

# The Study on Groundwater Development in Central Cambodia

## Final Report

### Main Report

LOCATION MAP

EXCHANGE RATE AND LIST OF ABBREVIATION

EXECUTIVE SUMMARY

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## **5.2 Survey of the 303 target villages**

### **5.2.1 Objectives**

The objective of village survey on the 303 target villages is to collect data for the selection of the villages for the groundwater development and water supply plan. The survey covered the following items:

- 1) General socio-economic status
- 2) Water supply status and situation of water use
- 3) Health and hygiene status
- 4) Education status
- 5) Community organization

### **5.2.2 Methodology**

#### **(1) Survey Team**

The following eight people, divided into five groups, conducted the survey under supervision by two Japanese consultants.

Mr. Sam Bonal	Technical officer, Department of Rural Water Supply, Ministry of Rural Development
Mr. Seng Eam Hor	Hydrologist, Department of Rural Water Supply, Ministry of Rural Development
Mr. Loeuk Ngeth	Technical officer, Department of Rural Water Supply, Ministry of Rural Development
Ms. Kheng Chanthou	Hydrologist, Department of Rural Water Supply, Ministry of Rural Development
Mr. Chhun Bunnarrin	Local consultant, SAWAC
Ms. Men Neary Socheat	Local consultant, SAWAC
Mr. Sreng Vann Molly	Local consultant, SAWAC

Besides the seven people above, ten PDRD staffs, five each from Kampong Chhnang and Kampong Cham province, were involved in the survey as a part of on-the job training.



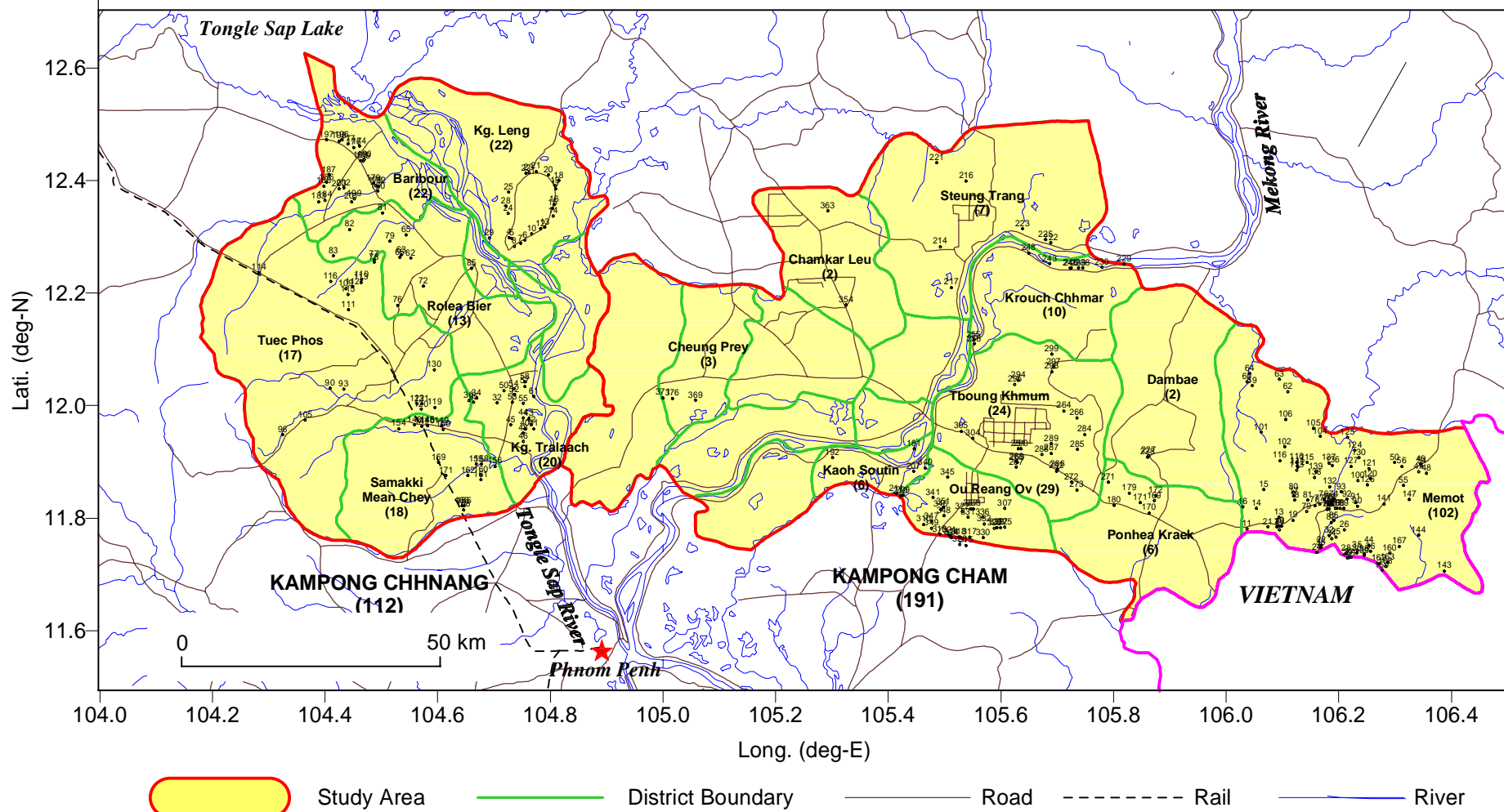


Figure 5.2.1.1

Location of 303 Target Villages

THE STUDY ON THE GROUNDWATER DEVELOPMENT  
IN CENTRAL CAMBODIA

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

## **(2) Survey Method**

Since comparable data covering a wide range of issues needed to be collected from a large number of the target village in limited time, the survey team focused more on quantitative information than qualitative one, and emphasized on creditability of data rather than accuracy of that. It means that, although qualitative information, such as villages' thought on and/or reaction to the development activities, can be used to improve the individual village water supply plan, it is much difficult to compare such information for the target village selection. For some information, accurate number, such as 42.7 % for literacy rate for example, does not necessarily need to be spent a lot of time. It is possible to consider a plan and implementation for the village to use even roughly number on such information, as long as creditability of the information source is secured.

In general, a rural social survey often meets some difficulties in collecting several series of consistent data. This is partly because that a surveyor has to depend on villagers' uncertain memory instead of documented record, and partly because that misunderstanding between a surveyor and villagers often happens. Questions which seems to be clear to a surveyor are too abstract and complicated for villagers so that they cannot reply logically enough for the surveyor to understand exactly. In consequence, the interview is often being continued under a situation that the villagers do not understand what a surveyor are asking about, whereas a surveyor miss what the villagers are talking about.

In order to avoid such misunderstandings and to improve creditability of the data, the survey team conducted the interviews in the following manner. The question should be short, simple and concrete one. Visual materials, such as photograph and illustrations should be fully used to confirm the topic concerned

The survey consisted of the three parts: Village Representatives Interview, Household Interview and Village Mapping. These three methods complemented each other to make crosscheck of information collected from the village concerned.

### **1) Village Representatives Interview**

The study team interviewed a group consisting of village representatives, with using a structured interview sheet. The village representatives generally included a village chairman, members of VDC, aged person and so on. The group consisted of three males and two females on average of the survey. The topics covered general socio-economic conditions, education status, health and hygiene status, water supply condition in the village. It took

generally two to three hours for this interview.

## **2) Household Interview**

The interview was conducted to households, which accounted for approximately 10 percent of the total household in each village, and made 5,175 sample households in total of the 303 target villages. Sample households were selected with attention to the two points. The first one was a location of the household in the village. Samples were selected from different parts in the village, so as to reflect different distances to existing water source. The second one was that female-headed households, which were considered as one of the disadvantaged class in Cambodian society, were selected according to the proportion occupied to the total household in the village concerned.

The survey team concentrated on collecting information in terms of water use practice. Seasonal utilization, distance, purpose, quality of water, satisfaction with the quality, frequency of fetching work and time consumption per work were asked to every water point used by the household. The interview was carefully conducted using structured interview sheet and illustrations in order for the interviewee not to miss what they were being asked. Accumulation of these series of information could bring clear picture of water use practice of the household, which varied from household to household under the circumstances that various type of and quite a lot of water sources existed in the area concerned.

The survey team also collected information on household structure as well as each member's role in terms of water fetching work. After listing up all family members with his/her sex and age, each member was ranked according to a frequency for water fetching work, such as "the most frequently", "the second most", "never to fetch" and so on. Questions in this sequence could bring certain situation in terms of water fetching work, which could be used for gender analysis.

In most villages, household interview was conducted at each house so as to avoid interruption and confusion caused by audience. However, the survey team gathered households at a place, and interviewed one by one in case that they had to interview lots of households within limited time. As a whole, it took approximately 10 to 15 minutes to interview one household.

## **3) Village Mapping**

Village map was drawn on a paper generally by village representatives. In some villages, the surveyor drew a map based on information provided by villagers. Location of existing water

sources as well as public buildings such as school and pagoda were clearly pointed on the map. This drawn information was used not only when the surveyor confirmed information collected through interview, but also when the survey team selected families for household interview.

### **5.2.3 Socio-Economic Conditions**

#### **(1) Population**

The total population of the 303 target villages was 258,983 and total household number is 51,422. The average size of the village was 170 households with 855 persons, and the number of family member is 5.0 persons on average. The maximum size of the village was 5,120 persons, while the minimum size was 256 persons. (Refer to Table 5.2.3.1)

#### **(2) Growth Rate of Population**

To compare the results of the survey with the data of the General Population Census of Cambodia conducted in 1998, the annual growth rate of the population in the 303 target villages is estimated to be 0.90 %, which is much lower than expected. There were 202 villages which increased in population, while 101 villages decreased in. It is estimated that these changes was partly caused by separation and integration of the villages, and partly caused by movement of population. The survey team found one village that had divided into nine villages after the 1998 census. Also, there were 168 villages which had households moved in during the past three years, whereas 158 villages had households moved in during the period. Thus, it is considered that these factors brought the low growth rate mentioned above. As long as the villages without households moved in and/or out during the past three years are concerned, the annual growth rate of population is estimated to be 2.23 %. (Refer to Table 5.2.3.2)

#### **(3) Sex Ratio and Female-Headed Household**

The high proportion of women in the adult population is an important feature in Cambodian society. The sex ratio (number of males to females) in the 303 target villages was 0.94, which is as same level as that of the 1998 Census data. (Refer to Table 5.2.3.1) Percentage of female-headed households ranged from 3 % to 44 %, and was 17 % on average in the 303 target villages.

#### (4) Ethnic Group and Religion

The survey identified that there were four ethnic groups in the 303 target villages. The majority group was Khmer, which accounted for 87.2%. The second group was Cham, which accounted for 12.4%. Besides those groups, there were Chinese and Vietnamese, which consisted of only seven and 10 households respectively.

Almost all Khmer was Buddhist, and almost all Cham was Islam in the target villages. There were a few Christians, which accounted only for 0.4% of the total households.

There were 249 Khmer villages and 11 Cham villages, which consisted of only one ethnic group, and 33 villages consisted of both groups. Apart from those, there were 10 villages which included some Chinese or Vietnamese in addition to Khmer and/or Cham. On the other, Christians were distributed in 19 villages. (Refer to Table 5.2.3.3)

In order to maximize a benefit as well as to improve sustainability of it, the villages which consisted of several ethnic groups and/or religions will be carefully analyzed and treated according to different needs and practices of water use when village water supply plan and implementation are considered. The list of the villages with ethnic and religion information is attached in appendix.

**Table 5.2.3.1 Populations Statistics in The 303 Target Villages**

	Kampong Chhnang	Kampong Cham	Total / Average
Number of village	112	191	303
Population	84,586	174,397	258,983
Household	17,200	34,222	51,422
Population per village	755	913	855
Household per village	154	179	170
Person per household	4.9	5.1	5.0
Maximum population per village	2,055	5,120	-
Minimum population per village	256	263	-
Maximum household per village	349	999	-
Minimum household per village	52	53	-
Sex ratio (number of male to female)	-	-	0.94
Female-headed household (%)	-	-	17

**Table 5.2.3.2 Growth Rate and Movement of Population**

Annual growth rate of the 303 total villages	0.90%
Annual growth rate of the villages without households moved in/out	2.23%
Village increased in population	202
Village decreased in population	101
Village with households moved out	166
Village with households moved in	158

**Table 5.2.3.3 Village Types by Ethnic Group and Religion**

	Number of village
<b>A. Ethnic group</b>	
Khmer only	249
Cham only	11
Khmer + Cham	33
Khmer + Vietnamese	4
Khmer + Chinese	4
Khmer + Cham+ Chinese	1
Khmer + Cham+ Vietnamese	1
Total by races	303
<b>B. Religion</b>	
Buddhist only	235
Islam only	11
Buddist + Islam	28
Buddhist + Christiane	14
Buddist + Islam + Christiane	5
Buddist + Others	8
Buddist + Islam + Others	2
Total by religion	303

## (5) Economic Status

Availability of the information in terms of economic status at village level was quit limited. However, size of agricultural land can be one of the indicators, which estimates differences of economic status at village level as well as household level. Table 5.2.3.4 presents a size of

agricultural land per household in the target villages. The average of the largest size and the smallest size per household in a village were 3.26 hectares and 0.41 hectares respectively. The average of the average size per household in a village was 1.22 hectares. The largest size ranged from 0.40 hectares to 25.00 hectares, whereas the smallest size ranged from 0.01 hectares to 2.50 hectares in the target villages. (Refer to Table 5.2.3.5)

Table 5.2.3.6 presents a condition of landless farmer, which is considered as one of the disadvantaged group. Landless farmers were distributed in 212 villages in total, out of which 64 villages were in Kampong Chhnang province and 148 villages were in Kampong Cham province.

It can be estimated that economic status in the target villages was quite different both of village level and household level. This suggests that standardizing of water charge may bring inequity between villagers in the target villages in access to water point developed by a project. A graduated water charge according to economic status will be potentially more suitable for the villagers under these economic conditions.

**Table 5.2.3.4 Size of Agricultural Land Per Household (1)**

	Average of the largest land size per household	Average of the smallest land size per household	Average of the average size per household
112 villages in Kampong Chhnang	2.39	0.40	1.11
181 villages in Kampong Cham	3.78	0.42	1.28
Average of the 303 villages	3.26	0.41	1.22

unit: hectare

**Table 5.2.3.5 Size of Agricultural Land Per Household (2)**

	The largest land size per	The smallest land size per	The average land size per
The maximum in the 303 villages	25.00	2.50	7.00
The minimum in the 303 villages	0.40	0.01	0.04

unit: hectare

**Table 5.2.3.6 Landless Farmer**

	Number of village with landless farmer	Percentage of landless farmer to total houholds
Kampong Chhnang	64	6.2%
Kampong Cham	148	15.1%
Total/average of the 303 villages	212	12.2%

## (6) Education Status

Almost all of the target villages had primary school in their own village or one which adjoined within five kilometers. (Refer to Table 5.2.3.7)

In contrast to primary schools well distributed among the target villages, adult literacy status remained still weak. All villages can be classified into 5 groups according the adult literacy rate (Refer to Figure 5.2.3.1). Only 34 villages belong to group A, the highest which got more than 80 % of literacy rate, followed 61 villages of group B, the second highest getting the rate of 61 % to 80 %. The mean rate group C, of which rate is 41 % to 60 %, includes 89 villages, and group D and E, the second lowest and the lowest, includes 76 and 43 villages, of which rates are 21 to 40% and lower than 20 % respectively.

Figure 5.2.3.2 presents the difference of the adult literacy rate between male and female. It is clearly shown that the rate of male was higher than that of female. There are 84 villages, of which the rate of male is classified as group A, while there are only 35 villages, of which rate of female is classified as the same. To the contrary, there are 84 villages, of which rate of female is classified as group E, while there are 45 villages, of which rate of male is classified as the same.

As a whole, the weakness of the adult literacy rate should be taken into account, when development project is launched in the villages. Visual materials are appropriate to be used in order for the villagers to receive a project benefit efficiently and effectively. Moreover, such material could prevent unfair distribution of project benefit between sexes. The list of the villages in term of literacy status is attached in appendix.



**Table 5.2.3.7 Distance to a primary school**

	In the village	-5km	6 - 10 km	11km -
Number of village	150	148	4	1

\*\*\*\*\* Classification according to the adult literacy rate \*\*\*\*\*

Group A: The rate is over 80 %

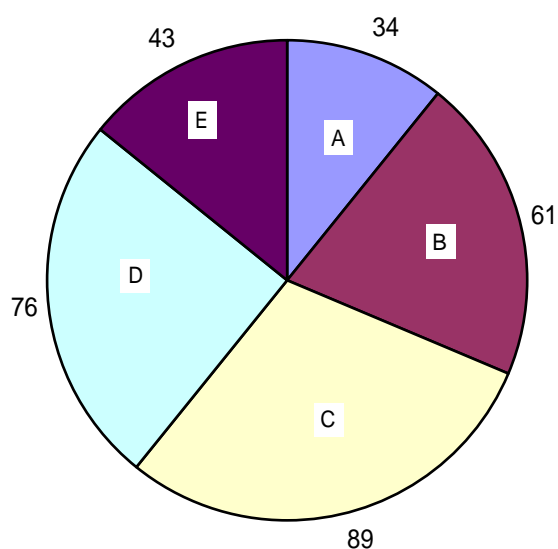
Group D: The rate is 21- 40 %

Group B: The rate is 61- 80 %

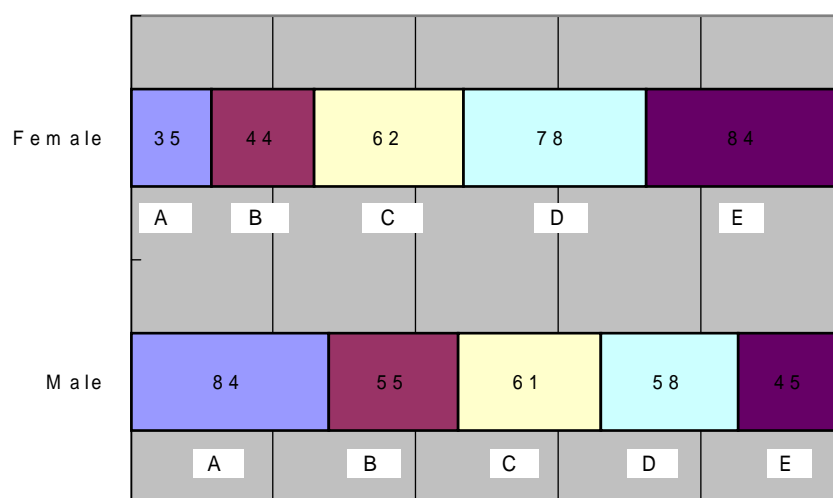
Group E: The rate is 20% and lower

Group C: The rate is 41- 60 %

\*\*\*\*\*



**Figure 5.2.3.1 Village Distribution by Adult Literacy Status**



**Figure 5.2.3.2 Village Distribution by Adult Literacy Status between Male and Female**

## (7) Community Organizations

A village in rural Cambodia is conventionally represented by a group of village leaders consisting of a village chief, and several vice-village chiefs and secretaries. Table 5.2.3.8 presents condition of the village meeting held by the leaders. Although 189 villages held meetings more than five times last year, 41 villages did not have any meetings.

In the target villages, there were several kinds of community organization found, such as funeral committee, school committee, pagoda committee, which were managed by the villagers themselves. However a number of the village having such a community organization was relatively small. 211 villages, which accounted for 69.6 %, did not have such organizations working regularly.

From these facts, it can be estimated that organizational work were not so active very much, and collaborate activities and experiences by the villagers were limited in the target villages as a whole

Under these circumstances, there has been increasing attention paid to VDC in rural Cambodia. It is expected to be a key organization for effective, efficient and sustainable village development including water supply and health and hygiene issues. Both governmental and aid agencies have been involved to organize and train VDC as well as VWC and WPC.

According to the results of the survey, VDC were established in 160 villages, which accounts for 52.8 % of the 303 target villages, and VWC and WPC were organized only in 69 villages, which accounted for 22.8 The efforts to organize and train these organizations should be continued. The list of the target villages in terms of the status of VDC and VWC and WPC is attached in appendix.

**Table 5.2.3.8 Village Administration Meeting Held Last Year**

	Zero	Once	Two - four times	Five times and more	No information
Number of village	41	5	65	189	3

## (8) Development actions by governmental/aid agencies

Table 5.2.3.9 shows development actions implemented by governmental and/or aid agencies

in the 303 target villages. The development activities in health sector are carried out most actively. 222 villages have experiences to receive vaccination service and/or dissemination activities about diseases at the village. The activities in terms of water supply and hygiene issues, which include new water source development and sanitary education, are carried out in 165 villages.

**Table 5.2.3.9 Development actions by governmental/aid agencies**

	Agriculture	Water supply & hygiene	Health	Education	Others
Number of village	80	165	222	98	83

## 5.2.4 Water Supply Conditions

### 5.2.4.1 Water Use

#### (1) Water Sources

The type and number of water sources in 303 villages are shown in Table 5.2.4.1.

**Table 5.2.4.1 Number of Water Sources in 303 Villages**

	Dug Well	Borehole Well	River	Pond	Others
Total	12,689	721	193	223	126

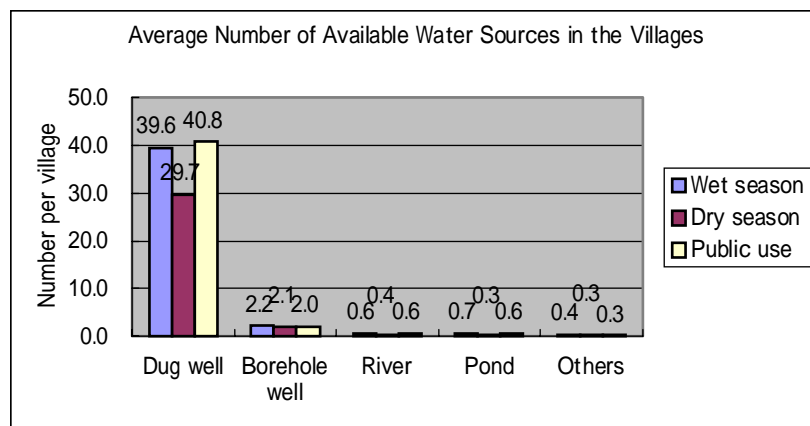
(except rainwater and purchase water)

Other water sources in the area are the followings.

