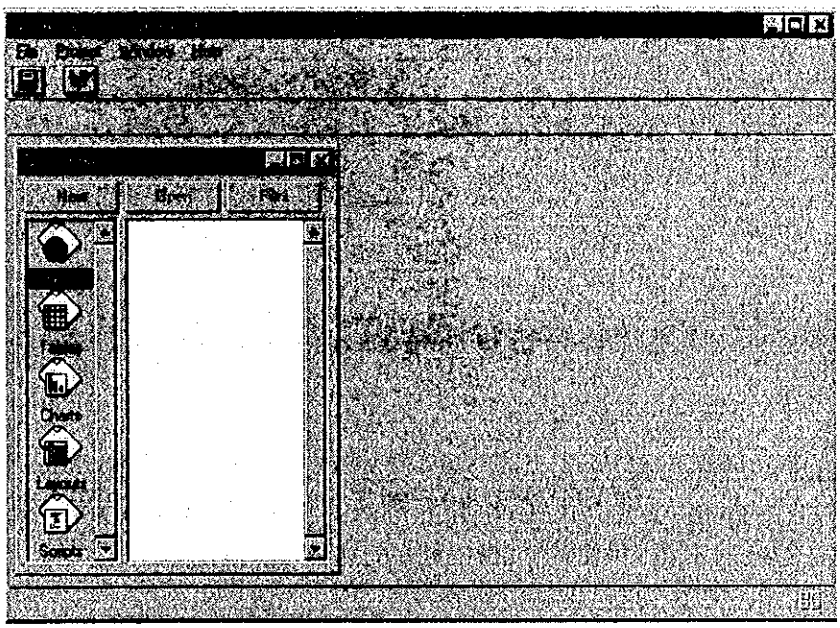
APPENDIX A
MANUAL OF GIS DATABASE

Quick Start Tutorial

This tutorial will briefly guide you how to use the Maritza GIS Database. Please refer to ArcView User Manual for more detailed information.

Open the Project

1) Start ArcView.
   When ArcView opening window disappears, you will see the ArcView application window as shown below.



2) From ArcView's File menu, select "Open Project".
   A project file is the file in which study team stored the work with ArcView. A project contains information of the views, tables, charts, layouts, and scripts operated by ArcView. The names of project file have an extension of .apr.

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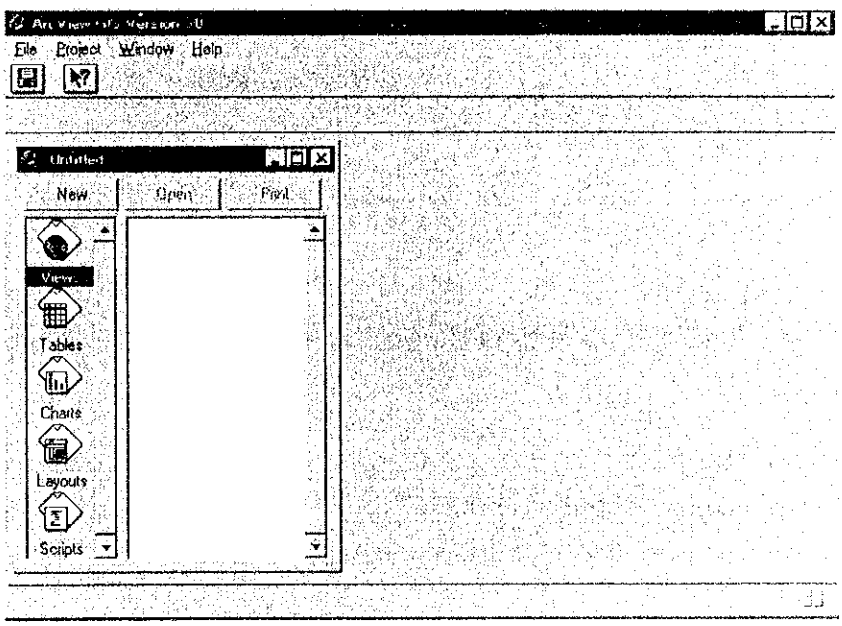

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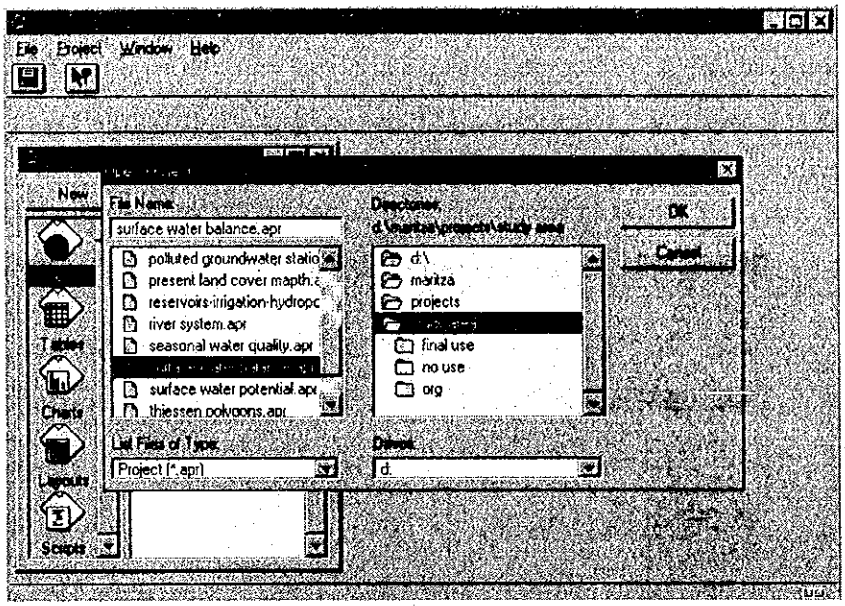
A project file is the file in which study team stored the work with ArcView. A project contains information of the views, tables, charts, layouts, and scripts operated by ArcView. The names of project file have an extension of .apr.

3) Open the Project file.

In the dialog of Open Project, navigate to the location of the directory named "maritza". The directory of "maritza" is located in D drive and contains all of the Maritza GIS data under this directory. Double-click the "projects" directory and then double-click the directory that contains the .apr file you want to open.



For example, please open the project file of "surface water balance.apr" in the directory of study area. Select the project file called "surface water balance.apr" from the list on the left side of the dialog and press OK.

