman       |
| <input type="checkbox"/> farmer's group  | <input type="checkbox"/> BAAC   | <input type="checkbox"/> savings Co-op   |
| <input type="checkbox"/> saving group    | <input type="checkbox"/> patron | <input type="checkbox"/> commercial bank |
| <input type="checkbox"/> other (specify) |                                 |  |

15.2 For what period of time do you usually borrow

..... months.

15.3 What rate of interest do you usually pay

..... % per month.

15.4 Have you ever borrowed money without interest from a patron or friend ?

If yes, how did you return the favor to your friend or patron

.....  
.....  
.....  
.....  
.....

15.5 Have you ever obtained fertilizer or seed on credit

- Yes       No

If yes then from whom ?

- mill owner  
 cooperative or farmers group  
 government  
 other (specify) .....

15.6 If yes, did you have to pay a higher price or a fee for obtaining this fertilizer or seed on credit ?       Yes       No

If yes, what were the conditions under which these items were supplied

- pay later but a higher price  
 pay later at the same price ?  
 exchange labor for rice or other crop  
 agree to sell your crops to the supplier  
 other (specify) .....

15.7 Have you ever sold your crop before harvesting it ? (while it is in the field) If yes, to whom

- mill owner
- trader
- money lender
- patron
- other (specify) .....

15.8 If yes, under what conditions did you sell the crop

- at a lower price than you would normally obtain
- at the same price as during the harvest time
- at the same price as harvest time but with a discount
- other (specify) .....

15.9 Who provides assistance when you need money for a wedding or special occasion

- |  |                                 |   |
|--|---------------------------------|---|
| <input type="checkbox"/> relative        | <input type="checkbox"/> friend | <input type="checkbox"/> wealthy person |
| <input type="checkbox"/> mill owner      | <input type="checkbox"/> trader | <input type="checkbox"/> middleman      |
| <input type="checkbox"/> farmer's group  | <input type="checkbox"/> BAAC   | <input type="checkbox"/> savings Co-op  |
| <input type="checkbox"/> savings group   | <input type="checkbox"/> patron | <input type="checkbox"/> bank           |
| <input type="checkbox"/> other (specify) |                                 |   |

15.10 If you have borrowed money in the past but not from the BAAC then why not ?

- |   |  |
|---|--|
| <input type="checkbox"/> difficult to get loan  | <input type="checkbox"/> cannot borrow   |
| <input type="checkbox"/> interest rate too high | <input type="checkbox"/> no reason       |
| <input type="checkbox"/> requires collateral    | <input type="checkbox"/> not a member    |
| <input type="checkbox"/> overborrowed           | <input type="checkbox"/> other (specify) |

15.11 Would you be willing to borrow from the BAAC in the future

- yes       no       Don't know

If yes, under what circumstances

- |  |   |
|--|---|
| <input type="checkbox"/> lower requirements for collateral | <input type="checkbox"/> less difficult procedure |
| <input type="checkbox"/> longer term loans available       | <input type="checkbox"/> lower interest rate      |
| <input type="checkbox"/> other (specify)                   |   |

15.12 What advice would you give your children about accepting financial help from others .....

.....  
.....

16. Group Participation

16.1 Do you or a member of your household participate in one of the following groups ? If yes, is this group helpful and how often does it meet

type of group	group in this village	member yes or no	is group useful	frequency of meetings <u>1</u>
1. village committee				
2. temple committee				
3. school committee				
4. village development committee				
5. agriculture cooperative group				
6. savings group				
7. farmers group				
8. youth farmer group				
9. water use or irrigation group				
10. housewife group				
11. professional group				
12. village boy scout group				
13. BAAC group				
14. burial group				
15. teenage group				
16. veterans group				
17. political party				
18. self defense group				
19. other (specify)				

x for yes, - for no

Note 1

1. 1-2 times/week
2. 1-2 times/month
3. 3-6 times/year
4. annual
5. no schedule
6. never

16.2 Is there a development committee in your village

yes  no  Don't know

16.3 If yes, have they had any project in the last 12 months

yes  no

16.4 If yes, describe the project

building road  building source of water  
 building bridge  other (specify) .....

16.5 Do you think that this project was important for the village

yes  no

16.6 If no, then what project is important

building road  building source of water  
 building bridge  other (specify) .....

16.7 Do you or any member of your household have an ability to solve village problems ?  yes  no

If yes, then what way could you help

money  labor  equipment  
 other (specify)

16.8 Have you or a member of your household worked with any group on a community development project in last 5 year

yes  no

16.9 If yes please list

<u>with whom</u>	<u>for what</u>	<u>when</u>
<input type="checkbox"/> relatives	<input type="checkbox"/> road	<input type="checkbox"/> in last 12 months
<input type="checkbox"/> neighbors	<input type="checkbox"/> source of water	<input type="checkbox"/> in last 2-5 years
<input type="checkbox"/> your group	<input type="checkbox"/> bridge	<input type="checkbox"/> more than 5 years ago
<input type="checkbox"/> others	<input type="checkbox"/> other (specify)	

16.10 If no then could you work with other people to improve your community ?

yes  no

16.11 If yes then with whom would you be willing to work ?

relatives  neighbors  friends  
 others

16.12 Under what conditions would you work ?

voluntary labor  exchange labor  hired labor  
 other (specify) .....

16.13 What are the major problems for you and your family in agriculture  
.....  
other than agriculture .....

16.14 What would you need to solve these problems ?

money  equipment  other .....

16.15 Are your problems similar to those of your neighbors ?





TRANSPORTATION DATA

19.1 Transprotation of goods

	in village				outside village			
	method of transportation *	average distance for trip(km)	trips per month	number of months per year	method of transportation	average of distance for round trip(km)	trips per month	number of months per year
buy or sell agricultural products or inputs	buy							
	sell							
buy or sell household and consumer goods	buy							
	sell							

\* Method of transportation code

- 00 no transportation or merchant comes to your home
- 01 tractor
- 02 car
- 03 train
- 04 large track
- 05 private vehicle
- 06 bus
- 07 mortorcycle
- 08 tri-motorcycle
- 09 motor boat
- 10 boat
- 11 bicycle
- 12 tri-bicycle
- 13 animal
- 14 animal cart
- 15 walk
- 16 push cart

Travel by Family

What is the average number of times member of your household use the following transport in one week

	Average number of trips per week *			average distance one way
	Rainy	Winter	dry	(Km.)
Bus				
Small truck or jitney, Kwaylek				
Motorcycle, Tuk				
Automobile				
Animal cart				
Large truck				

\* A person-trip is the number of people travelling multiplied by the number of trips made

20. Home Industry

If the household produces a product for sale, obtain the following information

20.1. What type(s) of product are produced \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

20.2. is any hired labor used?  yes  no if yes then how many and for what period each year

number of employees	period pf employment

20.3. What is their average daily wage ? \_\_\_\_\_ Baht per day

20.4. What raw materials are used in this production activity? \_\_\_\_\_  
 \_\_\_\_\_

20.5. What type of equipment is used in this production \_\_\_\_\_  
 \_\_\_\_\_

20.6 What type of fuel is used \_\_\_\_\_  
 \_\_\_\_\_

20.7 If possible measure how much fuel is consumed and how much product is produced

weight of fuel	type of fuel	weight of product	type of product

20.8 Selling proce of product in local market and in central market?

Village Market	Central Market
_____ Bahtper _____	_____ Baht per _____

20.9 Cost of raw materials?

type	cost		units
		Baht per	
		Baht per	
		Baht per	

20.10 How much raw material is required for producing a fixed quantity of product

type of raw material	quantity of raw material	quantity of product

21. Crop Processing

21.1 Crop Drying

type of crop	method of drying <sub>1</sub>	cost of drying	cost of drying unit <sub>2</sub>	price increase after drying

Note 1

- 1 in open, sun
- 2 dryer oven
- 3 shelter, solar heat
- 4 closed storage
- 5
- 6 smoke house
- 7 other

Note 2

ask only  
if interviewee is owner

21.2 Crop milling

type of crop	method of milling <sub>1</sub>	amount milled	cost of milling	cost of milling unit <sub>2</sub>	price increase after milling

Note 1

- 1 machine
- 2 manual
- 3 animal

Note 2

ask only  
if interviewee is owner



22. Fuel use form

22.1 Cooking (non-gas)

time of measurement

fuel type	amount at start (kg)	amount at end (kg)	period of measurement (days)

22.2 Lighting (non-electric)

type of fuel

amount at start	amount at end	amount added	units	period of measurement (days)

22.3 Lighting (electric)

bulb size (watts)	nightly hours of operation	total watt hours

monthly cost \_\_\_\_\_

22.4 Gas lighting or cooking

size of tank \_\_\_\_\_

average length of time used \_\_\_\_\_

## 2.0 Interview Schedules

### 2.1 Interview with the Village Leader

This interview should concentrate on two areas; the overall problems of the village and the government and local programs which are concerned with these problems. The energy technologies which are being introduced in this project will only be accepted if they relate to the problems of the villagers. The discussion with the village leader should be unstructured, but some of the questions to be covered are;

1. What are the major problems of the village with regards to
  - agriculture
  - land ownership
  - poverty
  - health
  - non-farm employment
  - transportation
  - marketing the outflow of agricultural goods and the inflow of consumer goods
2. What government programs have been introduced into the village in the last five years and how effective have they been in solving the problems of the villagers ?
3. As government involvement in village problems increases and the local programs become more complex, who will you look to for assistance in providing leadership for the village ?
4. What local programs have already been initiated to relieve the programs of the villagers ?
5. Who initiated these programs and how was the participation of the villagers obtained ?

## 2.2 Interview with Agricultural Extension Agent

The interviewer should discuss with the Agricultural Extension Agent the type of agriculture practiced in the region. Agriculture is important because it requires various forms of energy including human, animal and machine power and it produces fuels in the form of agricultural residues and animal wastes. The most important subjects to be discussed are;

1) The major crops planted, 2) the changes in agricultural practices which have occurred over the last ten years, 3) the principal problems of the farmer, and 4) the new programs which are being introduced which will change agricultural practices in the next few years.

Among the questions to be discussed are;

1. What are the principal crops grown in this area?
2. During what months do the following activities occur - land preparation, planting, fertilizing, irrigation, weeding, harvesting, milling, selling?  
Prepare a calendar to describe these activities on the attached sheet.
3. When are the periods of peak labor demand and how is this demand met (labor exchange, hired labor, machines, migrant labor, etc)?
4. Is multiple cropping practiced (if more than one crop is planted in a year then please indicate the sequence of planting and harvesting)?
5. Is mixed cropping practiced (if crops are planted together in the same field then indicate which ones are planted together)?
6. Is rotation of crops practiced (if different crops are planted in successive years indicate the sequence of planting)?
7. What fertilizers, pesticides, herbicides and insecticides are used by the farmers for the different crops?
8. What is the recommended rate of application for each?
9. Is irrigation practiced. If yes then during which months? What are the sources of water? Who controls the flow of water to the individual plots?
10. What crops are planted in the different areas (such as the lowland, upland and hillside areas) ?
11. Is there a problem with erosion on the upland and hillside areas?

