DATA F.3

WATER USE SURVEY

Water Usage Survey

1. General

1.1. Background

The water Usage Survey was carried out in the Maritza River Basin in accordance with the agreement between Japan International Cooperation Agency (JICA) study team and WaMeCo Ltd, Sofia and the agree Terms of Reference.

The Water Usage Survey is in compliance with the Scope of work for the Study on integrated Environmental Management for the Maritza River Basin agreed upon MoEW, Republic of Bulgaria and JICA.

1.2. Objectives

The general objective of the Water Usage Survey is to collect actual information for the water usage in the Maritza River Basin from the inhabitants and farmers on the level of family and private farm.

The general objective is related to the collection of information on the following items:

- domestic water use;
- pattern of the seasonal water use for irrigation.

1.3. Survey area

The survey area covers the entire Maritsa River Basin. The cities, towns and villages as well as agricultural lands situated in the regions of Plovdiv, Pazardjik, Haskovo and Stara Zagora are under consideration. The survey area is shown on Map 1 and 2.

1.4. Survey Method

Questionnaires were used as a survey method for the collection of the information for the water use. The total numbers of questionnaire samplings are 600 devided in two phases as follows:

- primary survey with 500 sampling numbers;
- supplementary survey with 100 sampling numbers.

Two types of questionnaires were designed one for domestic water use and the other for agricultural water use. This ensured the collection of uniform answers from the interviewers.

A random sampling of questionnaire survey method was applied, this mean that random selection of inhabitants to be interviewed was made. The sampling points in each settlement were distributed uniformly in the area.

The survey was conducted by using the forms of questionnaires prepared by the JICA Study Team as shown in Table 1 and 2.

1.5. Survey organisation

The survey experts were devided in four teams with three participants each as shown in Table 3. The survey area of each team was around the four biggest cities in the region Plovdiv, Pazardjik, Haskovo and Stara Zagora with approximately the same sampling points. Cars and drivers were provided for the teams. Members of the teams were engineers, sociologist and students.

Start up workshops were organised at the beginning of the primary and supplementary survey and detailed instructions and information were given to the experts. A long the Survey and the field trips a periodical reporting each 3 to 4 days was ensured by the team leaders.

The survey took place from 19 July 1997 to 19 August 1997. The initial work schedule is shown in Table 4. During the work the dates of the supplementary survey were changed and took place from 9 August to 11 August 1997.

The locations and sampling number at each sampling points for the supplementary survey were agreed and in instructed with the JICA Study Team considering the results of the primary survey.

2. Survey data analysis

2.1. Water Consumption for Domestic Use

The objectives are to obtain actual information on domestic water use and they are focused on the following items:

- general pattern of the domestic water use;
- actual amount of water requirement for domestic use;
- the characteristics of the domestic water use.

The sampling points (settlements) are devided in three types of residential area: urban, semi-urban and rural areas.

The total sampling numbers for domestic water use are 300, which are 250 samples for the primary survey and 50 samples for the supplementary survey. The locations of the sampling points and sampling numbers for the primary survey are

shown in the Table 5 and Map 1. The locations of the sampling points and the sampling numbers of the supplementary study are shown in Table 6.

The original data sheets of questionnaires are given in Annex 1. The information from the survey on Water Consumption for Domestic Use, on the general pattern, the characteristic and the amount of water use are summarised in the following tables:

- Table 7 - Urban area;
- Table 8 - Semi-urban area;
- Table 9 - Rural area.

2.1.1. Urban Domestic water use - pattern and characteristics

The survey covers four big cities in the area as follows: Plovdiv, Pazardjik, Haskovo and Stara Zagora. The summarised results are shown in Table 7.

Total of 110 families with 355 members were interviewed. From them 98,8 % have public water supply. The lowest percentage is in Pazardjik - 92 %. The biggest number of the main earning persons are public servants - 41.82 %, followed by private offices 0 34.55 % and the retired - 14.55 %. Most of the families - 42.73 % have average annual income between US$ 500 and US$ 1000. In Plovdiv, 46.7 % of the covered families have income between US$ 1000 and US$ 2000. The most used durable water consumers are: washing machine - 81.82 %, water heater - 90 %; shower - 97.27 %, only 14,55 % have bathtub.

Individual toilet with flushing have 93.64 % of the families, and 96.36 % used a public sewerage system. The lowest percentage is in Pazardjik respectively 80 % water toilets and 84 % for the usage of a public sewerage system. The average frequency of taking bath in the summer is 1.2 times/day per person and 0,52 times/day in the winter. The average number of cooking per families is 2.67 times/day and the average time used for that is 2.01 hours/day.

The average monthly water consumption in the summer is 3.62 m3/month per person and 2,45 m3/month in the winter. The highest average water consumption is in Plovdiv - 5.60 m3/month as the others three towns have the same water consumption pattern almost twice less than in Plovdiv. Almost all the families use water meter - 98.18 %. The average water charge per person is 1115 lv/month. This varied from 836 lv/month in Pazardjik up to 1614 lv/month in Haskovo. As far as the winter average water charges are concerned the analysis has to take into consideration the big change of the water prices in the end 1996 and the beginning of 1997 caused by the hyperinflation in the country.

The water quantity satisfied 80 % of the interviewed. The situation is worse in Stara Zagora - only 53.3 % are satisfied. The same is for water pressure, that in Stara Zagora satisfied only 63.3 %.

The water quality seems to be the most significant problem for the inhabitants more than 49 % consider it "not acceptable" and 26 % as "good". The situation is worst in Haskovo, where 76 % consider it "not acceptable" and in Stara Zagora - 60 %.

Only 33 % of the families can afford to pay the actual water charges. For 50 % the water charge should be less than 2000 lv/month and for 17 % less than 3000 lv/month.

2.1.2. Semi-Urban cities - pattern and characteristics

The Survey covers eleven semi-urban cities namely: Dimitrovgrad, Asenovgrad, Panagurishte, Nova Zagora, Harmanli, Peshtera, Rakovski, Radnevo, Stamboliiski, Ihtiman, Svilengrad.

The summarised results are shown in Table 8. Total of 125 families with 426 members were interviewed. From them 92 % have public water supply. The biggest number of the main earning persons are public servants - 45.6 %, followed by private offices - 25.6 % and pensioners - 20.8 %. Most of the families - 48.8 % have average annual income between US$ 500 and US$ 1000. In Dimitrovgrad, 67 % of the covered families have income between US$ 1000 and US$ 2000. In Panagurishte and Ihtiman, 70 % of the interviewers have annual income less than US$ 500. The most used durable water consumers are: washing machine - 90.14 %; water heater - 94.4, shower - 92.8 %. Only 8.8 % have bathtub. Individual toilet with flushing have 83.2 % of families and 90.4 used a public sewerage system. The lowest percentage is in Rakovski - 30 %, respective for flushing toilet and public sewerage system. The average frequency of taking bath in the summer is 1.06 times/day per person and 0.58 times/day in the winter. The average number of cooking per families is 1.6 times/day and the average time used for that is 2 hours/day.

The average monthly water consumption in the summer is 4.1 m3/month per person which is higher than in the urban cities, but a lot of the families have a garden in the yard and potable water is used for irrigation. The highest average water consumption is in Svilengrad, Harmanli and Dimitrovgrad were the conditions are best for yard agriculture. Almost all families used water meter - 92.5 %. The average water charge per person is 1237 lv/month and per families is 4216,67 lv/month. The charges varied from 2240 lv/month per families up to 7830 lv/month/families in Svilengrad. The highest charges are paid in Svilengrad, Harmanli and Dimitrovgrad. The winter prices must be recognised as it was mentioned in Chapter 2.2. "Urban cities".

The water quantity satisfied 86 % of the interviewed. The situation is worse in Stamboliiski only 20 % are satisfied. The dame is for water pressure, that in Stamboliiski satisfied also 20 % in comparison with the average for semi-urban, which is 91 %.

The water quality again is the most significant problem for the inhabitants. More than 59 % consider it "not acceptable" and only 13 % as "good". The situation is

worst in Harmanli, where 93 % consider it "not acceptable", followed by Dimitrovgrad and Panagurishte - 87 %.

Only 17 % from the families can afford to pay the actual water charges. For 24 % the water prices should be less than 1000 lv/month, for 30,4 % less than 2000 lv/month. More than 83 % can afford charges less than 4000 lv/month, which is the average water charge paid be families actually.