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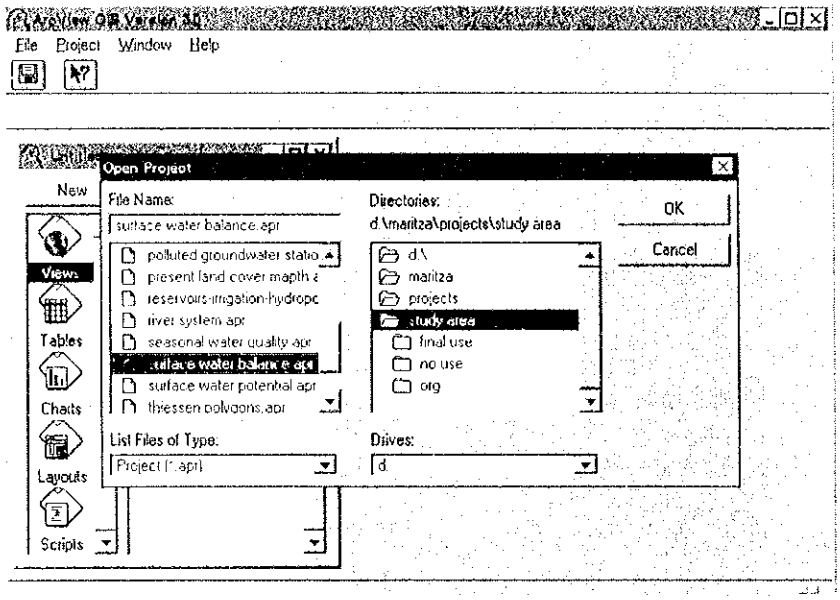

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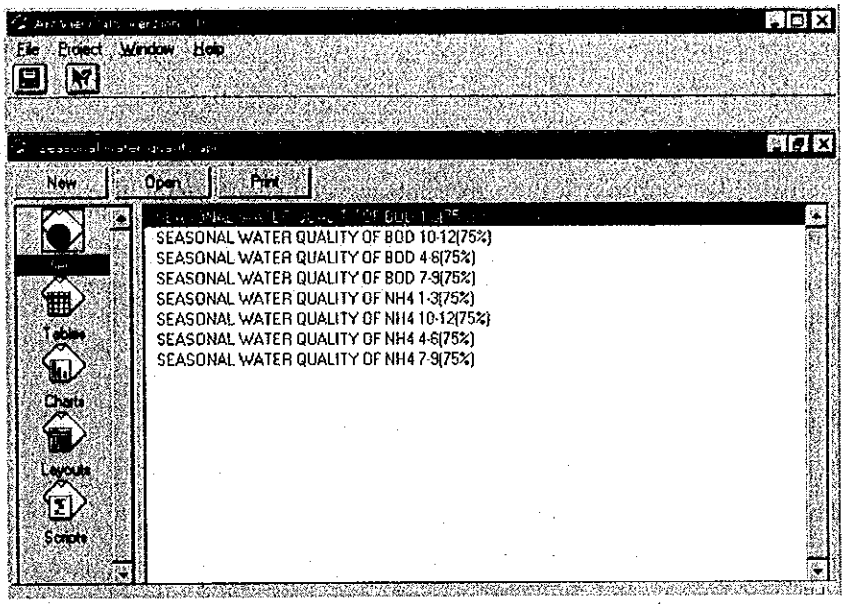
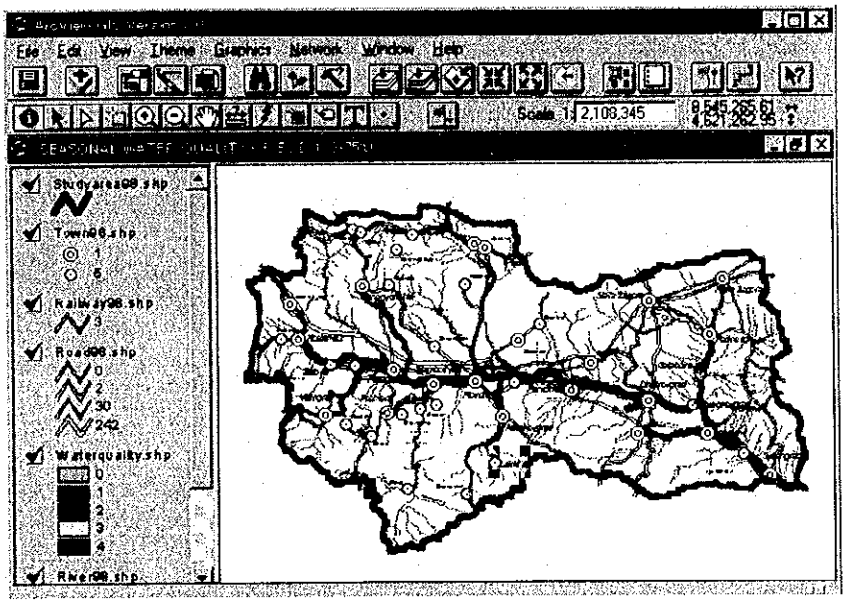
4) Select View.

When the project opens, you will see a project window named "surface water balance.apr". The Project window gives you access to all the components contained in the project file. As you can see from the list in the Project window, "surface water balance.apr" contains eight (8) views. A view is an interactive map that lets you display, explore, query, and analyze geographic data in ArcView.



5) Open the Map.

Double-click the view called "Seasonal Water Quality of BOD 1-3(75%)" in the list shown in the Project window. The Seasonal Water Quality of BOD map appears.



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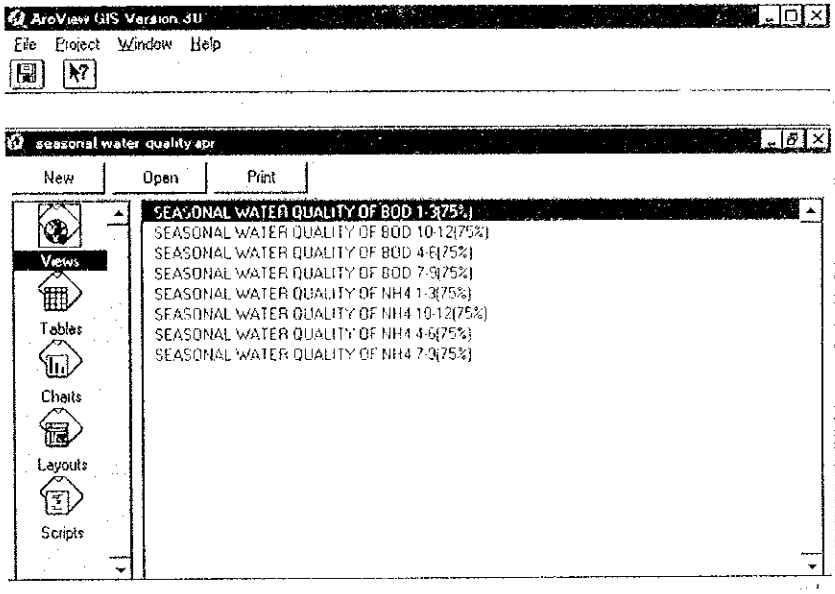