12. When does the farmer normally sell his crop and to whom?
13. How could the farmer obtain a better price for his crop.?
14. Where do the farmers obtain money for purchasing seed, fertilizer, hired labor or equipment, fuel for equipment, etc?
15. What are the major problems for the farmers ;  
indebtedness?, poor yields? low prices for farm products?  
decline in soil fertility? irregular weather? lack of irrigation?  
landlessness? insufficient land? lack of additional land to rent, purchase or open for cultivation?
16. How much land is required to support a family of six at an acceptable level of income assuming that they do not have another source of income?
17. What are the major changes which have occurred in the last ten years in
  - a. the types of crops planted?
  - b. the method of cultivation?
  - c. the areas in which crops are planted?
  - d. the use of labor and the arrangements for obtaining non-family labor?
  - e. the use of equipment, especially tractors, sprayers and small scale rice mills?
  - f. the percentage of landless and those owning too little farm land to support their family?
  - g. the method of marketing the crops?
18. What government programs have been introduced in the last five years to help the farmer? Which programs have been successful? Why have these succeeded and others failed?
19. What changes are expected to occur during the next few years in the types of crops? the methods of cultivation? the availability of land? the yields? the income of the farmers?
20. If there is irrigation then how much land is irrigated? What crops are irrigated? and what percentage of these crops are irrigated?
21. What type of soil is there in the lowland area, the upland area and the hillside area?
22. How far down is the water table in the lowland area?
23. Of the major crops produced in this area, which crops are

produced in surplus quantities and can be exported to other regions? Which crops are produced in insufficient quantity and must be imported from other areas?

### 2.3 Interview with Health Worker

This interview should be conducted with the medical officer at the local health clinic. The subject of this interview is local health problems. Many health problems are related to problems of sanitation and water supply. This is important for two technologies; biogas, which can improve sanitation while producing fuel, and water lifting, which uses energy to provide clean water through a deep well

The questions which should be discussed include;

1. What are the major health problems of the villages ?
2. What are the most common health problems that you treat in this clinic ?
3. What other problems are treated by villagers who buy their own medicines ?
4. What are the major sources of disease;  
unclean drinking water ?  
uncooked food ?  
diseases carried by insects ?  
diseases carried by parasites ?  
communicable diseases ?
5. Do the villagers use latrines ? If not is there any program underway to encourage them to use latrines ?
6. What drugs do you most frequently prescribe ? Is there an adequate supply of these drugs in your clinic or in the village ?
7. What programs is the government conducting to improve the health of the villagers ? What programs do you think that they should undertake ?

## 2.4 Interview with BAAC manager

This interview is to be conducted with a local official of the BAAC bank. The interview concerns the use of credit by the farmers. Of particular interest is there reasons for using different sources of credit. The project is planning for the introduction of new technologies in the village such as waterpumps and biogas digesters and these will require some investment. Some of the subjects to be discussed are: the type of credit offered by the BAAC, the situations in which the farmer prefers to use the BAAC, and the rate of acceptance of the BAAC. Questions to be asked include;

1. What is the interest rate charged by the BAAC ? Does it differ for different types of loans ? How long is the money loaned for ?
2. What type of collateral is required when making a loan ? Does this differ for different types of loans ?
3. How long has this office of the BAAC been providing services to the farmers ?
4. Is the number of farmers making use of the BAAC increasing ?
5. About how many farmers are now receiving loans from the BAAC ?
6. About how long is required from the time a farmer requests a loan until his loan is approved and he receives the money ?
7. What are the major credit problems that the farmers in this region have ? Which of these can the BAAC help with ?
8. What are the major reasons that the farmer comes to the BAAC to make a loan ?
9. Do you have adequate funds to meet all these requests ?
10. During what months do you receive the most requests for loans from farmers ?
11. Are there problems with farmers defaulting on their loans ?
12. If yes then what action do you take when a farmer defaults ?
13. Under what conditions does the farmer prefer to obtain money from a relative ?
14. Are there co-operatives in this village (amphoe) which also offer loans to the farmers ?
15. If yes, then when would the farmer prefer to use the co-operative and when would he prefer to use the BAAC ?
16. Do you expect that the BAAC will become the major source of credit for the farmers in the next five years ?

## 2.5 Interview with the Village Principal and the Village Abbot

This interview should be conducted with the head of the local school and the head of the local wat. The subject of this interview is the structure of the community, its formal and informal leadership, distribution of land ownership and types of employment. This subject is interesting because the technologies in our project must be selected and designed for the community and introduced into the community in a way that will encourage participation in the use of that technology. Some of the questions which the interviewer should seek to answer are;

1. Who in the community has been most successful in using new techniques or technologies in farming ? in small-scale industry ? in the home ?
2. Do other villagers imitate what these families have done ?
3. Who provides leadership in suggesting programs for improving the village?
4. Who provides leadership in implementing these programs ?
5. Are most decisions for village improvements made by individuals, groups or committees
6. What are the major groups in the village ? What are their goals ?  
Who are their leaders ?
7. How is inheritance handled in the village ? Does each child share equally in the division of land ? Who usually inherits the parent's house?
8. Who usually resides in the parent's house ?  
unmarried children up to what age ?  
married children for how long ? married sons ? married daughters ?  
grandparents ? other relatives ?
9. Who is usually the head of the household, the eldest male, the eldest male income earner, or another person ?

## 2.6 Interview with Community Development Worker and Village Development Committee

This interview should be conducted with the community development worker and also with a number of the village development committee. This interview is concerned with problems of introducing new technologies, developing new programs, and constructing community systems to improve the life of the villagers. This subject is important because many of the technologies in our project can improve the life of the villagers but must be demonstrated to them and accepted by them.

The questions to be included in the this interview are

1. What are the major problems in this village which if solved would permit the villagers to have a better life ?
2. What programs have you undertaken to solve these problems ?
3. How does the villager participate in these programs ?  
Is he involved in the planning of these programs ?  
Will he contribute his labor to these programs ?  
Will he be responsible for maintaining the results of these programs ?
4. Who in the village provides the leadership for projects to improve the community ?
5. Under what circumstances does the villager seem most willing to participate in a project to improve the community ?
  - When there are direct benefits for he and his family
  - When he receives a daily wage for contributing labor
  - When the village leaders encourage him to participate
  - When the government provides funds
  - When he or a relative is part of the group which decides to undertake the project
  - When his group or cooperative plans or agrees to participate in the project
6. Does the average farmer have sufficient income or free time to participate in community projects or must he spend all of this time to produce food and income for his family
7. What strategy would you recommend for introducing a new technology such as a biogas digester, or more efficient stove ?  
How would this strategy encourage participation by the villagers ?

### 3.0 Essay Formats and Classification Schemes

#### 3.1 Basic Data

1. Describe the ethnic groups in your village
2. Describe the basic topography and major geographic features of the village surrounding area, describe the distribution of houses.  
(is the village clustered or linear)
3. How far is it from the village to a hard surfaced road. Can the connecting road be used by trucks, buses, 4 wheel vehicles, motor-cycles, ox - carts
4. Does the village have electricity, a school, wat, post office, telephone
5. About what percent of the village households have farming as the primary occupation of the head of household. What percentage of the families involved in farming own their own lands. What is the average amount of land cultivated (4 or less rai, 5 to 10 rai, 11 to 50 rai or over 50 rai)
6. What are the principal non - farm activities, (migrant labor, home industry, rural industry, other). How important are these compared to agriculture ?
7. What are the primary sources of fuel in this village. How far away is the nearest forest. How far do villagers travel to collect fuel ?
8. Are the villagers active in community development? Are there many groups in the village ? Do the villagers actively participate in these groups ?
9. What were the major health problems of this village ?
10. What are the major security problems of the village ?

BASIC DATA

QUESTION I

A. How are the houses in village distributed ?

- In one group
- Along the road
- Along a river or canal
- No response
- Scattered in many groups
- A few large groups
- Dispersed
- Other

QUESTION II

A. What is the distance from the village to the nearest asphalt road ?

- 0 - 3 Kilometers
- 4 - 6 "
- 7 - 10 "
- 11 - 30 "
- 31 - 50 "
- More than 50 Kilometers
- No response
- Near the highway
- Other

B. What kind of vehicles can be used on the village roads ?

- Cart or walking
- Every kinds of vehicle (all year)
- Every kinds of vehicle (not convenient in rainy season)
- No response
- Other

QUESTION III

A. Is there a school, temple, post office or telephone in the village ?

- No
- School and temple
- School
- Temple
- Electricity, school and temple
- School and Electricity
- Temple and Electricity
- School, Monk's quarters
- No response
- Other

QUESTION IV

A. What percentage of the households have a head of household employed in agriculture ?

- |          |           |
|----------|-----------|
| 1) 0-5%  | 3) 11-30% |
| 2) 6-10% | 4) 31-50% |

- |           |                |
|-----------|----------------|
| 5) 51-70% | 8) 91-100%     |
| 6) 71-80% | 9) No response |
| 7) 81-90% | 10) Other      |

B. What percentage of the households cultivate their own land ?

- |           |                |
|-----------|----------------|
| 1) 0-5%   | 6) 71-80%      |
| 2) 6-10%  | 7) 81-90%      |
| 3) 11-30% | 8) 91-100%     |
| 4) 31-50% | 9) No response |
| 5) 51-70% | 10) Other      |

C. What is the average area cultivated ? (Rai)

- |              |                     |
|--------------|---------------------|
| 1) 0-4 Rai   | 4) More than 50 Rai |
| 2) 5-10 Rai  | 5) No response      |
| 3) 11-50 Rai | 6) Other            |

QUESTION V

A. What is the main employment outside the village ?

1. Agricultural labor
2. Other labor
3. Industrial labor
4. No response
5. No outside work
6. Trading
7. Labor exchange
8. Other

B. How important is this employment compared with the agricultural work ?

1. Households' primary source of income
2. Not important
3. Provides additional income during free time
4. Provides agricultural products
5. 1 & 4
6. No data
7. Do not have
8. Provides second source of income
9. Other

QUESTION VI

A. Is the primary source of fuel ?

1. Own land
2. Other land in village
3. Reserved forest, public forest, hilly area in village
4. Reserved forest, public forest, hilly area beyond village
5. Buy from merchants
6. Electricity
7. Responses 1 to 4
8. Wood factory
9. Land inside and outside village
10. No response
11. Other

B. What is the greatest distance travelled to get firewood ?

- 1) 0-3 Kilometers
- 2) 4-6 "
- 3) 7-10 "
- 4) 11-30 "
- 5) 31-50 "
- 6) More than 50 kilometers
- 7) No response
- 8) Other

C. What is the average distance travelled to get firewood ?

- 1) 0-3 Kilometers
- 2) 4-6 "
- 3) 7-10 "
- 4) 11-30 "
- 5) 31-50 "
- 6) More than 50 kilometers
- 7) No response
- 8) Other

#### QUESTION VII

A. Are the villagers active in developing the village ?

1. Yes, they cooperate with the development program
2. No, but the headman wants them to
3. No, they must be paid for their labor
4. No, but they cooperate if they benefit
5. No, they are doing fine
6. No, because the leader can't supervise them
7. Yes, because they respect the leader
8. They participate only on holidays

B. Are there different groups in the village ?

1. Yes
2. No
3. No data
4. Other

C. Are the villagers interested in participating in these groups' activities ?

1. They participate very well
2. It varies with the opportunities
3. If they receive some benefit
4. No
5. Most of the groups are political
6. They participate because they are members
7. No response
8. They participate because of good leadership
9. Other

#### QUESTION VIII

A. What is the health problem in the village ?

1. The health clinics is far from the village or they do not have health clinic or no equipment

2. No problem
3. They buy medicine without prescription
4. They have problem with sanitary facilities
5. They have respiratory and gastro-intestinal problems
6. Common cold
7. Alcoholism
8. Undernourishment, malnutrition
9. Malaria
10. No response

QUESTION IX

- A. What is the main security problem in village ?
1. Communists
  2. No problem
  3. Robbers from other village
  4. Response 1 and 3
  5. Conflict between teenagers in different villages
  6. Conflicts between villages
  7. No response
  8. Conflicts in the village and between villages
  9. Other

QUESTION X

- A. Would the villagers accept substitute energy sources ?
1. Depends on the demonstration
  2. They would be glad to participate
  3. No, they like to use traditional methods
  4. No, they are not aware of energy problems
  5. Depends on their problems
  6. Yes, if a government officer or leader brings the technology to them
  7. Yes, if they think it is useful
  8. No response

3.2 AGRICULTURAL CROPS AND ACTIVITIES

1. Describe the agricultural cycle (only 3 main crops)

- Weeding	- Taking care of crops	WHEN  HOW
- Land preparation	- Festicide	
- Planting	- Harvesting	
- Fertilization	- Equipment use	
- Irrigation	- Labor	

2. Describe the equipment used by the rich farmers and by the poor farmers ?
3. In your opinion are the farmers aware of modern agricultural techniques ? Do they use modern agricultural techniques ? If not, then why not ?
4. What are the major changes which have occurred in village agriculture in the last ten years ? What government programs have been introduced ?
5. What are the major problems in your village for the farmers to obtain a good harvest ? What are the major problems preventing the farmers from improving their yields and their farm ?
6. In what way could a new source of energy improve the agriculture of your village ? by providing irrigation, by powering farm equipment, or by providing energy for crop processing including milling and drying ?