2.1.3. Rural cities

The Survey covers seven rural cities in the area namely: Galabovo, Kritchim, Simeonovgrad, Saedinenie, Belovo, Sadovo. The summarised results are shown in Table 9.

Total of 70 families with 267 members were interviewed. From them 94,29 % have public water supply. The biggest number of the main earring persons are public servants 0 42.86 %, followed by private offices - 21.43 %, and pensioners - 21.43 %. Most of the families - 42.86 % have average annual income between US $ 500 and US$ 1000. In Saedinenie 60 % of the covered families have income between US$ 1000 and US$ 2000. The most used durable water consumers are: washing machine - 78.57 %; water heater - 95.71 %, shower - 80 %. Only 7.14 % have bathtub.

From the interviewed families 74.29 % have individual toilet with flushing and 61.43% used a public sewerage system. From interviewed in Saedinenie no one used public sewerage system and in Kritchim only 20 %. The average frequency of taking bath in the summer is 1.05 times/day per person and 0.49 times/day in the winter. The average number of cooking per families is 2.4 times/day and the average time used for that is 2 hours/day.

The average monthly water consumption in the summer is 3.71 m3/month per person and 2.43 m3/month in the winter. The highest water consumption is in Saedinenie and Kritchim. Almost all families used water meters - 94 %. The average water charge per person is 927.3 lv/month and 3573 lv/month per family. The charges varied from 1837 lv/month per family up to 5080 lv/month per family in Belovo. The highest charges are paid in Belovo, Saedinenie and Simeonovgrad.

The water quantity satisfied 70 % of the interviewed. The situation is worse in Kritchim, Belovo and Galabovo. Water pressure satisfied 77 % of the inhabitants.

The water quality again is the most significant problem for more than 44 % of the interviewed, which consider it "not acceptable". The situation is worse in Simeonovgrad, where 100 % consider it "not acceptable", followed Saedinenie - 80%.

Only 16 % from the families can afford to pay the actual water charged. For 30 % the water prices should be less than 1000 lv/month and for 25 % less than 2000 lv/month.

2.1.4. Problems and items to be improved

The main problems concerning the Domestic water use are linked with the potable water quality.

Most of the interviewers consider in "not acceptable" in the "urban cities" - 49%, in "semi-urban" - 59% and in "rural" - 44%. A lot of people prefer to use water for potable purposes not for the tap but brought from other local sources known to be good for drinking or to buy mineral water.

The main water quality problems listed by the interviewers are:

- sand, sediments, hard substances and other mechanical residues
- muddy, rusty, coloured
- bad smell and taste
- limestone
- manganese

The information about the actual drinking water quality is inadequate and the inhabitants in some places fears that water is polluted by: nitrates, herbicides, heavy metals, Manganese, radiation, biological pollution, hazard substances and other.

The main causes for the inadequate water quality are:

- *polluted water sources.* The sources of pollution are agriculture practices with nitrates and other fertilizers, industries, mining and settlements situated nearby the water sources. Another set of problems are linked with natural reasons i.e. the Manganese in Haskovo area.
- *lack of adequate water purification stations.* Most of this plants are old and not well maintained. Even the filtration is not appropriate and big number of interviewer complain from sand, hard substances and other residues in the tap water. They tray to solve this problem with individual filtration.
- *broken pipes in the water supply network.* This caused not only leakeges but also increased the risk for infiltration from passing nearby sewer pipes or other source of pollution.

The actions the interviewer proposed mainly are focused by:

- new water purification plants to be upgraded.
- the pipes of the supply network to be changed
- new more clean water sources to be found
- population to be provided with modern individual tap filters which ensured not only mechanical but chemical treatment too.

The water quality and pressure is another problem in the survey area: 20% in the "urban cities", 14% in the "semi-urban" and 30% in the "rural cities" are "insufficient".

The main problems are:

- *water shortages*
- *low pressure in the high flats*

The main causes are:

- insufficient water resources mainly in summer
- often accidents in old and not well maintained water supply network
- bad management of the local water supply and sewer systems and the companies.

The price of the water is an overall problem for the survey area. The survey data shows that only 39% in the "urban cities", 17% in the "semi-urban" and 16% in "rural cities" can afford to pay the actual prices. The inhabitants do not trust the water companies that this is the actual price and in the same time they are sure that the collected money are not used for the improvement of the water supply system.

2.2. Water usage for agriculture

The objectives of the survey on water usage for agriculture are focused to obtain actual information on the following items:

- cropping patterns in the study area
- the actual pattern of water usage for agriculture
- the characteristics of water usage in the irrigated areas and nonirrigated areas

The sampling points are divided in two types of agriculture land: irrigated and nonirrigated areas.

The total sampling numbers are 300, which are 250 samples for the primary survey and 50 for the supplementary survey. The locations of the sampling points and sampling numbers for the survey are shown in *Table10* and Map 2. The locations of the sampling points and the sampling numbers of the supplementary survey are shown in *Table 11.*

The original data sheets of questionnaires are given in Annex 2. The cropping patterns and characteristics on water usage for agriculture are summarised in the following tables:

- Table 12 - Summary Table for Agriculture - Irrigated Areas
- Table 13 - Summary Table for Agriculture - Nonirrigated Areas
- Table 14 - Summary Table for Agriculture Cooperative Farms - Irrigated Areas

2.2.1. Irrigated Areas

The survey covers 16 settlements in the study areas defined by the Terms of Reference as irrigated area. The summarised results are shown in Table 11.

The number of the families that were interviewed was 191. The number of the personnel engaged in the agriculture is 603. The total farm area is 605.4 ha from which the cultivated area is 517.5 ha or 85.5%. The average family farm area which is cultivated is 2.7 ha.

The irrigated area is 255.272 ha or 50% of the cultivated area.

The main water sources are open canals and dugwells. The main irrigation facilities are open canals and pumps. The most used irrigation type is basin - 76% and sprinkler - 14%.

The main crops in the study area are cereals 414.41 ha or 80% of the cultivated area, followed by vegetables - 50.5 ha or 10% and fruits - 36.6 ha or 7%. From the cereals the main crops are: wheat - 195.5 ha or 37.8%, maize - 91 ha or 17.6%, sunflower - 77.5 ha or 15% and barley - 49 ha or 10%.

From the vegetables the main crops are tomatoes, potatoes, peppers, beans, cabbage, onion and others.

2.2.2. Nonirrigated Areas

The survey covers 10 settlements in the study area. The summarised results are shown in Table 12.

Total of 105 families with 433 members were interviewed. The number of the personnel engaged in agriculture is 271. The total farm area is 382.8 ha from which the cultivated area is 372.25. It should be stressed that in Simeonovgrad the size of the farms is significant bigger than in the other areas. Only in Simeonovgrad the farm area is 325.9 ha and the average farm area is 22 ha. The average farm area of the interviewed inhabitants in the study nonirrigated area is 3.6 ha. The crops in Simeonovgrad are mainly cereals and cotton.

The irrigated area is 44.2 ha - this is 11.6% from the cultivated area. The main irrigation facilities are open canal and pump. More than 75% of irrigation type is basin.

The main crops in the study area are the cereals - 257.8 ha or 69.26% from the cultivated area, followed by the cotton - 82.8 ha or 22.24%. The vegetables are only 20 ha - or 5.43%.

From the cereals the major crops are: wheat - 229 ha or 62% from the cultivated area, barley - 17.47 ha or 4.7% and maize - 7.9 ha or 2.1%.

Most of this crops don't need irrigation which is the main feature for the region.

The irrigation period in the study area for more of the crops is from May to September depending of the wetness of the year. The survey gives information fro the present year which most of the interviewer consider as wet.

The vegetables, depending of the type needs to be irrigated 8-16 times per month. For the fruits it is 4-5 times for the whole period and fro the cereals which need to be irrigated - 3-4 times for the period.

The most significant problem for the farmers in the study area is the price of the water, which varied from 70 000 leva/ha up to 300 000 leva/ha.

Another problem is that a lot of the irrigation facilities, like pump stations, derivations and canals are destroyed or not maintained. Irrigation equipment like sprinklers, tractors, pipes and other was disseminated and despair or where they resist the small farmers can not afford to hire it.

The overall problem is that the farms are too small and there is no possibility a modern irrigation equipments to be implemented.