- Temporary Dug Well
- Spring

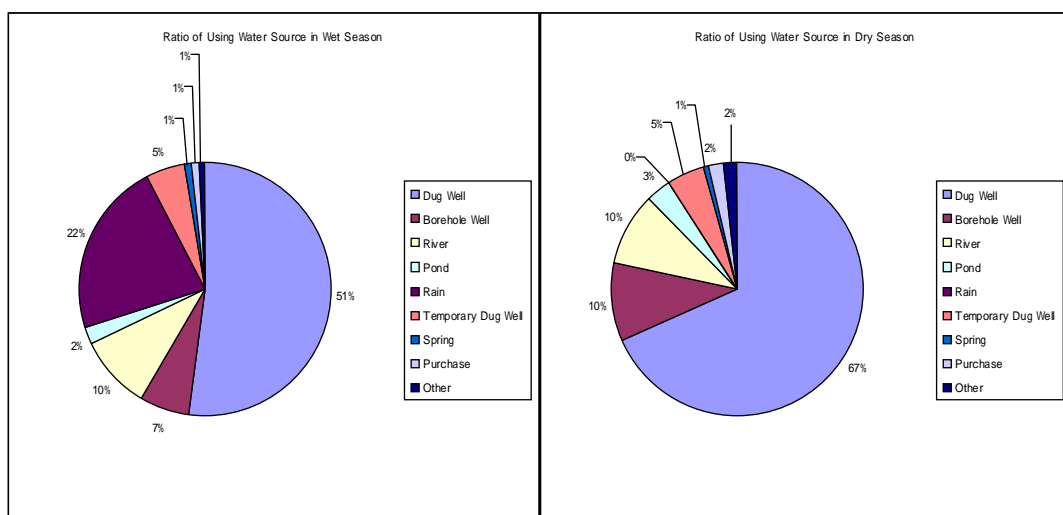
Temporary dug well means the pit without any casing which is only excavated the surface of ground in order to take the water coming up from the shallow aquifer.

Figure 5.2.4.1 shows the average number of water sources per village. Most of the water sources are for public use.



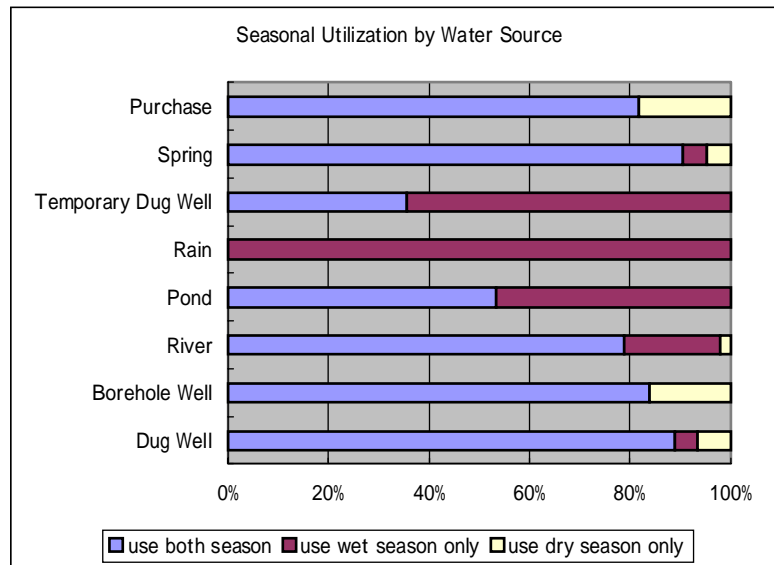
**Figure 5.2.4.1 Average Number of Water Sources in the Village**

Figure 5.2.4.2 shows the ratio of utilized water sources in both wet and dry season. Rainwater is 14% of whole in wet season against 0% in dry season. Dug well is more than a half of whole in both wet and dry season.



**Figure 5.2.4.2 Ratio of Utilized Water Sources**

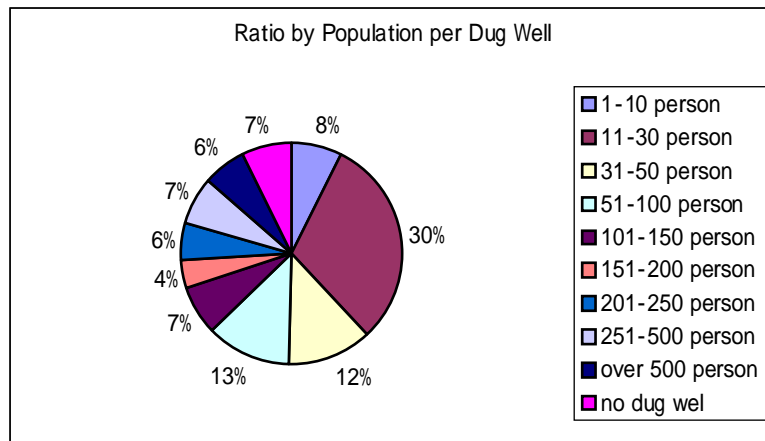
Figure 5.2.4.3 shows the seasonal utilization by water sources. Rainwater is used only in wet season because it is not available in dry season. About 65% of temporary dug well and 45% of pond is not used in dry season. More than 80% of dug well, borehole well, river, spring and purchase-water is available through a year.



**Figure 5.2.4.3 Seasonal Utilization by Water Source**

### 1) Dug Wells

Dug well is the most popular water source in the area. There are 12,689 dug wells in the area. The number of average dug wells is 41.9 per village. Figure 5.2.4.4 shows the population per dug well by village. The village where a dug well exists at a rate of 50 or less persons per place is 50% of the whole. But the village where no dug well exists is still 7% of the whole.



**Figure 5.2.4.4 Ratio by Population per Dug Well**

## 2) Borehole Wells (Hand Pump Wells)

There are 721 borehole wells in the area, and the number of average borehole wells is 2.4 per village. The village with the borehole well which exists in 250 or less persons at one rate has 20% of the whole. And there is a village where a borehole well does not exist, 54% of the whole.

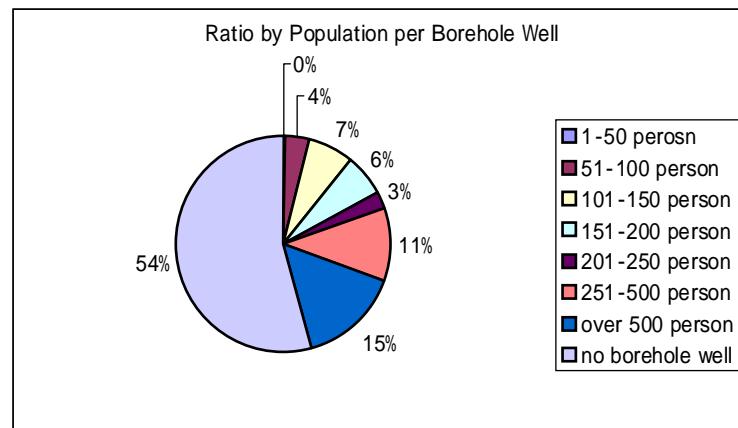


Figure 5.2.4.5 Ratio by Population per Borehole Well

## 3) River, Pond and Other Water Sources

There are in total 193 rivers and 223 ponds in the target villages. Although used also for the dry season 80% of the river, as for the pond, the abbreviation half is not used for the dry season. Moreover, the use of water of a river or a pond is mainly for the drinking of livestock as shown in the Figure 5.2.4.8.

Apart from dug wells, borehole wells, rivers and ponds, villagers use rainwater. Rainwater is a important water source in wet season. Figure 5.2.4.6 shows the use of rainwater by household level and village level. 87% of whole villages use rainwater in the wet season. But rainwater is used less than 43% of households.

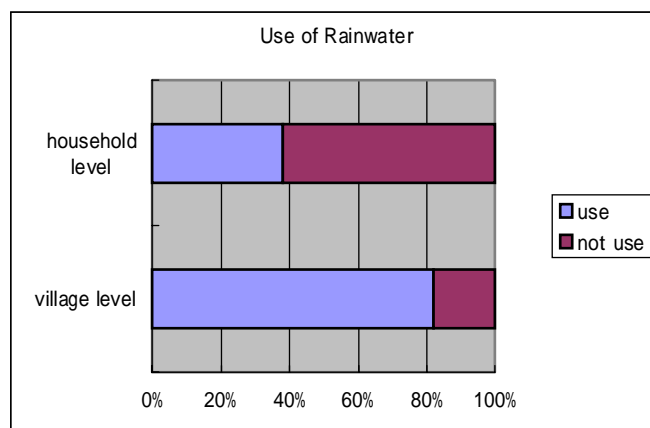
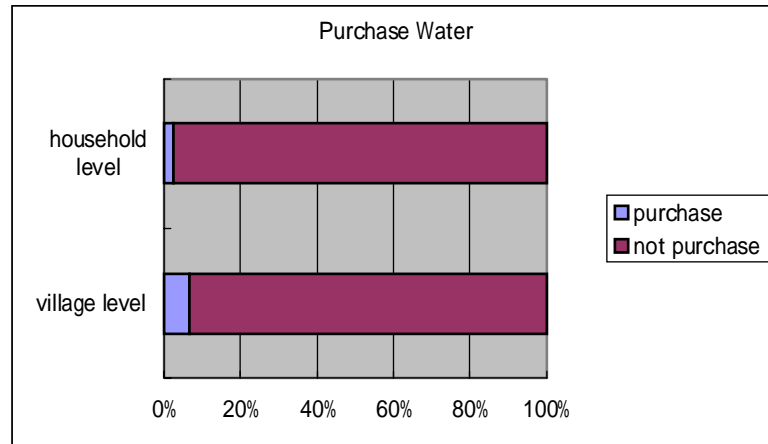


Figure 5.2.4.6 Use of Rainwater

In villages where water availability is low, villagers purchase water for drinking. The price range is between 5 to 10 Riel per liter. Purchase of water is more common along Mekong river and Tonle Sap river, indicating water shortage conditions.

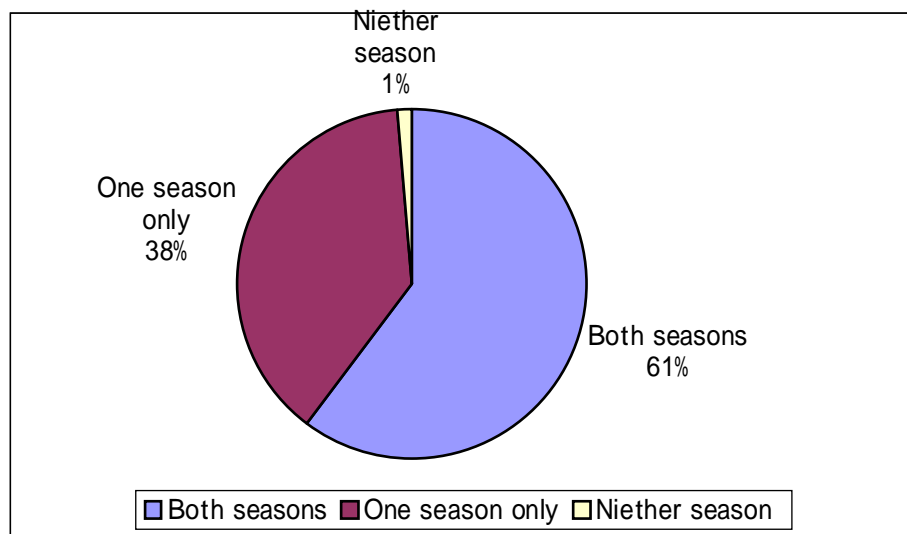


**Figure 5.2.4.7 Purchase Water**

## (2) Water Quality

Sample water were collected from all villages conducted the village survey. The results of water quality test are attached in Data Book.

Villagers' satisfaction with water quality of dug wells which can be used a whole year. Approximately 61 % of the households express their satisfaction of three aspects of water quality: taste, odor and clearness, in both seasons. Nearly 40 % of households satisfied in wet or dry season only. There are a quite few households satisfied with in neither season. (Refer to Figure 5.2.4.8)

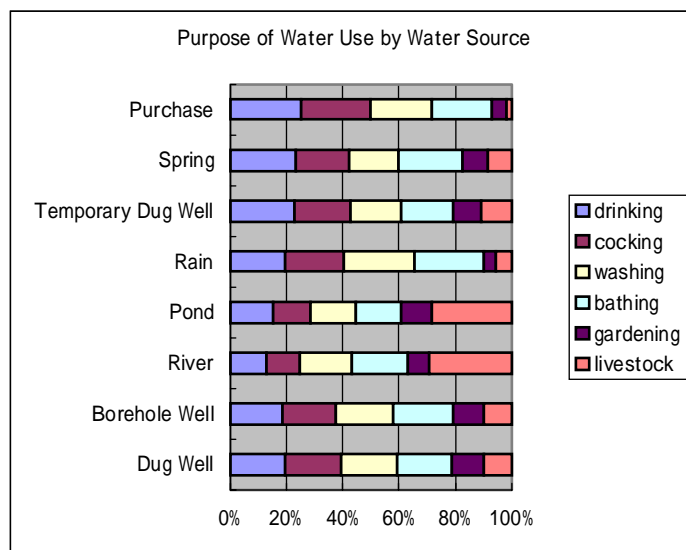


**Figure 5.2.4.8 Villagers Satisfaction of water quality of dug well**

### (3) Purpose of Water Use and Water Drink Practice

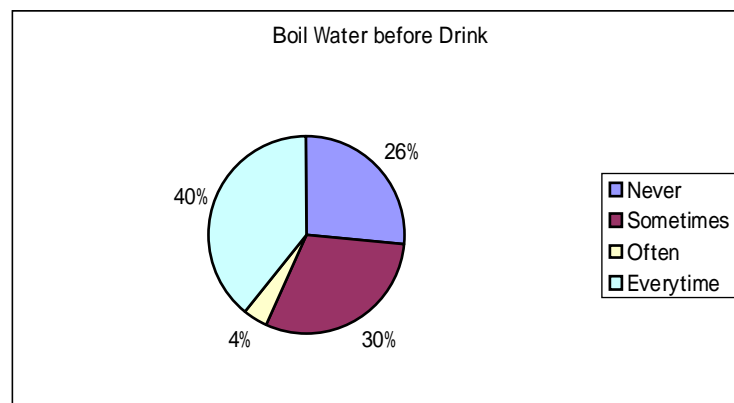
The purposes of water use are for drinking, cooking, washing, bathing, gardening and livestock. The purpose by the water source is shown in the Figure 5.2.4.9.

Although each purpose has averaged Dug well, Borehole well, Rainwater, Spring, and Purchased water, Pond and River have a high use as a purpose for the livestock, and Temporary dug well has a high ratio as a purpose for drinking.



**Figure 5.2.4.9 Purpose of Water Use by Water Source**

Regarding how villagers drink water, one (1) third of villagers responded that they always drink water after boiling it and another one (1) third of villagers responded that they often or sometimes drink water after boiling it. But remaining one (1) third of villagers responded that they drink directly without any boiling it. (see Figure 5.2.4.10)



**Figure 5.2.4.10 Water Drinking Practice**



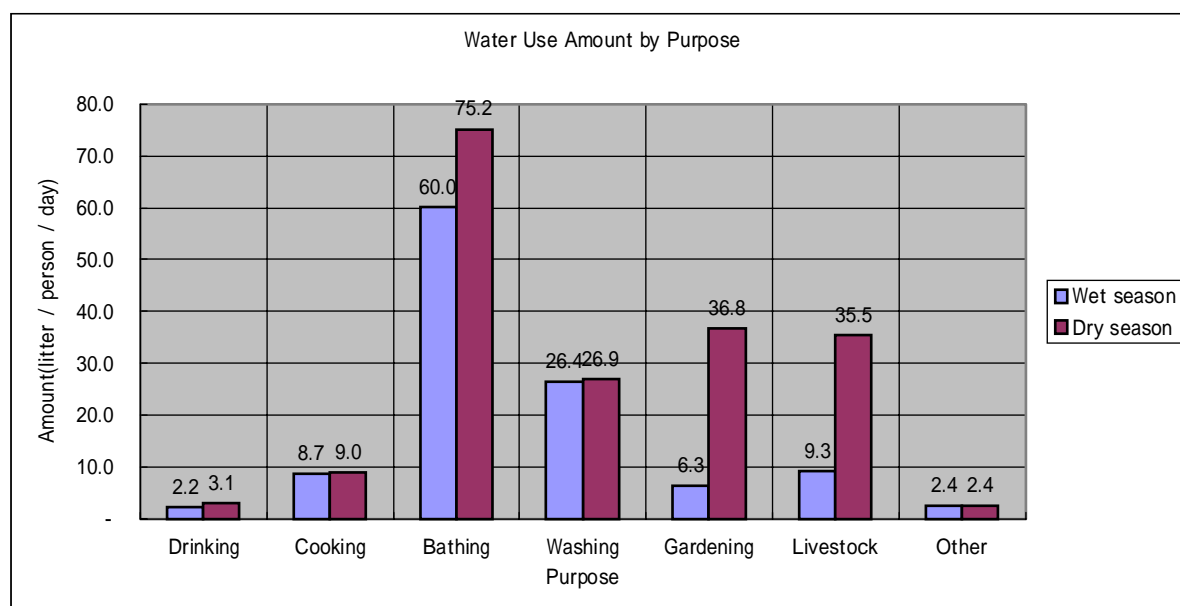
#### (4) Water Use Amount

Table 5.2.4.2 shows the amount of water used by purpose.

**Table 5.2.4.2 Water Use Amount (Unit: litter/person/day)**

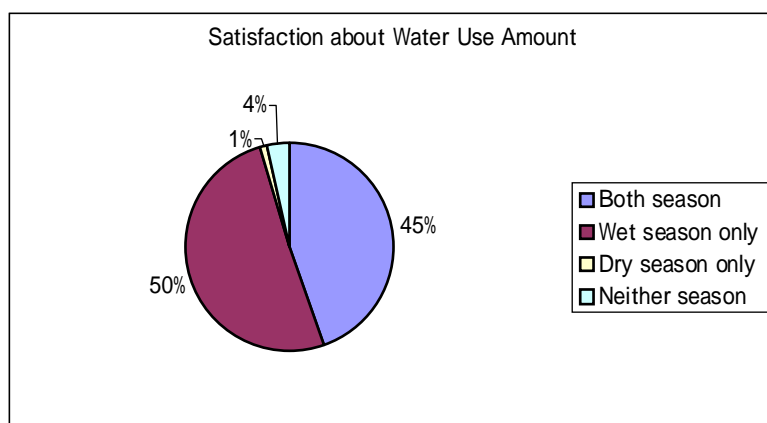
	Wet Season	Dry Season	Average
Drinking	2.2	3.1	2.6
Cooking	8.6	9.0	8.8
Bathing	60.0	75.2	67.6
Washing	26.4	26.9	26.6
Gardening	6.3	36.8	21.6
Livestock	9.3	35.5	22.4
Others	2.4	2.4	2.4
Total	115.4	188.8	152.1

The average amount of water used in the area is 152.1 liters/person/day. Figure 5.2.4.11 shows water use amount by purpose.



**Figure 5.2.4.11 Water Use Amount by Purpose**

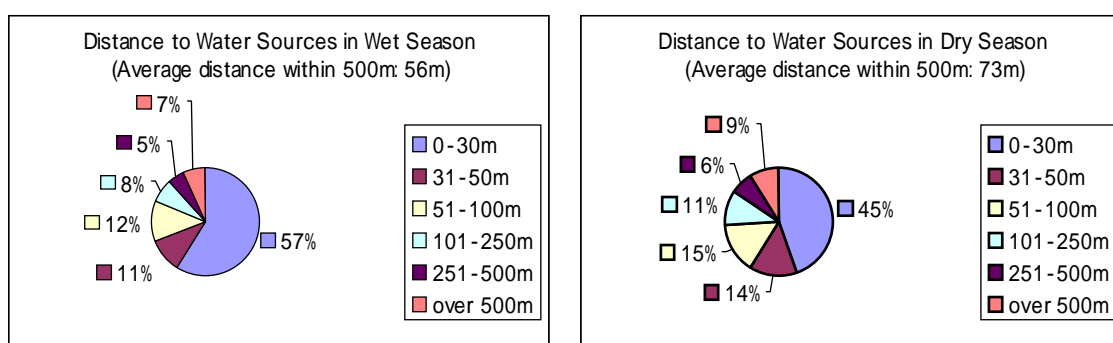
Regarding whether villagers satisfy water use amount, one (1) third of villagers responded that they satisfy through a year and another one (1) third of villagers responded that they satisfy only in half season. But remaining one (1) third of villagers responded that they don't satisfy in neither season. (refer to Figure 5.2.4.12)



**Figure 5.2.4.12 Satisfaction about Water Use Amount**

### (5) Distance to Water Sources

Figure 5.2.4.13 shows the distance to the water sources. 90% of water sources are located within 500m from houses. About a half of water sources are located within 30m from houses. Average distance to water sources within 500m is 56 m in wet season and 73 m in dry season.



**Figure 5.2.4.13 Distance to Water Sources**

Figure 5.2.4.14 shows distances by water sources. About 60% of dug wells and 30% of borehole wells are located within 30m from houses. About 40% of rivers and 60% of ponds are located further than 500m from houses.

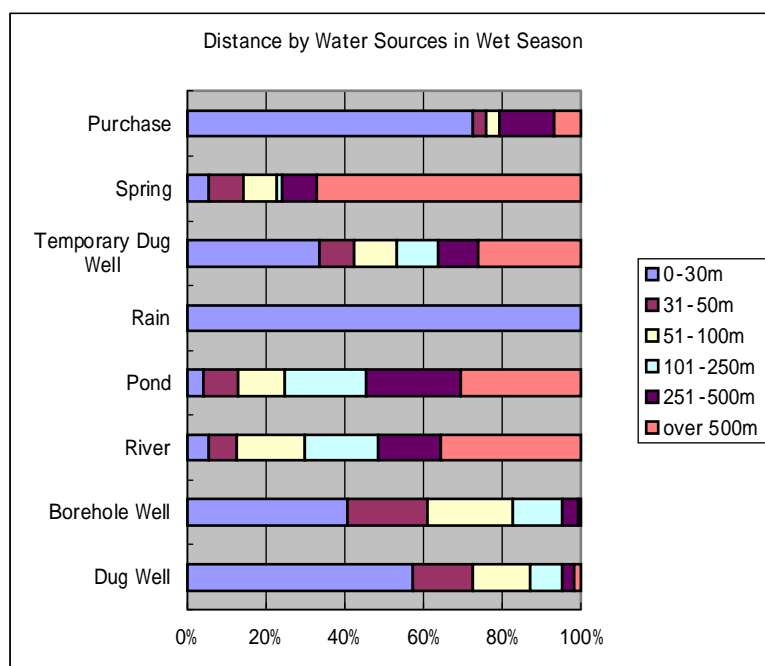


Figure 5.2.4.14 Distance by Water Sources

## (6) Water Fetching

Figure 5.2.4.15 shows the person who fetch the water by sex and age. Age of 81% of persons who fetch the water is between 16 and 50.