## Agriculture Activities

- I. Explain the cultivation processes of three major plants (seeds and soil preparation, cultivation, fertilizer usage, irrigation, maintenance, weed clearing, harvesting, equipment and labor usage)
  - a. Kind of plants
    1. Rice
    2. Annual crops or kitchen garden crops
    3. Cassava
    4. Beans
    5. Fiber plants
    6. Tobacco
    7. Rubber
    8. Perennial plants
    9. Coconut
  - b. Seed preparation
    1. From last year
    2. Buy
    3. No response
    4. Free from government
  - c. Soil preparation
    1. Plough 1 time
    2. Plough 2 times
    3. Plough more than 2 times
    4. No preparation
    5. Hoeing
    6. No response
    7. Digging
    8. Constructing mounds
  - d. Cultivation
    1. Broadcast seeding
    2. Put in the hole or use bulbs and small branches
    3. Stick in the ground
    4. No response
    5. Bud grafting
  - e. Fertilizing
    1. Manure
    2. Chemicals
    3. Do not use
    4. No response
    5. Fertilizer
  - f. Maintenance
    1. Always take care
    2. Seldom take care
    3. Do not need to take care
    4. Only when small plants
    5. No response
    6. During the paddy growing season
    7. Depends on weather

- g. Irrigation
    - 1. Rainwater only
    - 2. Water pump or other water source
    - 3. Water pumped by irrigation department
    - 4. No response
    - 5. Irrigation canals
    - 6. Do not use irrigation canals
  - h. Weeds
    - 1. Manual weeding
    - 2. Herbicides
    - 3. No response
    - 4. No problem
    - 5. Never weed
  - i. Harvesting
    - 1. Household labour
    - 2. Labour exchange
    - 3. Hired labour
    - 4. No response
  - j. Equipment
    - 1. Two wheel tractor
    - 2. Plough
    - 3. Tractor
    - 4. Water pump
    - 5. No response
    - 6. Sprayer
    - 7. Never use equipment
    - 8. Tractor, water pump and/or sprayer
  - k. Animal or human power
    - 1. Man power
    - 2. Animal power
    - 3. No response
- II. Does the type of agricultural equipment differ between rich and poor farmers ?
- 1. The same
  - 2. Yes, rich farmers own good equipment, but the poor have to rent or use old equipment
  - 3. No response
  - 4. Other
- III. a. Are the farmers interested in using new agricultural techniques ?
- 1. Yes, many already do
  - 2. Not very enthusiastic
  - 3. No response
- b. Do the farmers use new agricultural techniques ?
- 1. Yes, most of them do
  - 2. No
  - 3. No response

- c. If no, why not ?
  - 1. The old style cultivation gives higher yields
  - 2. They are difficult, waste time and labour
  - 3. Economic problems such as lack of capital and equipment
  - 4. Lack of technical assistance
  - 5. No response
- IV. a. Was there any change in technology in the past 10 years ?
  - 1. Yes, the introduction of modern agricultural machines
  - 2. Yes, better irrigation systems
  - 3. New seed varieties, better agricultural processes and more fertilizer usage
  - 4. No
- b. What government projects have been introduced in the village ?
  - 1. Irrigation
  - 2. Develop and encourage new agricultural processes, including breeding seeds, using fertilizer and preparing natural fertilizer
  - 3. Farming promotion
  - 4. No projects
  - 5. No response
- V. a. What are the major problems limiting farm production ?
  - 1. Not enough irrigation, lack of water or flooding
  - 2. Lack of agricultural investment
  - 3. Lack of agricultural knowledge
  - 4. Weather
  - 5. No problem
  - 6. No response
- b. What are the problems of improving soil fertility ?
  - 1. Do not have any irrigation or not enough irrigation
  - 2. Lack of knowledge about soils
  - 3. Lack of funds
  - 4. The farmers are not interested
  - 5. No problem, the soil is good
  - 6. No response
- c. What are the problems for increasing farm income ?
  - 1. Low yields, low prices
  - 2. Small areas for cultivation, inefficient use of the land
  - 3. No work after harvesting
  - 4. Communication and transportation are not good
  - 5. Lack of investment
  - 6. No response
- VI. How could new energy sources (irrigation, agricultural equipment such as threshing machines and drying machine, etc) help agricultural development in the village ?
  - 1. Improved irrigation
  - 2. Agricultural energizing equipment
  - 3. Better equipment
  - 4. Better use of man and animal power
  - 5. No response

### 3.3 AGRICULTURAL PROCESSING AND MARKETING

1. In what form are the major crops which are produced in the village shipped to outside markets ? List for each crop ?
2. Who do the farmers sell their crops to ? Why do they sell to that individual or facility ?
3. Do the buyers have a monopoly position in the village ?
4. How could the farmers get a better price for their crop ?
5. Must the farmers sell their crop at harvest time or can they store their crops until the price increases ?
6. Who provides the facilities for drying, milling, and other processing of these crops ? What is the economic relationship between the owners of these facilities and the farmers who produce the crop ? Do the owners supply agricultural inputs such as fertilizer and seed ? Do the owners provide a source of credit for the farmers ?
7. Do the mill owners provide an alternative outlet for selling crops or do they create a monopoly for buying the farmer crops ?
8. Describe the methods used for drying, milling and further processing of the crops. (summarize the data from the questionnaire section on crop processing)
9. How could energy best be used to help the farmer to earn
  - a good income from his crops
  - more production
  - processing for crops to increase its market price
  - transportation to move the crop to regional markets.

## Agricultural, Processing and Marketing

- I.A. For the agricultural products what is the major destination outside the village ?
1. In the same village
  2. Same Tumbon (subdivision of an amphoe)
  3. Same Amphoe (subdivision of changwat)
  4. Same Changwat (Province)
  5. In the next changwat
  6. In Bangkok and the provinces near Bangkok
- B. What is the type of transportation ? (specify the kind of agricultural products and transportation)
1. Bus
  2. Truck
  3. Motorcycle and bicycle
  4. No transportation or transport by the buyers
- II.A. Whom do the farmers sell their product to ?
1. Middle man in the village
  2. Middle man outside the village
  3. General merchants
  4. Consumers
  5. Government or cooperative societies
  6. Factories or rice mills
- B. Why do they sell to this person or organization ?
1. No special reasons
  2. High price
  3. Because of their honest measurement
  4. Convenience in transport or the farmers do not have to transport their products
  5. Because they always trade together
  6. Because of contracts and loans
  7. Easy to make a deal and immediate payment
- III. Do the buyers have a monopoly in the village ?
1. Yes
  2. No
  3. Some products are monopolized
- IV. How can the farmers increase the prices of their products ?
1. They do not know how or they are not able to
  2. They are careful about the quality of their products
  3. They need funds so they can sell to any body and wait for a good price
  4. Need farmer's cooperative to bargain for a good price
  5. They need to expand their market especially to foreign countries

- V. Are the farmers able to delay the sale of their products until the price have been raised or do they have to sell immediately after harvested ?
1. They are able to wait for a good price
  2. They cannot wait because the products cannot be stored
  3. They cannot wait because they need money to pay loans and other expense
  4. For some of the products they can wait but for others they cannot
- VI.A. Who supplies the equipment for drying, threshing, milling and other processes ?
1. Villagers
  2. People outside the village
  3. The merchants
- B. What is the economic relationship of these people to the farmer ?
1. No special relationship
  2. They help each other
- C. Do these people supply credit for the farmers
1. Yes
  2. No
  3. No response
- VII. Do these people permit the farmer to sell their products freely or have they monopolized the market ?
1. The farmers sell only to them
  2. The farmers can sell to anyone
  3. Some products sold only to them; some sold to anyone
- VIII. A. What is the best way to help the farmer ?
1. Increase the farmer's income
  2. Increase the price of the agricultural products
  3. Limit production to be appropriate with market demand or expand the market
  4. Promote new occupations appropriate to the environment, provide work after the harvest
  5. Cannot solve their problems
  6. Decrease production costs
- B. What is the best method to increase yields ?
1. Construct more irrigation canals, dams, reservoirs or artesian wells
  2. Introduce and promote new techniques and seeds
  3. More extensive and productive use of the land
  4. No response
- C. How should crops be processed to increase the price for the farmer ?
1. Do not know
  2. Not necessary, the price of product is already good
  3. Pickling, drying, threshing, baking using a good standard method and quality
  4. No response
  5. To introduce factories or equipment

D. How should the markets for the crop be expanded ?

1. Not necessary because there are many markets
2. No data
3. Use well managed cooperative societies
4. Cannot expand the markets, because no control
5. Organize a farmer's group to sell products to cooperative society or merchants or export without middle man

### 3.4 COOKING, STOVES, CHARCOAL

1. What types of stoves are used in the village ? What type of fuels are used in these stoves ? Are these stoves used with more than one type of fuel ?
2. Who makes the stoves and how much do they cost ?
3. Are different fuels, or different stoves used for different types of cooking and different foods ? If so, describe how the villagers select a type of stove and fuel for cooking major foods.
4. Have the villagers used any new stove designs ? If yes, describe these stoves and why they were (or were not) successful.
5. Is there any interest among the villagers in using a stove which will consume less fuel ? What other characteristics would the villagers like to see in a new stove ? (see survey question on stove operation problems)
6. Do they use metal pots ? If no, then why not ?
7. Do the villagers use charcoal for cooking ? If, yes, then why do they prefer charcoal to wood as a cooking fuel ?
8. Do the villagers make their own charcoal or do they buy it ? If they make it, then how often do they make it ? Do they make it only for themselves or also for sale ?
9. Describe the most common technique for preparing charcoal, including the type of kiln, the species of wood, the method of igniting and covering the wood, and the length of time to produce the charcoal.
10. Do the villagers use a variety of kilns. If so which types are preferred and why are they preferred ?
11. Is there any interest in using a better kiln ? How would the villagers like to see the kiln improved : easier to construct and maintain ? easier to operate ? More fuel efficient ?

Cooking Stoves

Essay Questions

The type of stoves used in the village ?

- a. Bucket Stove
- b. Clay Stove, Pits
- c. 3 bricks Stove or 3 legs stove or horseshoe stove
- d. Half oil can Stove with a hole for firewood
- e.

1) What type of fuel is used with these stoves ?

- Charcoal
- Firewood
- Wood scraps and dried leaves

2) A. Who made these stoves ?