During the Primary Survey it becomes obvious that most of the interviewers have small farms less than 1 ha in which 2 to 3 numbers of their families are engaged. They use most of the agriculture products for themselves and only small part is sold in the regional markets. Some of them have given most of their lands in the local cooperative farms. It became obvious to of most of the land is cultivated in the local cooperative farms. In each settlements there are one or two of them. It was decided during the supplementary survey some of the existing cooperative farms to be interviewed additionally to the ToR. The results are shown in Table 12. The number of the cooperative farms is 14 with 3074 members. The personnel engaged in them is 607 persons. The total farm area is 4702 ha from which is cultivated 4035 ha or 86%. The average farm area is 336 ha. The irrigated area is 1369 ha or 34%. They use the existing irrigation systems and can afford to pay the price of the water.

The main crops are cereals - 3727 ha or 92%. The wheat covers 2050 ha or 51%, followed by the sunflower - 458 ha or 12%, rice - 400 ha or 10%, barley - 360 ha or 9%, maize 339 ha or 8%, etc.

Most of the crops - 62% do not need irrigation. The most irrigated crop is the rice.

The survey covers 5688 ha from which 4702 ha or 82% in cooperative farms and 986 ha in individual farms. The cultivated areas are 4925 ha or 87% and the irrigated areas are 30%.

2.2.4. Cropping rotation

One of the expectations as a result of the Survey (see Table 15) is determination of the cropping rotation in the investigated area.

More than a half of the cultivated area is sown of wheat - 2475 ha that means about 50.5 %. The next major crop is the sunflower which covers 535 ha or 10.9 % of the land. Others two crops are the maize and the barley - they have respectively 437 and 427 ha or in percentage about 8.9 % and 8.69 %, followed by the rice - 400 ha or 8.14 %. The clover and the vegetables as summarised culture have 105 ha and 103 ha that are 2.15 % and 2.1 %. The fruits as a total cover a very small piece of the cultivated areas - 28 ha or about 0.5-0.6%. All other crops take place of 320 ha (6.4%) and they have not any influence on the cropping rotation.

The most part of the area's land is covered by cereals. The reason of this fact is that the biggest part of the irrigation facilities are either destroyed or they have been stolen in the last 6-7 years. The impossibility of irrigation push the farmers and the cooperative farms to sow them. The next reason if it is that the water prices for irrigation are so high and practically there are not any tax or other concessions or donations from the governmental authorities.

The main cropping rotation types are shown in Table 16. It is very schematic because the cultivated fields are in general very different as a size and fields which are sowed by one crop are so remote. The cropping rotation is possible mostly to organise in big own farms (which are no so often met) and in cooperative farms.

3. Conclusions and proposals

The Water Usage Survey shows that the questionnaires as a survey method gives a lot of possibilities an actual information for the water use to be collected from the consumers.

It is obvious that the Survey gives basis this information to be enlarged, precised and focused on the key users, problems and causes. The risk regions must be of special consideration.

The survey of the domestic water use has be continued and aimed on the following items:

- to precise the specific problems separately of the public water supply and private water sources
- to screen the water uses and the amount of water for inhouse purposes
- to screen the causes for inhouse water losses
- Water quality problems to be better defined and precised
- special and detailed survey in the risk areas
- the water charge mechanism to be screened and to be precised the amount of water which the consumers has to pay for public water supply losses
- to screen the other urban drinking water considers in the cities such as: hospitals, schools, commercial and others uses

The survey on water usage for agriculture must be better defined, enlarged and aimed on the actual pattern of water consumption:

- the real number of irrigation watering for the main crops to be investigated
- the price and the amount of water for different regions and crops to be screened
- the specific water demand for different crops to be defined
- the size of the survey farms to be precised according to the farm area. The big farms must be of special consideration
- the crop rotation to be better defined
- the irrigation water sources and the irrigation systems to be precised and evaluated
- the amount of the applied fertilisers and herbicides to be defined.

TABLE 1 QUESTIONNAIRE SURVEY ON WATER USAGE FOR DOMESTIC USE

1 Interviewer's Memo

Date	
Interviewer	
Place	
Size of house	Width ( )m x Length ( )m ( ) Story

2 Questions to the Residents

2-1 General Information

(1) Family size ( ) persons

(2) Kind of water supply
1) Public water supply ( )
2) Private water source ( )
3) Combination of 1) and 2) ( )

(3) Occupation of main earning person
1) Public servant ( )
2) Private office ( )
3) Commercial ( )
4) Hotel ( )
5) Agriculture ( )
6) Others ( )

(4) Average annual income
(This question is used for studying the appropriate unit price of water)
1) Less than US$ 500 ( )
2) Between US$ 500 and US$ 1,000 ( )
3) Between US$ 1,000 and US$ 2,000 ( )
4) Between US$ 2,000 and US$ 4,000 ( )
5) Between US$ 4,000 and US$ 6,000 ( )
6) Between US$ 6,000 and US$ 10,000 ( )
7) More than US$ 10,000 ( )

(5) Utilization of consumer durable
1) Washing machine ( )
2) Hot water heater ( )
3) Shower ( )
4) Bathtub ( )

(6) Type of toilet
1) Individual toilet with flushing ( )
2) Individual toilet without flushing ( )
3) Others ( )

(7) Type of sewerage facilities

1) Public sewerage system ( )
2) Septic tank ( )
3) Pit latrine ( )
4) Direct discharge to ( )

2-2 Sanitation and Living

(1) Frequency of taking shower or bath

1) Summer: total ( ) times/day
2) Winter: total ( ) times/day

(2) Frequency of toilet usage

Total ( ) times/day

(3) Cooking

( ) times/day total ( ) hours/day

2-3 Residents who use Public Water Supply

(1) Water consumption

1) Summer: total ( ) m3/month
2) Winter: total ( ) m3/month

(2) Tariff system

1) Method of water charge

a) Water meter ( )
b) Flat rate ( )

(3) Average water charge

1) Summer: total ( ) Lv/month
1) Winter: total ( ) Lv/month

(4) Satisfaction for service

(4)-1 Quantity:

1) Sufficient ( )
2) Insufficient ( )

(4)-2 Pressure

1) Sufficient ( )
2) Insufficient ( )

(4)-3 Quality

1) Good ( )
2) Acceptable ( )
3) Not acceptable ( )

Reason of 3): ( )

(5) Affordability to pay the water charge

(Up to) Lv./month

(6) Problems/Points to be Improved

2-4 Residents who use Private Water Source

(1)	Water source	1) Deep well	( )
		2) Shallow well	( )
		3) River and canal	( )
		4) Others ( )	
(2)	Quantity of water source	1) Sufficient	( )
		2) Insufficient	( )
(5)	Quality of water source	1) Good	( )
		2) Acceptable	( )
		3) Not acceptable	( )

(5) Problems/Points to be Improved

TABLE 2 QUESTIONNAIRE SURVEY ON WATER USAGE FOR AGRICULTURE

1 Interviewer's Memo

Date	
Interviewer	
Place	
Size of house	Width ( )m x Length ( )m ( ) Story

2 General Information

(1)	Family size	( ) persons
(2)	Number of personnel engaged in agriculture	( ) persons
(3)	Farm area	
	1) Total area of farm	( ) ha
	2) Cultivated area	( ) ha
	3) Irrigated area	( ) ha
(4)	Water resource:	[River] / [Open canal] / [Pond] / [Tubewell] / [Dugwell] /[Others:]
(5)	Irrigation system	
	1) Irrigation Facility:	[Open canal] / [Pump] / [Others:]
	2) Irrigation Type:	[Basin] / [Sprinkler] / [Drip] / [Others:]
(6)	Drainage method:	Drainage canals/pipes [Yes] [No.]