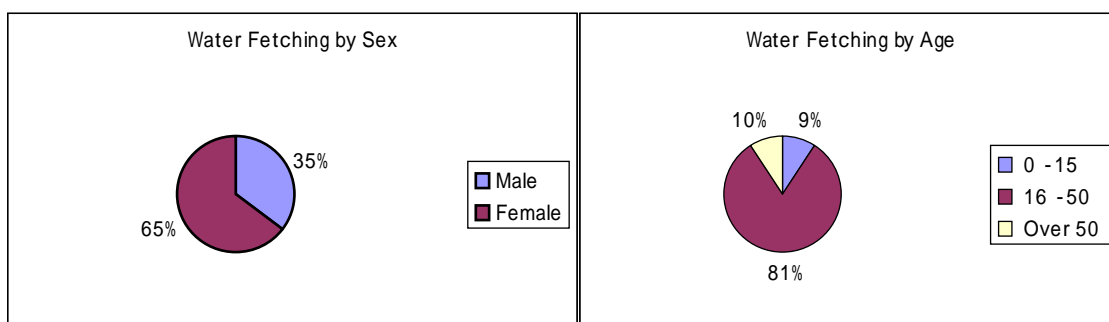
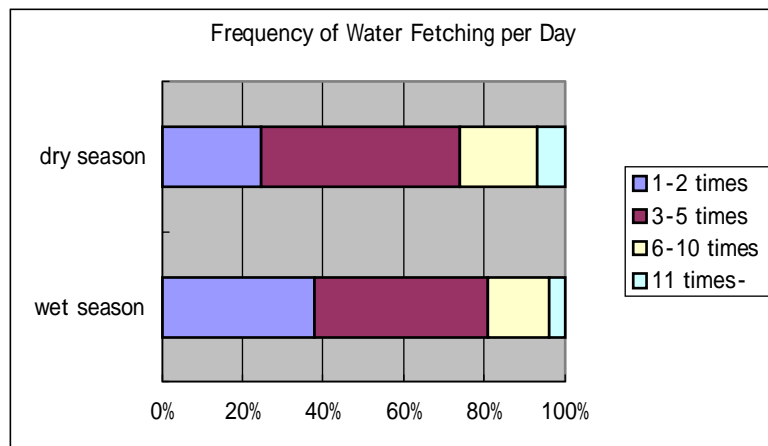


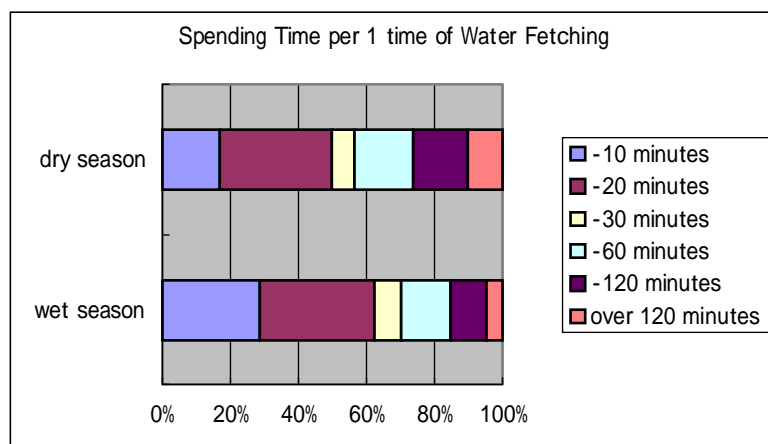
Figure 5.2.4.15 Water Fetching by Sex and Age

Figure 5.2.4.16 shows the frequency of water fetching. Villagers go water-fetching average 3.9 times a day in wet season and 4.7 times a day in dry season.



**Figure 5.2.4.16 Frequency of Water Fetching**

Figure 5.2.4.17 shows the spending time for water fetching. Average spending time for water fetching 34 minutes in wet season and 49 minutes in dry season per day per household.

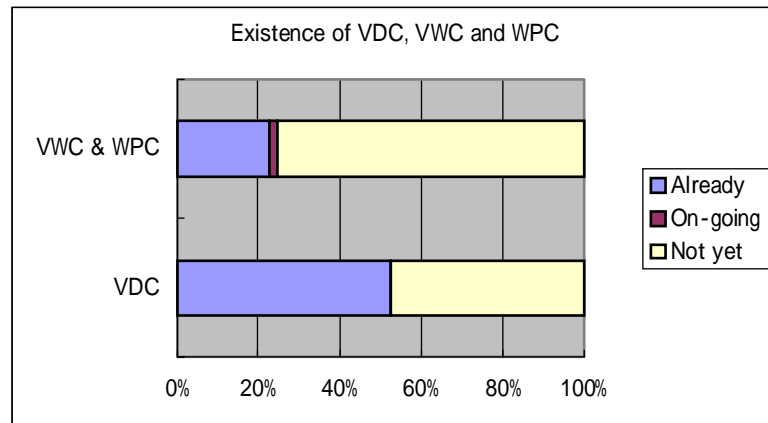


**Figure 5.2.4.17 Spending Time for Water Fetching**

## 5.2.4.2 Information about Operation and Maintenance of Handpumps

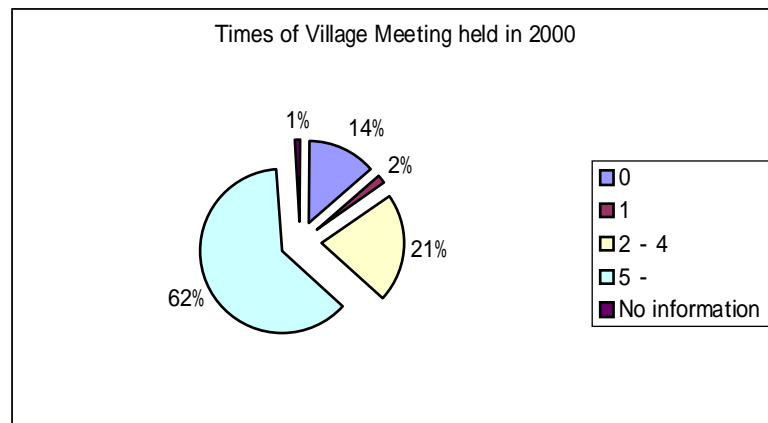
### (1) Establishment of VDC, VWC & WPC

VDC is already established in 53% of the 303 villages and VWC & WPC are established in 22% of the whole. (refer to Figure 5.2.4.18)



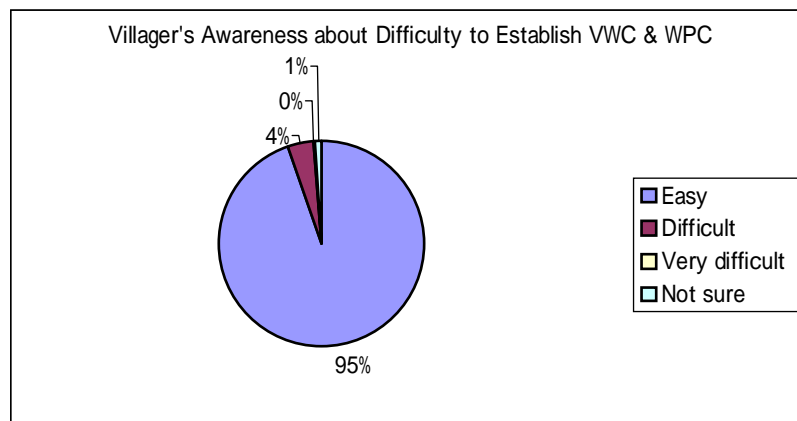
**Figure 5.2.4.18 Existence of VDC, VWC and WPC**

Figure 5.2.4.19 shows the frequency of village meeting held in 2000. 85% of the villages held village meeting in 2000, and 62% of the villages held the meeting more than five (5) times in 2000.



**Figure 5.2.4.19 Times of Village Meeting**

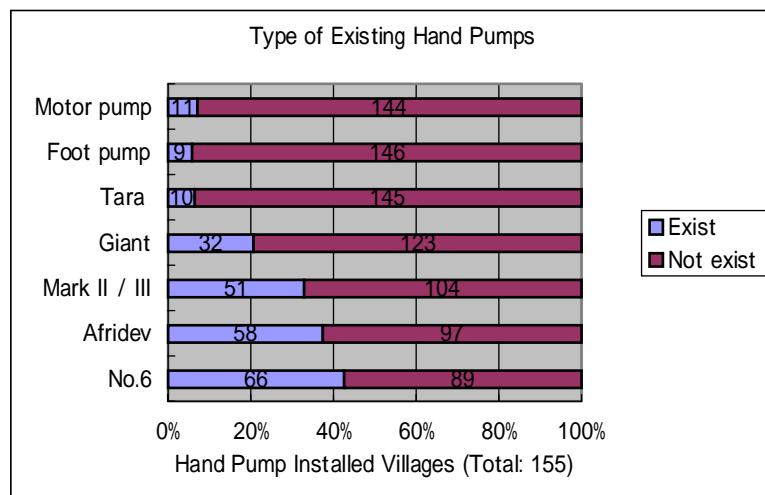
Figure 5.2.4.20 shows the villager's awareness about difficulty for establishing VWC and WPC. 95% of Villagers consider that it is easy to establish VWC and WPC.



**Figure 5.2.4.20 Awareness about Difficulty for Establishing VWC and WPC**

## (2) Type of Hand Pumps

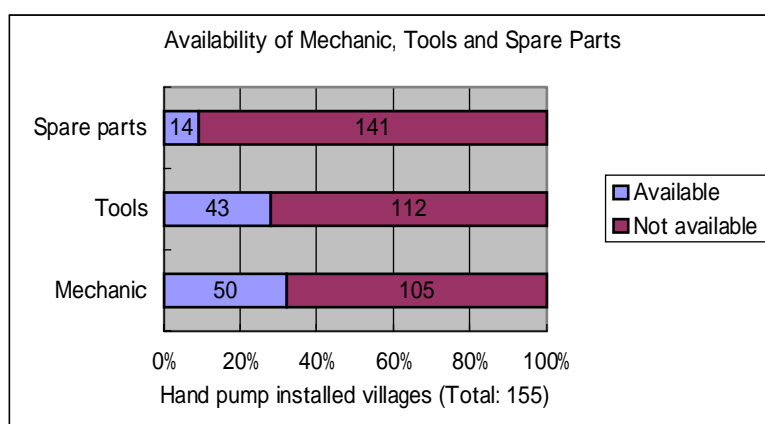
Hand pumps exist in the 155 villages out of 303 villages. Figure 5.2.4.21 shows the type of existing hand pumps in the villages. No.6, Afridev and India Mark II/II types exist in more than 30% of the villages where hand pumps are installed.



**Figure 5.2.4.21 Type of Existing Hand Pumps**

## (3) Availability of Mechanic, Tools and Spare Parts in the Village

Figure 5.2.4.22 shows the availability of mechanic, tools and spare parts in the village where hand pumps are already installed. Considering the situation shown in the Figure 5.2.4.22, it seems that it is no capability of maintenance and repair of hand pumps in more than 70% of the villages where hand pump wells exist.



**Figure 5.2.4.22 Availability of Mechanic, Tools and Spare Parts**

#### (4) Training Needs for Operation and Maintenance

Figure 5.2.4.23 shows the villager's awareness about necessity of training for operation and maintenance. Most of the villagers consider that training is necessary for operation and maintenance.

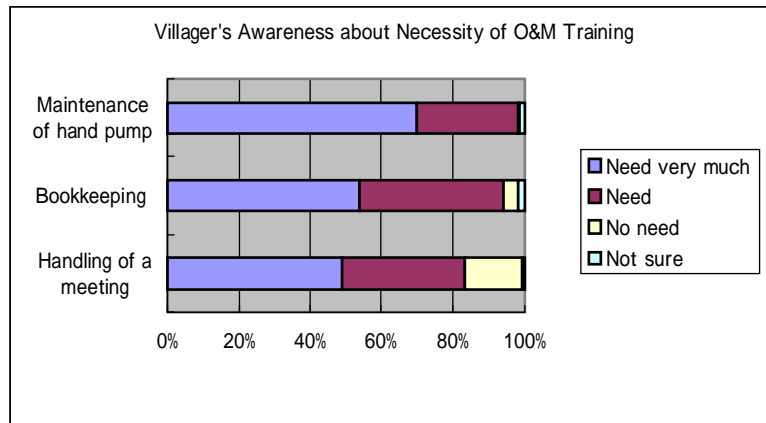


Figure 5.2.4.23 Awareness about Necessity of O&M Training

#### (5) Willingness to Pay

With regard to willingness to pay for the future hand pump maintenance fee, the response was positive except for 3% of villages. According to the Figure 5.2.4.24, 90% of reply shows the payable amount is between 100 and 500 Riel/month/household.

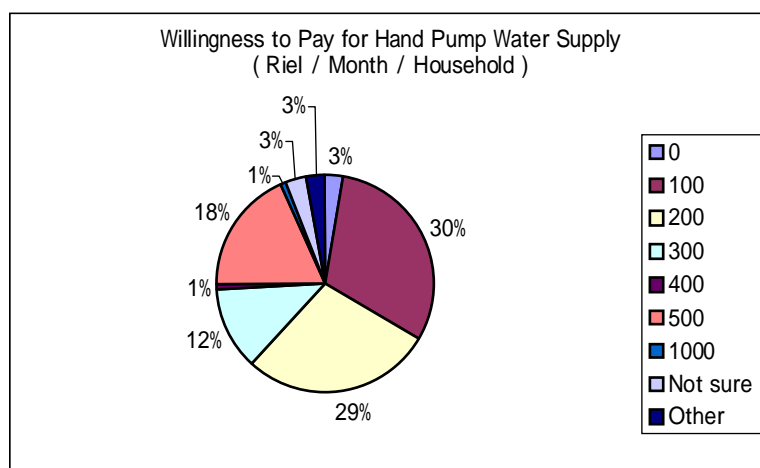


Figure 5.2.4.24 Willingness to Pay

### 5.2.4.3 Information about Groundwater Development

#### (1) Problem Ranking

Figure 5.2.4.25 shows the villager's awareness about 1<sup>st</sup> priority of water supply problem. According to the Figure 5.2.4.25, the quantity is most important problem for the villagers.

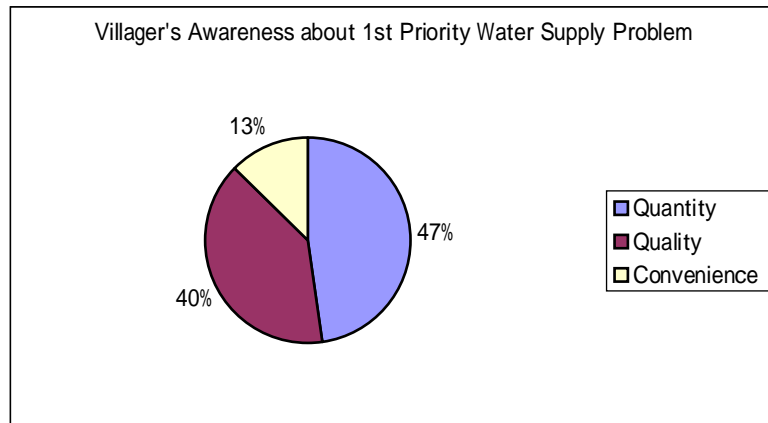


Figure 5.2.4.25 Awareness about Water Supply Problem

#### (2) Land Acquisition

Figure 5.2.4.26 shows the villager's awareness about land acquisition for construction borehole wells. Villagers consider that it is easy to prepare the land to construct the borehole wells.

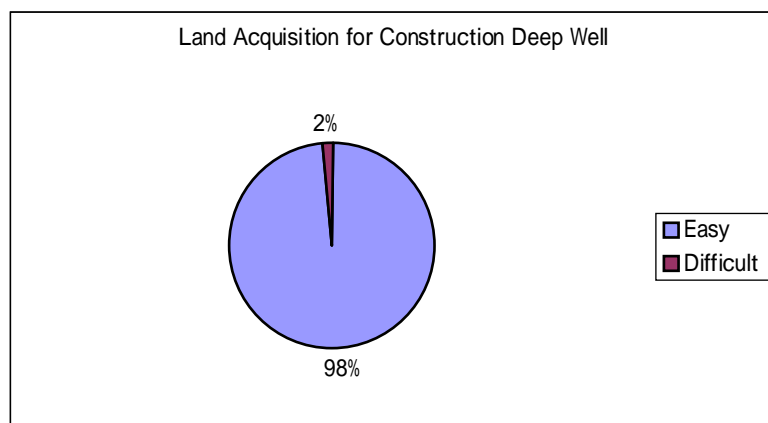


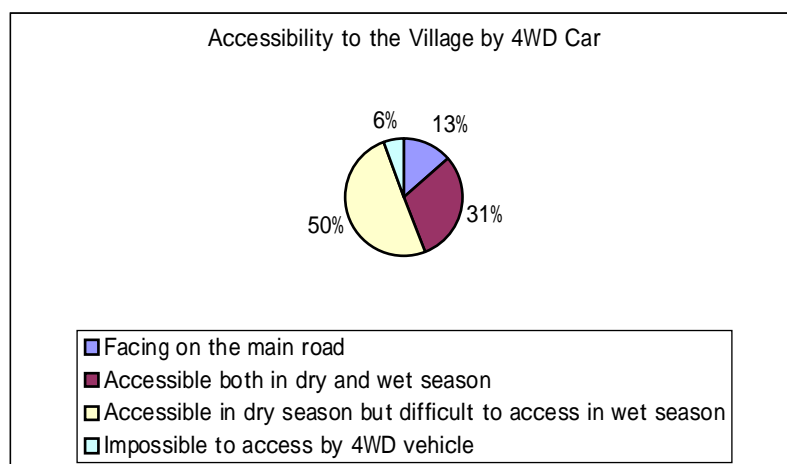
Figure 5.2.4.26 Awareness about Land Acquisition

#### (3) Accessibility and Infrastructure

Figure 5.2.4.27 shows the accessibility to the villages. Villages that are accessible through a

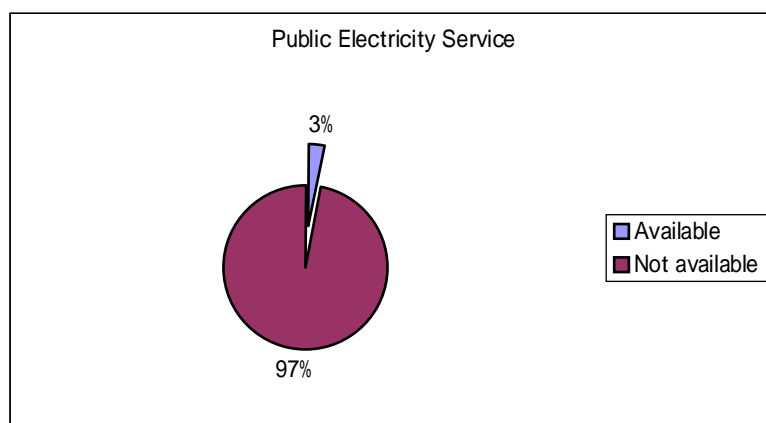


year are only 44% of the whole. It should be considered for the implementation plan.



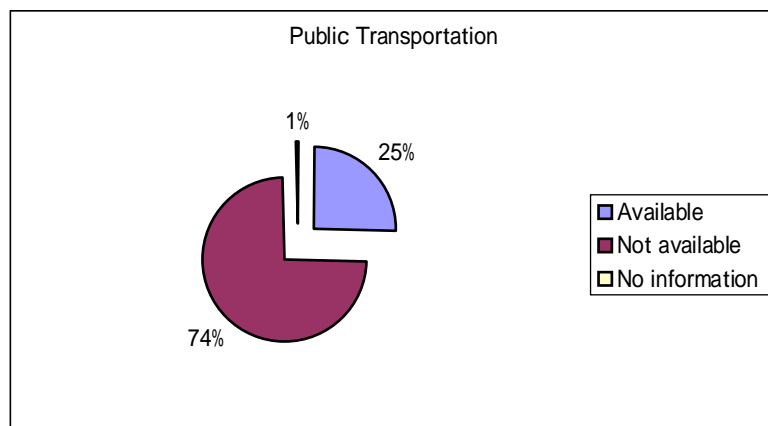
**Figure 5.2.4.27 Accessibility to the Villages**

Figure 5.2.4.28 shows the availability of public electricity service in the villages. Public electricity service is not available in most of the villages.



**Figure 5.2.4.28 Availability of Public Electricity Service**

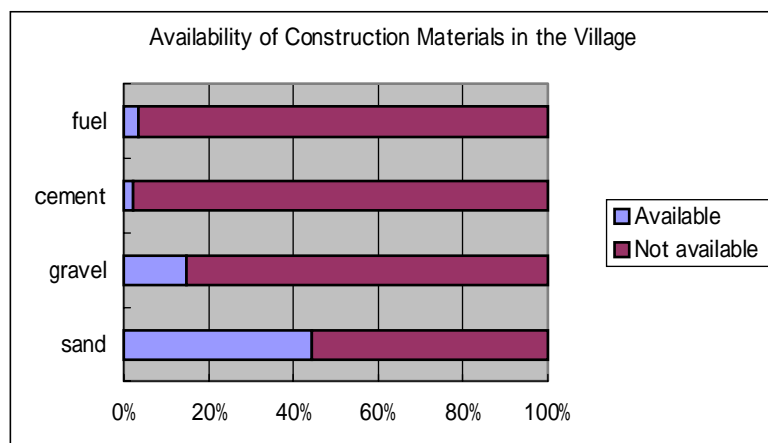
Figure 5.2.4.29 shows the availability of public transportation services. Villages where public transportation service is available are only 25% of the whole.



**Figure 5.2.4.29 Availability of Public Transportation**

#### **(4) Availability of Construction Materials**

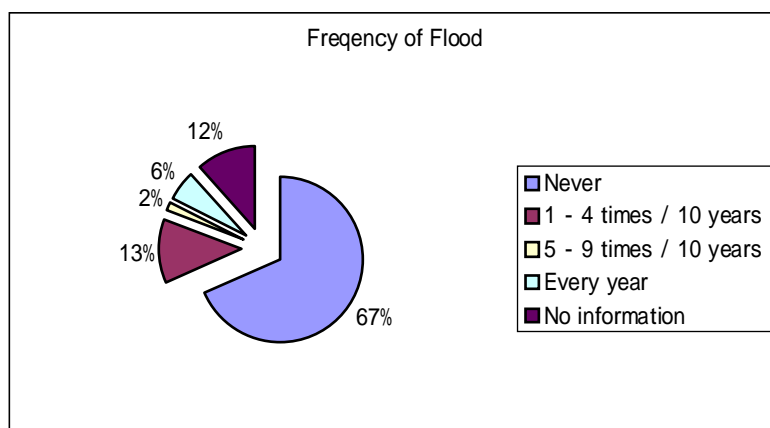
Figure 5.2.4.30 shows the availability of construction materials in the village. Fuel and cement are not available in most of the villages.



**Figure 5.2.4.30 Availability of Construction Materials in the Villages**

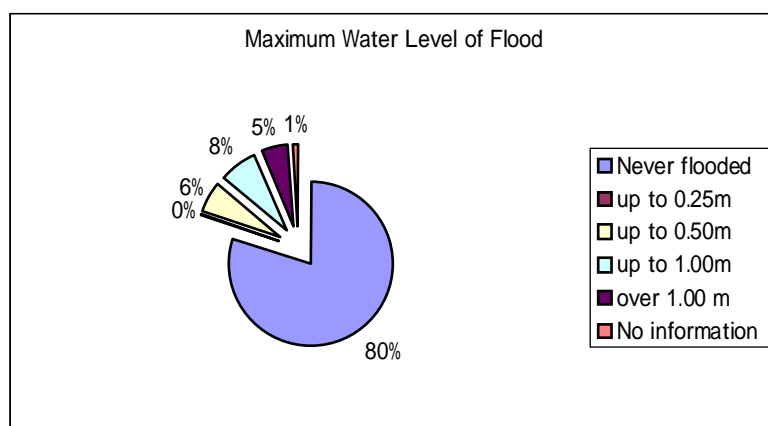
#### **(5) Experience of Flood**

According to the Figure 5.2.4.31, which shows the frequency of flood in the village in recent 10 years, 21% villages of the whole became flood. Measures to protect water sources and facilities from the flood shall be considered for implementation.