- Buy from market (make by factory)
- Paid village craftsmen
- By family
- No enumerator response

B. Price of stove ?

- |               |                           |
|---------------|---------------------------|
| 1) 15-17 Baht | 5) 31-35 Baht             |
| 2) 10-20 "    | 6) Do not know            |
| 3) 21-25 "    | 7) Do not have to buy     |
| 4) 26-30 "    | 8) No enumerator response |

3) Do they use different types of stoves to cook different kinds of food ?

- 1) Yes
- 2) No

4) A. Have the villagers ever used new types of stoves ?

- 1) Yes
- 2) No
- 3) No enumerator response

B. What type of new stove do the villagers use

- 1) Gas stove or L.P.G. stove
- 2) Economic stove
- 3) Electric Stove, electric pot or pan
- 4) Husks Stove
- 5) enclosed horseshoe with arched port
- 6) Biogas Stove
- 7) No enumerator response

C. Were these designs successful ?

- 1) Success
- 2) failure
- 3) not sure
- 4) No enumerator response

- D. Why did they fail or succeed ?
- 1) not needed by villagers
  - 2) not appropriate or too expensive
  - 3) not convenient
  - 4) bad quality, not useful
  - 5) Save, faster, convenient
  - 6) Not sure if it will fail or succeed
  - 7) No enumerator response
- 5) A. Are the villagers interested in using stoves that save fuel ?
- 1) Yes
  - 2) No
  - 3) No enumerator response
- B. What kind of new stove do the villagers want to see ?
- 1) Economic Stove or Paddy Stove
  - 2) Stoves that save fuel
  - 3) Stoves that can use fuels in village (wood scraps, dried leaves)
  - 4) biogas stove
  - 5) Convenient, efficient, safe, good quality stoves
  - 6) Stove that do not have to use charcoal or firewood
  - 7) Not interested
- 6) Do they use metal pots ?
- 1) Yes
  - 2) No
  - 3) No enumerator response
- 7) A. Do they like to use charcoal for cooking ?
- 1) Yes
  - 2) No
  - 3) No enumerator response
- B. Why do they like to use charcoal for cooking ?
- 1) Convenient, clean, safe
  - 2) familiar, easy to find
  - 3) Savings in cost of fuel
  - 4) High heat, easy to control the heat
  - 5) No enumerator response

Charcoal Kilns - Essay Questions - English

- 1) A. Do the villagers like to use charcoal for cooking ?
  - 1) Yes
  - 2) No
  - 3) No dataB. Why do they like to use charcoal for cooking ?
  - 1) Convenient, clean and safe
  - 2) Easy to find, used to this fuel
  - 3) Saving
  - 4) High heat, easy to control the heat
  - 5) No response
- 2) A. Do they make or buy the charcoal ?
  - 1) Make by themselves
  - 2) buy
  - 3) Both make and buy
  - 4) Almost all of them use firewood
  - 5) No responseB. How often do they make charcoal ?

1) once a month	6) 2-3 times a year
2) twice a month	7) 4-5 times a year
3) 3-4 times a month	8) Not sure
4) 5-7 times a month	9) No data
5) once a year	10) Never make

C. Do they make charcoal for use in household or for sale ?
  - 1) household
  - 2) to sell
  - 3) No response
- 3) For each kiln what is period of operation
  - a) Permanent kiln
  - b) Pits covered with soil
  - c) Pits covered with paddy or dirt mounds
  - 1) 1-2 days
  - 2) 3-4
  - 3) 5-7
  - 4) 8-10
  - 5) 10-12
  - 6) Do not use this kiln
  - 7) No response
- 4) A. Do the villagers use different types of kilns ?
  - 1) Yes
  - 2) No
  - 3) Use firewood
  - 4) No response

- B. If they used different types, what type of kiln do they prefer ?
- 1) Permanent kiln, mud/clay
  - 2) Mound covered with earth/clay
  - 3) Mound covered with paddy/straw
  - 4) Both 1 and 2
  - 5) Both 1 and 3
  - 6) Do not make charcoal
  - 7) No response
- C. Why do they like to use this type of kiln ?
- 1) larger capacity, more charcoal, better quality charcoal
  - 2) convenience, easy to use
  - 3) saves time
  - 4) 2 + 3
  - 5) Depends on availability and satisfaction
  - 6) do not make charcoal
  - 7) No response
- 5) A. Are the villagers interested in more efficient kiln ?
- 1) Yes
  - 2) No
- B. How would they like the kiln improved ?
- 1) easier to build and use, easier to maintain and long life
  - 2) shorter production time
  - 3) cheaper
  - 4) no response

### 3.5 ENERGY SUPPLY AND DEMAND

- 1 What are the principal fuels used in this village. Are the villagers familiar with other energy sources such as those from solar, biogas, electricity?
- 2 In agriculture what is the primary source of energy - human labor, animal labor, or equipment using petroleum - based fuels?
- 3 Is the cooking fuel purchased or collected? If it is collected, describe the source of fuel?
- 4 Is the source of fuel decreasing at a significant rate? Are the villagers concerned about an increase in fuel prices or growing scarcity of fuels?
- 5 For which activities are the costs or scarcity of fuels creating a problem - cooking, lighting, agriculture, home industry, or rural industry?
- 6 Based on your observations of the village demand for energy and the supply of fuels, indicate which method of increasing energy supply would be most appropriate? Why do you think this method is best?

- increasing wood supply through woodlots
- converting animal dung to biogas for cooking, lighting or industry
- reducing the consumption of cooking fuels through more efficient stoves
- improving the quality of charcoal produced and increasing the yield of charcoal from wood
- introducing solar heat for distilling water or for drying agricultural crops
- using gasifiers on agricultural equipment so that biomass can be used as a substitute for petroleum - based fuels
- using more fuel efficient technologies in local and home industries

- 7 What are the major factors affecting the villagers' choice of fuel used for;  
cooking?  
lighting?  
home industry?

ESSAY CLASSIFICATION  
ENERGY SUPPLY & DEMAND

QUESTION I

- A) What are the principal fuels used in this village ?
1. Charcoal, firewood
  2. Kerosene
  3. Charcoal
  4. Firewood
  5. Diesel
  6. Agricultural residue
  7. Electricity
  8. Charcoal, kerosene, diesel, and agricultural residue
  9. Firewood, charcoal, kerosene, diesel, and electricity
- B) Are the villagers familiar with other fuel sources ?
1. Yes
  2. No
  3. No response
  4. Other
- C) If yes, what other fuel sources ?
1. Biogas
  2. Electricity
  3. Solar dry heat
  4. Solar Energy
  5. Other

QUESTION II

- A. What are the principal energy sources for agriculture other than manual labor ?
1. Two-wheel tractor
  2. Animal, two-wheel tractor
  3. Two-wheel tractor, water pump
  4. Animal
  5. Animal, water pump, two-wheel tractor
  6. Animal, Tractor, water-pump
  7. Animal, two-wheel tractor, large tractor
  8. Large tractor, two-wheel tractor
  9. Large tractor, two-wheel tractor
  10. Only manual labor

QUESTION III

- A. Is the cooking fuel purchased or collected ?
1. Purchased
  2. Collected
  3. Both
  4. Use electricity
  5. Collected and use electricity
  6. Other

- B. If collected, describe the source
1. Own land
  2. Other land
  3. Public land or mountain areas in the village
  4. Public land or mountain areas outside the village
  5. Other land outside village
  6. Other

QUESTION IV

- A. Is the fuel source decreasing ?
1. Decreasing
  2. Increasing
  3. The same
  4. Unused land
  5. Do not know
  6. Other
- B. Are the villagers concerned with the increasing price or scarcity of fuel ?
1. No, but know that it has happened
  2. No, because they think fuel is still available
  3. Yes, but don't know what to do
  4. Yes, but they possess their own firewood
  5. Yes, they plant trees to replace the supply
  6. Yes, they try to collect more firewood or purchase from other places
  7. Some are concerned, some not
  8. Yes, they make their own charcoal
  9. No, they use fuels when they are available
  10. Yes, they are switching to other fuels

QUESTION V

- A. Are the costs or scarcity of fuels creating problems for cooking
- B. Are the cost or scarcity of fuels creating problems for lighting
- C. Are the cost or scarcity of fuels creating problems for agriculture
- D. Are the cost or scarcity of fuels creating problems for home industry
1. Yes, high costs
  2. Yes, fuel is scarce
  3. No
  4. No response

QUESTION VI

What factors affect the villager's choice of fuels for cooking, lighting, home industry ?

1. Convenience
2. Cost
3. Availability
4. Efficiency
5. Familiarity
6. Income
7. Lack of alternatives
8. Conform with other villagers
9. No special reasons
10. No response

QUESTION VII

Where is the wood for making charcoal obtained ?

1. From mixed forests
2. From rubber tree plantings
3. From orchards
4. Dipterocarp trees
5. No response
6. Samet trees

### 3.6 BIOMASS, PYROLYSIS, GASIFICATION

1 What do the villagers use the following residues for:

rice hulls at the mill

rice stem after threshing

rice stalk left in the field

mill residues from other major crops

field residues from other major crops

2 Would the villagers be willing to collect these residues;

If they could be used to make charcoal?

If they could be used for cooking?

If they could be used to power agricultural equipment?

3 Do the villagers use small diesel or gasoline engines for agriculture, transport, pumping water? If yes, describe the type of motors and what they are used for.

4 If the small diesel and gasoline engines could be fueled with agricultural residues would the villagers be interested? What agricultural residues are available for fueling these engines?

5 Describe the type of biomass fuels and the sources of these fuels which are currently not utilized by the villagers including ;

- Agricultural residues in the field
- Agricultural residues from the mill
- Animal manure
- Garden and tree residues

6 Why are these not used as fuels?

## BIOMASS ESSAY CLASSIFICATION

- 1) What do the villagers use the following residues for
1. Rice Husks
  2. Rice Stems
  3. Straw
  4. Corncobs, Millet scrap
  5. Agricultural product's shells (S lk cotton, castor oil)
  6. Fanpalm or coconut palm
  7. Cassava
  8. Banana
  9. Sugar cane, Fiber plants
  10. Leaves, Scrap
  11. Kitchen garden plants
  12. Sawdust, Wood scrap
  13. Rubber scrap
  14. Rubber fruit, Rubber branch and Rubber stem

### Uses

1. To burn, throw away
  2. Fuel to make charcoal
  3. Fuel for cooking, ripening fruits
  4. Animal Food
  5. Heating, protection from insects.
  6. Make Fertilizer
  7. Roofing material
  8. Cultivate mushrooms
  9. Cover ice to protect from melting
  10. Sell
  11. Make charcoal
- 2) A. Are the villagers willing to gather residues, if they can be use for cooking.
1. They are willing to do so if they can obtain good quality and it is not difficult to process, or costly.
  2. No
  3. Not sure, don't know
  4. Both yes and no
  5. No data
- B. Are the villagers willing to gather residues if they can be used to make charcoal ?
1. They are willing to if they can get good quality and it is not too difficult to process or too expensive
  2. No
  3. Not sure, don't know
  4. Both yes and no
  5. No data

- C. Are the villagers willing to gather residues if they can be used to power agricultural equipment ?
1. They are willing to, if they can get good quality, it is not to difficult to process, and is not too costly.
  2. No
  3. Not sure or don't know
  4. Both yes and no
  5. No data
- 3) A. Do they use small gasoline machine or diesel machine for transport, agriculture and pumping water ?
1. Yes
  2. No
  3. No data
- B. If yes, describe the type of motor and what it is used for
- a. Water pump
  - b. Spaying machines
  - c. Truck
  - d. Small tractor (ploughing)
  - e. Tractor
  - f. Complementary power units used with various machines
    1. Pumping water
    2. Spaying insects
    3. Transport (products and people)
    4. Ploughing
    5. making electricity
    6. winnowing or milling
    7. No data
    8. Don't use these machines
- 4) A. will they be interested if small gasoline or diesel machines can be fueled with residues ?
1. Yes
  2. Not sure
  3. No
  4. No data
- B. Is there enough rice husks for fueling these engines ?
1. Yes
  2. No
  3. No data
- C. Is there enough corn residue for fueling these engines ?
1. Yes
  2. No
  3. No data
- D. Is there enough cassava residue for fueling these engines ?
1. Yes
  2. No
  3. No data

- E. Is there enough sugar cane residue for fueling these engines ?
1. Yes
  2. No
  3. No data
- F. Is there enough shells from castor bean, fiber plants and cotton-silk for fueling these engines ?
1. Yes
  2. No
  3. No data
- G. Is there enough bean stems and shells for fueling these engines ?
1. Yes
  2. No
  3. No data
- H. Are there enough banana trees and leaves and branches for fueling these engines ?
1. Yes
  2. No
  3. No data
- I. Are there enough dried leaves and branches for fueling these engines ?
1. Yes
  2. No
  3. No data
- J. Are there enough other (pepper trees, tobacco trees, lalang) residues for fueling these engines ?
1. Yes
  2. No
  3. No data
- K. Are there enough coconut and palm residues for fueling these engines ?
1. Yes
  2. No
  3. No data
- 5) A. Are there any steam engines used for milling or other activities "
1. Yes
  2. No
  3. No data
- B. If yes, describes these activities.
1. What type of fuel is used with steam machines ?
  2. What is the machine size ?