3 Annual Average Cropping Rotation

Month	Item	Major Crops			
		1st.	2nd.	3rd.	4th.
January	1) Crop				
	2) Area (ha)				
February	1) Crop				
	2) Area (ha)				
March	1) Crop				
	2) Area (ha)				
April	1) Crop				
	2) Area (ha)				
May	1) Crop				
	2) Area (ha)				
June	1) Crop				
	2) Area (ha)				
July	1) Crop				
	2) Area (ha)				
August	1) Crop				
	2) Area (ha)				
September	1) Crop				
	2) Area (ha)				
October	1) Crop				
	2) Area (ha)				
November	1) Crop				
	2) Area (ha)				
December	1) Crop				
	2) Area (ha)				

4 Pattern of Water Consumption

Month	Major Water Source	Two Major Crops	
		1st. major crop	2nd. major crop
January	1) Irrigation		
	2) Rain		
	3) Others		
February	1) Irrigation		
	2) Rain		
	3) Others		
March	1) Irrigation		
	2) Rain		
	3) Others		
April	1) Irrigation		
	2) Rain		
	3) Others		
May	1) Irrigation		
	2) Rain		
	3) Others		
June	1) Irrigation		
	2) Rain		
	3) Others		
July	1) Irrigation		
	2) Rain		
	3) Others		
August	1) Irrigation		
	2) Rain		
	3) Others		
September	1) Irrigation		
	2) Rain		
	3) Others		
October	1) Irrigation		
	2) Rain		
	3) Others		
November	1) Irrigation		
	2) Rain		
	3) Others		
December	1) Irrigation		
	2) Rain		
	3) Others		

Tables 3

WATER USAGE SURVEY - PAZARDJIK AREA

№	Cities and Towns Team 1	Domestic Water Consumption						Agriculture Water Usage				Coop. Farms .Irrigated Areas
		Urban Areas		Semi-Urban Areas		Rural Areas		Irrigated Areas		Non-Irrigated Areas		
		I	II	I	II	I	II	I	II	I	II	II
1	Pazardjik	20	5					10	5			4
2	Panaggyurishte			10	5					10		
3	Peshtera			10								
4	Ihtiman			10								
5	Belovo					10		10	5			
6	Kostenetz									10		
7	Velingrad									10		
8	Rakitovo									10		
9	Batak									10		
	Total Forms by Areas	20	5	30	5	10		20	10	50		
	Total forms by Survey	60 - I Phase			10 - II Phase			70 - I Phase		10 - II Phase		4 - II Phase
	Total Forms	130 - I Phase						24 - II Phase				

WATER USAGE SURVEY - PLOVDIV AREA

№	Cities and Towns Team 2	Domestic Water Consumption						Agriculture Water Usage				Coop. Farms .Irrigated Areas
		Urban Areas		Semi-Urban Areas		Rural Areas		Irrigated Areas		Non-Irrigated Areas		
		I	II	I	II	I	II	I	II	I		II
1	Plovdiv	20	10					10				
2	Asenovgrad			10						10		2
3	Stamboliyski			10				10				1
4	Kritchim					10			10			1
5	Saedinenie					10		10				1
6	Hisarya						10			10		
	Total Forms by Areas	20	10	20		20	10	30	10	20		
	Total forms by Survey	60 - I Phase			20 - II Phase			50 - I Phase		10 - II Phase		5 - II Phase
	Total Forms	110 - I Phase						35 - II Phase				

WATER USAGE SURVEY - HASKOVO AREA

№	Cities and Towns Team 3	Domestic Water Consumption						Agriculture Water Usage				Coop. Farms .Irrigated Areas
		Urban Areas		Semi-Urban Areas		Rural Areas		Irrigated Areas		Non-Irrigated Areas		
		I	II	I	II	I	II	I	II	I	II	II
1	Haskovo	20	5					10				
2	Dimitrovgrad			10	5			10				
3	Harmanli			10	5			10				
4	Svilengrad			10				10				
5	Simeonovgrad					10				10		1
6	Sadovo					10		10	5			1
	Total Forms by Areas	20	5	30	10	20		50	5	10		
	Total forms by Survey	70 - I Phase			15 - II Phase			60 - I Phase		5 - II Phase		2 - II Phase
	Total Forms	130 - I Phase						22 - II Phase				

WATER USAGE SURVEY - STARA ZAGORA AREA

№	Cities and Towns Team 4	Domestic Water Consumption						Agriculture Water Usage				Coop. Farms .Irrigated Areas
		Urban Areas		Semi-Urban Areas		Rural Areas		Irrigated Areas		Non-Irrigated Areas		
		I	II	I	II	I	II	I	II	I	II	II
1	Stara Zagora	20	10					10	5			1
2	Nova Zagora			10				10	6			1
3	Rakovski			10				10				
4	Radnevo			10				10				
5	Galabovo					10				10		
6	Tchirpan							10	5			1
7	Brezovo									10		
	Total Forms by Areas	20	10	30		10		50	16	20		
	Total forms by Survey	60 - I Phase			10 - II Phase			70 - I Phase		16 - II Phase		3 - II Phase
	Total Forms	130 - I Phase						29 - II Phase				

TIME SCHEDULE OF WATER USAGE SURVEY

Table 4

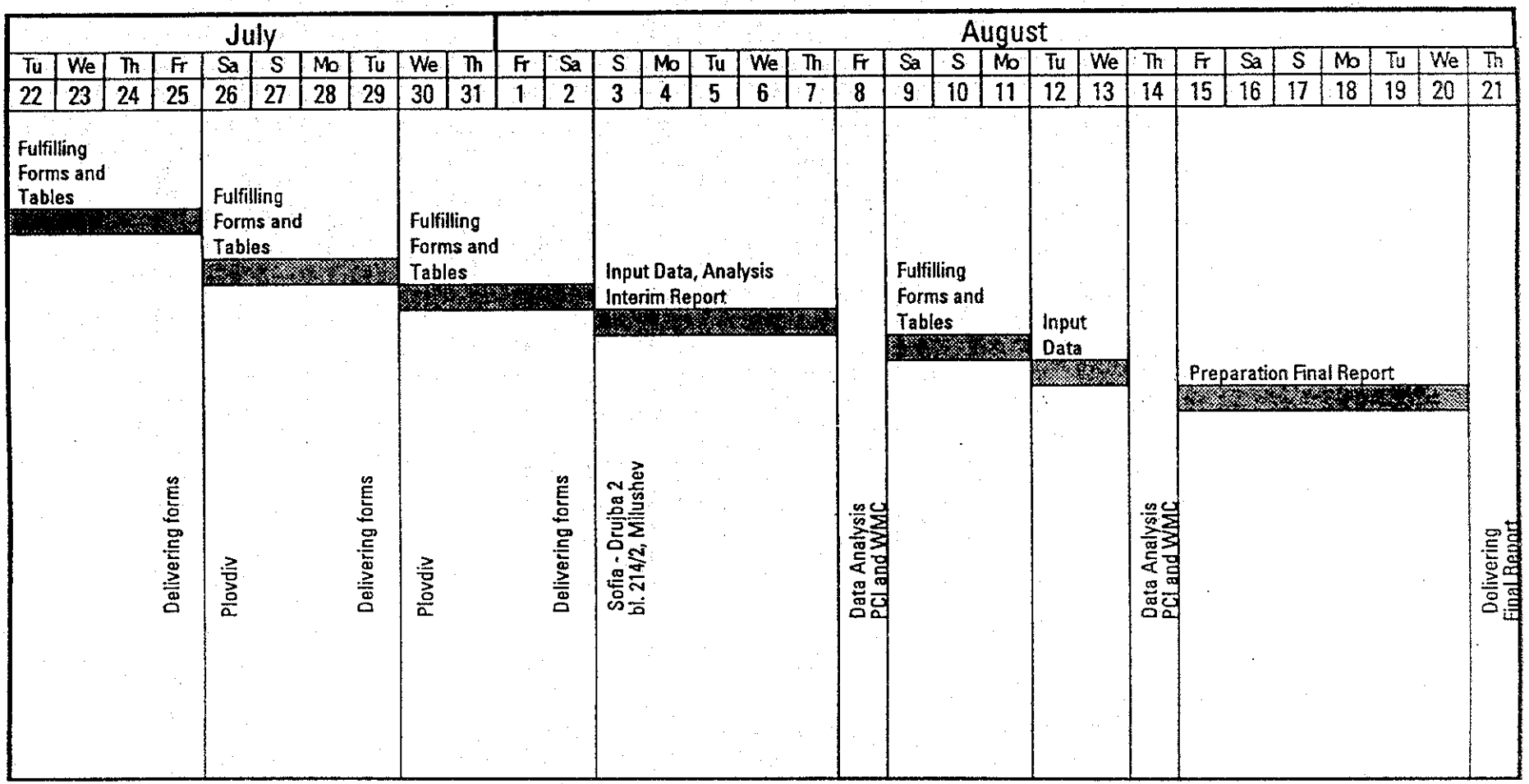

Table 5

SAMPLING LOCATION AND AND SAMPLING NUMBERS FOR DOMESTIC WATER USE FOR THE I PHASE

Location of sampling (Cities and towns)	Sampling number for primary surwey
1. Urban areas	**80**
1.1. Plovdiv	20
1.2. Stara Zagora	20
1.3. Pazardjik	20
1.4. Haskovo	20
2. Semi-urban areas	**110**
2.1. Dimitrovgrad	10
2.2. Assenovgrad	10
2.3. Panagyurishte	10
2.4. Nova Zagora	10
2.5. Harmanli	10
2.6. Peshtera	10
2.7. Rakovski	10
2.8. Radnevo	10
2.9. Stamboliyski	10
2.10. Ihtiman	10
2.11. Svilengrad	10
3. Rural areas	**60**
3.1. Galabovo	10
3.2. Kritchim	10
3.3. Simeonovgrad	10
3.4. Saedinenie	10
3.5. Belovo	10
3.6. Sadovo	10
Total 21 cities/towns	**TOTAL 250 samples**