**Figure 5.2.4.31 Frequency of Flood in the Villages**

According to the Figure 5.2.4.32, which shows the maximum water level of flood, water level is over 1m in the 5% villages of the whole. Measures to protect water sources and facilities from the flood shall be also considered for implementation.

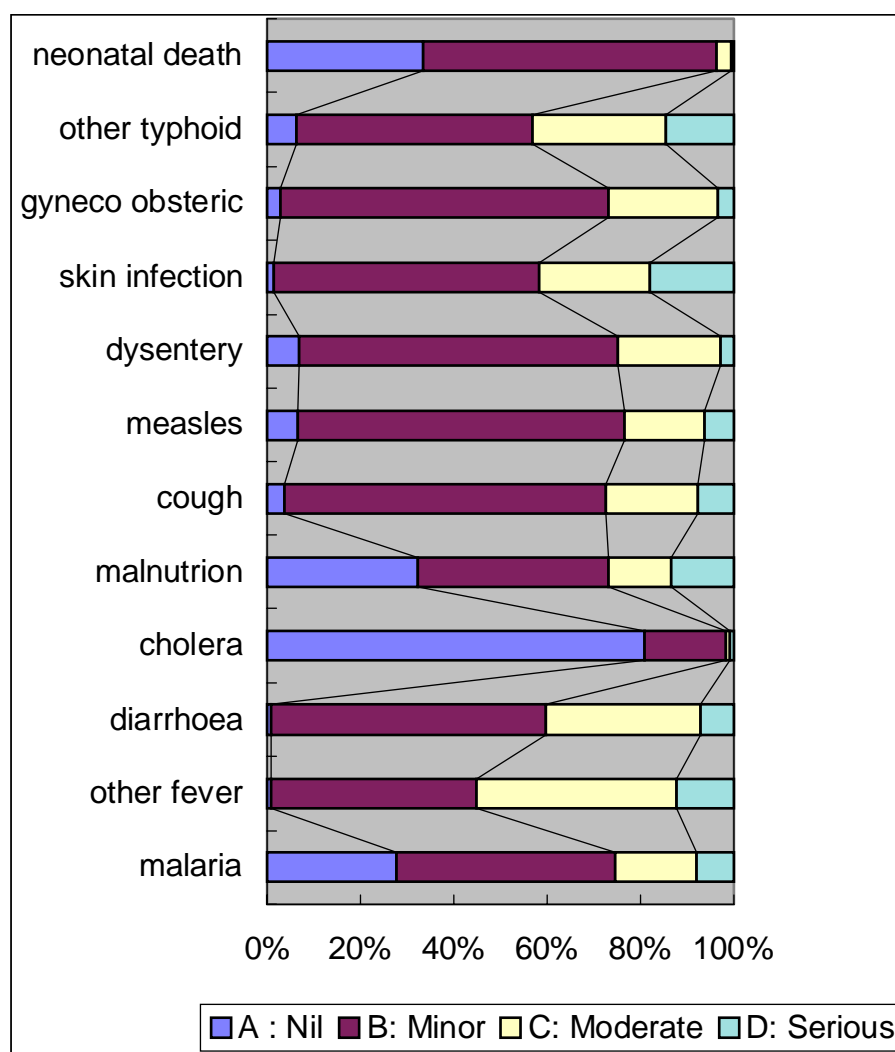


**Figure 5.2.4.32 Maximum Water Level of Flood**

## 5.2.5 Health and Hygiene Conditions

### (1) Diseases

Major diseases found in the 303 villages are typhoid, skin infection, diarrhea and other fever. Their situation indicates that more than 40 % of the village people feel these diseases are serious and/or moderate (Figure 5.2.5.1). They are thought to be caused mainly by the lack of clean water. Malaria is also found generally but not so serious. In the villages of Kg.Cham, 2 % of the village people feel it serious while in Kg. Chhnang it counts only 1 %. Most of the village people feel Malaria is minor and/or moderate situation in the diseases, accordingly.



**Figure 5.2.5.1 Diseases Found in the Villages and Their Situation**

## (2) Health Care

The number of health workers working in the 303 villages is presented in the following table (Table 5.2.5.1). The survey result shows that 17 villages have no health workers at all. The number of the villages where one of four kinds of the health worker is working is 286, accordingly. In 119 villages out of 286 villages, however, there exists the traditional birth attendant only. In 19 villages, four kinds of the health worker exist and it counts only 6.3% of the 303 villages (Table 5.2.5.2).

**Table 5.2.5.1 Number of Health Workers in the Villages**

	Nurse	Midwife	Village Health Volunteer	Traditional Birth Attendant
Number	117	95	55	259

**Table 5.2.5.2 Combination of Health Workers and Number of the Village**

	Nurse	Midwife	Village Health Volunteer	Traditional Birth Attendant	Number of Village
1	YES	YES	YES	YES	19
2	YES	YES	YES	NO	3
3	YES	YES	NO	YES	33
4	YES	YES	NO	NO	5
5	YES	NO	YES	YES	10
6	YES	NO	YES	NO	1
7	YES	NO	NO	YES	41
8	YES	NO	NO	NO	5
9	NO	YES	YES	YES	3
10	NO	YES	YES	NO	4
11	NO	YES	NO	YES	21
12	NO	YES	NO	NO	7
13	NO	NO	YES	YES	13
14	NO	NO	YES	NO	2
15	NO	NO	NO	YES	119
16	NO	NO	NO	NO	17
					303

In most of the villages, the distance to the health center is within 10 km. The number of the village where the distance to the health center within 5 km is 170 villages and 5 to 10 km 87 villages, respectively. There exists 22 villages having a health center inside the village (Table 5.2.5.3).

**Table 5.2.5.3 Distance to Health Center**

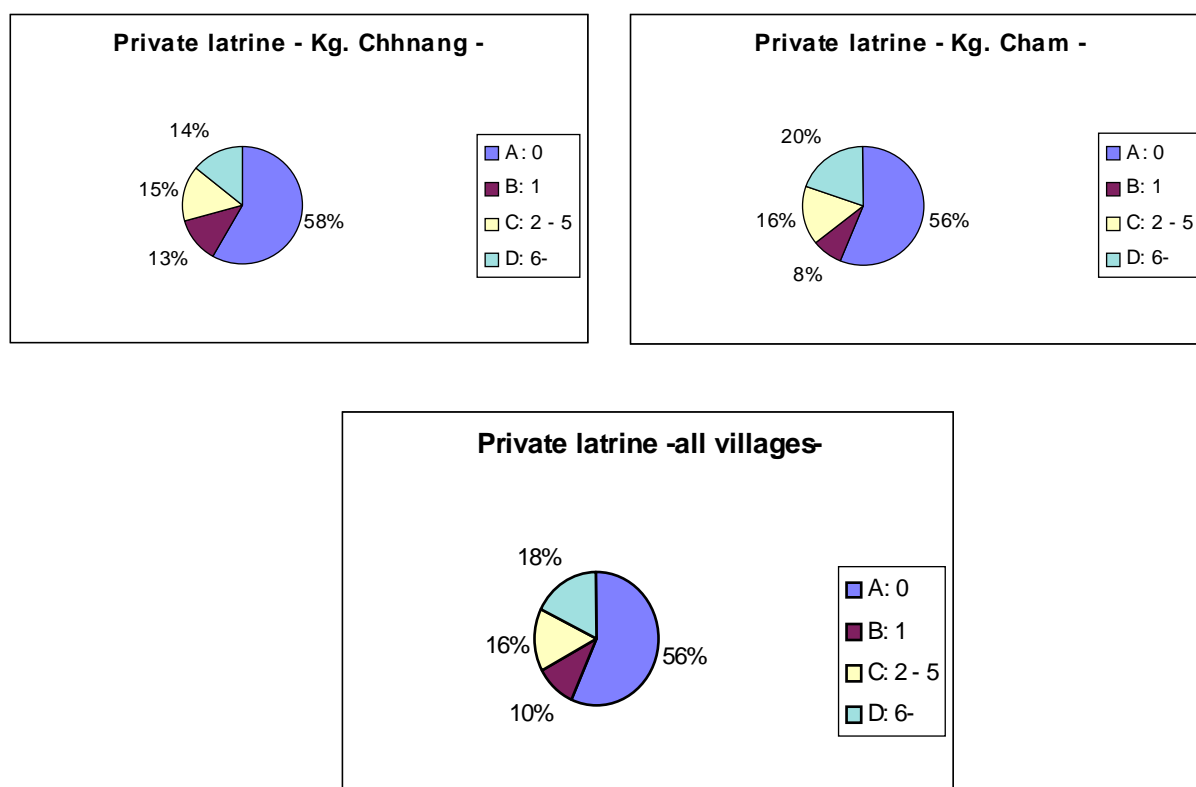
	Inside the village	less than 5km	6-10 km	11-20 km	more than 21 km
Kg. Cham	8	53	37	11	3
Kg. Chhnang	14	117	50	6	4
Total	22	170	87	17	7

### (3) Latrine

The private latrine is not constructed in 171 villages. The village number having the private latrine more than 6 is only 54 villages. 30 villages only have one private latrine each (Table 5.2.5.4 and Figure 5.2.5.2).

**Table 5.2.5.4 Number of Private Latrine**

Number	0	1	2-5	6-
Kg. Cham	65	14	17	16
Kg. Chhnang	106	16	31	38
Total	171	30	48	54

**Figure 5.2.5.2 Percentage of Private Latrine Number in the Villages**

Compared with the number of the private latrine, the public latrine is few in the surveyed villages. In Kg. Cham, 76% of the villages have no public latrine and 88 % in Kg. Chhnang. A total number of the villages are 255. On the other hand, 48 villages (22 villages in Kg. Cham and 26 villages in Kg. Chhnang) have public latrine. Latrine construction is a main activity in the sanitation sector of the national program which is currently being implemented by the UNICEF and NGOs etc. However, the diffusion of the private and public latrines lags far behind.

#### **(4) Correlation between the disease and the tube well**

Table 5.2.5.5 shows the correlation between the disease situation and the number of the users for the tube well with hand pump (TW). The disease situation is divided into two

groups. “Low group” indicates the villages where nil and low situation on diarrhea diseases felt by the villagers, while “High group” indicates the villages where moderate and serious situation on diarrhea disease are felt. The TW users are divided into 4 groups, i.e., no tube well, 200 persons per well, 150 persons per well and 100 persons per well. Paying attention to the high group, the percentage of the high group village is decreasing in accordance with TW users per well is reducing. Similar tendency is also found in the skin disease.

**Table 5.2.5.5 Correlation Between Disease Situation and Number of TW Users (Diarrhea)**

	Low group	High group	Total
Total	181(59.7%)	122(40.3%)	303(100%)
No tube wells	95(57.9%)	69(42.1%)	164(100%)
200 persons/TW	32(62.7%)	19(37.3%)	51(100%)
150 persons/TW	20(62.5%)	12(37.5%)	32(100%)
100 persons/TW	9(69.2%)	4(30.8%)	12(100%)

TW: Tube well with Hand Pump

## 5.3 SURVEY OF PRIORITY VILLAGES

### 5.3.1 Methodology Used

Out of about 300 target villages in the study area, 30 communities were selected as the priority villages (the candidate villages for test drilling) during Phase I and Phase II study works. In order to understand the general condition of socio-economy and the water supply in these villages, a village survey was conducted during the Phase I study period

In this village survey, the interview and village mapping methods were used. A JICA/MRD team consisting of two JICA study team members and two DRWS counterpart staffs conducted the survey. Interview method was mainly used for socio-economy related survey, and village mapping was used for general understanding of village location including location of existing water supply facilities in each village.

The interview method, which was the main method used in the study of socio-economy at the concerned villages, involves presentation of oral-verbal stimuli and reply in terms of oral-verbal response. In this study, personal interviews were conducted. In this study the questions were prepared in a sequence that the first questions were easiest to answer so as to influence the attitude of the respondent and seek his/her desired co-operation. It happened however that in some cases the order of the questions could be rearranged to fit the discussion in each

particular case.

The target respondents were the village leaders such as chairperson, vice-chairperson, and/or secretaries. In most cases these leaders were men. Neighbors of these village leaders sometimes participated in the interview, providing some information to the interviewer.

### 5.3.2 General Feature of Socio-Economy of the Area

#### (1) Distribution of the Priority Villages

In Kampong Chhnang province, ten (10) villages were selected as priority villages out of 112 target villages. In Kampong Cham province, twenty-one (21) villages were selected as the same out of 189 target villages. Distribution of target villages and priority villages by administrative divisions is presented in Table 5.3.1.

#### Kampong Chhnang Province

District	Commune	Number of Priority Villages	Name of Priority Villages
Kg. Tralach	Chhuk Sa	1	Trapeang Khtum (R035G)
	Chrees	1	Prey Pis (R045G)
Rolea Bier	Banteay Preal	1	Sdok Kabbas (R065G)
	Prasneb	2	Prasneb (R082G), Chor (R083G)
Tuec Phos	Kbaal Tuek	1	Krasang Doh Laeung (R096G)
	Krang Skear	1	Kdol (R114G) *
Saamakki Meam Chey	Seedthei	1	Peareach (R162G)
Baribour	Ponley	1	Ponley (R189G)
	Trapeang Chan	1	Kbal Damrei (R197G)
Total		10	

Note: \* Kdol village was divided into 9 villages after 1998 census.



### **Kampong Cham Province**

District	Commune	Number of Priority Villages	Name of Priority Villages
Memot	Dar	4	Dar Lech (R008M), Meaek Puk (R015M), Srae Chroam (R016M), Samraong (R019M)
	Ton Lung Tramung	2	Kdol Phsar (R046M), Sla Phnum (R055M)
		1	Chhuk (R092M)
	Kampoan Kokir	2 3	Lour (R101M), Tuck Tum (R106M) Kngaok (R115M), Kantuot (R126M), Angkam (R127M)
Ponhea	Popel	1	Khsak (R171M)
Steung Trang	Preaek Kak	1	Tuol Pou (R214M)
Krouch Chhmar	Svay Khleang	1	Phum Ti Prammuoy (R248M)
Tboung Khmum	Kor	1	Veal Khmum (R264M)
	Mong Rieng	1	Mong Ti Prampir (R269M)
	Anhchaeum	1	Chheu Teal Chrum (R273M)
Ou Reang Ov	Kong Chey	1	Cheung Voat (R321M)
	Tuol Sophy	1	Thma Da Lech (R337M)
Cheung Prey	Khnor Dambang	1	Knaor Dambang (R376M)
Total		21	

## **(2) Population and Settlement Characteristics**

### **1) Population size**

#### **Kampong Chhnang Province**

Population of each village based on the 1998 census and the JICA village survey in 2001 was presented in the following table.

The average size of the village was 1,125 persons based on the 1998 census, while the results of the village survey in January 2001 indicated that the same was 880 persons. Main reason for this discrepancy is due to separation of the village.

For instance, in the case of Kdol village (R114G in Kampong Chhnang), the village was divided into 9 villages after the 1998 census. Dam Nak Ampil village is one of the 9 villages divided. In the JICA Village Survey in 2001, only the population of Dam Nak Ampil village was recorded.

District	Village Code	Village Name	Population	
			1998 Census	Village Survey
Kg. Tralach	R035G	Trapeang Khtum	752	772
Kg. Tralach	R045G	Prey Pis	681	678
Rolea Bier	R065G	Sdok Kabbas	500	800
Rolea Bier	R082G	Prasneb	797	570
Rolea Bier	R083G	Chor	602	650
Tuek Phos	R096G	Krasang Doh Laeung	988	420
Tuek Phos	R114G	Kdol (Dam Nak Ampil)	3,583 *	774 **
Samakki Mean Chey	R162G	Peareach	827	1,543
Baribour	R189G	Ponley	1,395	1,723
	R197G	Kbal Damrei	1,367	1,179
Total			13,490	9,109

Note: \* Population of Kdol village including Dam Nak Ampil and other sub-villages.

\*\* The population of Dam Nak Ampil village.

Source: (1) 1998 Population and Housing Census

(2) JICA Village Survey, 2001

### **Kampong Cham Province**

Population of each village based on the 1998 census and the JICA village survey in 2001 was presented in the following table.

The average size of the village was 952 persons based on the 1998 census, while the results of the village survey in January 2001 indicated that the same was 908 persons. There are some villages where population has slightly increased and another villages where population has been decreased. The reason for the decrease of population is not clearly defined.

District	Village Code	Village Name	Population	
			1998 Census	Village Survey
Memot	R008M	Dar Lech	1,100	1,000
	R015M	Meaek Puk	548	450
	R016M	Srae Chroam	866	954
	R019M	Samraong	512	512
	R046M	Kdol Phsar	785	801
	R055M	Sla Phnum	483	535
	R092M	Chhuk	608	656
	R101M	Lour	1,291	1,334
	R106M	Tuek Tum	315	486
	R115M	Kngaok	680	520
	R126M	Kantuot	731	743
	R127M	Angkam	373	449
Ponhea Kraek	R171M	Khsak	1,431	1,431
Steung Trang	R214M	Tuol Pou	1,052	1,114
Krouch Chmar	R248M	Phum Ti Prammuoy	1,872	1,861
Tboug Khmum	R264M	Veal Khmum	1,828	2,282
	R269M	Mong Ti Prampir	767	766
	R273M	Chheu Teal Chrum	417	388
Ou Reang Ov	R321M	Cheung Voat	771	908
	R337M	Thma Da Lech	606	629
Cheung Prey	R376M	Knaor Dambang	1,318	1,692
Total			20,352	19,511

Source: (1) 1998 Population and Housing Census

(2) JICA Village Survey, 2001

## **2) Female-headed households (FHH)**

Percentage of female-headed households differs from the lowest (5%) in Ponley to the highest (42%) in Prey Pis. These villages are located in Kampong Chhnang province. The average percentage is 21.6% in 10 villages of Kampong Chhnang province and 16.3% in 21 villages of Kampong Cham province. (Refer to Table 5.3.2)

## **3) Repatriated and resettled families**

Number of repatriated families was 77 in 10 villages of Kampong Chhnang, of which Ponley (R189G) accounted for 36 families (47%) and Prasneb (R082G) 15 families (19%). The same was only 13 families in 21 villages of Kampong Cham, of which Toul Pou (R214M) accounted for 38%. (Refer to Table 5.3.2)

Number of resettled families was 64 in 10 villages of Kampong Chhnang, of which Ponley (R189G) accounted for 27 families (42%) and Kdol (R114G) 18 families (28%). The same was 83 families in 21 villages of Kampong Cham, of which Lour (R101M) accounted for 30 families (36%) and Kdol Phsar (R046M) 20 families (24%). (Refer to Table 5.3.2)

## **4) Establishment of villages**

Most villages in the study area are old ones established in the very old times. Village chairpersons mostly do not know when their villages were established.

Teuk Tum village (R106M) in Memot district was established in 1995. Most village people moved from the area along the Mekong when they suffered from the flooding. It is estimated that high population increase in this village is due mainly to higher percentage of immigrant households. Immigrant households were 28 in 2000.

## **5) Settlement type**

Settlement types of the villages are classified as i) crowded, ii) medium (partly crowded), and iii) scattered.

In Kampong Chhnang province, out of 10 villages two (2) were classified as crowded, six (6) as medium, one (1) as scattered and another one as mixture between crowded and medium. The villages classified as crowded are located along the national road. In Kampong Cham province, out of 21 villages thirteen (13) were classified as crowded, six (6) as medium, and

two (2) as mixture between crowded and medium. There is no scattered village in the surveyed villages. (Refer to Tables 5.3.4 and Table 5.3.5)

## **6) Ethnic groups and religion**

Ethnically majority of rural population is Khmer. However, there are 4 Cham villages in the study area, i.e. 2 each in both provinces. In Khmer villages almost all the community members consist of Khmers, and in Cham villages the same consist of Chams. This is due to their religion. Theravada Buddhism is the religion of virtually all of the ethnic Khmer, while Islam is the religion of the ethnic Cham.

According to the Khmer Royal Chronicles, the refugees from Champa Kingdom settled in Cambodia from the fifteenth and the seventeenth century. Their descendants are known as the Cham. They met the Malays, the descendants of immigrants coming from the Indonesian archipelago and the Malay Peninsula. They mixed with one another and many a Cham were converted into Islam by the Malays. The result was the formation of a Muslim community with customs and manners, which distinguished them from the Khmer people, who entirely adhered to Theravada (Hinayana) Buddhism.

### **Khmer and Cham Population in the Surveyed Villages**

	Khmer population	Cham population
Priority villages in Kampong Chhnang province	6,982 (83%)	1,450 (17%)
Priority villages in Kampong Cham province	19,539 (83%)	3,396 (17%)

Source: JICA Village Survey, 2001

## **(3) Institutional Development**

### **1) Village leadership**

Most of the surveyed villages are old villages. A group of village leaders consisting of a village chairperson, one or two vice-chairpersons, and one or two secretaries represent each village.

### **2) Village Development Committee**

In some villages the village development committees (VDCs) have been established for the execution of rural development activities. In the priority villages in Kampong Chhnang and Kampong Cham provinces, VDCs have been established only in 2 and 3 villages, respectively.

There was no village that had established a water committee or water point committee.

#### **(4) Social Services**

##### **1) Education facilities**

Most of priority villages have primary schools within the villages or in the adjoining villages. Therefore, distance to schools is more or less one kilometer in most of the villages.

Among priority villages in Kampong Chhnang province, 7 out of 9 villages have primary schools in their villages. In other villages, children go to primary schools in the adjoining villages. Among priority villages in Kampong Cham province, 13 out of 21 villages have primary schools in their villages. (Refer to Tables 5.3.4 and Table 5.3.5)

Although the number of schools are increasing, most of the schools still lack basic facilities including school buildings, desks and chairs, and teaching materials. Sometimes teaching staffs cover more than 2 schools. In remote areas, primary schools have only 3 classes.