- 6) A. Are there any field residues which could be used for fuel but are not ?
- a. Rice stems
  - b. Corn harvest residues
  - c. Cassava harvest residues
  - d. sugar cane harvest
  - e. Castor oil shells, cotton-silk shells, fiber plants
  - f. Bean shells or stem residues
  - g. Kitchen garden plant residues
  - h. cotton or tobacco residues
  - i. varieties of weeds
  - j. rice husk
  - k. coconut residues
  - i. leafs, brenches
  - m. rice straw
  - n. banana plant residues
1. Yes
  2. Do not have
  3. Have and use already
- B. Are there mill residues that are not used ?
1. Yes
  2. No
  3. No data
- C. Is there dung from the following animals that is not used ?
- a. cattle
  - b. buffaloes
  - c. swine
  - d. fowls (duck, chicken)
1. Yes
  2. do not have
  3. have but do not use
- D. Are there any resiques from these plants ?
- a. coconut husks, coconut shells
  - b. coconut leaves
  - c. dried leaves and branches
  - d. rubber trees and fruits
- 7) Why don't they use residues as fuel ?
1. They do not know or understand that residues can be used for fuel.
  2. They do not know how to use
  3. They do not have appropriate equipment
  4. They have plenty of fuel
  5. No data

### 3.7 WOODLOTS

1. Is there land in the village which could be used for growing trees ?  
Where is this land ? Why is it not used for housing or for agriculture ?  
Who owns this land ? Would they be willing to use it for growing trees  
for fuelwood and or fodder ?
2. Are there places in the village where trees could be planted next to  
agricultural land, roads or rivers ?
3. Are there places in the village where the trees could be grown, if the  
species were selected to permit intercropping (planting crops between  
the trees) ? If yes, then what type of crops would be planted between  
the trees ?
4. During which season would the villagers be able to plant trees ?  
During which months would they be unable to plant or weed the wooded  
area because of other agricultural activities ?
5. Who in the village could organize a village woodlot program. If seed  
were provided would the villagers help in planting ? Would the villagers  
have to be paid or would they volunteer their labor ? Who would be  
responsible for protecting the trees for the four or five years until  
they are ready for harvesting ?
6. If a village woodlot were established, how should the fuelwood be  
distributed :
  1. by selling in the market
  2. by giving in equal proportions
  3. by distributing in proportion to the amount of labor contributed  
by each family,
  4. by following the decision of the village leaders ?
7. Would the villagers be willing to plant trees in their household compounds ?  
Is there much space within the compound for planting trees ?

A.6 Woodlot Essays

Woodlots Essay - English

I.A. Is there land in the village that could be used for growing trees ?

1. Yes
2. No

B. If yes, where is this land ?

1. In the field
2. Public land or mountain area
3. Boundary of village
4. Samet forest
5. Reserved forest
6. Unused land

C. Why is it not used for agriculture ?

1. Don't know
2. Unusable land
3. Public land
4. For government building, for rent
5. Samet forest
6. Used for other purpose
7. Others

D. Who owns this land ?

1. Villager
2. Government

E. Would they be willing to use it for growing trees for fuelwood and for fodder ?

1. Yes, if villagers are aware of future benefit
2. Yes, if for public uses
3. Yes, if it does not interfere with their lives
4. Yes, because they have fuel problems
5. Yes, because nobody uses the land
6. No, because they will use it for agriculture in the future
7. Yes, if they have proper procedures and resources
8. Don't know
9. Yes, if they get paid to establish the woodlot

II. Are there places in the village where trees could be planted next to agricultural land, roads or rivers ?

1. Yes
2. No
3. Yes, but it is unused area

III.A. Are there places in the village where the trees could be grown, if the species were selected to permit intercropping ?

1. Yes, in the house compound
2. Yes, in the garden
3. Yes, in the field
4. Yes, in the rubber area
5. No
6. No data

B. If yes, then what type of crops would be planted between the trees ?

1. Annual crops, vegetables
2. Fast-growing crops
3. Perennial crops
4. Don't know
5. Others

IV.A. During which season would the villagers be able to plant trees ?

1. Rainy season
2. Dry season (After harvesting)
3. Winter
4. All year
5. No
6. Don't know

B. During which months would they be unable to plant or weed the wooded area because of other agricultural activities ?

1. May - February
2. August - March
3. While the perennial crops are still small
4. Available day
5. Don't know

V.A. Who in the village could organize a village program ?

1. Village headman or Kamnan
2. Agricultural extension agent
3. Abbot or school principal
4. C.D. worker or community development committee
5. Informal village leader
6. Government officers
7. Experts

B. If seeds were provided would the villagers help in planting ?

1. Yes, if the government or village headman tell them to do
2. Yes, if asked by community development committee
3. Yes, if there are good public relations and demonstrations

4. Yes, if the villager understand about future benefits
5. Yes, if the villager can plant in their own land
6. Yes, (no reason)
7. Don't know
8. No

C. Would the villagers have to be paid or would they volunteer their labor ?

1. volunteer
2. get pay
3. depends on villagers' decision
4. no data

D. Who would be responsible for protecting the trees for the four or five years until they are ready for harvesting ?

1. distribution of responsibility set by village headman or other village leaders
2. set up a committee or guard to be responsible
3. let everybody share responsibility
4. hire someone to take care of trees
5. community development committee would be responsible
6. No data

VI. If a village woodlot were established, how should the fuelwood be distributed

1. Establish a committee for distribution
2. Distribute equally to each family
3. Distribute rationally according to the man-hours each family contributes
4. Sell the wood and use the money for the village development budget
5. Based on village headman's decision
6. Others such as by voting
7. No data, don't know

VII. How to use the fuelwood ?

1. for charcoal making
2. for firewood
3. for both charcoal and firewood
4. Others
5. No data

VIII.A. Would the villagers be willing to plant trees in their household compounds ?

1. Yes, they would if they are able
2. Yes, they would if they see the usefulness
3. Yes, but not much
4. No, because there is not enough land
5. Don't know

B. Is there much space within the compound for planting trees ?

1. Yes, there is
2. Yes, but not much
3. Yes, there is space, but do not want to plant trees
4. No, there is not
5. Others

### 9.3 SOLAR CROP DRYING AND WATER DISTILLING, WATERLIFTING, MICROHYDRO

1. Which crops are dried before selling ? What fuels are used to dry the crops or are they dried by the sun ?
2. Is the drying done by the individual homes or by groups.
3. Is the crop damaged during drying by animals, insects, other sources ? If yes, is the damage significant ?
4. Do the farmers use irrigation ? If no, why ? (A lack of interest ? a lack of reliable sources of water ? problems in distributing the water to the different fields ?)
5. If pumping were available could the villagers irrigate more of their crop land ? If yes, then do the farmers not purchase pumps because of the cost of the pump, the price of fuel to power the pump, or the problems in operating and maintaining a pump ?
6. What sources of water could be used for irrigation if suitable pumping and distribution canals were available ?
7. Does the village have electricity ? If yes, is it provided by the government or from small generating units ?
8. What are the major uses of electricity in the home, in agriculture, in local industry ?
9. If the village does not have electricity, why not ?

Solar Crop Drying and Water Distilling, Waterlifting and Microhydro

QUESTION I

- A. What crops are dried before selling ?
1. Rice
  2. Beans or plants from which skin must be removed such as kapok, castor-oil plant, cashew nut
  3. Tobacco
  4. Cassava
  5. Annual crops
  6. Cotton
  7. None
  8. Para Rubber
  9. Fiber plants
  10. Response 1 through 4
- B. What kind of fuel is used to dry the plants ?
1. Never use
  2. Don't know
  3. Do not dry
  4. Other
- C. Do you dry the plants in the sun ?
1. Yes
  2. No
  3. Do not dry

QUESTION II

Is drying done by the household or by a group ?

1. The household
2. A group
3. No data
4. Do not dry
5. Both
6. Other

QUESTION III

- A. Is the crop damaged during drying by animals or insect ?
1. Yes
  2. No
  3. A little
  4. No data
  5. Do not dry

QUESTION IV

- A. Do the farmers use water from irrigation ?
1. Yes
  2. No
  3. In rainy season only
  4. Some years
  5. Never
  6. In some areas
  7. In rainy season in some areas
  8. Other

- B. If they do not, then why not ?
1. Lack of interest
  2. Need irrigation but do not have an irrigation system
  3. Insufficient sources of water for the village
  4. Too little water from the source or in the irrigation system
  5. Have enough water without irrigation
  6. Do not have enough canals
  7. Depends of the weather
  8. Lack of implementing policy
  9. System under construction
  10. Problems in the village

QUESTION V

- A. If pumping were available could they irrigate more of their crop land ?
1. Yes
  2. Not enough water
  3. Yes, but only in the rainy season
  4. No data
  5. Other
- B. Why don't they buy a water pump if they have enough water ?
1. Financial constraints
  2. Do not need, because they have enough water
  3. Too expensive
  4. Problem with thieves
  5. Difficulties in using and maintaining
  6. Farmers already use water pump
  7. Not worth the expense

QUESTION VI

- A. What sources of water could be used for irrigation if suitable pumping and distribution canals were available ?
1. Artesian well
  2. Do not have
  3. No data
  4. Pool, River, Canal, Reservoir, Stream
  5. Dam
  6. Household pond
  7. Water from the forest
  8. Could build dam and reservoir to store water
  9. From reservoir or Irrigation Ditch

QUESTION VII

- A. Does the village have electricity ?
1. Yes
  2. No
  3. Other
- B. If yes, who provides the electricity
1. Government organization
  2. Privately owned generator
  3. Other

QUESTION VIII

A. What are the major uses of electricity ?

1. In the home
2. Agriculture
3. Local industry
4. Commerce
5. Special occasions
6. In the home and local industry
7. Other

QUESTION IX

A. How much do the farmers pay for electricity per month ?

1. 10-20 Baht
2. 21-30 "
3. 31-40 "
4. Generate their own electricity
5. No data
6. Other