NUMBERS FOR DOMESTIC WATER USE FOR THE II PHASE **Table 6**

Location of sampling (Cities and towns)	Sampling number for primary surwey
1. Urban areas	**30**
1.1. Plovdiv	10
1.2. Stara Zagora	10
1.3. Pazardjik	5
1.4. Haskovo	5
2. Semi-urban areas	**15**
2.1. Dimitrovgrad	5
2.2. Panagyurishte	5
2.3. Harmanli	5
3. Rural areas	**10**
3.1. Hisarya	10
Total 8 cities/towns	**TOTAL 55 samples**

Table 7

SUMMARY TABLE OF WATER USAGE FOR DOMESTIC USE - URBAN AREAS

	Cities/Towns	Plovdiv	Pazardjik	Stara Zagora	Haskovo	Total	% Total
1. Number of families		30	25	30	25	110	
2.Total living persons		107	87	82	79	355	3.2
3. Kind of water supply	1. Public water supply	30	23	30	25	108	98.2
	2. private water source						
	3. Combination of 1) and 2)		2			2	1.8%
4. Occupation of main earning person	1. Public servant	15	9	18	4	46	41.8%
	2. Private office	8	10	9	11	38	34.6%
	3. Commercial	1			2	3	2.7%
	4. Hotel	1		1		2	1.8%
	5. Agriculture	1				1	0.9%
	6.Retired	4	4	2	6	16	14.6%
	7. Uneployers		2		2	4	3.6%
5. Average annual income	1. <500 US$	2	12	8	6	28	25.4%
	2. 500 - 1000 US$	10	7	20	10	47	42.7%
	3. 1000 - 2000 US$	14	5	1	4	24	21.8%
	4. 2000 - 4000 US$	4		1	5	10	9.1%
	5. 4000 - 6000 US$						
	6. 6000 - 10 000 US$						0.9
	7. >10 000 US$		1			1	81.8
6.Utilization of consumer durable	1. Washing machine	29	18	24	21	90	90%
	2. Hot water heating	25	22	27	25	99	97.3%
	3. Shower	30	25	27	25	107	14.6%
	4. Bathtub	8	4	2	2	16	93.6%
7. Type of toilet	1. Individual toilet with flushing	30	20	29	24	103	6.4%
	2. The same without flushing		5	1	1	7	
	3. Others						
8. Type of sewerage facilities	1. Public sewerage system	30	21	30	25	106	96.4%
	2. Septic tank		1			1	0.9%
	3. Pit latrine		3			3	2.7%
	4. Direct discharge						
9. Frequency of taking shower or bath	1. Summer - total times/day	250	36.2	74.14	63.49	424.83	1.2
	2. Winter - total times/day	71	25	45.42	41.73	183.15	0.52
10. Frequency of toilet usage	Total times/day	313	147	224	263	947	2.67
11. Cooking	Total times/day	44	31.2	25.8	32.4	143.4	1.3
	Total hours/day	63.5	42.5	47.6	67	220.6	2.01
12. Water consumption	1. Summer - total m^3/month	599.5	241	229	216	1285.5	3.62
	2. Winter - total m^3/month	353	166	187.2	162	868.2	2.45%
13. Tariff system - method of water charge	1. Water meter	30	25	28	25	108	98.2%
	2. Flat rate			2		2	1.8%
14. Average water charge	1. Summer -total Lv/month	96745	72700	98895	127480	395820	1115
	2. Winter -total Lv/month	41320	13650	47000	67220	169190	477
15. Satisfaction for service							
15.1. Quantity	1. Sufficient	27	22	16	23	88	80%
	2. Insufficient	3	3	14	2	22	20%
15.2. Pressure	1. Sufficient	23	21	19	20	83	75.4%
	2. Insufficient	7	4	11	5	27	24.6%
15.3. Quality	1. Good	12	9	5	3	29	26.4%
	2. Acceptable	11	6	7	3	27	24.5%
	3. Not acceptable	7	10	18	19	54	49.1%
16. Affordability to pay the water charge	1. <1000 Lv/month	9	9	8	1	27	25%
	2. 1000 - 2000 Lv/month	8	7	9	4	28	25%
	3. 2000 - 3000 Lv/month	1	5	6	7	19	17%
	4. 3000 - 4000 Lv/month	5	1	2	4	12	11%
	5. 4000 - 5000Lv/month	5	1	2	5	13	121%
	6. > 5000 lv/month	2	2	3	4	11	10%
17. Water source	1. Deep well						
	2. Shallow well						
	3. River or channel						
	4. Others						
18. Quantity of water source	1. Sufficient						
	2. Insufficient						
19. Quality of water source	1. Good						
	2. Acceptable						
	3. Not acceptable						

SUMMARY TABLE OF WATER USAGE FOR DOMESTIC USE - SEMI-URBAN AREAS

Table 8

	Cities/Towns	Nova Zagora	Panagy urishte	Radnevo	Peshtera	Svilengrad	Iltiman	Pakovski	Assenovgrad	Stamboliyski	Harmanli	Dimitrovgrad	Total	% Total
1. Number of families		10	15	10	10	10	10	10	10	10	15	15	125	
2.Total living persons		33	72	36	52	43	36	38	31	30	55	54	**426**	3.4
3. Kind of water supply	1. Public water supply	8	15	9	10	8	7	9	10	9	15	15	**115**	92%
	2. private water source												**2**	1.6%
	3. Combination of 1) and 2)	2		1		1	3	1					**8.**	6.4%
4. Occupation of main earning person	1. Public servant	8	9	3	4	4	5	5	3	4	5	7	**57**	45.6%
	2. Private office	1	3	5	4	5	1	2	2		4	5	**32**	25.6%
	3. Commercial			1	1			1	1	3			**7**	5.6%
	4. Hotel													
	5. Agriculture											2	**2**	1.6%
	6.Retired	1	3	2	1	1	3	2	3	3	5	1	**25**	20.8%
	7. Uneployers						1		1				**2**	1.6%
5. Average annual income	1. <500 US$	3	7	5	2	2	7	1	2		4		**33**	26.4%
	2. 500 - 1000 US$	6	8	5	8	6	3	8	3	3	7	4	**61**	48.8%
	3. 1000 - 2000 US$	1				2		1	4	7	4	10	**28**	23.2%
	4. 2000 - 4000 US$								1				**1**	1.6%
	5. 4000 - 6000 US$													
	6. 6000 - 10 000 US$													
	7. >10 000 US$													
6.Utilization of consumer durable	1. Washing machine	10	14	8	10	9	6	10	10	10	12	14	**113**	90.4%
	2. Hot water heating	10	15	8	9	10	8	10	10	8	15	15	**118**	94.4%
	3. Shower	9	15	8	9	10	5	10	10	10	15	15	**116**	92.8%
	4. Bathtub	1	1		3		1	1	1	1		2	**11**	8.8%
7. Type of toilet	1. Individual toilet with flushing	7	13	8	9	8	9	3	10	9	13	13	**104**	83.2%
	2. The same without flushing	3	6	2	3	3	1	7		1	2		**28**	22.4%
	3. Others													
8. Type of sewerage facilities	1. Public sewerage system	10	12	10	10	10	9	3	10	9	15	15	**113**	90.4%
	2. Septic tank		3					7		1			**11**	8.8%
	3. Pit latrine		2				1			1			**3**	2.4%
	4. Direct discharge													
9. Frequency of taking shower or bath	1. Summer - total times/day	33	31.5	29.2	29.6	53.29	15.94	42.6	31.5	40.5	58.72	85.43	**451.28**	1.06
	2. Winter - total times/day	30.5	22.2	16.9	14.5	33.14	5.22	21.75	17.59	9.43	27.3	49.14	**247.67**	0.58
10. Frequency of toilet usage	Total times/day	97	103	75	69	170	116	115	127	133	206	211	**1422**	3.34
11. Cooking	Total times/day	13.5	20.5	11.14	13.14	14.29	14.4	19	11	11.5	20.4	21.4	**199.77**	1.6
	Total hours/day	23	29.5	16	18.5	27.5	17.5	23	15	16	29.5	30.5	**246**	1.97
12. Water consumption	1. Summer - total m^3/month	108	165	101	112	188	84	171	155	144	249	268	**1475**	4.1
	2. Winter - total m^3/month	82	110	82	68	149	50	110	118	94	136	189	**1188**	2.79
13. Tariff system - method of water charge	1. Water meter	8	15	10	10	10	9	10	10	9	14	14	**119**	95.2%
	2. Flat rate	2					1			1	1	1	**6**	4.5%
14. Average water charge	1. Summer -total Lv/month	32400	43470	40400	22400	78300	27900	27324	29450	27360	112050	85760	**527084**	5717
	2. Winter -total Lv/month	18080	29090	27090	12300	29800	11625	16400	14160	11280	56440	56700	**282965**	664