##### **2) Medical facilities**

Medical facilities are inadequate and poorly distributed. Few villages have good access to health centers. In most cases patients have to travel long distances to access medical facilities. The average distance to medical facilities was 13 km in Kampong Chhnang province, while in Kampong Cham province the same was only 5.5 km. (Refer to Tables 5.3.4 and Table 5.3.5)

##### **3) Main diseases**

Malaria was mentioned in most villages as the main health problem followed by gynecological diseases. Water related diseases such as skin, typhoid, diarrhea and malaria are prevailing in the surveyed villages. (Refer to Tables 5.3.4 and Table 5.3.5)

All Villages		Villages in Kg. Chhnang		Villages in Kg. Cham	
Diseases	Point	Diseases	Point	Diseases	Point
Malaria	2.3	Other fever	2.3	Malaria	2.0
Other fever	2.3	Diarrhea	2.1	Gyneco obstetric	2.0
Gyneco obstetric	2.2	Malaria	1.9	Skin	1.9
Skin	2.1	Cough	1.9	Other fever	1.9
Neonatal death	2.1	Neonatal death	1.9	Other typhoid	1.9
Cough	2.0	Skin	1.7	Neonatal death	1.7
Other typhoid	1.9	Gyneco obstetric	1.7	cough	1.5
Diarrhea	1.8	Dysentery	1.6	Diarrhea	1.5
Dysentery	1.5	Other typhoid	1.5	Dysentery	1.3
Malnutrition	1.2	Malnutrition	1.1	Measles	1.0
Measles	1.1	Measles	1.0	Malnutrition	1.0
Cholera	0.5	Cholera	0.7	Cholera	0.2

Note: 3=serious; 2=moderate; 1=minor; 0=nil

#### 4) Other social facilities

Other social services available in the study area include shops, go-downs, markets, pagodas, and mosque. There are some small shops in villages. Big shops, restaurants, and guesthouses are only found in district headquarters. Almost in all district headquarters, the major government institution/departments are available. Although Buddhism is dominant in the area, Islam is active in the Cham villages.

#### (5) Infrastructures

##### 1) Transport

Accessibility is one of the most important selection criteria in the selection of priority villages. All the priority villages were considered as having good accessibility compared to other target villages.

Major means of transport used by communities in the study area is mainly bicycles, motorbikes and oxen-driven carts. Families with motorbikes or trucks are better off. Bicycles

are used for fetching water and firewood, and carrying farm inputs and output to and from markets.

## **2) Electricity**

Electricity is only available at district headquarters. Diesel generators are used to generate electricity. Due to fuel shortages, occasionally electricity is rationed. In Memot district headquarters, electricity is only available during nighttime, from 18:30 to 05:30.

All the surveyed villages are not electrified except Ponley in Kampong Chhnang province that is situated along the national road No. 5.

## **(6) Economic Activities in the Village**

### **1) Agriculture**

Farming is the main activity of the people in the surveyed villages. Villagers in lowland area are mostly engaged in rain-fed rice cultivation in small plots of land. The principal crops grown are rice, cassava, maize, beans, and vegetables. Villagers in highland area, however, are engaged in cultivation of tree crops and upland crops such as cashew nut, coffee, tobacco, sesame, pepper, and so on. Most of villages in Memot district in Kampong Cham province have very limited paddy field and their activities are focused on upland crop cultivation and seasonal wage works for road construction, rubber plantation, coffee plantation, and the like. (Refer to Tables 5.3.4 and Table 5.3.5)

### **2) Livestock**

Cows, water buffaloes, pigs and chickens are main livestock raised in the surveyed villages, although pigs are not raised in Cham villages. Cattle and water buffaloes are the most important livestock as they are used as the draft animals for farming and transport. Out of the total stock of cattle and water buffaloes, about half are used as the draft animals.

### **3) Other Economic Activities**

Other economic ventures done by the community include handicraft, skilled trades (basket making), lumbering, timber sales, poultry, bricks, charcoal, firewood cutting and selling and mats making.



## **(7) Household Income**

As the households are the main users of water supply facilities, household income is the determining factors in the implementation of water supply program. If the income of the people at the household level is small, affordability of the community will also be low then the implementation of the program could be difficult.

The average household income of 10 villages in Kampong Chhnang province was R 801,000, of which rice income accounted for 50%, other crops 4%, livestock 11% and other income 35%. Other income included bucket making, palm sugar production, lumbering, and wage labor.

The average household income of 21 villages in Kampong Cham province was R 1,162,857, of which rice income accounted for 39 %, other crops 15 %, livestock 11 % and other income 35 %. Other income included dried bamboo shoots making, charcoal making, palm sugar production, lumbering, fishing and wage labor.

The people in the surveyed villages generally have small income. From the surveyed villages in Kampong Chhnang and Kampong Cham provinces, majority of people's income lies between R 800,000 and 1,500,000 per household per year. Only 3 villages indicated the annual household income of more than R 2 million.

### **Average Annual Household Income (Unit: Riel)**

	Rice	Other Crops	Livestock	Others	Total
Priority villages in Kg. Chhnang	405,000	30,000	89,000	277,000	801,000
Priority villages in Kg. Cham	447,619	179,524	127,143	408,571	1,162,857

Source: JICA Village Survey, 2001

Note: Refer to Table 7.3.3 for more detailed information.

## **5.3.3 Rural Water Supply Situation**

### **5.3.3.1 Kampong Chhnang Province**

## **(1) General Situation**

### **1) Water sources**

In the priority villages of Kampong Chhnang province, the dug well water is the main water sources. There are 392 dug wells in 10 priority villages, averaging 39 wells per village. The number of dug wells differs from 100 wells in Ponley to only 5 dug wells in Trapeang Khtum. In 6 villages, more than 90% of households depend their domestic water needs on dug wells.

The percentage of borehole well users is very limited. Out of 10 villages, borehole wells can be found only in 4 villages. Out of 21 borehole wells, 11 wells are public and the remaining 10 are privately owned. In Ponley, there are 4 public and 8 private borehole wells.

In Krasang Doh Laeung and Dam Nak Ampil in Tuek Phos district, spring and stream water is also the main water sources. In addition to dug wells, the villagers in these villages use surface water as their supplementary source of domestic water. In Kbal Damrei, a part of the villagers live near the Mekong where their main water source is river.

In 8 villages out of 10 villages, rainwater is also used mainly for drinking purpose. The people collect rainwater usually in rainy season and use it for drinking.

### **2) Water consumption**

Average water consumption per capita is between 40 to 100 liter, averaging 58 liter including drinking, cooking, and washing. A family normally uses one cement jar of water per day, which contains about 200 to 250 liters.

### **3) Fetching water**

Usually women and children are the main water collector. However, in some villages where river or stream is the main water source, men tend to fetch more frequently than women and children.

## **(2) Kampong Tralach District**

The district is located in southeast part of the province. National Road No. 5 is passing through the central part of the district. Two out of 20 target villages were selected as priority villages.

### 1) Location of priority villages

Trapeang Khtum (R035G) is located about 28 km south of Kampong Chhnang town. The village is about 7 km west of the national road No. 5. Most of the residents (97%) are the Cham. There are 153 households as of January 2001.

Prey Pis (R045G) is located about 30 km south of Kampong Chhnang town. District headquarters is about 5 km south of this village. Accessibility is excellent as the national road No. 5 is passing through this village. Most of the residents (98%) are the Cham. There are 128 households as of January 2001.

### 2) Main water sources

In Trapeang Khtum, dug well water is the main source of water for domestic use. In Prey Pis, majority of households (70%) in the village have dug wells, but only about half of them (44 units) can be utilized as water sources in wet season. In dry season, only about 22 dug wells can be utilized. There are two boreholes wells equipped with hand pumps (Afridev and Indian Mark II). Some houses have rain water harvesting systems.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Trapeang Khtum (R035G)	153	Dug wells (5)	Dug well: 100%
Prey Pis (R045G)	128	Dug wells (40) Borehole wells (2) Rain water, etc.	Dug well: 67% Borehole well: 2% Other: 31%

### (3) Rolea B'ier District

Rolea B'ier district is located in the central part of the province. National Road No. 5 is passing through the central part of the district. Total population was 81,134 in 1998, accounting for 19 % of the total population in the province. Three out of 13 target villages were selected as priority villages.

#### 1) Location of priority villages

Sdok Kabbas (R065G) is located about 20 km northwest of Kampong Chhnang town. There

are 118 households as of January 2001. Prasnep (R082G) is located about 28 km northwest of Kampong Chhnang town. It is about 8 km away from national road No. 5. There are 183 households as of January 2001. Chor (R083G) is located about 3 km south of Prasnep village. There are 129 households as of January 2001.

## 2) Main water sources

In Sdok Kabbas, temporary dug wells are main water sources. There are 23 dug wells in the village. The dug well water is sometimes not clear. No borehole well is available in this village.

In Prasnep, dug wells are main water sources. There are 16 dug wells in the village, of which 8 dug wells were constructed under support from NGO (FFP). No borehole well is available in this village.

In Chor, dug wells are main water sources. There are 30 dug wells in the village. In some dug wells, water is clear and taste is good. But in some dug wells, taste of water is not so good. No borehole well is available in this village. Rain water is used for drinking, cooking and washing.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Sdok Kabbas (R065G)	118	Dug wells (23)	Dug well: 98% Spring: 2%
Prasnep (R082G)	183	Dug wells (30) Rain water, etc.	Dug well: 99% Other: 1%
Chor (R 083G)	129	Dug wells (16)	Dug well: 97% Other: 3%

## (4) Tuek Phos District

Tuek Phos district is located in the western part of the province. Railway line connecting Phnom Penh and Battambang is passing through the central part of the district. There are 4 stations in the district including Krang Skear and Kdol stations. Total population was 45,950 in 1998, accounting for 11 % of the total population in the province. Out of 17 target villages, 2 villages were selected as priority villages.

### 1) Location of priority villages

Krasang Doh Laeung (R096G) is located about 50 km southwest of Kampong Chhnang town. There are 129 households as of January 2001.

Dam Nak Ampil (R114G) is located about 42 km west of Kampong Chhnang town. The village was a part of Kdol village at the time of 1998 census. After the census, however, Kdol village was divided into 9 villages. The village is situated about 3 km north of Kdol station. There are 120 households as of January 2001.

## **2) Main water sources**

In Krasang Doh Laeung, dug wells and stream are main water sources. There are 4 dug wells in the village. Recently one private borehole with hand pump (Giant) has been installed. In some dug wells, water is clear and taste is good. But in some dug wells, taste of water is not so good.

In Dam Nak Ampil, dug wells and stream are main water sources. There are 120 dug wells in the village.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Krasang Doh Laeung (R096G)	118	Borehole well (1) Dug wells (4) Stream	Borehole well: 1 % Dug well: 46% Stream: 53%
Dam Nak Ampil (R114G)	183	Dug wells (120) Stream	Dug well: 69% Stream: 30% Other: 1%

## **(5) Samaaki Mean Chey District**

Samaaki Mean Chey district is located in the southern part of the province. Railway line connecting Phnom Penh and Battambang is passing through the central part of the district. There are 3 stations in the district including Samaaki Mean Chey station. Total population was 57,170 in 1998, accounting for 14 % of the total population in the province. Out of 18 target villages, only one village was selected as the priority village.

### **1) Location of the priority village**

Peareach (R162G) is located between national road No. 5 and Samaaki Mean Chey railway

station. District headquarters (Samaaki Mean Chey) is about 5 km west of this village. There are 176 households as of January 2001.

## 2) Main water sources

In Peareach village, dug wells and borehole wells are main water sources. There are 8 dug wells and 4 borehole wells in the village. Although there are 4 borehole wells in the village, the water users are very limited. The people usually use dug well water by tradition even if borehole well is available nearby their houses.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Peareach (R162G)	176	Borehole wells (4) Dug wells (8) Spring	Borehole well: 3 % Dug well: 93 % Spring, etc.: 4 %

## (6) Baribour District

Baribour district is located in the northern part of the province. National Road No.5 is passing through the central part of the district. Total population was 51,516 in 1998, accounting for 12 % of the total population in the province. Out of 22 target villages, 2 villages were selected as priority villages.

### 1) Location of priority villages

Ponley (R189G) is located close to district headquarters. Many households are located along the national road No. 5. Due to its population size and good accessibility, assistance has been made by PRASAC in water supply sector. There are 318 households as of January 2001.

Kbal Damrei (R197G) is located in the northwestern part of the province and on the border area with Pousat province. Many households are located along the national road No. 5. Some households in the sub-village are located near the Mekong River. There are 244 households as of January 2001, of which 175 households are located along the national road No. 5 and the remaining 78 households are located near the Mekong River.

### 2) Main water sources

In Ponley, borehole wells and dug wells are main water sources. There are 12 borehole wells

and 100 dug wells in the village.

In Kbal Damrei, dug wells are main water sources. In addition, there are 3 borehole wells, of which one is broken. A borehole well constructed by UNICEF/MRD in Pagoda area is still functioning. Out of the total households, 78 households (32 %) are living near the Mekong, where river water is their main water source.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Ponley (R189G)	318	Borehole well (12) Dug wells (100)	Borehole well: 3 % Dug well: 93% Other : 4 %
Kbal Damrei (R197G)	244	Borehole wells (3) Dug wells (46) River	Borehole well: 2 % Dug well: 62 % River: 35 % Other: 1 %

### **5.3.3.2 Kampong Cham Province**

#### **(1) General Situation**

##### **1) Water sources**

In the priority villages of Kampong Cham province, the dug well water is the main water sources. There are 798 dug wells in 21 priority villages, averaging 38 wells per village. The number of dug wells differs from 200 wells in Angkam to only 1 dug well in Meaek Puk. In 13 villages out of 21 villages, almost all the households depend their water needs on dug wells.

The percentage of borehole well users is very limited. Out of 21 villages, borehole wells can be found only in 8 villages. Out of 18 borehole wells, 4 wells are public and the remaining 14 are privately owned.

In Phum Ti Prammuoy in Krouch Chhmar district, about 30 % of households depend their water needs on river. In Knaor Dambang in Cheung Prey district, about 20 % of households use spring water for their water needs.

In 12 villages out of 21 villages, rainwater is used for drinking purpose. In the remaining 9 villages, they do not use rainwater.

## **2) Water consumption**

Water consumption per capita is between 20 to 180 liter, averaging 60 liter including drinking, cooking, and washing. A family normally uses one cement jar of water per day, which contains about 200 to 250 liters.

## **3) Fetching water**

In 10 villages, children are the main water collector. In 4 villages, however, every family member fetches water. There are only 3 villages where women are the principal family members who fetch water. In 3 villages, men are the principal members to fetch water.

## **(2) Memot District**

Memot district is located in the eastern part of the province. National Road No.7 is passing through the district heading for Kratie province. Total population was 111,296 in 1998, accounting for 7 % of the total population in the province. Out of 102 target villages, 12 villages were selected as priority villages.

### **1) Location of priority villages**

- Dar Commune

Dar Lech (R008M), Meaek Puk (R015M), Srae Chroam (R016M) and Samraong Cheung (R019M) belong to Dar commune, located in the western part of Memot district.

Dar Lech (R008M) is located in the north of Dar village that is the commune headquarters. The village is close to the national road No. 7. There are 199 households as of January 2001.

Meaek Puk (R015M) is located about 7 km northwest of Dar village, having 110 households as of January 2001.

Srae Chroam (R016M) is located about 12 km northwest of Dar village and situated near the district border with Thbong Khmum district. The village is accessible from Chi Peng in Ponhea Kraek district. There are 180 households as of January 2001.

Samraong Cheung (R019M) is located about 3 km east of Dar village, having 110 households



as of January 2001.

- Ton Lung Commune

Kdol Phsar (R046M) and Sla Phnum (R55M) belong to Ton Lung commune that is located in the eastern part of the district. Kdol Phsar (R046M) is located about 24 km northeast of Memot town and situated along the national road No. 7. The village is the Ton Lung commune headquarters, having 167 households as of January 2001.

Sla Phnum (R55M) is located in southwest of Kdol Phsar and about 5 km away from the national road No. 7. All the residents are the Cham. There are 107 households as of January 2001.

- Tramung Commune

Chhuk (R092M) belongs to Tramung commune, and is located immediately east of Memot town. There are 126 households as of January 2001.

- Kampoan Commune

Lour (R101M) and Tuck Tum (R106M) belong to Kampoan commune and are located in the northwestern part of the district.

Lour (R101M) is located about 20 km northeast of Memot town and situated in the north of Memot rubber plantation. Tuck Tum (R106M) is about 5 km east of Lour village. There are 246 households and 123 households, respectively, in these villages as of January 2001.

- Kokir Commune

Kngaok (R115M) belongs to Kokir commune that is located in the northwest of Memot town. Kngaok (R115M) is located about 18 km northwest of Memot town and sandwiched by rubber plantation. There are 126 households as of January 2001.

- Choam Ta Mau Commune

Kantuot (R126M) and Angkam (R127M) belong to Choam Ta Mau commune that is located in the northeast of Memot town. Kantuot (R126M) is located about 11 km northeast of Memot town, having 125 households as of January 2001. Angkam (R127M) is located about 4 km

northwest of Kantuot, having 70 households as of January 2001.

## 2) Main water sources

Dug well water is the main water source of these 12 villages although in some villages there are some other water sources. In Dar Lech, Srae Chroam, Samraong Cheung, Sla Phnum, Lour, Chhuk, Kngaok and Angkam villages, the people depend almost 100 % on dug well water.

In Meaek Puk, the villagers can use stream and spring water in addition to dug well water. In Kdol Phsar, there are 3 borehole wells in addition to dug well water. In Tuck Tum, stream water is available in addition to dug well water.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Dar Lech (R008M)	199	Dug wells (50)	Dug well: 100 %
Meaek Puk (R015M)	110	Dug wells (1) Stream Spring	Dug well: 62 % Stream: 35 % Spring: 3 %
Srae Chroam (R016M)	180	Dug well (80) Spring	Dug well: 99 % Spring: 1 %
Samraong Cheung (R019M)	110	Dug well (30) Spring	Dug well: 90 % Spring: 10 %
Kdol Phsar (R046M)	167	Borehole well (3) Dug well (2)	Borehole well: 15 % Dug well: 85 %
Sla Phnum (R55M)	107	Dug well (3)	Dug well: 100 %
Chhuk (R092M)	126	Dug well (25) Spring	Dug well: 99 % Spring: 1 %
Lour (R101M)	246	Borehole well (1) Dug well (22)	Dug well: 99 % Other: 1 %
Tuck Tum (R106M)	123	Dug well (5) Stream	Dug well: 88 % Stream: 12 %
Kngaok (R115M)	129	Borehole well (1) Dug well (40)	Borehole well: 1 % Dug well: 99 %
Kantuot (R126M)	125	Dug well (3)	Dug well: 100 %
Angkam (R127M)	70	Dug well (200)	Dug well: 100 %

### **(3) Ponhea Kraek District**

Ponhea Kraek district is located in the southern part of the province. National Road No.7 is passing through the central part of the district. Total population was 123,879 in 1998, accounting for 8 % of the total population in the province. Out of 6 target villages, only one village was selected as priority village.

#### **1) Location of the priority village**

Khsak (R171M) belongs to Popel commune. It is located about 3 km north of the national road No. 7. There are 270 households as of January 2001.

#### **2) Main water sources**

In Khsak, dug wells are main water sources. Almost all the households have their dug wells within or nearby their houses.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Khsak (R171M)	270	Dug wells (4) Spring	Dug well: 99% Other : 1 %

### **(4) Stung Trang District**

Stung Trang district is located in the northern part of the province. The Mekong River constitutes the boundary between Krouch Chhmar and Stung Trang districts. Many villages are located along the Mekong. Total population was 107,683 in 1998, accounting for 7 % of the total population in the province. Out of 7 target villages, only 1 village was selected as the priority village.

#### **1) Location of the priority village**

Tuol Pou (R214M) is located in the central part of the district, about 8 km west of the district headquarters. Some households are located along the feeder road No. 222. There are 244 households as of January 2001, of which 237 households (97 %) are Chams and the remaining 7 households are Khmers.

## 2) Main water sources

Dug well water is the main water source. About 98 % of households depend their domestic water source on dug well water. In addition, there are 4 borehole wells that are privately owned.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Toul Pou (R214M)	244	Borehole wells (4) Dug wells (4)	Borehole well: 2 % Dug well: 98%

## (5) Krouch Chhmar District

Krouch Chhmar district is located in the northern part of the province. The Mekong River constitutes the boundary between Krouch Chhmar and Stueng Trang districts. Many villages are located along the Mekong. Total population was 99,695 in 1998, accounting for 6 % of the total population in the province. Out of 10 target villages, only one village was selected as priority village.

### 1) Location of the priority village

Phum Ti Prammuoy (R248M) is located in the northern part of Krouch Chhmar district, near the Mekong. There are 404 households as of January 2001.

### 2) Main water sources

Dug well and river water is the main water source. About 60 % of households located in the south and southwest of the village depend their domestic water source on dug well water. Other households near the Mekong depend their water sources on the river water. Some households buy water from water vendors.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Phum Ti Prammuoy (R248M)	404	Dug wells (13) River	Dug well: 66 % River: 23 % Paid: 15 %

## **(6) Thbong Khmum District**

Thbong Khmum district is located in the central part of the province. National Road No.7 is passing through the district heading for Kratie province. Total population was 214,780 in 1998, accounting for 13 % of the total population in the province. Out of 24 target villages, 3 villages were selected as priority villages.

### **1) Location of priority villages**

Veal Khmum (R264M) belongs to Kor commune. It is located about 15 km north of Suong town and situated on the eastern edge of Chup rubber plantation. The residents are the Cham. There are 382 households as of January 2001.

Mong Ti Prampir (R269M) belongs to Mong Rieng commune. It is located about 3 km southwest of Suong town. There are 164 households as of January 2001.

Chheu Teal Chrum (R273M) belongs to Anchaum commune. It is located about 12 km southeast of Suong town. The village is surrounded by paddy fields. There are 79 households as of January 2001.

### **2) Main water sources**

In these three villages, dug well water is the main water source. Almost all the households depend their domestic water source on dug well water. In Veal Khmum, a small percentage of households are using borehole well and stream water. In Mong Ti Prampir (R269M), a small percentage of households are using borehole well water.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Veal Khmum (R264M)	382	Dug wells (14) River/stream	Dug well: 97 % River/stream: 3 %
Mong Ti Prampir (R269M)	164	Borehole wells (1) Dug wells (59)	Borehole well: 2 % Dug well: 98 %
Chheu Teal Chrum (R273M)	79	Dug wells (13)	Dug well: 100 %

## **(7) Ou Reang Ov District**

Ou Reang Ov district is located in the southern part of the province. Provincial Road No.11 is passing through the district. Total population was 82,806 in 1998, accounting for 5 % of the total population in the province. Out of 29 target villages, 2 villages were selected as priority villages.

### **1) Location of priority villages**

Cheung Voat (R321M) belongs to Kong Chey commune. It is located about 28 km southwest of Suong town and situated near the border with Prey Veng province. There are 176 households as of January 2001.

Thma Da Lech (R337M) belongs to Tuol Sophy commune. It is located about 25 km southwest of Suong town and situated on the south edge of Peam rubber plantation. There are 122 households as of January 2001.

### **2) Main water sources**

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Cheung Voat (R321M)	176	Borehole wells (3) Dug wells (132)	Borehole well: 2 % Dug well: 98 %
Thma Da Lech (R337M)	122	Borehole wells (1) Dug wells (73)	Borehole well: 8 % Dug well: 92 %

## **(8) Cheung Prey District**

Cheung Prey district is located in the western part of the province. National road No.7 is passing through the district. Total population was 74,859 in 1998, accounting for 5 % of the total population in the province. Out of 3 target villages, one village was selected as the priority village.