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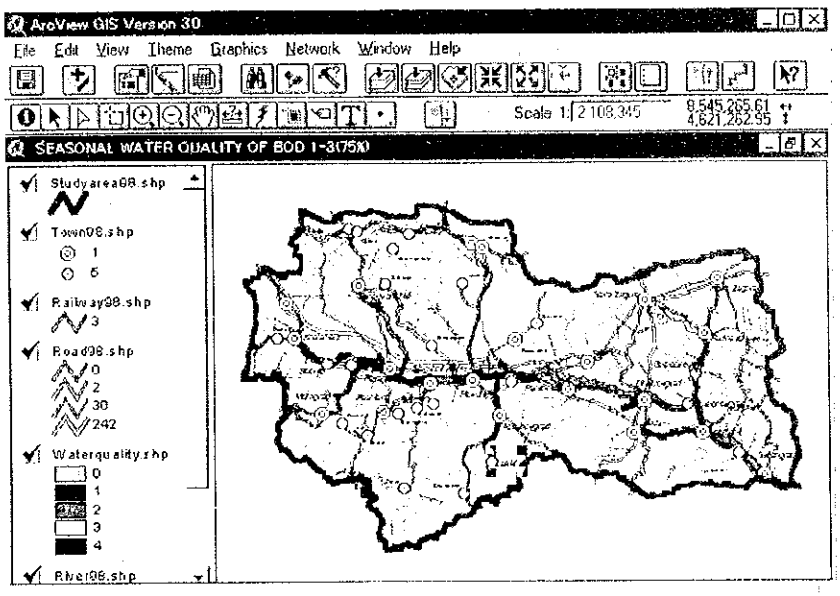


A view is made up of layers of geographic information for a particular area or place. Each layer is a collection of geographic features such as study area, towns, railway, roads, water quality and river. In ArcView, these layers are called themes.

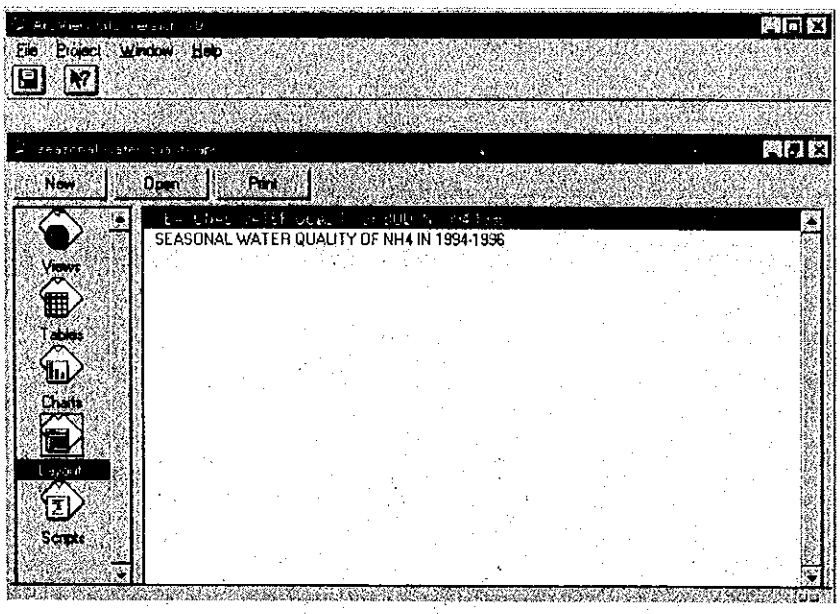
All the themes in a view are listed to the left side of the map. The check box next to each theme indicates whether it is currently turned on or off in the map, that is, whether it is currently drawn on the map or not.

The order in which the themes are listed in the Table of Contents is also important. The themes at the top of the Table of Contents are drawn on top of those below it. The order of themes is easily changed by dragging the themes.

You can also change the width of the Table of Contents by dragging the border between the Table of Contents and the map either left or right. This is useful if you want to increase the width of the Table of Contents so that you can see long theme names or long labels in a theme's legend.

6) Open the Layout.

Close the Map window and select the "Layouts" icon listed in the Table of Contents in the project window. As you can see from the list in the Project window, the project file of "surface water balance.apr" contains two (2) layouts. Double-click the layout called "Seasonal Water Quality of BOD in 1994-1996" in the list shown in the Project window.



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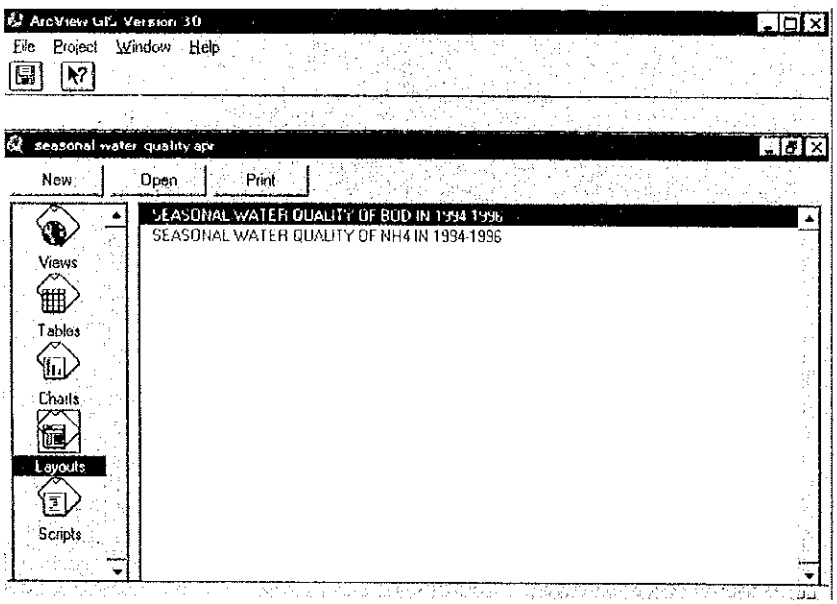
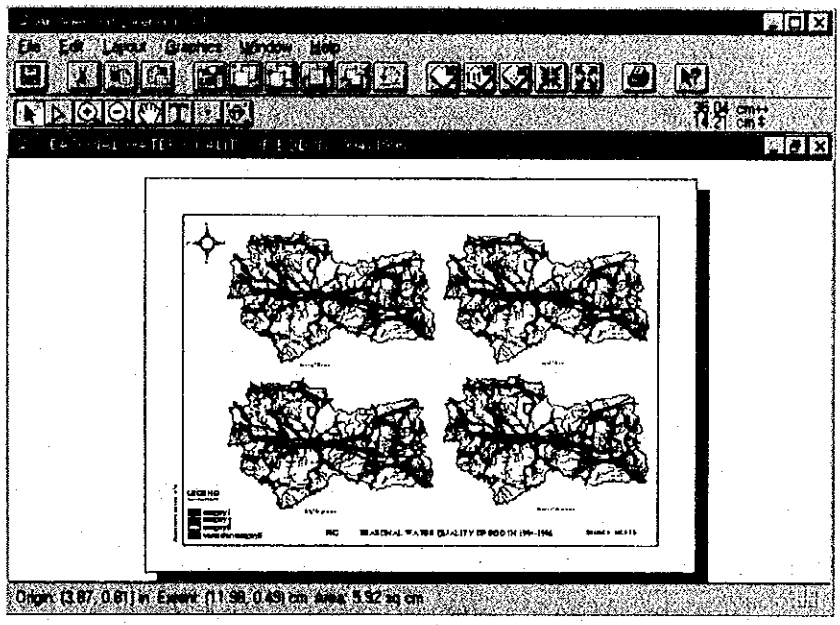
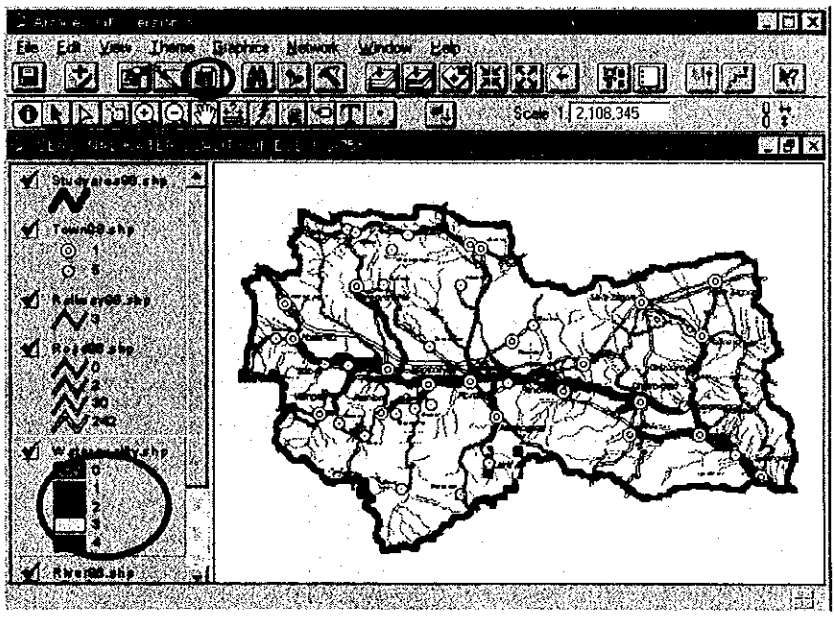