B. Expenditure for the generator

1. 1-500 Baht
2. 501-1000 Baht
3. No data
4. More than 1000 Baht

QUESTION X

A. If the village does not have electricity, why not ?

1. Financial constraints
2. No installation
3. Most do not need it
4. Under construction
5. Do not have government program
6. Too far from highway, transportation is not convenient
7. Village has a program, but needs more money
8. The headman is not interested, and villager won't cooperat
9. Do not know

### 3.9 VILLAGE DEVELOPMENT

1. Has this village had a village development project (in the last 5 years)?  
If yes, what project and how was it done ?
2. Does this village use exchange labor in agriculture ? Does it use volunteer labor for community projects or does it pay the villagers for their participation ?
3. Are there many groups in this village ? Describe the major formal and informal groups. What activities do they participate in ?  
Is there rivalry between these groups or do they work together ?
4. Describe the major innovations which have been introduced into the village in the last five to ten years ?
5.
  - a. Describe the process of innovation for at least two innovations
  - b. Include in your description a chronology of the events leading up to the widespread acceptance or rejection of this innovation
  - c. The source of these innovations.
  - d. The villagers who initially used these innovations.
  - e. The informal leaders who after trying these innovations encouraged a significant number of other villagers to try the same innovations.
  - f. And the period of time required for acceptance of these innovations.
6. Who would you suggest as an informal leader in the village if a new energy technology is introduced for :
  1. producing fuel in woodlots
  2. improving stove design
  3. providing energy for pumping water or for powering agricultural equipment
  4. generating biogas for cooking
  5. providing fuels or energy for local industry
7. Based on what you have learned about innovation in this village who are the best formal or informal leaders to ask to participate in a demonstration of renewable energy technologies

VILLAGE DEVELOPMENT

- 1)
- A. What were the village development programs in the past 5 years ?
    - A Construction and maintenance program for village facilities (road, water source)
    - A Village public area development program.
    - A Village emergency program
    - A Human development program in the village (child, adults, teenage, or housewife development program)
    - A agricultural development program.
    - A Village security program
    - A Village health program
  - B. Who organized these programs ?
    - Government
    - Villagers
    - No data
  - C. Who worked on these programs ?
    - Villages' volunteers
    - Hired villagers
    - Government personnel
    - Government personnel and villagers worked together
- 2)
- A. Is agricultural labour exchange practiced
    - No
    - Yes (a few)
    - Yes
    - No data
  - B. Is villager labor for the development programs volunteer or hired ?
    - Volunteer
    - hired by village development program
    - Both volunteer and paying
    - No data
- 3)
- A. What groups are prominent in the village ?
    - activities development group
    - Village institute development group
    - agricultural development group
    - human development
    - Village security groups
    - Other
    - No data
  - B. What are the informal group in the village ?
    - Location group such as Northern group, Southern group.
    - Party group, friendship group.
    - Coordinative group, Labour exchange group.
    - Other
    - No data

- C. What development-related activities do these groups participate in
- Villages development
  - Institution development (Education, Religion)
  - Agricultural activities
  - Villager education and occupational training Activities
  - Village security
  - Labour Exchange
  - Others
  - No development-related
  - No data
- D. Are there conflicts between groups ?
- No
  - Yes
  - No data

(4 and 5)

- A. Were there new inventions introduced into the village in last 5 to 10 years ?
- Engines (Generator, small trucks)
  - Generators and electric appliances
  - Various Stoves (Gas Stoves, Economic Stoves)
  - Others appliances and equipment (sewing machine, water supply, distilling machine)
  - No innovation
  - No data
- B. Did they accept these new inventions ?
- Yes
  - No
  - Not sure
  - No data
- c. Do they like to use these inventions ?
- Yes
  - No
  - Not sure
  - No data
- D. Who introduced these invention ?
- Health officers
  - The community development interns
  - Agricultural officers
  - Merchants, private company
  - Village leader or teachers
  - Product samples
  - No one
  - No data
  - Mass communications
- E. Who are the users
- Villages' leaders
  - Villagers
- F. Did the Village leader help to disseminate these innovations

- Yes
- No
- No data
- ... G. What period of time was needed for acceptance of
  - They are already to accept
  - Less than six months
  - Six months
  - About 1-4 Years
  - Do not accepted
  - No introduced and demonstrated
  - No data

\* Do not need No 6 and 7

## 4.0 Data Collection Forms and Procedures

### 4.1 Biomass Sampling

1. For forest sample all the trees above breast height within a 20 x 20 m<sup>2</sup> sampling area (see form 1.1)
2. For agricultural fields which have been harvested within the last two weeks, or will be harvested in the next two weeks, (count all the stalks within a sampling area of 5m x 5m) Cut several stalks off at ground level measure their height and weigh them together to obtain an average height and weight per plant. Take a 100 gm sample, place in a labelled plastic bag and weigh
3. For agricultural residues from crop processing, observe the amount produced for a given quantity of input. Use volume or weight, but if volume then take a sample and determine the conversion from volume to weight. Take about a 100 gram sample, weigh it, and save in labelled plastic bag (not done)
4. For growing biomass other than forest, measure the number of plants in a 5 x 5 meter area. Weigh five plants if possible and measure the height. Take a 100 gram sample, weigh it and place in a labelled plastic bag (see form 1.2)
5. For cattle or buffalo dung ask the villager who takes care of these animals to count the number of times selected animals produce dung. Pay him for his help (50 Baht or less as appropriate). Choose samples of fresh dung from adult and young animals. Weigh the dung. Next take a 100 gram sample, place in a container, weigh the sample and label the can, also record the approximate size of the animal (see form 1.3).
6. For pig dung, locate a home where the pigs are kept in a pen. Ask the owner when he will clean out the pen. Return 24 hours after he cleans the pen and have him collect the dung. Pay him for his help. Record the number of pigs and whether they are adult, child. Ask the owner their approximate weights. Weigh the total dung collected. Take a 100 gram sample, place in weigh it and label the contents.
7. Sample weighing should be done twice, first weigh the container, then weigh the sample and the container. Each sample should be labelled and the following information should be recorded on the data sheets. (form 1.4)

date,  
collector,  
sample #,  
species,  
village,  
source,  
weight of container,  
weight of container and contents,  
number of related questionnaire,

ADDITIONAL  
BIOMASS INSTRUCTIONS

1. Sample size should be 100 grams  $\pm$  10 grams. Minimum is 50 grams, maximum is 200 grams.
2. Weigh the container even if it is a plastic bag and record the weight on the sample sheet.
3. Place the sample in the container, weigh and record the weight on the sample sheet.
4. Record all data on the sample sheet at the time that the sample is collected.
5. Label the container with the same code number you write on the sample sheet.
6. Remove any dirt from the sample before placing it in the container.
7. Label and measure each sample separately. Do not combine leaves and branches, crops and residues, or different species. Combine wood species only if the fuel is a mixture of species.
8. Do not put pieces of paper inside the container, label the outside of the container using blue felt-tip pens.
9. All samples should be collected, weighed and recorded by the supervisor together with the enumerator.
10. For dung or recently-cut biomass, dry the sample. After the sample is collected and weighed and placed in the container, then the supervisor should bring it back to his residence. There the container should be opened to let air in and should be placed on a piece of paper out in the sun. To protect the samples while they are drying place a plastic food protector over it. The sample should be left to dry for at least one day.

## Biomass Assessment

In your discussions with the village leaders and the head of households and through direct observation, determine what is done with the agricultural residues. Are they sold? collected by others? used by those who own the land or animals that produce it?

Observe what use is made of;

- the manure from buffaloes, cows, pigs and chickens-is it used for fertilizer, fuel, building material, for sale, to produce biogas?
- the milling residues especially rice husks and corn husks - are they sold, left in piles, used as a fuel for the mill or home industry, used by local or outside industry as a raw material, used as a fodder?
- the residues left in the field specifically the straw- are they used as a fuel, burnt in the field, plowed under, used for animal feed, or used as a building material?
- the residues from home gardens especially leaves, branches and dead vegetation (collected for fuel, left on the ground, used to produce building material or other product)
- the residue from sawmills especially sawdust and wood chips (are they used in chipboard industry, as a fuel for rice mill, for cooking, other uses).

## BIOMASS SAMPLE

### SCREENING PROCEDURES FOR ENERGY MEASUREMENTS

1. For Buffalo, Cow and Pig dung, samples should be taken of adult male and female and child male and female of each species for one changwat if available
2. For the adults of the species, assuming no major variation by sex in (2) a sample should be taken for adults and children in three changwat. If there is no appreciable difference (10% plus or minus) for the adults or for the childrens then the tests should be stopped. If there are significant differences then samples from the other two changwats should be examined. If differences still persist then second samples should be taken from each of the changwat (if available).
3. For the charcoal making samples the charcoal should be grouped according to kiln type, beehive, pit, mound. For the pit kiln with rice and wood as fuels test one sample from each changwat. The test should include both the input fuels and the charcoal. For beehive kilns test all the output samples.
4. For the fuels used in the stove tests
  - a. charcoal-test one sample from each changwat, if the differences are significant (greater than 5%) then test a second group. If the variation is still significant (greater than 7½%) then test a third group. If the variation is greater than 10% then test a fourth group.
  - b. wood-test one sample for each changwat and then follow the same procedure as for charcoal
5. For the field residues sample by species take one sample for each species for three changwat, if the differences within species are more than 5%, then take samples from the remaining two changwat. If the differences are more than 7½% than take a second set of samples from each changwat. If the differences are greater than 10% then take a third set of samples (if available)
6. For other fuel wood fuels take up to five species from each changwat and compare the values

### Dung Collection

1. The dung should be weighed when wet. The sample should then be dried.
2. The number of dung produced per animal should be collected with the assistance of the villager as before.
3. The number of samples to be collected should be limited to 30 per changwat. If is not necessary to collect duplicate samples from each village. Instead collect dung from all 3(4) species - buffalo, cow and pig (elephant), adult and young, male and female.

### Fuels and other residues

1. For cooking fuels used in the village collect the samples from the house where they are used or the market where they are sold. Do not collect samples of recently cut fuels which have not dried enough for use as cooking fuels.
2. For cooking fuels collect samples of both the main fuel and the starter fuel.
3. For charcoal making collect samples of both the good and bad charcoal produced from the kiln and estimate the percentage of each produced.
4. Charcoal samples should be stored carefully to avoid crushing the fuel in the plastic bags.
5. Do not collect mill residues.
6. Do not collect fruit tree residues except when they are being used in the home for cooking.

### Forests

1. The selection of wooded areas within a village which should be surveyed will be made by the technical assistants.
2. If there is forest area within 15 kilometers of the village which is used as a primary source of wood then it should be surveyed.
3. Scattered trees in the padi fields and brush land will not be surveyed unless the technical assistants recommend it.
4. The technical assistants will work with the enumerators in surveying the forest and other wooded areas.

## FIELD RESIDUES

1. The field residues should not include the crop such as the corn, cassava, sugar cane or rice, but only what is left in the field after harvest.
2. Residues such as corn cobs, palm leaves, and rice husk which are used as fuels should be collected not in the field but from the houses where they are used or the market where they are sold.
3. To ensure that the field residue has not been seriously scavenged, residues should be collected only if the harvest has occurred within the last two weeks and there has not been a lot of rain since the harvest.
4. Residues may also be collected if the crop will be harvested within the next two weeks. Ask the farmer to harvest a square meter of land, then measure the biomass which he leaves behind in the field after removing the crop.
5. For beans it is necessary to collect the field residue before harvest, for water hyacinth collection should be made within one week of harvest, for rice a period of two weeks before or after harvest is permissible.
6. Where the field residue is collected before harvest, the sample must be weighed and then air dried in a manner similar to dung.
7. In phase I several of the pre-harvest residues continued to grow in the sample bag following the premature harvesting.
8. For vegetation which grows on water it is not necessary to wade into the water to measure a square meter of growth. Instead, estimate the percentage of water area which is covered by this vegetation and then use a rake to gather about one square meter onto the shore.