### **1) Location of the priority village**

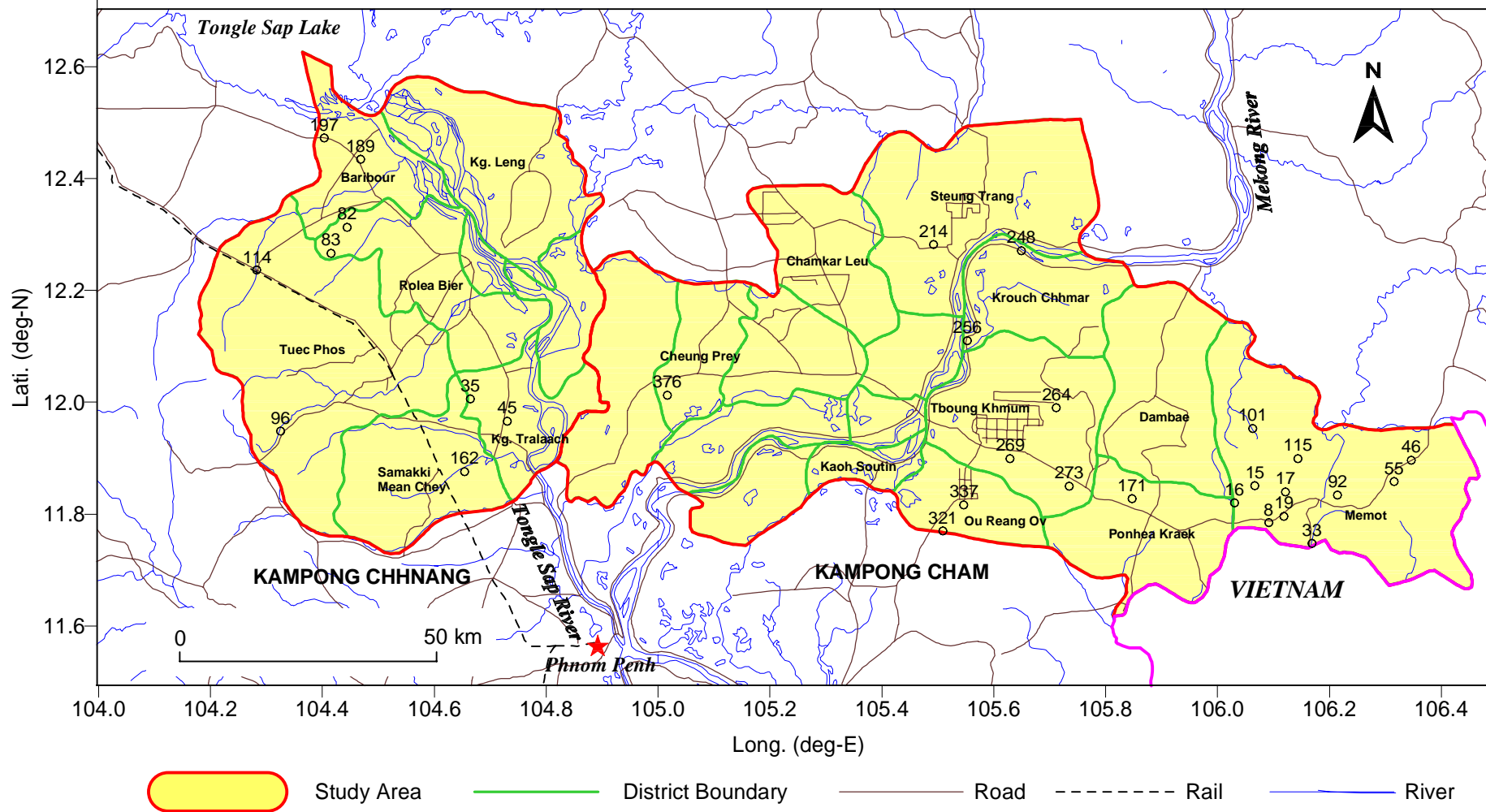
Knaor Dambang (R376M) is located in the southern part of the district and situated about 4 km south of the national road No. 6. It is located about 12 km southwest of the district

headquarters. There are 321 households as of January 2001.

## **2) Main water sources**

In Knaor Dambang, dug well and pond water is the main water source. About 74 % of the households depend their domestic water source on dug well water and 24 % on pond water. A small percentage of households use borehole well water.

Name of Village	Number of Households	Main Water Sources	Distribution of Households by Main Water Source
Knaor Dambang (R376M)	321	Borehole wells (4) Dug wells (8) Pond	Borehole well: 2 % Dug well: 74 % Pond: 24 %



**Figure 5.3.1**

**Location of 30 Priority Villages**

**THE STUDY ON THE GROUNDWATER DEVELOPMENT  
IN CENTRAL CAMBODIA**

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



Table 5.3.1 Distribution of Target Villages and Priority Villages

Province	District	Commune	No. of Selected 300 Villages	No. of Candidate Villages for Test Drilling	Name of Candidate Villages for Test Drilling	
Kampong Chhnang	Kg. Leng	Tra Ngai	5	0		
		Svay Rampar	4	0		
		Dae	5	0		
		Chrasak	4	0		
		Pou	4 (22)	0		
	Kg. Traloch	Chhak Sa	7	1	Trapesang Khum (R0350)	
		Chrean	5	1	Prey Piz (R0450)	
		Tra Chrean	8 (20)	0		
	Rutea Bier	Banteay	6	1	Sak Kabbat (R0550)	
		Prasab	6	2	Prasab (R0620), Chir (R0830)	
		Brae Thamei	1 (13)	0		
	Tuc Phou	Chieb	2	0		
		Khaol Taek	1	1	Krasang Dob Laeung (R0960)	
		Tuol Khgor	1	0		
		Krasang Sear	8	1	Kdol (R1040)	
		Alphavouth	4	0		
		Tang Krasang	1 (17)	0		
	Saamoldi Mean Ch	Krasang Lvear	7	0		
		Seedfeti	6	1	Pearack (R1620)	
		Thang Khpor	5 (18)	0		
	Barhear	Chak	3	0		
		Phraar	4	0		
		Peech	5	0		
		Porley	3	1	Porley (R1890)	
Trapesang		3	1	Khal Damrei (R1970)		
Anchhaan		4 (22)	0			
Kampong Cham	Menot	Dar	14	4	Dar Lech (R000M), Measak Pak (R015M), Brae Chrean (R016M), Samraong (R019M)	
		Rong	12	0		
		Chan Mol	6	0		
		Ton Lung	7	2	Kdol Phour (R046M), Sla Phour (R055M)	
		Ranchek	5	0		
		Menot	13	0		
		Tramang	12	1	Chhak (R092M)	
		Kampan	5	2	Lour (R100M), Tuck Tum (R106M)	
		Kokor	13	3	Kngak (R115M), Kamut (R126M), Angkor (R128M)	
		Measung	5	0		
		Cham Kravien	4	0		
		Cham	6 (162)	0		
		Ponhea	Papel	4	1	Khaok (R170M)
			Kandol Chrean	2 (6)	0	
	Kach Sotin	Kach Sotin	1	0		
		Preak Ta Nang	1	0		
		Pungro	1	0		
		Moha Leaph	3 (6)	0		
	Steng Trang	Preak Kak	1	1	Tuol Pou (R214M)	
		Ou Ma	1	0		
		Tuol Preah Khleang	1	0		
		Dang Kdar	1	0		
		Pean Kach Saa	3 (7)	0		
		Dandae	Cheng Cheach	2 (2)	0	
	Krouch Chamar	Chamar	1	0		
		Rokar Khmor	5	0		
		Svay Khleang	2	1	Phum Ti Premsay (R240M)	
		Kampong Treas	2 (10)	0		
	Thoung Khmum	Kor	2	1	Veal Khmum (R264M)	
		Mong Ruang	3	1	Mong Ti Prempir (R269M)	
		(Sralorp)	1	0		
		Anchhaan	4	1	Chheu Teal Chrean (R273M)	
		Vihear Luang	4	0		
		Suang	3	0		
		Thma Pech	2	0		
		Roka Po Prang	3	0		
		(Chhro No.2)	2 (24)	0		
	Ou Ruang Or	Damrei	1	0		
		Mien	1	0		
		Kong Chay	9	1	Cheng Vost (R321M)	
		Chak	4	0		
		Tuol Sapay	6	1	Thma Da Lech (R337M)	
Preah Thant		3	0			
Ampl Ta Pak		5 (29)	0			
Chamkar Leu	Bes Khmor	1	0			
	Lvea Leau	1 (2)	0			
Chuang Pory	Phiau Chrean	1	0			
	Kok Ruang	1	0			
	Khmor Dambang	1 (3)	1	Kruer Dambang (R378M)		
Total			303	31		

Table 5.3.2 Demographic Data of Priority Villages

Province	District	Commune	Vill. Code	Village Name	Population	HH	FHH	% FHH	Repatriated	Resettled	Minorities	Ethnic G.
Kg. Chhnang	Kg. Tralach	Chhuk Sa	R035G	Trapeang Khtum	772	153	33	21.6%	0	2	5	Khmer
Kg. Chhnang	Kg. Tralach	Chrees	R045G	Prey Pis	678	128	54	42.2%	4	8	2	Khmer
Kg. Chhnang	Rolea Bier	Banteay Preal	R065G	Sdok Kabbas	508	118	31	26.3%	5	0	1	
Kg. Chhnang	Rolea Bier	Prasneb	R082G	Prasneb	800	183	40	21.9%	15	0	0	
Kg. Chhnang	Rolea Bier	Prasneb	R083G	Chor	570	129	47	36.4%	11	1	3	Cham
Kg. Chhnang	Tuek Phos	Khal Tuek	R096G	Kr. Doh Laeung	650	150	45	30.0%	0	4	0	
Kg. Chhnang	Tuek Phos	Krang Sknear	R114G	Kdol (Don Nak Angol)	420	120	32	26.7%	0	18	0	
Kg. Chhnang	Sa. Mean Chey	Seedthei	R162G	Peareach	774	176	47	26.7%	2	0	0	
Kg. Chhnang	Baribour	Ponley	R189G	Ponley	1,537	318	17	5.3%	36	27	5	Cham
Kg. Chhnang	Tuek Phos	Khal Tuek	R197G	Khbal Damrie	1,179	243	25	10.3%	4	4	0	
Sub-total					7,888	1,718	371	21.6%	77	64	16	
Kg. Cham	Memot	Dar	R008M	Dar Lech	1,000	199	57	28.6%	0	0	0	
Kg. Cham	Memot	Dar	R015M	Meaek Puk	450	110	20	18.2%	0	10	0	
Kg. Cham	Memot	Dar	R016M	Srae Chroam	954	180	10	5.6%	3	0	0	
Kg. Cham	Memot	Dar	R019M	Somrong Cheung	512	110	45	40.9%	0	0	0	
Kg. Cham	Memot	Tun Long	R046M	Kdol Phsar	801	167	25	15.0%	0	20	1	Vietnamese
Kg. Cham	Memot	Tramung	R055M	Sla Pnom	535	107	25	23.4%	0	0	0	
Kg. Cham	Memot	Tramung	R092M	Chhuk	656	126	10	7.9%	0	1	0	
Kg. Cham	Memot	Kampoan	R101M	Lour	1,334	246	50	20.3%	0	30	0	
Kg. Cham	Memot	Kampoan	R106M	Tuek Tum	619	123	7	5.7%	0	0	0	
Kg. Cham	Memot	Korki	R115M	Knoang	520	129	30	23.3%	0	1	0	
Kg. Cham	Memot	Choam Ta Mau	R126M	Kantaot	750	125	20	16.0%	1	5	0	
Kg. Cham	Memot	Choam Ta Mau	R127M	Angkam	404	70	10	14.3%	0	0	0	
Kg. Cham	Ponea Krack	Popel	R171M	Khsak	1,431	270	?	#VALUE!	3	0	0	
Kg. Cham	Kroch Chmar	Svay Khleang	R248M	P. Ti Pramnuoy	1,861	404	75	18.6%	1	0	6	2Khmer, 4Vietnamese
Kg. Cham	Stung Trang	Preaek Kak	R214M	Toul Pou	1,114	244	22	9.0%	5	0	7	Khmer
Kg. Cham	Thbong Khmum	Kor	R264M	Veal Khmum	2,282	382	66	17.3%	0	6	0	
Kg. Cham	Thbong Khmum	Moung Reav	R269M	Moung 7	766	164	47	28.7%	0	6	0	
Kg. Cham	Thbong Khmum	Anchaum	R273M	Chheu Teal Chrum	388	79	12	15.2%	0	0	0	
Kg. Cham	Ou Reang Ov	Kong Chey	R321M	Cheung Voat	908	176	43	24.4%	0	2	0	
Kg. Cham	Ou Reang Ov	Tuol Sophy	R337M	Thma Da Lech	629	122	20	16.4%	0	0	0	
Kg. Cham	Chheung Prey	Knaor Damnan	R376M	Knaor Damnan	1,800	321	0	0.0%	0	0	0	
Sub-total					19,714	3,854	594	15.4%	13	81	14	
Total					27,602	5,572	965	17.3%	90	145	50	

Source: JICA Village Survey, January 2001

Table 5.3.3 Household Annual Income and Expenditure in Selected 31 Villages

Province	District	Commune	Vill. Code	Name of Village	Household Income					Household Expenditure			
					Rice	Other crops	Poultry/pig	Others	Total	Food	Clothes	Others	Total
Kg Chhnang	Kg. Tralach	Chhnuk Sa	R035G	Trapeang Khum	1,500,000	150,000	50,000	0	1,700,000	800,000	5,000,000	0	5,800,000
Kg Chhnang	Kg. Tralach	Chrees	R045G	Prey Pis	400,000	150,000	20,000	0	570,000	500,000	50,000	0	550,000
Kg Chhnang	Rolea Bier	Banteay Preal	R065G	Sdok Kabbas	250,000	0	0	260,000	510,000	1,000,000	100,000	45,000	1,145,000
Kg Chhnang	Rolea Bier	Prasneb	R082G	Prasneb	400,000	0	0	700,000	1,100,000	1,000,000	300,000	500,000	1,800,000
Kg Chhnang	Rolea Bier	Prasneb	R083G	Chor	100,000	0	0	160,000	260,000	200,000	50,000	15,000	265,000
Kg Chhnang	Tuek Phos	Kbal Tuek	R096G	Kr. Doh Laeung	400,000	0	120,000	0	520,000	60,000	20,000	0	80,000
Kg Chhnang	Tuek Phos	Krang Sinear	R114G	Kdol (Dom Nak Ampil)	150,000	0	0	0	150,000	200,000	20,000	0	220,000
Kg Chhnang	Sa. Mean Chey	Seedthei	R162G	Peareach	250,000	0	0	500,000	750,000	500,000	100,000	40,000	640,000
Kg Chhnang	Baribour	Ponley	R189G	Ponley	400,000	0	400,000	1,000,000	1,800,000	1,500,000	70,000	120,000	1,690,000
Kg Chhnang	Tuek Phos	Kbal Tuek	R197G	Khbal Damrie	200,000	0	300,000	150,000	650,000	450,000	100,000	30,000	580,000
Sub-total					4,050,000	300,000	890,000	2,770,000	8,010,000	6,210,000	5,810,000	750,000	12,770,000
Average per village					405,000	30,000	89,000	277,000	801,000	621,000	581,000	75,000	1,277,000
Kg Cham	Memot	Dar	R008M	Dar Lech	1,000,000	0	0	500,000	1,500,000	1,000,000	100,000	600,000	1,700,000
Kg Cham	Memot	Dar	R015M	Meaek Puk	250,000	500,000	300,000	0	1,050,000	700,000	50,000	0	750,000
Kg Cham	Memot	Dar	R016M	Srae Chroam	300,000	500,000	0	0	800,000	350,000	40,000	150,000	540,000
Kg Cham	Memot	Dar	R019M	Somrong Cheung	250,000	100,000	0	400,000	750,000	700,000	50,000	120,000	870,000
Kg Cham	Memot	Tun Long	R046M	Kdol Phsar	400,000	0	400,000	1,500,000	2,300,000	1,000,000	500,000	100,000	1,600,000
Kg Cham	Memot	Tramung	R055M	Sla Phnom	0	0	0	400,000	400,000	750,000	5,000	0	755,000
Kg Cham	Memot	Tramung	R092M	Chhnuk	300,000	0	150,000	1,000,000	1,450,000	1,500,000	50,000	0	1,550,000
Kg Cham	Memot	Kampoan	R101M	Lour	400,000	0	0	1,000,000	1,400,000	700,000	60,000	70,000	830,000
Kg Cham	Memot	Kampoan	R106M	Tuek Tum	500,000	0	0	1,100,000	1,600,000	700,000	100,000	0	800,000
Kg Cham	Memot	Korki	R115M	Knoang	300,000	0	0	500,000	800,000	1,000,000	150,000	0	1,150,000
Kg Cham	Memot	Choam Ta Mau	R126M	Kantuat	500,000	200,000	0	0	700,000	480,000	150,000	360,000	990,000
Kg Cham	Memot	Choam Ta Mau	R127M	Angkam	200,000	0	1,000,000	100,000	1,300,000	1,099,000	150,000	0	1,249,000
Kg Cham	Ponea Kraek	Popel	R171M	Khsak	220,000	0	120,000	50,000	390,000	620,000	30,000	0	650,000
Kg Cham	Kroch Chmar	Svay Khleang	R248M	P. Ti Pramnuoy	500,000	1,500,000	0	80,000	2,080,000	1,000,000	300,000	0	1,300,000
Kg Cham	Stung Trang	Preaek Kak	R214M	Tuol Pou	500,000	700,000	0	50,000	1,250,000	400,000	20,000	700,000	1,120,000
Kg Cham	Thbong Khmum	Kor	R264M	Veal Khumun	800,000	0	0	0	800,000	700,000	50,000	0	750,000
Kg Cham	Thbong Khmum	Moung Reav	R269M	Moung 7	1,600,000	0	0	1,200,000	2,800,000	365,000	100,000	0	465,000
Kg Cham	Thbong Khmum	Anchaum	R273M	Chheu Teal Chrum	600,000	0	50,000	200,000	850,000	500,000	100,000	0	600,000
Kg Cham	Ou Reang Ov	Kong Chey	R321M	Cheung Voat	230,000	0	350,000	0	580,000	600,000	100,000	50,000	750,000
Kg Cham	Ou Reang Ov	Tuol Sophy	R337M	Thms Da Lech	150,000	150,000	300,000	0	600,000	1,000,000	150,000	80,000	1,230,000
Kg Cham	Chheung Prey	Knosr Damnsang	R376M	Knosr Damnsang	400,000	120,000	0	500,000	1,020,000	600,000	100,000	150,000	850,000
Sub-total					9,400,000	3,770,000	2,670,000	8,580,000	24,420,000	15,764,000	2,355,000	2,380,000	20,499,000
Average per village					447,619	179,524	127,143	408,571	1,162,857	750,667	112,143	113,333	976,143
Total					13,450,000	4,070,000	3,560,000	11,350,000	32,430,000	21,974,000	8,165,000	3,130,000	33,269,000
Average per village					433,871	131,290	114,839	366,129	1,046,129	708,839	263,387	100,968	1,073,194
Percentage					41.5%	12.6%	11.0%	35.0%	100.0%	66.0%	24.5%	9.4%	100.0%

Source: JICA Village Survey, January 2001

**Table 5.3.4 Survey Results Summary for Priority Villages in Kampong Chhnang Province**

Village Code	R035G	R045G	R065G	R082G	R083G	R096G	R114G	R162G	R189G	R197G	Total
Village Name	Thrapeang Khnum	Prey Par	Sdak Kabbau	Prameb	Chor	Kr. Dob Lareung	Kdel (Dom Nak Ampil)	Pearach	Penley	Kkhal Damre	
Population	772	678	588	800	570	658	420	774	1,537	1,723	8,432
HH	153	128	118	183	129	158	120	178	318	244	1,719
FHH	33	54	31	40	47	45	32	47	17	25	371
% FHH	21.6%	42.2%	26.3%	21.9%	36.4%	30.0%	26.7%	26.7%	5.3%	10.2%	21.6%
Village Type	2	1.5	2	2	3	2	2	2	1	1	1.9
Access	good	good	good	good	good	good	good	good	good	good	good
Main economic activities	rice, veg, Cattle	rice, Cattle	rice, sugar	rice, sugar, pig	rice, grass for roof	rice, pig, chicken	rice, wage	rice, pig, chicken, lag	rice, pig, commerce	rice, pig, chicken, vegetables	
Community Organizations	Concern	UNICEF/MD	PPP		HEK		CESVI	LWS	PRASAC	UMF	
Cooperative activities	sharing force for digging	Providing food for drilling team	N/A	N/A	sharing force for digging	N/A	Providing sand, stone, force for drilling team	Providing sand, stone, force for drilling team	loaning money	Providing sand, stone, force for drilling team	
Village establishment	1940	Old	ancient	old	1954	ancient	1940	old	ancient	old	
Land holding	0.3 to 1 ha	0.3 to 0.4 ha	0.7 to 2 ha	0.5 to 3 ha	1 to 2 ha	0.5 to 1 ha	n.a.	0.3 to 1.5 ha	1.5 to 5 ha	0.3 to 0.5 ha	
No. of Primary school	0	1	0	1	1	1	0	1	1	1	7
Distance to school (km)	1	within village	7	within village	within village	within village	3	within village	within village	within village	
Adult men's literacy	58%	30%	70%	88%	78%	n.a.	58%	88%	90%	90%	
Women literacy	48%	25%	50%	88%	48%	0%	18%	88%	70%	60%	
Latrine conditions	0	1	0	1	1	0	0	2	95	5	4 villages without latrine.
Distance to Medical facilities(km)	20	3.5	10	30	8	1	38	7	1	10	12.9
Doctor	0	0	0	0	0	0	0	0	0	0	0
Nurse	0	0	0	0	0	0	0	0	0	0	0
Midwife	0	0	2	0	0	0	0	0	1	0	3
TBA	1	0	1	4	1	3	3	1	0	0	14
VHV	0	0	0	0	0	2	0	0	0	0	2
Healer	1	0	1	3	2	1	1	1	2	0	12
Malaria	2	0	0	2	2	2	3	3	2	3	19
Malnutrition	3	0	0	2	2	1	2	0	1	0	11
Skin	1	2	0	1	1	3	3	2	1	3	17
Other fever	2	1	3	2	3	2	3	3	2	2	23
cough	3	1	1	3	2	2	2	0	2	3	19
Gyneco-obstetric	1	1	2	2	2	n.a.	2	2	3	2	17
Diarrhoea	2	1	2	2	2	3	3	1	3	2	21
Measles	1	1	1	2	2	1	0	0	1	1	10
Other typhoid	2	1	0	1	2	n.a.	3	2	2	2	15
Cholera	0	0	0	0	0	3	0	0	3	1	7
Dysentery	2	0	0	1	2	2	3	2	2	2	16
Neonatal death	3	1	2	1	3	3	3	0	1	1.5	18.5
Diseases occurrence: 0= nil, 1= minor, 2= moderate, 3= serious											
No. of Dugwells	5	48	23	30	16	4	120	8	188	46	392
No. of Boreholes	0	2	0	0	0	0	0	4	12	3	21
No. of Springs	0	0	0	0	0	1	0	1	0	0	2
No. of River	0	0	1	1	1	0	1	0	0	0	4
Ponds	0	0	0	0	2	0	0	0	1	0	3
Rain water	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Taste of Dugwells	bad	good & bad		good	good & bad		good	good	bad	good & bad	
Taste of Borehole		good						good	n.a.	good	
Taste of Rain water											
No. of Public HP	0	1	0	0	0	0	0	4	4	2	11
Constructed by		UNICEF/MD						LWS	PRASAC	UNICEF/MD	
HP type		Muck II, Ashdev									
No. of Private HP	0	1	0	0	0	0	0	0	0	1	10
Water fee (Riel)	0	0	0	0	500	0	0	0	0	0	
Water use volume (litre)	65	60	60	55	45	40	60	58	48	100	58
Main Water Fetching	children	women	men	women, children	women, children	men	men	women	children	women	
VDC	0	0	0	0	1	0	1	0	0	0	2
WPC	0	0	0	0	0	0	0	0	0	0	0
No. of Caretaker	0	0	0	0	0	0	0	0	0	0	2
Willingness to organize VWC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WTP (Riel per month)	588	500	750	588	588	300	588	300	1,000	500	535