The layout of titled "Fig.X Seasonal Water Quality of BOD in 1994-1998" appears. You can print out this layout to the printer. This picture of Layout is the final productm which is listed in the report as figures.



7) Open the Theme's Attribute Table

A theme has one attribute table and they are dynamically linked. Click the Open Theme Table button after you make one theme active by click the name of theme.



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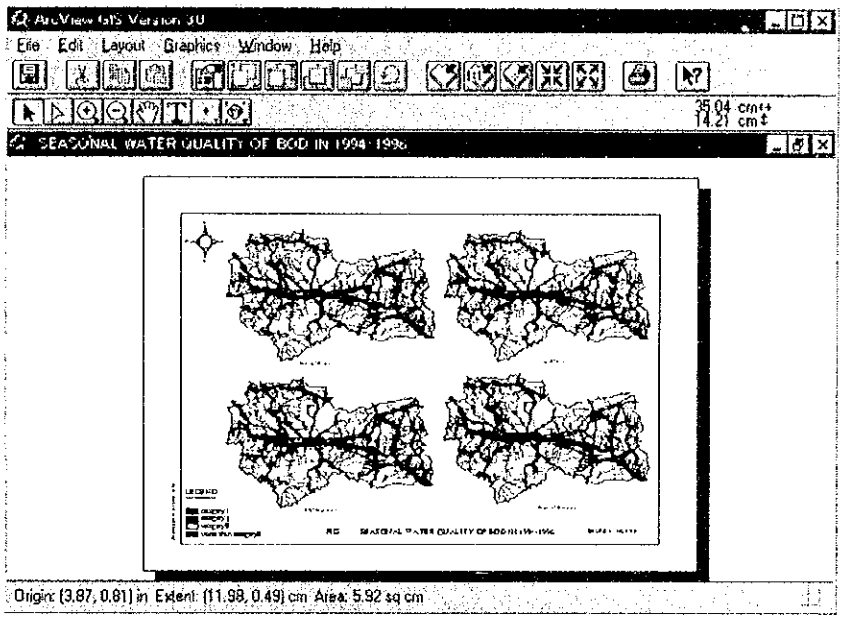

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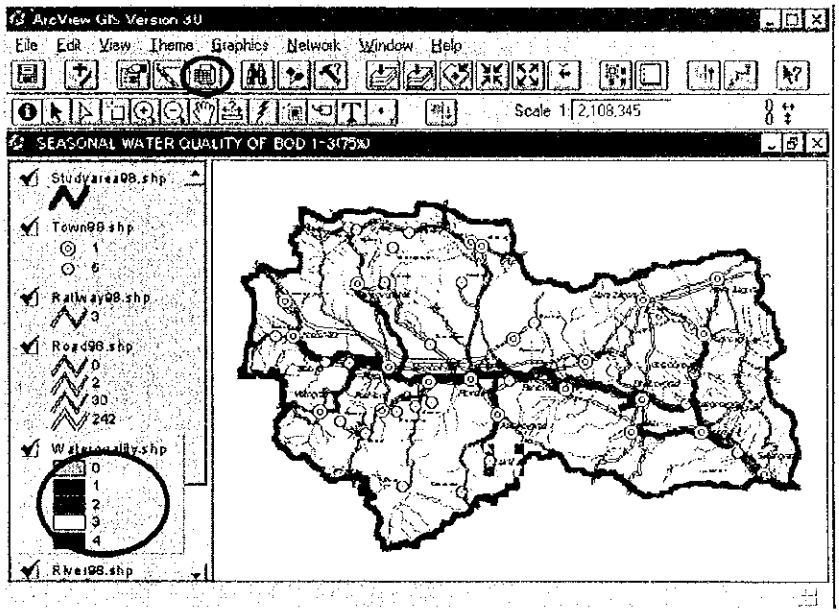