#### 4.2 Stove Testing Procedures

##### STOVE TESTING PROCEDURES = SUPERVISORS NOTES

1. Have your surveyors identify the major stove types and fuels used. Perform five to ten experiments and try to include all stove types and if possible all fuel types.
2. The operator of the stove should be a member of the household who normally does the cooking. Your job as an experimenter is to record the appropriate data as listed on the stove testing sheet.
3. For the boiling water experiment use the pot normally used by the household for cooking <sup>the</sup> principal food (rice).
4. The amount of water added to the pot should correspond to the amount normally used by the cook. A minimum of 1 liter and a maximum of 2.5 liters. Measure amount to nearest half liter.
5. The amount of fuel used should correspond to that amount normally used by the cook, but should be enough to boil the water.
6. The boiling water experiment should be conducted for 30 minutes after the water begins boiling (as indicated by the rapid bubbling of the water or the rising of steam).
7. After the water boils for 30 minutes, the fuel should be removed from the stove and placed in a dish of ashes or earth and covered so as to save the fuel for weighing. (Make sure that the dish does not contain pieces of fuel prior to the experiment). After 30-60 minutes the fuel can be removed for weighing.
8. The boiling water experiment should be conducted without using a top on the pot.
9. For those stoves on which experiments are conducted, a questionnaire form on the dimensions of the stove and the materials used in its construction should be filled in.
10. A description of the pot used including its shape, dimensions and material should be included on the testing report.

11. The cooking test should be made using rice if possible.
12. Before starting the cooking experiment, the stove and pot should be allowed to cool to room temperature.
13. For the cooking test the household member should determine the amount of food and the quantity of water to be used, but the experimenter should weigh the food and measure the volume of the water prior to conducting the experiment.
14. The fuel should be removed from the stove once the household cook determines that the food is properly cooked.
15. If the stove has more than one place for a pot, put pots with water on all places for the boiling water experiment and conduct the experiment for 30 minutes after the first pot boils. Measure the water temperature in all pots and the initial and final volumes of water
16. For the cooking experiment if the stove has place for more than one pot, the household cook should cover the extra places.

Stove Testing Form

Stove Experiment

Questionnaire No. ....

1. What type of stove do your family use ..... (from the picture)

2. Where its locate

in the house

outside the house

ground floor

kitchen but seperate from the house.

3. What kind of fuel do your family use ..... collect fuel used sample

No.....

4. Whether

regular wind

temporary wind

calm

5. The temperature outside your house .....°C

6. The temperature in cooking area (kitchen .....°C

7. Describe the type of pot you use (size and material)

(Draw picture)

8. What you use for light the fire

- kerosene
- paper
- resin
- stick
- other (specify)

Water boiling experiment (water 1 litre boil in 30 minute)

1. The weight of water before boiling ..... grams.
2. The weight of fuel use ..... grams.
3. The weight of rubbish for lit the fire ..... grams.
4. The temperature of water before boiling .....°C
5. Time start to lit the fire ..... o'clock.
6. Time taking pot to put on the fire ..... o'clock.

- 7. Temperature of water after 10 minute ..... °C
- 8. Temperature of water after 20 minute ..... °C
- 9. Boiling time ..... o'clock.
- 10. Extinguish time ..... o'clock.
- 11. Fuel weight after water boiling ..... grams.
- 12. Water weight after water boiling ..... grams.
- 13. Water weight that vaporize ..... grams.
- 14. Total fuel use ..... grams.

(In case that the portable stove has more than 2 months test all the stoves by using the same size of pots) Water weight before and after boiling.

Before

- Water weight of pot two ..... gram.
- " " three..... gram.
- " " four ..... gram.

After

- Water weight of pot two ..... gram.
- " " three ..... gram.
- " " four ..... gram.

Temperate after and before

- Begin with temperating of pot two ..... °C.
- " " three ..... °C.
- " " four ..... °C.
- After temperating of pot two ..... °C.
- " " three ..... °C.
- " " four ..... °C.

Cooking Test

1. Cooking food is the type .....
2. How to cook .....
3. Quantity of the food ..... gram.
4. Water weigh for cooking ..... gram .....cc.
5. Area cooking temperature .....°C.
6. Begin with water temperature .....°C.
7. Type of fuel .....
8. Type of wood lit the fire. ....
9. How to lit the fire ? .....
10. The time of liting the fire .....
11. The time of taking the pot above stove .....
12. All cooking times .....
13. Fuel weight for cooking .....
14. Amount of wood lit fire .....
15. Fuel weight after cooking ..... gram.
16. Amount of wood burned ..... gram.
17. How to extinguish .....
18. Cooking Area has soft wind or windy .....
19. If has the funnel, should observe the blow wind are not

### Observation of Cooking

If possible in a few houses observe the preparation of a meal.

If more than one meal is prepared each day try to observe the morning, afternoon and evening meals.

If the type of cooking and the type of foods prepared vary with the income of the families attempt to observe the cooking activity in houses with different levels of income.

During the food preparation and cooking activities please record the information listed below. This information should be observed, try not to ask the cook. Conversation with the cook should be limited so as not to disturb the normal activities.

1. The type and quantity of food being cooked.
2. The type of stove used for cooking.
3. the type of utensil (pot, pan, grill) used for cooking
4. the method in which each food is prepared before cooking (soaked for how long, chopped, diced, peeled)
5. the type of fuel used in the stove
- 6, the material and technique used for starting the fire in the stove
7. the time from when the fire is started until the cooking is begun
8. the time spent cooking each type of food
9. the sequence in which the foods are cooked
10. the other activities that the cook is involved in while the food is being cooked (talking with family members, cleaning utensils, preparing other foods, etc.)
11. What is the total time from when the fire in the stove was ignited until when it was extinguished,
12. How is the fuel extinguished (embers placed in ash, embers allowed to burn down, embers placed in earth, etc.)







### Observation of Cooking

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#### 4.3 CHARCOAL MEASUREMENT

1. What species of wood are used ?  
\_\_\_\_\_
2. How long is the wood dried ?  
\_\_\_\_\_
3. How long is it fired for ?  
\_\_\_\_\_
4. How many people are required to load the kiln ?  
\_\_\_\_\_  
To keep watch during firing ?  
\_\_\_\_\_  
To unload the kiln ?  
\_\_\_\_\_
5. Photograph or draw a picture of the kiln. Describe the materials used to make it.  
\_\_\_\_\_
6. Describe the loading and firing process.  
\_\_\_\_\_  
\_\_\_\_\_
7. Weigh or estimate the quantity of wood fired.  
\_\_\_\_\_
8. Weigh or estimate the quantity of charcoal produced.  
\_\_\_\_\_
9. Take a sample of the  
Wood \_\_\_\_\_ sample weight \_\_\_\_\_ sample no. \_\_\_\_\_  
Charcoal \_\_\_\_\_ sample weight \_\_\_\_\_ sample no. \_\_\_\_\_
10. What are the dimensions of the kiln  
height or depth \_\_\_\_\_  
width or diameter \_\_\_\_\_  
length \_\_\_\_\_
11. How is the kiln sealed ? What material is used ?





4.4 Rural Industry Survey- Phase II

1. What are the primary products produced ?

<u>NAME</u>	<u>DESCRIPTION</u>
1. ....	.....
2. ....	.....
3. ....	.....
4. ....	.....
5. ....	.....

2. Is this a family industry or are people hired to help in production?

- family only
- outsiders only
- family and relatives
- family and outsiders

3. What raw materials are used for making these products?

<u>NAME</u>	<u>USE</u>
1. ....	.....
2. ....	.....
3. ....	.....
4. ....	.....

4. What fuels or other sources of energy are used for production?

<u>FUEL, ENERGY</u>	<u>USE (NOTE 1)</u>	<u>EQUIPMENT</u>
1. ....	.....	.....
2. ....	.....	.....
3. ....	.....	.....
4. ....	.....	.....

5. For a typical  week or  month

describe the quantities used/produced in kilograms or tons.

<u>PRODUCT</u>		<u>RAW MATERIAL</u>		<u>FUEL</u>	
<u>TYPE</u>	<u>QUANTITY</u>	<u>TYPE</u>	<u>QUANTITY</u>	<u>TYPE</u>	<u>QUANTITY</u>
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

Note 1 :

- 1. heat
- 2. internal combustion engine
- 3. steam engine
- 4. electric motor
- 5. electricity generation
- 6. lighting
- 7. other

Note 2 :

If the respondent knows the production in number of units made, then weigh a sample of these units and estimate the weight of total production.

Note 3 :

For electricity or liquid fuels ask how much is purchased each week or month. For other fuels, measurements must be made. If possible observe the production process and the amount of fuel consumed. If not ask the respondent to show you how much fuel is used for one day's production.

If the fuel used in a day is specified in truck loads see if information can be obtained on the weight of fuel carried in each truck, if not measure the volume of fuel in the truck and weigh a sample volume. If the fuel used in a day is specified as a certain amount of the inventory stored at the factory, then weigh that amount if possible, otherwise measure the volume and take a sample. For large pieces of wood measure the length and diameter of each piece and determine the species. For each biomass fuel collect a sample of about 100 grams.

6. What waste products (residuals) are produced by this factory ?

For a typical  week or  month

how much of each is produced ? What is done with these residuals?

<u>TYPE</u>	<u>QUANTITY</u> (kilograms or tons)	<u>HOW IS IT USED</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

7. Describe the process for producing the major product. Begin with the collection of raw materials and conclude with the transport of the product and residuals away from the factory.

8. List the major types of equipment used in this factory, the number used and the purpose of each type:-

	<u>EQUIPMENT</u> - <u>NUMBER</u>	<u>USE</u>	<u>POWER</u> (B.H.P.) OR <u>TEMPERATURE</u> (°C)
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____

9. Describe the amount of labor used for production, daily wages, position, and duties.

<u>TYPE</u>	<u>NUMBER OF EMPLOYEES</u>	<u>DAILY WAGE</u>	<u>HOURS WORKED PER WEEK</u>	<u>STATUS</u> (PERMANENT, CASUAL, SEASONAL)	<u>DUTIES</u>

10. Describe the period of production and what determines how much is produced ?

high production

low production

no production

<u>MONTHS</u>	<u>AVERAGE MONTH PRODUCTION</u>

Reasons for change in production

- supply of raw materials
- supply of labor
- demand for product
- other (specify)

-----  
 -----  
 -----



14. What factors prevent this factory from expanding its production ?

Limitations on;

- |  |   |
|--|---|
| <input type="checkbox"/> finances for investment | <input type="checkbox"/> demand                             |
| <input type="checkbox"/> operating capital       | <input type="checkbox"/> ability to manage larger operation |
| <input type="checkbox"/> raw material            | <input type="checkbox"/> willingness to accept risk         |
| <input type="checkbox"/> labor                   |   |
| <input type="checkbox"/> transport               |   |

15. If this factory could expand its production, what factors would prevent it from expanding its market area to;

	NEW VILLAGES (MUBAN)	NEW COUNTIES (AMPHOE)	NEW PROVINCES (CHANGWAT)
Competition			
transport cost			
product quality			
lack of established markets			
lack of traders			
lack of information on demand			
other (specify)			

16. How has the price of raw materials, fuels and products changed over the last twelve months ?

	RISEN		FALLEN		FLUCTUATED	
	GRADUALLY	SHARPLY	GRADUALLY	SHARPLY	DAILY	MONTHLY
Product						
Fuels						
Raw material						

17. What sources of investment money were used to establish this factory? \_\_\_\_\_ what sources would be used to expand the factory? \_\_\_\_\_

- |                                     |                            |
|-------------------------------------|----------------------------|
| 1. Profits from production          | 5. Money from partners     |
| 2. Loans from friends and relatives | 6. Credit from suppliers   |
| 3. Loans from bank                  | 7. Advances from customers |
| 4. Loans from money lender          | 8. Personnel resources     |
|                                     | 9. Other (Specify)         |

18. How many competing factories are there in this county (amphoe) \_\_\_\_\_ and province (changwat) \_\_\_\_\_ ?

19. What type of transport is used, who controls it, what does it cost and for what distance is it used ?

TYPE OF RAW MATERIAL, FUEL OR PRODUCT	TYPE OF TRANSPORT	COST OF TRANSPORT ฿ per		AVERAGE DISTANCE TRANSPORTED (KM)

20. If the respondent were to expand or improve his factory what changes would be made in the type of equipment used, fuel consumed, and amount of processing ? What are the reasons for making these changes ?