Source: JICA Village Survey, January 2011

Note: n.a. = no answer or data is not available

**Table 5.3.5 Survey Results Summary for Priority Villages in Kampong Cham Province**

Village Code	R126M	R127M	R171M	R248M	R214M	R264M	R269M	R273M	R321M	R337M	R376M	Sub-total
Village Name	Kambot	Angkorn	Khsak	P. Ti Prommay	Toul Pou	Veal Khaman	Moung 7	Chheu Teal Chrum	Chreng Voat	Thma Da Lech	Knaer Dannang	
Population	750	404	1,431	1,841	1,114	2,282	795	388	908	629	1,188	12,333
HH	125	70	270	484	244	382	164	79	176	122	321	2,367
FHH	20	10	n.a.	75	22	66	47	12	43	20	8	315
% FHH	16.0%	14.3%	n.a.	13.6%	9.8%	17.3%	28.7%	15.2%	24.4%	16.4%	0.0%	13.4%
Village Type	1	1	2	1	1	1	1	2	2	2	1	14
Village type: 1= crowded, 1.5= mixture of 1 & 2, 2= partly crowded, 3= scattered												
Access	good	good	good	good	good	good	good	good	good	good	good	good
Main economic activities	plantation	rice, plantation	crops	crops, fishing	rice (twice)	rice, plantation	rice, plantation	rice	rice	rice, soybean, corn, vegetable	rice, sugar, vegetable	
Community organizations	Nd	WHO	Nd	Health agency	Nd	Nd	VDC	VDC	Nd	Nd	PRASAC	
Cooperative activities	Nd	Nd	Nd	Nd	Nd	Nd	Nd	Nd	Nd	Nd	PRASAC loan	
Village establishment	old	old	old	old (separated from Pak Choung in 1970)	old	old	old	old	old	ancient	ancient	
Land holding	n.a.	n.a.	n.a.	0.5 to 1 ha	0.7ha	n.a.	n.a.	n.a.	0.5 to 1.5ha	0.5 to 1ha	0.3 to 1 ha	
No. of Primary school	1	1	1	1	0	1	0	0	0	0	1	6
Distance to school	within village	within village	within village	within village	Less than 1km	within village	Less than 1km	Less than 1km	Less than 1km	Less than 4km	within village	Less than 1km
Adult men's literacy	90%	90%	100%	90%	45%	100%	80%	50%	90%	50%	80%	
Women literacy	30%	40%	100%	90%	45%	100%	80%	60%	60%	40%	10%	
Latrine conditions	0	1	0	some	0	1	0	1	0	0	0	6 villages have no latrine
Distance to Medical facilities(km)	8	5	8	3.5	6	3.5	1.5	12	3	7	n.a.	6.4
Doctor	0	0	0	0	0	0	0	0	0	0	0	0
Nurse	0	1	0	2	0	2	0	0	0	0	1	6
Midwife	0	0	0	0	0	2	0	0	1	0	1	4
TBA	2	5	2	0	1	0	0	1	1	1	2	16
VHV	3	3	3	0	0	0	0	3	0	0	0	12
Healer	3	10	0	0	0	2	0	1	0	0	4	20
Malaria	3	2	0	2	1	2	0	0	1	3	1	15
Malnutrition	2	2	2	0	1	1	1	1	0	1	0	11
Skin	3	3	2	2	2	2	0	3	3	3	1	24
Other fever	2	2	2	2	2	2	2	2	1	2	2	21
cough	2	2	2	1	2	3	1	1	1	1	1	17
Gyneco obstetric	3	3	3	1	3	n.a.	2	2	1	3	2	23
Diarrhoea	2	2	2	2	0	2	2	2	1	2	1	18
Measles	2	1	2	1	0	1	1	1	1	1	1	12
Other typhoid	3	1	2	2	1	3	3	n.a.	1	2	1	19
Cholera	1	1	0	0	0	0	0	0	0	0	0	2
Dysentery	2	1	0	2	1	2	2	1	1	1	2	15
Neonatal death	1	2	1	1	2	1	0	2	1.5	3	1	16
Diseases occurrence: 0= nil, 1= minor, 2= moderate, 3= serious												
No. of Dugwells	3	200	4	13	4	14	59	30	132	73	8	540
No. of Boreholes	0	1	0	0	4	0	1	0	3	0	4	13
No. of Springs	1	0	2	0	0	0	0	0	0	0	0	3
No. of River	0	0	1	1	0	0	0	0	0	0	0	2
Ponds	0	0	0	0	0	0	0	0	0	0	2	2
Rain water	Yes	No	No	Yes	No	No	No	Yes	No	No	Yes	Yes: 4 No: 7
Taste of Dugwells	good	good	good	good	good and bad	good	good and bad	good	good and bad	bad	bad	
Taste of Boreholes	n.a.	bad	n.a.	n.a.	good	n.a.	good	n.a.	good	n.a.	bad	
Taste of Rain water	good	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	good	n.a.	n.a.	n.a.	
No. of Public HP	0	0	0	0	1	0	0	0	0	0	0	1
Constructed by					n.a.							
HP type					No. 6							
No. of Private HP	0	1	0	0	3	0	1	0	3	0	4	12
Water fee (Riel)	No	No	No	No	No	No	No	No	No	No	No	No
Water use volume (liter)	50	100	50	50	60	100	100	20	50	50	50	69
Main Water Fetching	everybody	men	women	children	children	everybody	everybody	women	men	women	children	
VDC	0	0	0	0	1	0	0	0	0	0	1	2
WPC	0	0	0	0	0	0	0	0	0	0	0	0
No. of Caretaker	0	0	0	0	0	0	0	0	0	0	0	2
Willingness to organize VWC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WTP (Riel per month)	1,000	1,000	1,000	500	500	1,000	1,000	1,000	1,000	500	500	818

Source: JICA Village Survey, January 2001

Note: n.a. = no answer or data is not available

## 5.4 Analysis on Hand Pump Well Utilization

### 5.4.1 Background of The Analysis and Data to Be Analyzed

According to the results of the field survey there are many hand pump wells constructed by aid and/or government agencies in the study area. However, the JICA survey team found that, in some villages, the number of users of hand pump wells was quite limited even though the hand pumps were working. The experiences of agencies that have launched water supply programs show that this is not an exceptional phenomenon in rural Cambodia. For example, OXFAM said, “...new water sources they constructed were often not used for drinking. People preferred their traditional sources because of taste, custom or convenience.”<sup>2</sup> UNICEF also reported that hand pump wells constructed under the UNICEF/MRD program during 1992-1997 were used by only 20 families per well on average, which was approximately 50 % of the number which they had intended to supply with safe water.<sup>3</sup>

The primary objectives of social analysis are to maximize, as well as to secure fair allocation of project benefits among target beneficiaries. Therefore, factors that effect villagers’ hand pump well utilization should be identified. A more effective project could then be designed using the results of the analysis. The analysis will focus on any differences, including socio-economic, between those who use and those who not use hand pump wells in the study area.

Table 5.4.1.1 shows the list of villages to be analyzed. These were abstracted from the 303 target villages according to the following criteria; 1) Village which has only aid/governmental agency-provided hand pump well(s), 2) Village in which hand pump well(s) is(are) still functioning. Consequently, in cases where villagers do not use hand pump wells because their well is constructed privately, and/or the hand pump well is broken, they will be excluded from this analysis.

Villager’s participation in a hand pump well project will also be analyzed. It has been increasingly recognized that beneficiaries’ participation could contribute to the improved effectiveness, efficiency and sustainability of a project. Therefore, the relationship between the degree of participation in the project concerned and utilization of hand pump wells should be examined. In order to collect this information, the JICA study team additionally surveyed the seven villages listed in Table 5.4.1.2. Households using and not using hand pump wells were asked about their experiences with the projects, particularly when and how to take part

<sup>2</sup> OXFAM, 1995, *Water is life*

<sup>3</sup> UNICEF, 1997, *From Emergency to Community in Action*

in the meetings and activities concerned.

**Table 5.4.1.1 The Villages Analyzed for Hand Pump Well Utilization**

No.	Village	total households surveyed	households not using hand pump	utilization percent (%)	total population	number of dug well available a whole year	number of public hand pump well	population per dug well available a whole year (1)	population per hand pump well (2)	Population (2)-(1)	VDC establishment	WPC establishment
1	G 8 Andoung Ronuk	12	2	83	690	1	1	690	690	0	Yes	Yes
2	G 21 Thlok	35	32	9	1559	2	1	780	1559	780	Yes	No
3	G 32 Prey Pear	11	10	9	560	10	1	56	560	504	Yes	No
4	G 48 Chumteav	17	13	24	846	26	1	33	846	813	No	No
5	G 112 Chan Trak	15	3	80	686	17	5	40	137	97	Yes	Yes
6	G 115 Krang Skear Tboung	10	7	30	316	11	2	29	158	129	Yes	Yes
7	G 119 Srae Khtum	8	2	75	442	6	4	74	111	37	Yes	Yes
8	G 120 Tuek Chum	9	3	67	516	15	4	34	129	95	Yes	Yes
9	G 123 Trapeang Pring	13	5	62	715	3	5	238	143	-95	Yes	Yes
10	G 158 Khnach	7	6	14	433	9	1	48	433	385	Yes	Yes
11	G 160 Angkrong	8	4	50	440	1	3	440	147	-293	Yes	Yes
12	G 165 Neang Mealea	13	3	77	675	0	5	nil	135		Yes	Yes
13	G 166 Veal Ta King	10	1	90	420	0	3	nil	140		Yes	Yes
14	G 168 Tbaeng Khpos	13	7	46	619	1	2	619	310	-310	No	No
15	G 174 Pou Mreah	13	13	0	591	20	3	30	197	167	Yes	No
16	G 176 Chak	10	10	0	472	30	3	16	157	142	Yes	No
17	G 177 Dangkhau Mau	10	6	40	410	20	1	21	410	390	Yes	No
18	G 179 Kam Prong	11	3	73	515	36	4	14	129	114	Yes	No
19	G 180 Chumteav Botrei	12	11	8	548	46	1	12	548	536	Yes	Yes
20	G 190 Cheung Khnar	24	24	0	1259	63	2	20	630	610	No	No
21	G 202 Stueng Thmei	17	15	12	802	31	2	26	401	375	Yes	No
22	M 9 Dar Phsar	21	14	33	1225	26	3	47	408	361	No	Yes
23	M 10 Dar Kandaol	37	33	11	1868	201	4	9	467	458	No	No
24	M 36 Chan Mul	20	18	10	1107	44	1	25	1107	1082	No	No
25	M 38 Srae Ta Nong Kaeut	8	8	0	460	31	1	15	460	445	No	No
26	M 70 Memot Thmei	9	7	22	450	26	4	17	113	95	No	No
27	M 77 Sangkom Mean Chey Thmei	10	9	10	462	87	3	5	154	149	No	Yes
28	M 78 Sangkom Mean Chey Chas	15	15	0	845	80	1	11	845	834	No	No
29	M 86 Choam Triek	20	20	0	1040	25	1	42	1040	998	No	No
30	M 147 Chrey Laeung	7	7	0	326	23	1	14	326	312	Yes	No
31	M 207 Pongro Kaeut	12	12	0	481	2	1	241	481	241	No	No
32	M 239 Saoy Pir	39	12	69	2008	0	12	nil	167		Yes	Yes
33	M 243 Phum Ti Muoy	21	21	0	1083	20	1	54	1083	1029	Yes	No
34	M 248 Phum Ti Prammuoy	37	10	73	1968	8	5	246	394	148	No	Yes
35	M 255 Phum Buon	26	24	8	1598	0	6	nil	266		Yes	No
36	M 304 Srae Siem	39	32	18	1830	20	8	92	229	137	Yes	Yes
37	M 305 Tuol Vihear	44	24	45	2299	22	3	105	766	662	Yes	Yes
total/average		643	446	31	32564	963	109	34	299	265	-	-

**Table 5.4.1.2 The List of Villages Additionally Surveyed**

No	Village	Donor/program constructed hand pump well	Number of Households surveyed
1	G061 Sampor	UNICEF/MRD, China, JICA (study well)	18
2	G120 Tuek Chum	Lutheran World Service	20
3	G162 Peareach	Lutheran World Service	21
4	G166 Veal Ta King	Lutheran World Service, JICA (study well)	20
5	G179 Kam Prong	UNICEF/MRD	21
6	M019 Samroang	JICA (study well)	10
7	M070 Memot Themei	Social Fund for Kingdom of Cambodia	19
Total			129

## 5.4.2 Utilization of Hand Pump Well

### 5.4.2.1 Current Status of Hand Pump Well Utilization

In total, of 638 households in 37 villages analyzed, 192 households are using and 446 households are not using hand pump wells. The utilization ratio of hand pump wells (the proportion of the households using hand pump wells to total households in a village) differs from village to village. It ranges from 0.0 % to 90.0% and is 30.6 % on average (Refer to Table 5.4.1.1). This ratio shows a tendency to increase as the number of hand pump wells in a village increases. The correlation between utilization-ratio and population per hand pump well in a village is stronger than that of population per dug well (Refer to Table- 5.4.2.1.1).

**Table- 5.4.2.1.1 Correlation of Hand Pump Well Utilization-ratio in Villages**

With population per dug well available a whole year (1)	With population per hand pump well (2)	With population (2) - (1)
0.32	-0.43	-0.57

### 5.4.2.2 Distance and Utilization of Hand Pump Well

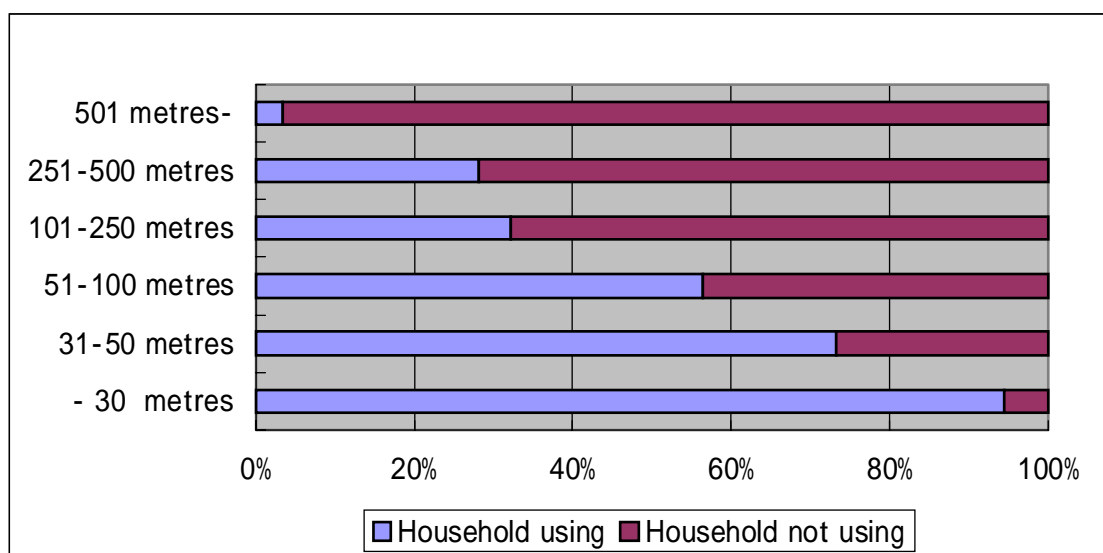
A strong correlation between distance from hand pump wells and hand pump well utilization is clearly shown in Table- 5.4.2.2.1 and Figure- 5.4.2.2.1. In a total of 434 households analyzed here, the proportion of households “using” and “not using” hand pump wells is 45 % and 55 % on average. In the group whose distance to hand pump wells is up to 30 meters, the



proportion of those using and not using is 95 % and 5 %, whereas usage becomes 3 % and 97 % in groups whose distance is more than 500 meters. Thus, increased distance to hand pump wells leads to a reduction in usage. The proportion using and not using hand pump wells is inverted for groups whose distance is 101 – 250 meters.

**Table- 5.4.2.2.1 Distance and Utilization Status of Hand Pump Well**

	- 30 meters	31-50 meters	51-100 meters	101-250 meters	251-500 meters	501 meters-	total
Households using hand pump wells	69 (95%)	41 (73%)	39 (57%)	27 (32%)	18 (28%)	3 (3%)	197 (45%)
Households not using hand pump wells	4 (5%)	15 (27%)	30 (43%)	57 (68%)	46 (72%)	85 (97%)	237 (55%)
Total	73 (100%)	56 (100%)	69 (100%)	84 (100%)	64 (100%)	88 (100%)	434 (100%)



**Figure- 5.4.2.2.1 Distance and Utilization Status of Hand Pump Well**

### 5.4.2.3 Economic Status and Utilization of Hand Pump Well

By using results of the “Wealth Ranking” conducted in the preliminary stage of this study, all households surveyed can be classified into four groups according to their economic status, such as; “Upper class,” “Upper middle class,” “Lower middle class” and “Lower class”<sup>4</sup>. As shown in Table- 5.4.2.3.1, there are no clear differences in terms of utilization of hand pump wells among four economic status groups.

<sup>4</sup> A criterion is set by a combination of possessing of household assets, such as TV, motorbike, and cow/buffalo and a material of a roof (tile, zinc or thatch).

**Table- 5.4.2.3.1 Economic Status of Household and Utilization of Hand Pump Well**

	Use hand pump well	Not use hand pump well	Total
Upper class household	30.8% 32	69.2% 72	100.0% 104
Upper middle class Household	28.3% 49	71.7% 124	100.0% 173
Lower middle class household	31.8% 74	68.2% 159	100.0% 233
Lower class household	28.9% 37	71.1% 91	100.0% 128
Total / Average	30.1% 192	69.9% 446	100.0% 638

**5.4.2.4 Female-headed Households and Utilization of Hand Pump Well**

There are 106 female-headed households out of 638 households analyzed. Table- 5.4.2.4.1 shows the relationship between household status and utilization of hand pump wells. The utilization-ratio of female-headed households is somewhat lower than that of male-headed households. However, this difference is not statistically significant according to sampling theory.

**Table- 5.4.2.4.1 Household Status and Utilization of Hand Pump Well**

	Using hand pump wells	Not using hand pump wells	Total
Female-headed Households	23.6% 25	76.4% 81	100.0% 106
Male-headed Households	31.4% 167	68.6% 365	100.0% 532
Total / Average	30.1% 192	69.9% 446	100.0% 638

**5.4.2.5 Village Organization and Utilization of Hand Pump Well**

Utilization of hand pump wells can be analyzed according to the existing village organization, the Village Water Committee (VWC). In general, VWC is a sub-organization of VDC and is responsible for O&M of hand pump wells. The villages listed in Table 5.4.1.1 are divided

into two groups. One group is villages that have VWC, and the other group is villages that don't.

There is a substantial difference in hand pump well utilization between the two groups. The average utilization ratio of groups with a VWC is 52.1 %, while that of groups without a VWC is 13.1% (Refer to Table- 5.4.2.5.1).

**Table- 5.4.2.5.1 Utilization Ratio of Hand Pump Well and Villages with/without a VWC**

Average of utilization ratio in villages with a VWC	Average of utilization ratio in villages without a VWC
52.1%	13.1%

#### **5.4.2.6 Participation Status and Utilization of Hand Pump Well**

##### **(1) Definition Concerned.**

Since the actual process of the hand pump well project differs from village to village, a clear definition of participation is needed for proper analysis. The stages of villagers' participation can be divided into three; *the Planning phase, Implementation phase* and *Operation phase*. Also their type of participation can be classified as: *Participation in meeting* (decision-making) and *Participation as contribution* (cash and/or labor).

The household is considered as having participated if at least one household member has joined at least one of the following meetings or collaborated on activities during the phase concerned.

##### Planning phase;

- Attend the initial meeting discussing the water supply issue of villagers before submitting request to organization outside village concerned.
- Attend the meeting to decide the location of the hand pump well and the shared contribution of villagers
- Attend the meeting to establish a group responsible for the O&M of hand pump wells

##### Implementation phase;

- To join in collaborative work on
  - \* Platform construction, fence construction, flower & vegetable planting

around the platform (including providing materials)

- To attend the meeting regarding the collaborative activities above
- To share the initial cost for hand pump well construction
- To offer food for construction engineers/workers

Operation phase;

- To join collaborative activities to repair hand pump wells.
- To join collaborative activities for periodical maintenance of hand pump wells.
- To share costs for repairs and/or periodical maintenance of hand pump wells
- To attend the meeting regarding the collaborative activities above

## (2) Results of The Analysis

A substantial correlation exists between the utilization of hand pump wells and participation among 94 households analyzed.

Table- 5.4.2.6.1 shows the distribution of households by participation in phases and the utilization status of hand pump wells. Among households using hand pump wells, the proportion of “participating” and “not participating” in the planning phase is 57 % to 43 %, while among households not using, the proportion is 32 % and 68 %. As for the implementation phase, the proportion among households using is 66 % to 34 %, while the proportion among households not using becomes almost the opposite. In particular, among households not using hand pump wells; no one has participated in the operation phase. Consequently, 83% of households using hand pump wells have taken part in some phases, while 51 % of households not using have not taken part in any phase.

**Table- 5.4.2.6.1 Utilization Status and Participation of Household (1)**

Participation Utilization	Planning phase		Implementation phase		Operation phase*		Any phase	
	Yes	No	Yes	No	Yes	No	Yes	No
Using hand pumps (47 families)	27 (57%)	20 (43%)	31 (66%)	16 (34%)	9 (69%)	4 (31%)	39 (83%)	8 (17%)
Not use hand pumps (47 families)	15 (32%)	32 (68%)	17 (36%)	30 (64%)	0 (0%)	11 (100%)	23 (49%)	24 (51%)
Total	42 (45%)	52 (55%)	48 (51%)	46 (49%)	9 (38%)	15 (63%)	62 (66%)	32 (34%)

\* The sample number for the operation phase is small because there were a few hand pump wells that were broken and no wells that were periodically maintained.