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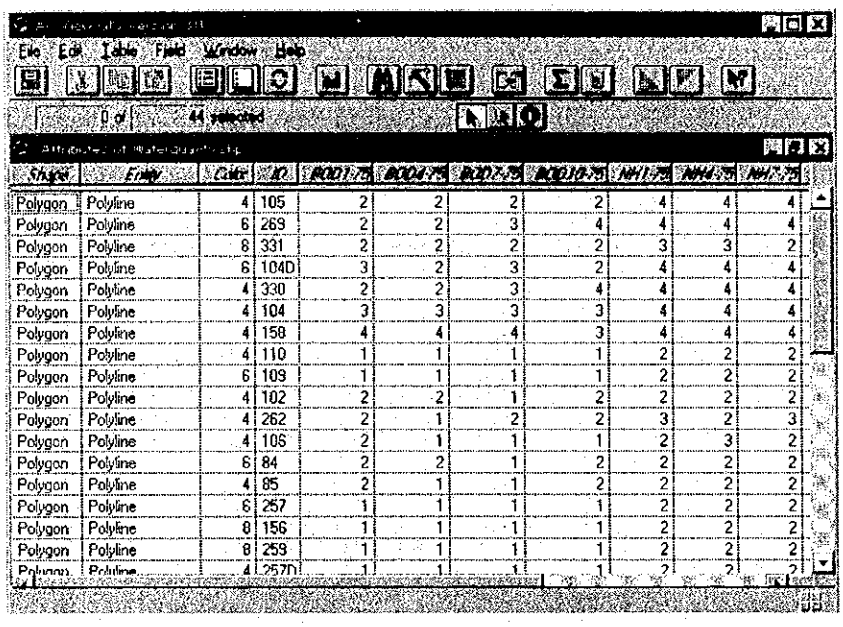
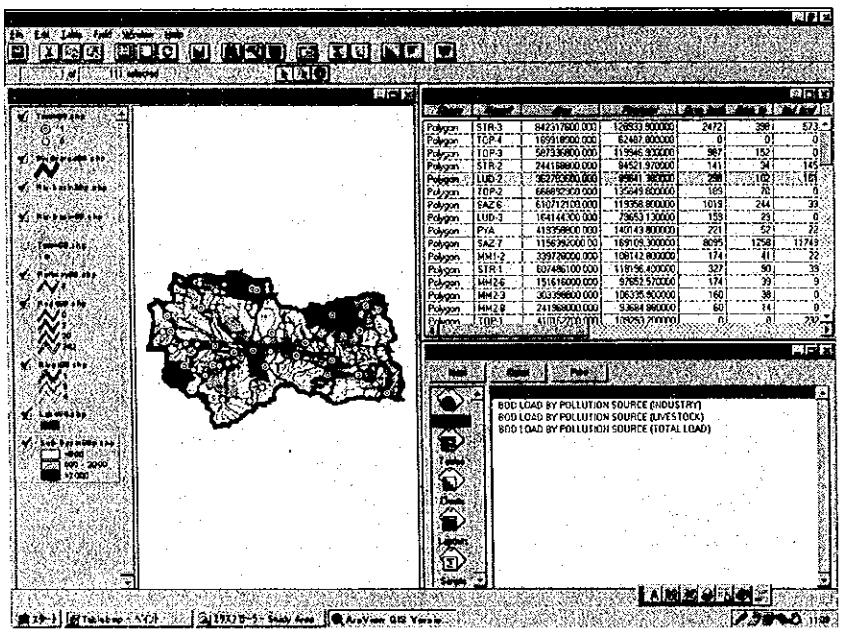


Shape	F.map	Color	ID	ROOT-75	BOD4-75	BOD7-75	BOD10-75	NH1-75	NH4-75	NH7-75
Polygon	Polyline	4	105	2	2	2	2	4	4	4
Polygon	Polyline	6	269	2	2	3	4	4	4	4
Polygon	Polyline	8	331	2	2	2	2	3	3	2
Polygon	Polyline	6	104D	3	2	3	2	4	4	4
Polygon	Polyline	4	330	2	2	3	4	4	4	4
Polygon	Polyline	4	104	3	3	3	3	4	4	4
Polygon	Polyline	4	158	4	4	4	3	4	4	4
Polygon	Polyline	4	110	1	1	1	1	2	2	2
Polygon	Polyline	6	109	1	1	1	1	2	2	2
Polygon	Polyline	4	102	2	2	1	2	2	2	2
Polygon	Polyline	4	262	2	1	2	2	3	2	3
Polygon	Polyline	4	106	2	1	1	1	2	3	2
Polygon	Polyline	6	84	2	2	1	2	2	2	2
Polygon	Polyline	4	85	2	1	1	2	2	2	2
Polygon	Polyline	6	257	1	1	1	1	2	2	2
Polygon	Polyline	8	156	1	1	1	1	2	2	2
Polygon	Polyline	8	259	1	1	1	1	2	2	2
Polygon	Polyline	4	257D	1	1	1	1	2	2	2

8) Dynamic link between Theme (Map) and Attribute table

Select "Tile" from ArcView's Window menu. You can make re-arrange the location of each window. Then, make active the theme titled "sub-basin" by click the theme's name. Notice a record of sub-basin is highlighted in yellow on the attribute table by click the feature on the map. ArcView's tool bar shows you how many sub-basins are currently selected, in this case, 1 out of 111. Thus theme and attribute table are dynamically linked.



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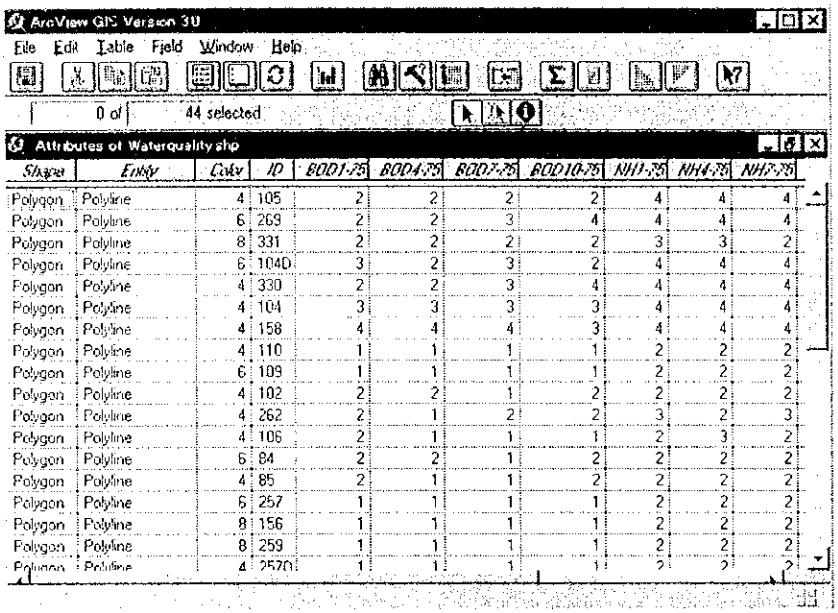