TYPE OF CHANGE

REASON



5.0 Other Questionnaires

5.1 VILLAGE PROBLEMS

1. List the most important problems of the village and the villagers

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2. List the order of importance of the problems in these five groups

- \_\_\_\_\_ agricultural production
- \_\_\_\_\_ supply of energy
- \_\_\_\_\_ health and nutrition
- \_\_\_\_\_ education
- \_\_\_\_\_ transport and communication

3. List the order of importance of problems within each group

- I. Agriculture \_\_\_\_\_ a. irrigation  
\_\_\_\_\_ b. use of fertilizers  
\_\_\_\_\_ c. better farming technology  
\_\_\_\_\_ d. other (specify) \_\_\_\_\_
- II. Energy \_\_\_\_\_ a. source should be closer to the village  
\_\_\_\_\_ b. fuel too expensive  
\_\_\_\_\_ c. need more efficient method of making charcoal  
\_\_\_\_\_ d. need more efficient stoves  
\_\_\_\_\_ e. need new sources of fuel such as biogas  
\_\_\_\_\_ f. other (specify) \_\_\_\_\_
- III. Health \_\_\_\_\_ a. unsafe water supply  
\_\_\_\_\_ b. inadequate basic health care (clinics, doctors, Paramedics)  
\_\_\_\_\_ c. poor diet and nutritional problems  
\_\_\_\_\_ d. malaria  
\_\_\_\_\_ e. other endemic diseases (specify) \_\_\_\_\_  
\_\_\_\_\_ f. other (specify) \_\_\_\_\_
- 
-

IV. Transport and Communications

- a. poor access to markets
- b. poor access to information on technology and agriculture
- c. lack of personal transport
- d. other (specify) \_\_\_\_\_

V. Education

- a. lack of education facilities for children
  - b. lack of attendance by children at local school
  - c. lack of education among adult villagers
  - d. lack of educational opportunities for adults
  - e. poor extension services
  - f. other (specify) \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## 5.2 Technology Choice

Surveyor \_\_\_\_\_  
Village \_\_\_\_\_  
Changwat \_\_\_\_\_  
Code (Area, village, surveyor number)

Technology Meeting

1. Which technologies are most appropriate for your village

1<sup>st</sup> \_\_\_\_\_  
2<sup>nd</sup> \_\_\_\_\_  
3<sup>rd</sup> \_\_\_\_\_

2. What problems do you foresee in applying these different technologies in your village

- A. Woodlots .....
- B. Biogas .....
- C. Solar Drying & Distilling .....
- D. New stove designs .....
- E. Small scale gasifiers .....
- F. Pyrolytic converters .....
- G. Water lifting with photovoltaic, biogas or wind .....
- H. Better charcoal kilns .....
- I. Small scale microhydro power .....

3. Are there problems in your village that would make you recommend against putting in a technology demonstration project

.....  
.....  
.....

### 5.3 APPROPRIATE TECHNOLOGY QUESTIONNAIRE

1. Type of unit

biogas digester  
windmill  
solar dryer  
woodlot  
water wheel  
micro hydro  
other (specify)

2. How long has this unit been used ?
3. What is this unit used for ?
4. How much did it cost to obtain this unit ?
5. Where did the user learn about this design ?
6. If this unit were not used what source of energy would be used ?
7. What problems are there in using this technology ?
8. How could this technology be changed to be more useful ?
9. Who constructed this unit ?
10. Please briefly describe this unit including the materials used in construction, the method of power transmission and the approximate dimensions.

5.4 Energy Seller Questionnaire

Part 1 Typed of Energy Sold

1. Type of fuel
  - Fire wood                       charcoal
  - other (specify) \_\_\_\_\_
2. Quantity sold in each month (measure and convert)
  - Fire wood \_\_\_\_\_ units \_\_\_\_\_ conversion \_\_\_\_\_ kg
  - charcoal \_\_\_\_\_ units \_\_\_\_\_ conversion \_\_\_\_\_ kg
  - other (specify) \_\_\_\_\_
3. You usually sell the fuel to
  - villagers                       Small scale industry
  - other (specify) \_\_\_\_\_
4. Source of Fuel
  - obtain yourself    Buy (in order to sell)
  - other (specify) \_\_\_\_\_
5. Problems concerned with fuel selling.
  - cannot sell                       don't have enough for sale
  - other (specify) \_\_\_\_\_
6. Your major costs are for
  - interest                       storage
  - other (specify) \_\_\_\_\_
7. If the government supports capital and/or land for woodlots, do you think you will participate ?
  - yes                       no                       uncertain
8. How much land do you need for woodlot, agricultural, livestock ?
  - less than 10 rais                       10-15 rais
  - other (specify) \_\_\_\_\_
9. What help do you need from government ?
  - new techniques
  - land
  - capital
  - other (specify) \_\_\_\_\_

Past II Seller's opinion

1. Is there a sufficient supply of this fuel for the future

yes                       no

If no then what fuel will you sell in the future

fire wood                       charcoal

other (specify) \_\_\_\_\_

2. As a seller, do you have any difficulty concerning government regulation ?

yes                               no

3. If yes, how do you solve this problem ?

obey the laws                       compromise

other (specify) \_\_\_\_\_

4. How much fuel do you store at one time ?

fire wood \_\_\_\_\_ m<sup>3</sup> (pieces)

charcoal \_\_\_\_\_ m<sup>3</sup> (bags)

gas \_\_\_\_\_ tank (kg)

other \_\_\_\_\_ units

5. If you store the fuel. Do you pay for storage ?

yes                                       no

5.5 CENSUS

1. How many members in your household ?

now ..... persons

during the rainy season ..... persons

2. How many members in your household work ? ..... persons

3. What are the fuels used in cooking ?

present  fire wood  charcoal  gas  other (specify)

rainy season  fire wood  charcoal  gas  other (specify)

4. How much landholding do you control ?

your own land \_\_\_\_\_ rai

rentals \_\_\_\_\_ rai

How much do you cultivate of other persons property, public land, and forest reserves \_\_\_\_\_ rai

5. How much land do you use for cultivation ?

During the rainy season \_\_\_\_\_ rai

winter \_\_\_\_\_ rai

summer \_\_\_\_\_ rai

6. What kinds of crops do you grow ?

	yes	no
rice	<input type="checkbox"/>	<input type="checkbox"/>
jute	<input type="checkbox"/>	<input type="checkbox"/>
cassava	<input type="checkbox"/>	<input type="checkbox"/>
sugar cane	<input type="checkbox"/>	<input type="checkbox"/>
ground nut	<input type="checkbox"/>	<input type="checkbox"/>
mung bean	<input type="checkbox"/>	<input type="checkbox"/>
pineapple	<input type="checkbox"/>	<input type="checkbox"/>
tobacco	<input type="checkbox"/>	<input type="checkbox"/>
maize for animals	<input type="checkbox"/>	<input type="checkbox"/>
vegetables	<input type="checkbox"/>	<input type="checkbox"/>
perennial trees	<input type="checkbox"/>	<input type="checkbox"/>
others	<input type="checkbox"/>	<input type="checkbox"/>

7. What kinds of livestocks do you have ? and how many ?

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8. Do you own the following ?

- motorcycle
- car
- truck
- radio, cassette
- refrigerator
- T.V.
- water pump

9. Do the members of your family have these skills ?

- pottery maker
- brick maker
- blacksmith
- craftsman
- carpenter
- construction worker
- textile
  - a. sewing
  - b. weaving
  - c. spinning
- butcher
- truck driver
- tractor operator
- construction equipment operator
- machine maintenance
- welder, steel worker
- tannery worker
- electrician
- T.V. and radio repair man
- others (identify)

10. Do you have any debts ?

- yes
- no

11. Have you borrowed money in the last year

- yes
- no

12. If so from whom

- BAAC \_\_\_\_\_
- farm association \_\_\_\_\_
- savings co-operative \_\_\_\_\_
- relatives \_\_\_\_\_
- friends \_\_\_\_\_
- middle men \_\_\_\_\_

13. According to the headman, is this family

- wealthy
- medium
- poor

14. Occupation of members of your household, work in agriculture

- work in agriculture on your land \_\_\_\_\_
- work in agriculture as hired labor \_\_\_\_\_
- full-time government \_\_\_\_\_
- full-time trade, shops \_\_\_\_\_
- full-time small industries, mills \_\_\_\_\_

13.6 Circle type of stoves that is used in your household (see attached drawing)

## 5.6 MARKET PRICES

PRICE	RICE	PRICE AND UNIT
Selling	1	padi after harvest
"	2	milled after harvest
"	3	padi in rainy season
"	4	milled rice in rainy season
Buying	5	rice husks
"	6	rice bran
Selling	7	cassava
"	8	cassava milled
"	9	sugar cane
"	10	tobacco leaves
"	11	tobacco leaves, dried
Selling	12	buffalo adult, male
Buying	13	" child, male
Selling	14	" adult, female
Buying	15	" child, female
Selling	16	cattle adult, male
"	17	" adult, female
Buying	18	" child, male
"	19	" child, female
Selling	20	swine adult, male
"	21	" adult, female
Buying	22	" child, male
"	23	" child, female
Selling	24	chicken, adult
Buying	25	" child
Selling	26	eggs
Buying	27	chicken, slaughtered
"	28	ducks
"	29	geese
"	30	kerosene
"	31	gasoline
"	32	diesel

PRICE	RICE		PRICE AND UNIT
Buying	33	fuelwood type_____price_____	
"	34	" type_____price_____	
"	35	" type_____price_____	
"	36	charcoal	
"	37	stoves, charcoal	
"	38	other fuels	
"	39	" " type	
"	40	" " type	
"	41	cement	
"	42	bricks	
"	43	sand	
"	44	steel sheet	
"	45	fertilizer type	
"	46	" type	
"	47	pesticide type	
"	48	" type	
"	49	insecticide type	
"	50	" type	
Renting	51	buffalo rental	
"	52	tractor rental	
Hiring	53	hired agricultural labor	
"	54	hired construction labor	
Buying	55	storage battery size	
"	56	charging storage battery	
"	57	typical cooking pot for rice	
"	58	typical wok	
"	59	stove, other kerosene	
"	60	lamp, kerosene pump	
"	61	lamp, kerosene chimney	
"	62	electric light bulb	
"	63	incandescent watt	
?	64	fluorescent watt	