15. Satisfaction for service														
15.1. Quantity	1. Sufficient	10	14	7	7	10	9	10	9	2	14	15	107	85.6%
	2. Insufficient		1	3	3		1		1	8	1		18	4.4%
15.2. Pressure	1. Sufficient	7	9	7	8	9	7	10	10	2	12	10	91	72.8%
	2. Insufficient	3	6	3	2	1	3			7	3	5	34	27.2%
15.3. Quality	1. Good	5	1	4		1	4		1		1		17	13.6%
	2. Acceptable	2	1	2	2	3	5	6	7	4		2	34	27.2%
	3. Not acceptable	3	13	4	8	6	1	4	2	5	14	13	74	59.2%
16. Affordability to pay the water charge	1. <1000 Lv/month	2	4		4	3	6	1	4	3	2	1	30	24%
	2. 1000 - 2000 Lv/month	3	8	4	3	1	3	5	2	4	3	2	38	30.4%
	3. 2000 - 3000 Lv/month	3	2	2	2	3	1	3	2	2	3	4	26	20.8%
	4. 3000 - 4000 Lv/month	2	1		1				2	1	1	1	10	8%
	5. 4000 - 5000Lv/month										4	2	6	4.8%
	6. > 5000 lv/month			4		3					2	5	15	12%
17. Water source	1. Deep well						2							
	2. Shallow well						1			1				
	3. River or channel													
	4. Others													
18. Quantity of water source	1. Sufficient						3							
	2. Insufficient									1				
19. Quality of water source	1. Good						1							
	2. Acceptable						2							
	3. Not acceptable									1				

SUMMARY TABLE OF WATER USAGE FOR DOMESTIC USE - RURAL AREAS **Table 9**

Cities/Towns		Simeon ovgrad	Kri-tchim	Sadovo	Gala-bovo	Saedi-nenie	Hisa-ryq	Belovo	Total	% Total
1. Number of families		10	10	10	10	10	10	10	70	
2.Total living persons		37	49	34	26	45	38	38	267	3.8
3. Kind of water supply	1. Public water supply	11	7	10	10	10	10	9	66	94.3%
	2. private water source		3					1	4	5.7%
	3. Combination of 1) and 2)	4		7		1			12	17.1%
4. Occupation of main earning person	1. Public servant	4	2	2	4	3	3	6	24	34.3%
	2. Private office	2	3	3	2		3	2	15	21.4%
	3. Commercial			1	1	2	3	2	9	12.9%
	4. Hotel									
	5. Agriculture			1		3			4	5.7%
	6.Retired	4	3	3	3	1	1		15	21.4%
	7. Uneployers	3		2			1		3	4.3%
5. Average annual income	1. <500 US$	2	1	2	6		2	3	15	22.9%
	2. 500 - 1000 US$	2	4	5	4	4	6	5	30	42.9%
	3. 1000 - 2000 US$	2	4	2		6	2	1	17	24.3%
	4. 2000 - 4000 US$	3	1	1				1	6	8.6%
	5. 4000 - 6000 US$	1							1	1.4%
	6. 6000 - 10 000 US$									
	7. >10 000 US$									
6.Utilization of consumer durable	1. Washing machine	9	9	9		10	10	8	55	78.6%
	2. Hot water heating	10	8	9	10	10	10	10	67	95.7%
	3. Shower	10	8	8	1	10	9	10	56	80%
	4. Bathtub	2			1	1		1	5	7.4%
7. Type of toilet	1. Individual toilet with flushing	9	3	7	9	8	9	7	52	74.3%
	2. The same without flushing	3	8	6	1	5	2	4	29	41.4%
	3. Others									
8. Type of sewerage facilities	1. Public sewerage system	7	2	8	9		10	7	43	61.4%
	2. Septic tank	3	8	2	1	10		3	27	38.6%
	3. Pit latrine									
	4. Direct discharge									
9. Frequency of taking shower or bath	1. Summer - total times/day	40.7	54	35	24.24	66	40.5	20	280.44	1.05%
	2. Winter - total times/day	19.09	26	12.72	13.58	23.6	25.5	10	130.49	0.49%
10. Frequency of toilet usage	Total times/day	117	152	97	69	129	102	70	736	2.76%
11. Cooking	Total times/day	13.14	16	13.47	12.2	18	11	14	98.07	1.4%
	Total hours/day	21.1	23	19.5	17.5	21	17	21	140.1	2%
12. Water consumption	1. Summer - total m^3/month	97.5	203	112	64	218	154	143	991.5	3.71
	2. Winter - total m^3/month	71	140	72	50	138	93	86	650	2.43
13. Tariff system - method of water charge	1. Water meter	10	9	10	10	8	10	9	66	94%
	2. Flat rate		1			2		1	4	6%
14. Average water charge	1. Summer -total Lv/month	43875	36540	18368	27860	41410	28730	50800	247583	927
	2. Winter -total Lv/month	14200	18200	4260	11900	16560	13680	25400	104200	390

15. Satisfaction for service										
15.1. Quantity	1. Sufficient	8	5	10	5	6	10	5	**49**	**70%**
	2. Insufficient	2	5		5	4		5	**21**	**30%**
15.2. Pressure	1. Sufficient	8	9	10	6	6	10	5	**54**	**77%**
	2. Insufficient	2	1		4	4		5	**16**	**22.9%**
15.3. Quality	1. Good		3	9		1	8	2	**23**	**32.9%**
	2. Acceptable		5	1	5	1	2	2	**15**	**21.4%**
	3. Not acceptable	10	2		5	8		6	**31**	**44.3%**
16. Affordability to pay the water charge	1. <1000 Lv/month	4	4	2	2	4	3	2	**21**	**30%**
	2. 1000 - 2000 Lv/month		3	5	2	3	4	1	**18**	**25.7%**
	3. 2000 - 3000 Lv/month		1	1	3	3		2	**10**	**14.3%**
	4. 3000 - 4000 Lv/month	1	2	1	2		1	3	**10**	**14.3%**
	5. 4000 - 5000Lv/month	3		1	1		1	2	**8**	**11.4%**
	6. > 5000 lv/month	2					1		**3**	**4.3%**
17. Water source	1. Deep well		2	1	6				**1**	
	2. Shallow well		2		1		1			
	3. River or channel									
	4. Others									
18. Quantity of water source	1. Sufficient		4	1	6		1		**1**	
	2. Insufficient				1					
19. Quality of water source	1. Good			1	5					
	2. Acceptable		1		1		1		**1**	
	3. Not acceptable		3		1					