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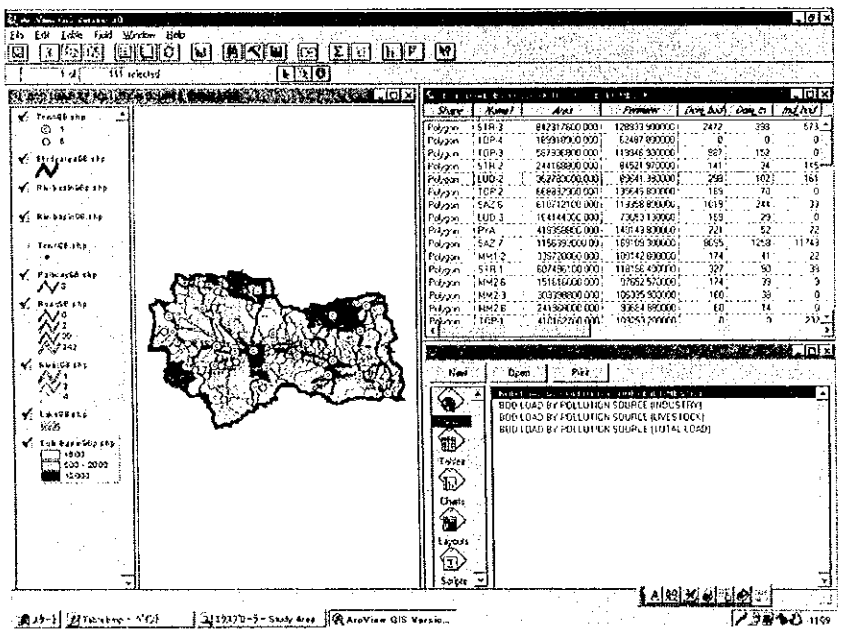
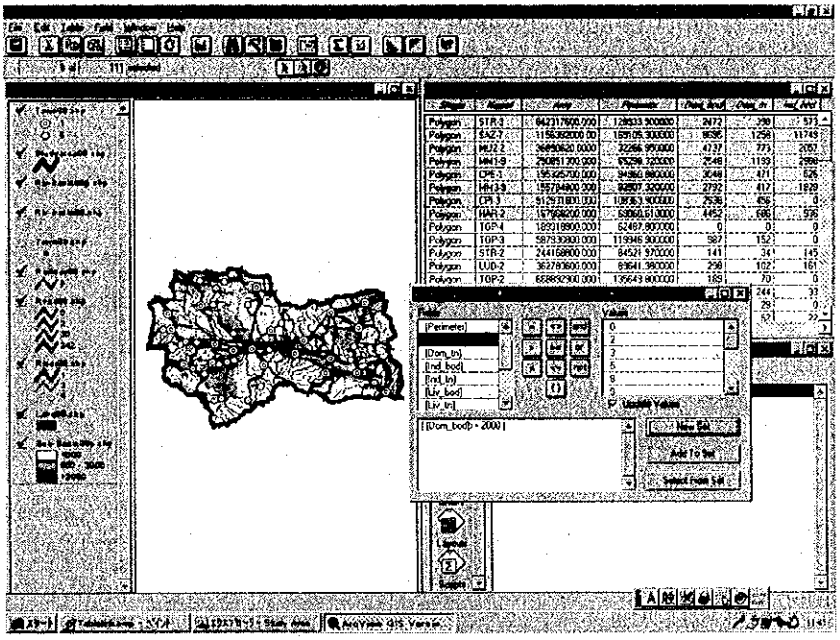


9) Query on Attribute Table

Click the Query Builder button. You use the Query Builder to find out a particular subset of the features represented in your theme, at the same time, highlight these features on map.

In the Query Builder dialog, build a query expression to select sub-basin that BOD is more than equal to 2000; double-click [bod dom] in the Field list, click the ">=" operator button, and then type "2000".

Press New Set. ArcView selects the sub-basin you specified. Close the Query Builder dialog. The sub-basin you have found are highlighted in yellow on the map. You can sort the highlighted record on the attribute table by click the Promote button.



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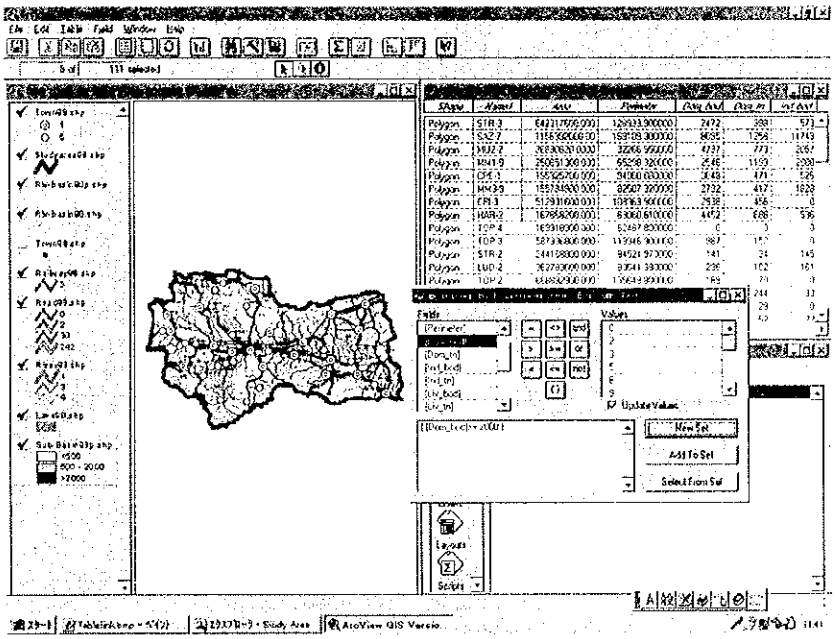
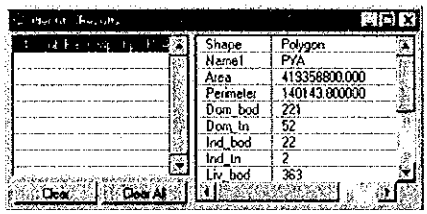


10) Query of Attribute Table

Identify Button

To get information about one of the features on your map, use the Identify tool. When you click on a feature with this tool, ArcView displays the attributes of the feature in a dialog.



Zoom To Full Extent button

Zooms to the full spatial extent of all the themes in your view. For example, if you have zoomed in a couple of times on your view, you can click this button if you want to see the whole view again.

Zoom to Active Themes button

Zooms to the spatial extent of the active theme in the view. The themes in a view often have different spatial extents. Some themes may represent features located all over the map, while others may represent features found in particular areas on the map. With this button you can easily zoom in on the area covered by a particular theme that interests you.

Zoom to Selected Features button

Zooms to the spatial extent of the currently selected features in the active theme. After you have selected particular features in a theme, click this button to zoom in on the area covered by the features you have selected.

Zoom In button

Zooms in once on the center of the view.

Zoom Out Button

Zooms out once from the center of the view.

 Zoom Previous Extent button

Goes back to the previous spatial extent you were viewing. Click this button to go back to where before you zoomed or panned. You can use this option to retrace your last five (5) steps.

 Zoom In tool

To zoom in centered on a particular position on the view, click that position once with this tool. To zoom in to a particular area on the view, drag a box over the area with this tool.

 Zoom Out Tool

Same as the Zoom In tool but zooms out from the position you click or the area you drag over.