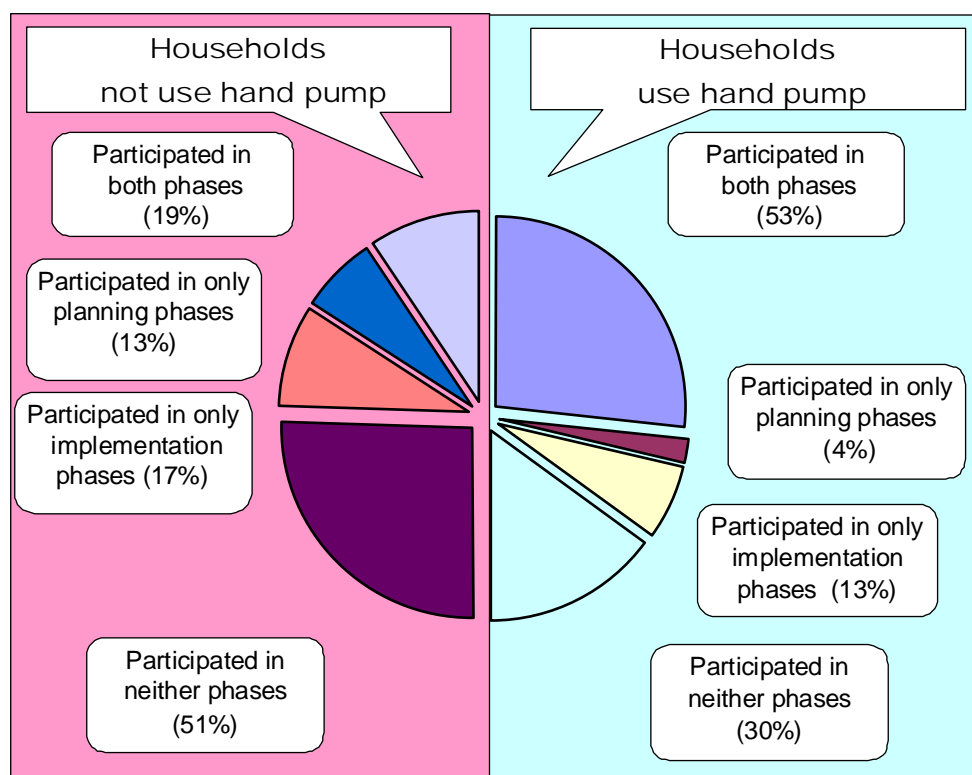
Table- 5.4.2.6.2 shows the distribution of households by participation as contribution and

utilization of hand pump wells. Among households using hand pumps, the proportion “participating with cash” and “not participating” is 36 % to 64 %, while among households not using, the proportion is 6 % and 94 %. As for participating with labor, the proportion among households using is 68 % to 32 %, while the proportion is 26 % to 74 % among households not using.

**Table- 5.4.2.6.2 Utilization Status and Participation of Household(2)**

Participation Utilization	With cash		With labour		Any	
	Yes	No	Yes	No	Yes	No
Using hand pumps (47 families)	17 (36%)	30 (64%)	32 (68%)	15 (32%)	34 (72%)	13 (28%)
Not use hand pumps (47 families)	3 (6%)	44 (94%)	12 (26%)	35 (74%)	12 (26%)	35 (74%)
Total	20 (21%)	74 (79%)	44 (47%)	50 (53%)	46 (49%)	48 (51%)

Moreover, of households using hand pump wells, 53 % have taken part in both the planning and implementation phases, 27% have taken part in one of the phases, and 30 % have taken part in neither phase (Refer to Figure- 5.4.2.6.1). In contrast, for households not using hand pump wells, only 19 % have taken part in both the planning and implementation phases, 30 % have taken part in any one phase, and 51 % have taken part in neither phase.



**Figure- 5.4.2.6.1 Households Using and Not Using Hand Pump Well and Degree of Participation**

Thus, a positive correlation between participation and utilization of hand pump wells has been identified. Those who have taken part in the project use hand pump wells much more than those whom have not taken part.

However, two things should be pointed out. One is that 49 % of the households not using hand pump wells have taken part in some phases. In particular, although 19 % of the households have taken part in both phases, they have not used hand pump wells for any reason. Secondly, 30 % of the households using hand pump wells have not taken part in any phase. They are so-called “Free Riders,” who may adversely affect the sustainability of the project. However, it is traditional to share water sources in a rural community.

Table- 5.4.2.6.3 presents the reasons for “not participating” in the hand pump project. 233 cases listed as “not participating” among 129 households are analyzed. The primary reason, accounting for 66 %, is “not invited to/ or informed about” the meeting and/or collaborative activities. It means they were not given the opportunities to participate. In the secondary reason, accounting for 18 %, is “invited/informed, but unable to participate. It means that they had chances to participate, but couldn’t afford to pay or were too busy to take part. The reason “invited/informed, but did not participate” accounting for only 5 %, means that they thought it was needless to take part, or that they did not want to take part due to interpersonal problems.

**Table- 5.4.2.6.3 Reasons for “Not participating” in The Hand Pump Project**

	Planning phase % :(number)	Implementation phase % :(number)	Operation phase % :(number)	Total % :(number)
1 <b>Not invited/informed</b>	79% (68)	61% (79)	41% (7)	66% (154)
2 <b>Invited/informed, but could not, because</b>				
2.1 Lack of money	0% (0)	2% (2)	0% (0)	1% (2)
2.2 Lack of time	17% (15)	18% (24)	6% (1)	17% (40)
Sub total	17% (15)	20% (26)	6% (1)	18% (42)
3 <b>Invited/informed, but did not, because</b>				
3.1 No need ( using dug well)	2% (2)	6% (8)	24% (4)	6% (14)
3.2 Interpernonel problem	0% (0)	0% (0)	0% (0)	0% (0)
Sub total	2% (2)	6% (8)	24% (4)	6% (14)
4 <b>Other reason</b>	1% (1)	2% (3)	6% (1)	2% (5)
5 <b>Not available to answer</b>	0% (0)	11% (14)	24% (4)	8% (18)
<b>Total</b>	100% (86)	100% (130)	100% (17)	100% (233)

### 5.4.2.7 Reasons for “Not Using Hand Pump Well”

During the additional survey, households not using hand pump wells were asked why. Their answers were summarized in Table- 5.4.2.7.1. The most frequent answer, accounting for 45.3 % of the households surveyed, was “too great a distance.” As seen in the analysis described in 5.4.2.2, distance seems to be a significant factor affecting hand pump well utilization. The second most frequent answer was the quality of water, which was the reason given by approximately one third of total households. In particular, “bad taste” was given as the reason by 13.2 % of the total households. Nearly one third of the total households claimed they do not need to use hand pump wells, two-thirds of whom have their own dug wells. Only one household claimed too little water as the reason, and 3.8 % of total households explained that they do not use them because of interpersonal problems.

**Table- 5.4.2.7.1 Reason for “Not using hand pump well”**

	Reason	Percent	Number of households
1	Distance too great	45.3%	48
2	Poor Water Quality	33.0%	35
2.1	(Bad Taste)	(13.2%)	(14)
3	Low Water Volume	0.9%	1
4	Interpersonal problems	3.8%	4
5	Unnecessary	30.2%	32
5.1	(Have own well)	(20.8%)	(22)
6	Unknown	10.4%	11

\* Multiple answers from 106 households

## 5.5 Gender Analysis

### 5.5.1 Overview of Women’s Situation in Cambodia

#### 5.5.1.1 Socio-Economic Status

It has generally been said that Cambodian women enjoy relative equality with men, particularly when compared to Asian countries such as China, or India. Traditionally, women inherit the same share of property as men. Women are almost always economically active,

and after marriage, a wife often makes household decisions<sup>5</sup>.

The Cambodian constitution states that men and women are equal and that women should take participate fully in political, economic, cultural, social and family life. In the last election, 54% of the registered voters were women and 59% of the actual voters were women.<sup>6</sup> In 1988, 65% of textile workers, 70% of medical doctors, 42% of pharmacists, and 19% of medical assistants were women<sup>7</sup>. The latest census data shows that women constituted 52% of the adult labour force in 1998<sup>8</sup>.

Thus, there are several figures that indicate active socio-economic participation of women, however, women still have little influence in the creation of the regulations and policies and in the management and administration of society. There were only two women out of 28 Ministers and 10 women out of 122 Parliamentarians in 1999.<sup>9</sup> A Cambodian Socio-Economic Survey conducted in 1997 shows that women held approximately 13 % of all administrative and managerial positions in both governmental organizations and private enterprises in Cambodia.

Women's position in the labor market also seems to be insecure. The proportion of women working without pay in family-operated farms or businesses is much higher than men<sup>10</sup>. Even paid female employees earn a wage that is approximately two-thirds of men's on average.<sup>11</sup> Moreover, the Census data in 1998 shows that the female unemployment rate was almost twice that of males in urban areas.

### **5.5.1.2 Health and Education**

#### **(1) Health**

In general, the status of women's health in rural Cambodia is very severe due to many factors, such as close pregnancies, lack of hygiene and heavy works on farm activities and

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<sup>5</sup> Beaufils Laure, 2000, *Population Matters in Cambodia, A Study on Gender, Reproductive Health and Related Population Concerns in Cambodia*

<sup>6</sup> UNICEF, 1996, *Towards a Better Future, An analysis of the Situation of Children and Women in Cambodia*

<sup>7</sup> Kokusai Kogyo/JICA, 1997, *The Study on Ground Water Development in Southern Cambodia, Progress Report*

<sup>8</sup> 1998 Census, Report 3: Labour Force and Employment

<sup>9</sup> Beaufils Laure, ditto P29

<sup>10</sup> Beaufils Laure, ditto P30

<sup>11</sup> Ministry of Planning, *Cambodia: Human Development Reports, 1998*



household tasks.

Although medical facilities and services have been much improved from the early 1990's, service levels are still insufficient, particularly in rural areas. The majority of pregnant women have never received antenatal care. It was estimated that 95% of babies were delivered at home. Furthermore, family members and/or traditional birth assistants, instead of qualified health workers, attended 85 % of deliveries.<sup>12</sup>

Frequent pregnancies and poor conditions for childbirth lead to complications such as hemorrhages, tetanus or other infections, causing many women to die. While the total fertility rate still remains high (5.1), the maternal death rate is around 900 (per hundred thousands), which was almost twice that of other developing countries<sup>13</sup>.

## **(2) Education**

Although boys and girls have roughly similar school enrollment rates during the first several years of primary school, girls start to drop out a short time later. As a result, male enrollment is 50% greater than female enrollment by the age of 15,<sup>14</sup> and at the tertiary level, 85 % of students are male.<sup>15</sup>

As seen in the results of the survey of the 303 target villages, the adult literacy rate of women is generally lower than that of men in the study area. The census data in 1998 indicated that the gender gap in adult literacy rate exceeded, on average, approximately 20% of the whole country.

### **5.5.1.3 Female-headed Households**

It is generally recognized that female-headed households are one of the most disadvantaged groups in Cambodian society. Female-headed households, on the one hand, received relatively smaller pieces of agricultural land, since land holdings were re-allocated according to the number of family members in 1989. Also, they have to endure additional expenditures to hire agricultural labors, due to their lack of manpower. Moreover, women heading households have to cope with both productive and reproductive activities in their daily life,

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<sup>12</sup> JICA,1997 ditto

<sup>13</sup> JICA, 1997, *Cambodia ,Country WID Profile*

<sup>14</sup> Beaufils Laure, ditto P26,

<sup>15</sup> Ministry of Education, Youth and Sports, Survey on Girls' Education 1998

which prevent them from receiving social services. As a whole, these factors often leave female-headed households at a disadvantage.

The 1998 census data shows that the proportion of female-headed households was 25.7 % on average for the whole country, and higher in urban areas (28.7 %) than in rural areas (25.5 %). As mentioned in the results of the survey of the 303 target villages, female-headed households account for 17 % of the total households in the study area.

## **5.5.2 Field Survey on Gender Issues**

### **5.5.2.1 Outline of The Field Survey**

The field survey on gender issues was conducted for two villages according to the resident's race, such as Khmer, the majority, and Cham, the minority in the study area. In each village, two female surveyors interviewed groups consisting of five to six women. It took one day in a village to collect information about gender topics such as activities profiles, participation in decision-making and access to/ control over resources.

#### **5.5.2.2 Daily Activities Profile**

Table 5.5.2.2.1 and Table 5.5.2.2.2 show typical daily activities of Khmer and Cham households respectively. The patterns of daily activities differ from season to season. Generally, they have many activities related to rice farming in the wet season, while they stay at home longer in the dry season.

As for Khmer households, during the wet season men go to rice fields earlier than women and they eat breakfast together in the field. Women come back home earlier and do house work, while men come back after grazing cattle/buffaloes. They have lunch and rest together at home and share housework, including fetching water. Women go again to the rice field directly, whereas men take care of cattle/buffaloes first and follow women to the field. At early evening, women feed the pigs and poultry and prepare dinner at home. After men come back, they have dinner together. Men go to bed after watching TV, but women stay up a bit later.

In the dry season, instead of rice farming, they spend a lot of time making palm sugar. Even they wake up later than in the wet season, they must stay up later for sugar production. Women spend much more time at home than in wet season.

As for Cham households, although general activity patterns seem to be similar to that of Khmer households, there is one thing that distinguishes them. The Cham worship five times a day, as Muslims do in general, at mosques, home and in the field. While men attend worship at mosques, women stay home and worship. They must bath or wash their hands before worshipping, therefore, they have more activities related to water than the Khmer.

### 5.5.2.3 Activities Profile

Table 5.5.2.3.1 and Table 5.5.2.3.2 show productive activities and reproductive activities respectively. Between the two races, no significant difference has been found.

As for productive activities, there is little gender division at large, however, in sub-categories, some differences can be seen. For example, men are in charge of heavy work such as plowing, land preparation and transporting for farming. Men also take care of cattle/buffaloes, while women feed pigs and poultry. In particular, women do small shop management and craft making, whereas men are generally motor-taxi drivers and carpenters.

As for reproductive activities, there seems to be a relatively clear gender division. Although some activities, such as fetching water and shopping at a market are shared by both, washing clothing, cooking, housecleaning, and family health and hygiene are tasks done by women. Men are in charge of getting materials for house repairs and furniture-making.

**Table 5.5.2.2.1 Daily Activity profile (1) – Khmer household -**

	Women		Men	
	Wet season	Dry season	Wet season	Dry season
2:00	Wake up, Cooking		Wake up, Rice-field work	
3:00	Rice-field work			
4:00		Wake up, Water fetching		Wake up, Palm-juice collection
7:00		Breakfast (at home)		
8:00	Breakfast (at field)		Breakfast (at field)	Breakfast (at field)
10:00		Palm-juice collection Cooking		
11:00	Water fetching, Cooking	Sugar making	Cattle/buffalo grazing & bathing	Cattle/buffalo grazing & bathing
12:00	Lunch	Lunch	Lunch	Lunch
13:00	Rest	Rest	Rest	Rest
14:00	Water fetching, Rice-field work	Sugar making	Water fetching Cattle/buffalo grazing	Palm-juice collection Cattle/buffalo grazing & bathing

	Women		Men	
	Wet season	Dry season	Wet season	Dry season
16:00		Palm-juice collection	Rice-field work	Water fetching
17:00	Feeding pigs, Bathing, Cooking,	Sugar making Cooking		
18:00			Bathing	
19:00	Dinner	Bathing	Dinner	Bathing
20:00	Rest, Watch TV	Dinner	Rest, Watch TV, Go to bed	Dinner
21:00	Go to bed			Rest
22:00		Sugar making Bathing		Sugar making
23:00		Go to bed		Go to bed
24:00				

\* Data source; Field interviews at Teuk Lak village, Kampong Chhnang

**Table 5.5.2.2 Daily Activities profile 2 – Cham household -**

	Women		Men	
	Wet season	Dry season	Wet season	Dry season
4:00	Wake up, Bathing Worship (home), Water fetching	Wake up, Worship (home)	Wake up, Bathing, Worship (mosque)	Wake up, Bathing Worship (mosque)
5:00		Water fetching	Rice-field work	
6:00	Washing			
7:00	Cooking			
8:00	Breakfast (at field)	Cooking	Breakfast (at field)	
9:00	Rice-field work	Breakfast/Lunch	Rice-field work, Cattle grazing	Breakfast/Lunch Cattle grazing
11:00		Water fetching Washing	Bathing (at field)	Bathing
12:00	Cooking, Bathing Worship (home), Lunch	Worship (home)	Worship (mosque) Lunch	Worship (mosque)
13:00	Rest, Rice-field work		Rest, Rice-field work	Cattle grazing
15:00	Washing, Bathing, Worship (field)	Firewood collection, Bathing	Bathing, Worship (field)	
16:00	Rice-field work	Worship (home) Water fetching Cooking	Rice-field work	Worship (field)
17:00	Water fetching, Cooking	Bathing Dinner	Bathing (at home)	Bathing Dinner
18:00	Worship (at home), Dinner	Worship (at home)	Worship (mosque), Dinner	Worship (mosque),
19:00	Wash hands Worship (at home)	Wash hands Worship (at home)	Worship (mosque)	Wash hands, Worship (mosque)
20:00		Watch TV		Rest
21:00	Watch TV			
22:00	Go to bed	Go to bed	Go to bed	
23:00				Go to bed

\* Data source; Field interviews at Trapeang Khtum village, Kampong Chhnang

**Table 5.5.2.3.1 Activity Profile – Reproductive Activities -**

Activities	Khmer		Cham	
	Women	Men	Women	Men
<b>Productive Activities</b>				
1 Agriculture:				
a) Rice				
–plowing		X		X
–planting	X	X	X	X
–harvesting	X	X	X	X
–transporting (seedling/ produce)		X		X
–threshing		X	X	X
–bargaining with merchants	X		X	
b) Crops/Vegetables/Fruits				
-land preparation	-	-		X
-seedling/planting	-	-	X	
-weeding	-	-	X	X
-harvesting	-	-	X	X
-transporting	-	-		X
-bargaining with merchants	-	-	X	
c) Other agricultural activities				
-palm tree climbing (palm juice collection)		X	-	-
-palm sugar making	X		-	-
-bargaining with palm sugar	X	X	-	-
d) Breeding/ feeding of livestock				
-cattle/buffaloes		X		X
-chicken/dug	X		X	
-pig	X		-	-
e) Fishing/Hunting				
-fish	X			X
-frogs		X		X
-shrimps	X		X	X
f) Home gardening	X			
2 Income Generation Activities				
Small shop management	X		X	
Crafts making/selling	X		X	
Sugar making/selling	X	X	-	-
Rice-cake making/selling	X		-	-
Motor-taxi driver		X		X
Carpenter		X	-	-
Trading of agricultural products	X		X	X
3 Employed works				
* seasonal work (in the village)	X		X	X
* seasonal work (outside the village)		X		X

\* Data source;

-Field interviews at Trapeang Khtum village in Kampong Chhnang,

**Table 5.5.2.3.2 Activity Profile – Reproductive Activities -**

Activities	Khmer		Cham	
	Women	Men	Women	Men
I. Reproductive Activities				
1 Water related activities				
fetching water	X	X	X	X
washing clothing	X		X	
washing jars/storage	X		X	
2 Fuel related activities				
firewood collection		X	X	X
3 Food preparation activities				
preparing foodstuff (vegetables)	X		X	
preparing foodstuff (meats)		X		X
cooking	X		X	
4 Childcare activities				
child-rearing	X		X	
5 Health related activities for family members				
taking care of health & hygiene	X		X	X
6 Cleaning and repairing activities				
cleaning and sweeping house	X		X	
getting materials for house & furniture		X		X
7 Market related activities				
shopping in market	X	X	X	X
transporting goods	X	X		X

\* Data source;

-Field interviews at Trapeang Khtum village in Kampong Chhnang,

#### 5.5.2.4 Decision-making at Village And Family Level

Table 5.5.2.4.1 and 5.5.2.4.2 show the gender division in terms of participation in decision-making at the village and family levels respectively. It seems that both women and men have almost equal opportunity to take part in decision-making stages for a wide range of issues at both the village and family level.

Although both women and men joined together in the meeting during the series of the surveys, the survey team found that village women tended to present their opinions more actively and clearly when no other village were present.

The survey team also noticed that, when compared with the Khmer, Cham women tended to follow men's ideas and opinions. When men expressed ideas opposed to women's, women rarely argued.

### 5.5.2.5 Access to / Control over Resources

As a whole, in the study area women do not face significant handicaps in terms of access to / or control over primary resources such as land, housing, water, money, livestock, seeds, foodstuffs. Also, they do not face significant barriers to participation in decision-making (Refer to Table 5.5.2.5.1).

The survey team found several things that could not be accessed equally and/or could be controlled by a single sex. For example, plows and rice-grinding machines were controlled by men and fishnets by women. However, it did not seem for the survey team that they created a substantial gender gap in terms of living standard.

### 5.5.2.6 Women and Water

As mentioned in the results of the survey of the 303 target villages, although women and men share water-fetching work in the study area, the proportion of adult women frequently fetching household water accounts for more than half. Women are in charge of cooking, washing, and home gardening, and also responsible for taking care of household hygiene -- all of which are highly related to water. Also, women can take part in decision-making regarding water supply issues in their village.

This situation implies that, as far as a development of new water sources is concerned, women are potentially not only the main beneficiaries, but also the main actors who can realize and maximize the benefits generated by the new water sources.

**Table 5.5.2.4.1 Participation in Decision-making – Village Level –**

Items	Khmer		Cham	
	Women	Men	Women	Men
1 Village chairman selection	X	X	X	X
2 Location of well	X	X	X	X
3 Location of village road	X	X		X
4 School management Issues	X	X	X	X
5 Health/hygiene Issues	X	X	X	X
6 Agricultural Issues	X	X	X	X
7 Festival	X		X	X

\* Data source;

-Field interviews at Teuk Lak village and Trapeang Khtum village in Kampong Chhnang

-Progress report "The study on groundwater development in Southern Cambodia" (Kokusaikogyo/JICA,1997).

**Table 5.5.2.4.2 Participation in Decision-making – Family Level -**

Items	Khmer		Cham	
	Women	Men	Women	Men
1 Children's Education	X	X	X	X
2 Family Health & Hygiene	X	X	X	X
3 Agricultural Issues	X	X		X
4 Job and income generation Issues	X	X	X	X
5 Family expenditures	X	X	X	X

\* Data source;

-Field interviews at Teuk Lak village and Trapeang Khtum village in Kampong Chhnang.

-Progress report “The study on groundwater development in Southern Cambodia” (Kokusaikogyo/JICA,1997).

**Table 5.5.2.5.1 Access to / Control over Resources**

Items	Khmer		Cham	
	Women	Men	Women	Men
1 Land	X	X	X	X
2 Water	X	X	X	X
3 House	X	X	X	X
4 Money	X	X	X	X
5 Livestock	X	X	X	X
6 Fruit tree	X	X	X	X
7 Transportation (motor-bike, bicycle)	X	X	X	X
8 Forest (firewood)	X	X	X	X
9 Tools for farming (plow)		X		X
10 Rice seeds	X	X	X	X
11 Vegetable seeds for gardening	X		X	

\* Data source;

-Field interviews at Teuk Lak village and Trapeang Khtum village in Kampong Chhnang,

-Progress Report “The study on groundwater development in Southern Cambodia” (Kokusaikogyo/JICA, 1997).