F-149

Table 10

SAMPLING LOCATION AND AND SAMPLING NUMBERS FOR AGRICULTURE FOR THE I PHASE

Location of sampling (indicated as the name of cities/towns)	Sampling number for primary surwey
1.Irrigated areas	**150**
1.1. Suburb of Plovdiv	10
1.2. Suburb of Pazardjik	10
1.3. Suburb of Belovo	10
1.4. Suburb of Saedinenie	10
1.5. Suburb of Stamboliyski	10
1.6. Suburrb of Sadovo	10
1.7. Suburb of Rakovski	10
1.8. Suburb of Tchirpan	10
1.9. Suburb of Dimitrovgrad	10
1.10. Suburb of Haskovo	10
1.11. Suburb of Harmanli	10
1.12. Suburb of Svilengrad	10
1.13. Suburb of Stara Zagora	10
1.14. Suburb of Radnevo	10
1.15. Suburb of Nova Zagora	10
2. Non-irrigated areas	**100**
2.1. Suburb of Kostenetz	10
2.2. Suburb of Panagyurishte	10
2.3. Suburb of Velingrad	10
2.4. Suburb of Rakitovo	10
2.5. Suburb of Batak	10
2.6. Suburb of Hisarya	10
2.7. Suburb of Assenovgrad	10
2.8. Suburb of Brezovo	10
2.9. Suburb of Galabovo	10
2.10. Suburb of Simeonovgrad	10
TOTAL 25 areas	**TOTAL 250 samples**

Table 11

SAMPLING LOCATION AND AND SAMPLING NUMBERS FOR AGRICULTURE FOR THE II PHASE

Location of sampling (indicated as the name of cities/towns)	Sampling number for primary surwey
1.Irrigated areas	**31**
1.1. Suburb of Pazardjik	5
1.2. Suburb of Belovo	5
1.3. Suburrb of Sadovo	5
1.4. Suburb of Tchirpan	5
1.5. Suburb of Stara Zagora	5
1.6. Suburb of Nova Zagora	6
2. Cooperative farms	**14**
2.1. Suburb of Pazardjik	4
2.2. Suburb of Assenovgrad	2
2.3.Suburb of Stamboliyski	1
2.4.Suburb of Kritchim	1
2.5.Suburb of Saedinenie	1
2.6.Suburb of Simeonovgrad	1
2.7.Suburb of Sadovo	1
2.8.Suburb of Stara Zagora	1
2.9.Suburb of Nova Zagora	1
2.10.Suburb of Tchirpan	1
TOTAL 16 areas	**TOTAL 45 samples**

SUMMARY TABLE FOR AGRICULTURE - IRRIGATED AREAS

Table 12

Cities / Villages	Plovdiv	Pazardjik	Belovo	Saedine-nie	Stambo-liyski	Sadovo	Rakovski	Tchirpan	Dimit-rovgrad	Haskovo	Har-manli	Svilen-grad	Stara Zagora	Radnevo	Nova Zagora	Kritchim	Total	% total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Number of families	**10**	**15**	**15**	**10**	**10**	**15**	**10**	**15**	**10**	**10**	**10**	**10**	**15**	**10**	**16**	**10**	**191**	
Family size	**40**	**64**	**68**	**38**	**39**	**81**	**49**	**83**	**41**	**31**	**43**	**48**	**59**	**45**	**61**	**42**	**832**	**4.36**
Number of personnel engaged in agriculture	**23**	**34**	**34**	**30**	**45**	**57**	**28**	**78**	**32**	**20**	**31**	**61**	**39**	**25**	**49**	**27**	**603**	**3.16**
Total area of farm	22.3	1.8	5.25	13.1	108.9	46.1	7.75	21.777	29.3	38.3	16.9	224.5	4.417	1.03	57.018	7.05	**605.492**	**12.6**
Cultivated area	22.1	1.39	4.64	13.1	108.9	46.1	7.75	21.645	26	36.2	16.6	149.5	4.165	0.99	51.882	6.55	**517.512**	**85.5%**
Irrigated area	7.66	1.17	1.53	8.3	87.5	24.3	5.15	11.645	16.9	17.2	9.75	54.5	1.065	0.97	1.882	5.75	**247.432**	**42.16% 49.33%**
Water resource:																		
River	2			3		2			2	3	5	2			1		**20**	**10%**
Open canal	4	5	5	5	8	1		1	1			1	4		2	10	**47**	**23%**
Pond	1		1			4			3	5		5					**18**	**9%**
Tubewell	2	2	6	2		6		4	3		1		6	6	1		**34**	**17%**
Dugwell	2	7	5			4	10	2	1	2	2	1	3	4	10		**54**	**27%**
Others	1	10			2			6				1	2		1		**28**	**14%**
Irrigation system																		
Irrigation Facility:																		
Open canal	4	5	5	1	4	2		1	3	4		6			2	2	**39**	**21.4%**
Pump	5	9	6	9	7	13	10	7	7	5	8	3	12	10	13	8	**132**	**72.5%**
Others	1	1			1			5					3				**11**	**6.1%**
Irrigation Type:																		
Basin	10	4	8	10	9	15	9	10	10	9	7	9	6	8	11	10	**144**	**74%**
Sprinkler		10	7		1		1		1			3		2	1		**26**	**13%**
Drip		1						2			1						**2**	**1%**
Others		1			1							1	9	5	4		**23**	**12%**
Drainage method: (Yes)		7	9							1	2		8		2		**29**	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Crop																		
Tomatoes	*1.15*	*0.18*	*0.11*	*0.2*	*0.3*	*0.2*	*0.35*	*0.27*		*0.1*	*1.05*	*0.2*	*0.242*	*0.28*	*0.181*	*0.05*	**4.863**	**0.94%**
Potatoes	*0.29*	*0.29*	*0.35*	*0.5*	*1.1*	*0.2*	*0.415*	*0.28*	*0.5*		*0.05*		*0.147*	*0.09*	*0.0912*	*0.3*	**4.6032**	**0.89%**
Fruit trees					*10.4*			*0.05*					*0.088*	*0.012*			**10.55**	**2.04%**
Vegetables	*0.27*			*1*	*1.55*	*0.2*	*0.4*					*0.35*	*0.205*			*0.9*	**4.875**	**0.94%**
French beans	*0.63*												*0.013*		*0.01*		**0.653**	**0.13%**
Cabbage	*0.56*	*0.005*	*0.046*	*0.9*	*0.05*		*0.25*	*0.041*	*0.1*				*0.055*	*0.13*	*0.147*		**2.284**	**0.44%**
Pepper	*0.14*	*0.08*	*0.088*		*0.05*	*0.9*	*0.67*	*0.33*	*0.4*	*1.5*	*0.8*		*0.015*	*0.11*	*0.061*		**5.144**	**0.99%**
Apples					*0.8*							*4.4*	*0.025*			*2.5*	**7.725**	**1.49%**
Vineyard													*0.07*				**0.07**	**0.01%**
Figs													*0.5*				**0.5**	**0.10%**
Peanut	*2.1*					*6.2*	*0.05*		*0.6*	*0.2*		*0.1*	*0.13*	*0.05*	*0.05*		**9.48**	**1.83%**
Walnuts													*0.01*				**0.01**	**0.002%**
Maize	*1.2*	*0.28*	*12*	*2.5*	*40.5*	*8.5*	*0.28*	*7.13*	*3.85*	*10*	*2*	*0.4*	*0.07*	*0.08*	*1.1*	*1.35*	**91.24**	**17.63%**
Beans		*0.034*	*0.081*		*0.1*		*0.175*	*0.082*	*0.05*				*0.01*	*0.05*	*0.0186*		**0.6006**	**0.12%**
Cucumbers		*0.002*	*0.003*					*0.025*					*0.035*	*0.029*	*0.049*		**0.143**	**0.03%**
Barley				*1.1*	*0.4*							*41*	*1.5*		*5*		**49**	**9.47%**
Wheat	*8.2*	*0.2*	*2.8*	*3.7*	*20.6*	*18.5*	*2.6*	*9.45*	*8.8*	*14.3*	*6*	*58.9*	*1.5*		*40*		**195.55**	**37.79%**
Clover							*0.1*			*1*				*0.02*			**1.12**	**0.22%**
Sunflower				*3.2*	*30.2*	*0.9*	*1.0*	*3.25*	*2.9*	*1*	*1.95*	*33.1*					**77.5**	**14.98%**
Carrots								*0.05*						*0.01*			**0.06**	**0.012%**
Onion		*0.023*						*0.03*			*0.1*			*0.05*	*0.111*		**0.314**	**0.06%**
Leeks								*0.011*	*0.3*						*0.06*		**0.371**	**0.07%**
Melon	*0.9*				*0.35*	*4.05*		*0.3*		*1.8*	*0.6*	*3.9*		*0.1*		*0.25*	**12.25**	**2.37%**
Water melon								*0.1*	*0.05*	*1.8*	*1.1*	*1.5*		*0.07*		*0.15*	**4.77**	**0.92%**
Marrow	*0.04*		*0.01*						*1*	*0.3*	*0.3*				*0.025*		**1.675**	**0.32%**
Garlic															*0.0101*		**0.0101**	**0.002%**
Aubergine	*0.11*														*0.01*		**0.12**	**0.023%**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Lettuce	*0.07*														*0.05*		0.12	0.023%
Turnip															*0.05*		0.05	0.01%
Millet															*5*		5	0.97%
Cotton								*0.15*	*1*								1.15	0.22%
Strawberry		*0.002*						*0.0001*								*0.05*	0.0521	0.01%
Lentil								*0.02*									0.02	0.004%
Tobacco									*0.4*	*0.5*	*1*	*1.65*				*0.2*	3.75	0.72%
Almond					*0.08*							*0.1*					0.18	0.03%
Peaches																*0.2*	0.2	0.04%
Meadow					*0.2*											*0.2*	0.4	0.08%
Peas						*0.6*											0.6	0.12%
Peppermint	*0.2*					*0.7*											0.9	0.17%
Spice		*0.004*															0.004	0.0008%
Okra											*1.1*						1.1	0.21%
Sesame											0.1						0.1	0.02%
Others						*0.45*			*6.75*								7.2	1.39%
Total	15.86	1.1	15.488	13.1	106.68	41.4	6.29	21.5691	26.7	32.5	16.15	145.6	4.615	1.081	52.0239	6.15	506.307	97.847%