 Pan Tool

Lets you pan the view by dragging the display in any direction with the mouse. To pan, click this tool, move the cursor anywhere over the view, hold down the mouse button, and drag in any direction. Release the mouse button to leave the view in your desired position.

SUPPORTING REPORT B

LAND USE

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SUPPORTING REPORT B LAND USE

Land use and potential analysis is conducted based on the GIS data base. Geographic data has been digitized and stored into the computer as single data files such as topographical, geological, land use and population and so on. The whole study area is divided into 16 catchment areas and each catchment area is sub-divided into smaller sub-basins. The total number of these sub-basins is 110. For more detailed analysis of the regional characteristics of the study area, this sub-basin boundary is used as a basic unit for the calculation and analysis. The boundary data of a sub-basin is overlaid on each geographical parameter and calculated the area distribution of each category. The results of calculation are listed and compiled into a table format. In addition to these data tables, maps of data calculation are also presented. Another concept of the regional division is presented as a spatial framework previously according to the location of the river channel such as upstream, mid-stream, down stream and tributaries. This concept is also used to summarize the regional characteristics of the study area. In this section, land use and its potential of the whole study area are analyzed from an environmental management point of view and the characteristics of land use. Related physical conditions of the basin are described based on these data tables and maps as shown in Table B.1.1 – B.1.5.

1. Assessment of the Existing Land Use and Related Physical Conditions

(1) Upstream Area

The upstream area consists of 5 tributaries and a minor sub-basin, those are Topolnitza, Chepinska, Stara, Luda Yana, the most upstream part of the main Maritza River MU1 and the minor sub-basin MU2. These rivers are sub-divided into totally 27 sub-basins. The total coverage of this area is 5,483 km^2 and the population is 387,950 in 1992. The average population density is 71 person/km^2, the lowest value is 24 person/km^2 in the Topolnitza sub-basin and the highest value is 311 person/km^2 in the sub-basin MU2. The sub-basin MU2 has the highest density due to the location of Pazardjik as a regional urban center.

Topographically, elevation of most of the area varies in a range from 500 m to 2,500 m. It is a mountainous area which is a part of the Balkan mountain or the Rodopi mountain. In detail, the sub-basin CPI located at the most upper reach of the Maritza River composes of mainly high elevation area. Seventy one percent (71 %) of the total area of the sub-basin CPI is over 1,000 meters in altitude above mean sea level while twenty seven percent (27 %) is between 500 and 1,000 meters. In the sub-basin MU1, the mountain areas with the altitude of more than 1,000 meters occupies approximately 450 km^2 and the sub-mountain areas with 500 - 1,000 meters occupies nearly 441 km^2. The total percentage of area of these two categories is seventy nine percent (79 %) of the whole sub-basin MU1.

Slope characteristics of this upstream area generally shows a variation from a hilly slope to a mountainous slope. In the upstream basin, the flat land area with a slope of less than 3 degrees (approximately 5 %) is 1,662 km^2, the area with a slope between 3 to 8 degrees (approximately 5 to 15 %) is 2,367 km^2, the largest in the upstream, and the area with a slope of more than 12 degrees (approximately 20 %) is about 573 km^2. Sixty six percent (66 %) of the area or 285 km^2 of the sub-basin MU2 located along the Maritza main channel has a relatively wider flat land area. Distribution of the steep slope area with more than 15 degrees (approximately 30 % slope) is found only 2 % in this sub-basin. In the sub-basin CPI, a steep slope area with more than 15 degrees occupies 17 % or 155 km^2.

Basically, these mountain areas are densely covered by forest vegetation. The forest coverage ratio in this area is 49 % in average, the Chepinska sub-basin has the highest value at 71 % and the Luda Yana sub-basin has the lowest value at 35 %. The agricultural land ratio, on the contrary, is relatively low in this area. The average ratio of the agricultural land is 30 % with the upper range 55 % at the MU2 and the lower range 15 % at the Chepinska sub-basin.

Erosion potential in this area is basically high because of the high and steep slope mountain area, however, a dense coverage of the forest vegetation prevents the earth surface from severe erosion. Therefore, conservation of the existing forest and

reforestation in this mountain area should be promoted to keep the high quality water resource area.

(2) Mid-Central Stream Area

Mid-stream area is divided into 4 tributaries named as Vacha, Chepelarska, Pyassachnik, Stryama and 1 aggregated catchment area MM1. These catchment areas are sub-divided into totally 23 sub-basins. The total catchment area is 6,299 km^2 and the population is 686,068. The average density of the population is 109 person/km^2 by 1992 data. Plovdiv is the largest urban center in this area with a total urban population of 341,058 in the MM1-9 sub-basin and Assenovgrad is the second largest urban area with a total urban of population of 52,360. Population density of the MM1-9 sub-basin shows a very high value at 1,480 person/km^2. The lowest value in the mid-stream area is found in the Vacha river basin at 27 person/km^2.

Main topographical characteristics of the Vacha and the Chepelarska sub-basin are wide distribution of mountains. Totally 2,667 km^2 (78 %) of these two sub-basins is occupied by higher mountain areas with more than 1,000 meters in altitude above sea level. On the contrary, the sub-basin MM 1 is mostly a low-lying area with an area of 1,261 km^2 (83 %) located below 500 meters. The sub-basin PYA and STR have totally 2,113 km^2 and the ratio of mountain and lowland area is 46 % and 54 % respectively.

Slope distribution of the Vacha and the Chepelarska sub-basin is characterized by relatively wider distribution of steep slope area. The slope of more than 15 degree (or 30 %) occupies164 km^2 of the Vacha sub-basin and 155 km^2 of the Chepelarska sub-basin. The area ratio of these steep slope areas is 9.7 % and 16 % for each sub-basin. The sub-basin STR also has a relatively wider steep slope area, of which 151 km^2 (9 %) is more than 15 degree. The sub-basin MM1 is characterized by an extensive flat land area of which 1,192 km^2 (78 %) belongs to less than 3 degrees and only 18 km^2 (1 %) is a steep slope area of more than 15 degrees.

Forest coverage ratio occupies 44 % of the total mid-central stream area and the highest value is 67 % in the Vacha river basin and the second highest value is 66 % at the Chepelarska river basin. Except 4 tributary basins, the MM1 area is an aggregated river basin area where the location is closer to the Maritza main channel with lower elevation, as a result, the forest coverage ratio shows the smallest value at 15 %. On the contrary, the agricultural land ratio of this sub-basin shows the highest value at 61 %. The average ratio of the agricultural land use in the mid-stream area is 33 %.

In the Vacha and the Chepelarska catchment area, the agricultural land ratio show the smallest value at 13 % and 15 % respectively. These two rivers originate in the Rodopi Mountain and flow into the Maritza main channel. Those basic physical conditions as topography, geology, elevation and vegetation are almost same type in both river basins.