SUMMARY TABLE FOR AGRICULTURE - NONIRRIGATED AREAS

Table 13

Cities / Villages	Kostenetz	Panagyurishte	Velingrad	Rakitovo	Batak	Hisarya	Asenovgrad	Brezovo	Gaiabovo	Simeonovgrad	Total	% total
1	2	3	4	5	6	7	8	9	10	11	12	13
Number of families	10	10	10	10	10	10	10	10	10	15	105	
Family size	42	39	41	40	47	47	56	41	36	44	433	4.12
Number of personnel engaged in agriculture	24	22	25	26	35	35	34	20	30	20	271	2.6
Total area of farm	5.82	2.4	6.28	3.5	4.64	10.6	10.5	6.67	6.512	325.9	382.822	3.646
Cultivated area	5.72	2.37	3.802	2.404	1.053	10.6	10.5	6.67	6.33	322.8	372.249	97.2%
Irrigated area	0.275	0.57	1.1894	0.0046	0.142	6.6	9.6	6.67	6.28	12.2	44.2176	11.6% 11.9%
Water resource:												
River		1		1		2	3		1	1	9	10%
Open canal	4		3				5				14	15.6%
Pond	2							3			5	5.6%
Tubewell						3		1	6	1	11	12.2%
Dugwell			2			5		4	2	1	14	15.6%
Others	4	9	5	9	10				1		37	41%
Irrigation system												
Irrigation Facility:												
Open canal	4	2	3				8				17	36%
Pump				1		10		8	10	1	30	64%
Others												
Irrigation Type:												
Basin	6		7			10	8	7	10	3	51	76%
Sprinkler				3	6					2	11	16%
Drip	1	1									2	3%
Others								3			3	5%
Drainage method: (Yes)	1	1	2	4	6				9		23	

1	2	3	4	5	6	7	8	9	10	11	12	13
Crop												
Tomatoes	*0.067*	*0.025*	*0.012*	*0.0065*	*0.032*	*0.9*		*0.185*	*0.175*	*1*	2.4025	0.645%
Potatoes	*0.08*	*0.94*	*1.21*	*1.262*	*0.87*	*0.83*	*0.35*	*0.74*	*0.5*		6.782	1.299%
Vegetables						*0.8*	*0.5*	*0.1*	*0.47*		1.87	0.502%
Cabbage	*0.008*		*0.003*					*0.02*	*0.05*		0.081	0.0218%
Pepper	*0.055*					*0.15*		*0.175*	*0.09*	*0.4*	0.87	0.234%
Apples									*0.02*		0.02	0.005%
Vineyard									*0.14*		0.14	0.038%
Peanut						*0.1*	*3.3*	*0.115*			3.515	0.944%
Maize	*0.05*	*0.47*	*0.32*	*0.55*		*0.4*	*1.35*	*0.245*	*4.533*		7.918	2.127%
Beans	*0.115*	*0.17*	*0.408*	*0.5*	*0.032*	*0.3*	*0.15*	*1.5*	*0.055*		3.23	0.868%
Cucumbers		*0.015*				*0.15*	*0.1*	*0.01*	*0.075*		0.35	0.094%
Barley	*0.5*							*0.17*		*16.8*	17.47	4.693%
Wheat	*4*					*3.5*	*1.3*	*0.34*	*0.001*	*220*	229.141	61.56%
Clover										*1.8*	1.8	0.484%
Carrots	*0.01*										0.01	0.003%
Onion	*0.014*	*0.05*	*0.05*				*0.85*	*0.06*			1.024	0.275%
Melon						*2.2*			*0.8*		3	0.806%
Water melon						*0.5*					0.5	0.134%
Marrow	*0.013*										0.013	0.003%
Aubergine						*0.1*					0.1	0.027%

1	2	3	4	5	6	7	8	9	10	11	12	13
Cotton										*82.8*	82.8	22.24%
Tobacco						*0.5*	*2.6*				3.1	0.833%
Ray		*0.3*									0.3	0.081%
Oats	*0.9*							*0.3*			1.2	0.322%
Peppermint						*0.12*					0.12	0.032%
Alfalfa								*0.1*	*0.1*		0.2	0.054%
Hop		*0.4*	*1.8*								2.2	0.591%
Total	**5.812**	**2.37**	**3.803**	**2.3185**	**0.934**	**10.55**	**10.5**	**4.06**	**7.009**	**322.8**	370.1565	99.438%

SUMMARY TABLE FOR AGRICULTURE - IRRIGATED AREAS

Table 14

Cities / Villages	Total	% total
1	2	3
Number of cooperative farms	14	
Number of personnel in cooperative farms	3374	
Number of personnel engaged in cooperative farms	607	
Total area of farm	4702	
Cultivated area	4035	86%
Irrigated area.	1369	14%/33.93
Water resource:		
River	4	20%
Open canal	6	30%
Pond		
Tubewell	1	5%
Dugwell	2	10%
Others	7	35%
Irrigation system		
Irrigation Facility:		
Open canal	5	35.7%
Pump		
Others	9	64.3%
Irrigation Type:		
Basin		
Sprinkler		
Drip		
Others		
Drainage method: (Yes)	5	
Crop		
Tomatoes	16.5	0.409%
Potatoes	4.5	0.112%
Fruit trees	91.5	2.268%
Cabbage	9	0.223%
Pepper	14	0.347%
Maize	338	8.37%
Barley	360.5	8.934%
Wheat	2050	50.805%
Clover	102.5	2.540%
Sunflower	458	11.35%

1	2	3
Millet	5	0.124%
Cotton	5	0.124%
Tobacco	120	2.97%
Ray	8.5	0.21%
Peas	2	0.05%
Oats	10	0.248%
Rice	400	9.913%
Coriander	40	0.9916%
Total	4035	100%

CROPPING ROTATION IN THE SURVEY AREA Table 15

Major crops / Months			Wheat	Sun-flower	Maize	Barley	Rice	Clover	Vege-tables	Fruits	Others
	Area		2474.69	535.5	437.16	426.97	399.99	105.42	103.07	28.05	402.706
	Percentage		50.36 %	10.9 %	8.9 %	8.69 %	8.14 %	2.15 %	2.1 %	0.57 %	8.19 %
January	Start	End									
February	Start	End							*		
March	Start	End									
April	Start	End		*	*		*				
May	Start	End									
June	Start	End									
July	Start	End	*			*					
August	Start	End					*				
September	Start	End	*	*	*	*					
October	Start	End							*		
November	Start	End									
December	Start	End									

- Period of the growing of the crop
- First month of planting of the crop
- Latest month of gathering harvest of the crop

CROPPING ROTATION TYPES IN THE SURVEY AREA Table 16

Cropping rotations	1st type	2nd type	3rd type
Fields			
1st field	wheat	annual grasses	clover
2nd field	maize	grain crops	clover
3rd field	wheat	late earthen-up crops	clover
4th field	sunflower	grain crops	silage crops
5th field	barley	late earthen-up crops	root crops
6th field	leguminous crops	grain forage crops	annual grasses
7th field		vegetables	mellow crops