Stryama River originates in the Balkan Mountains, flows down to the south and joins the Maritza River at Sadovo. This catchment is divided into 3 sub-basins those are STR-1, STR-2 and STR-3. The STR-1 sub-basin is located at the lower part of this basin and the STR-2 and STR-3 sub-basins are located at the upstream area. Physical characteristics of these two upstream sub-basins are almost same as that of mountainous ones having a higher forest cover ratio and a lower ratio of the agricultural land. The STR-1 sub-basin has a different type of physical characteristics compared to those upstream sub-basins. The sub-basin has a lower forest coverage ratio at 15 % and a higher agricultural land ratio at 59 %.

River basins of the Vacha, the Chepelarska and the upstream area of the Stryama are still mainly covered by dense vegetation and these areas have a significant meaning for the storage of the high quality water resources in the Maritza river basin. Conservation of the existing forest and reforestation practice should be also promoted in these catchments.

In the agricultural land area, especially those for steeper area, erosion control practice of the surface soil should be promoted.

Urbanization of Plovdiv will require an appropriate urban land use planning in order to absorb the future expansion of population and to strengthen urban functions as a regional center of the whole Maritza river basin.

(3) Mid-Low Stream Area

The mid-low stream area covers totally 3,569 km^2 and the population is 217,065. Many minor rivers flow to the Maritza main channel from both north and south side. These minor river basins are divided into 28 sub-basins and then grouped into two river basins, those are the Main-mid Upper Stream MM2 and the Main-mid Lower Stream MM3. Population density of this area is 61 person/km^2 and the highest value is 345 person/km^2 in the MM3-9 sub-basin where Dimitrovgrad, the local urban center of this area having 50,977 population is located.

Topographically, ratio of the mountain area is decreasing sharply but the ratio of the flat land area is increasing. The distribution of elevation in this area is that 3,273 km^2 (92 %) area is below 500 meters in elevation, and a gently sloped to flat land area is found extensively along the Maritza main channel. A low lying flat land area with less than 3 degrees (5 %) slope is found at 2,943 km^2 (83 %) in the mid-low stream area. Distribution of the steep slope area with more than 15 degrees is found only less than 1 % of the whole mid-low stream area.

The average forest coverage ratio in this area is low at 15 %, as a result, the rest of the area is utilized as an agricultural land. The MM2 river basin shows the highest agricultural land ratio in the whole study area at 66 %. The agricultural land ratio of the MM3 basin has also a high value at 60 % in average. The grass land and fruit tree area occupies 13 % of this area.

Though the area is located at the central part of the Maritza river basin, the urbanization potential will not be high except the existing urban center such as Dimitrovgrad. Most of the area will grow as a major agricultural production area.

(4) Sazliyka River Area

The Sazliyka river basin located in the north-eastern part of the study area is another main agricultural production area. This river basin is divided into 8 sub-basins. The total area of this basin is 3,343 km^2 and population is 273,543. Stara Zagora developed at the foot slope area of the western part of the Balkan Mountain is the largest urban center of this basin having 149,666 urban population. Nova Zagora is the second largest urban center in this basin, however, the urban population is rather low at 26,260 only. The population density is 82 person/km^2 in the whole basin and the highest value is 161 person/km^2 in the SAZ-7 sub-basin.

Topographically, most of the area is lower than 500 meters in altitude and a flat land area with a slope of less than 3 degree is found extensively along the Sazliyka River. For elevation, totally the area 2,444 km^2 (73 %) is found below 250 meters and 703 km^2 (21 %) is found between 250 and 500 meters. A hilly upland area with between 500 meter to 1,000 meter in elevation occupies only 6 % of the whole Sazliyka basin.

A flat land area with a less than 3 degree slope is totally 2,785 km^2 (83 %), the area with a 3 to 8 degree slope covers 526 km^2 (16 %) and the area with a more than 8 degree slope covers only 32 km^2 (less than 1%).

Under these flat land areas, tertiary sedimentary rocks and earlier quaternary sediments have developed. The surface area has been suffering from the chemical and mechanical weathering through quaternary period. Rich accumulation of humic materials provided by

vegetation through a long time makes the soil so productive that the agriculture in this area called Trace plain can be traced back to several thousand years ago.

Forest coverage ratio of this basin has the lowest value at 13 % in the whole study area and agricultural land ratio is the second largest at 65 %. The agricultural land ratio in such sub-basins as the SAZ-3, 4, 5 and 6 basin exceed 70 %.

Irrigation system has been developed densely in this river basin and river water is extensively used for the agriculture, therefore, flow volume of the river is rather limited.

Urbanization of Stara Zagora as an urban center of this area should be considered and a proper development plan for future urbanization should be prepared. The agriculture will continuously play an important role of main economical activities in this river basin.

(5) Down Stream Area

Down stream area is located close to the boundary of Turkey and Greece. Total area is 2,620 km^2 and population is 182,722. This catchment is divided into two basins, those are Harmanliyska (HAR) and the Main down stream (MD). The Harmanliyska river basin is subdivided into totally 3 sub-basins and the main down stream basin is subdivided into 21 sub-basins. Population density of the Harmanliyska basin is 134 person/km^2 and the highest value is 591 person/km^2 in the HAR-2 sub-basin where Haskovo is located. In the main down stream area MD, the population density is 31 person/km^2.

Hilly to gently sloped upland topography is well developed both in the east and west of the Maritza main channel and the elevation of this area is almost less than 500 meter. Totally the area 2,498 km^2 (95 %) is below 500 meter of which 1,611 km^2 (61 %) is below 250 meter in elevation. A flat land area is also widely distributed in this basin. The area 2,046 km^2 (78 %) is less than 3 degrees and 551 km^2 (21 %) is 3 to 8 degrees in slope.

These hilly to gently sloped lands are mainly used for agriculture and cattle grazing. The agricultural land ratio in the Harmanliyska basin is 50 % and the grass land occupies 12 % of the area. In the MD area, the agricultural land ratio is 52 % and the grass land ratio is 13 %. The distribution of forest is limited to the top of the upland and the forest coverage ratio is 22 % in Harmanliyska and 19 % in the main down stream area.

Erosion potential of this area is rather high due to an intensive use of hilly upland for agricultural. A gently sloped or undulated hill side has been dissected by small streams when it has stronger rainfall. Frost action in winter season also contributes for the surface erosion as a form of mass waste. For the protection of surface soil erosion, cultivation should be practiced along the contour line and meadows, or grass land type land use should be practiced in the sloped area to cover the soil surface.

Haskovo is the largest urban center and Harmanli having 21,349 population is the second largest in this area. Svilengrad is the nearest town to Turkey having 18,643 population. The urbanization potential of these towns is not low from a long term point of view because these towns are located along the main road connecting to Sofia and Istanbul. According to the future economic growth in the East Europe and Asia Minor or middle east countries, more commodities, traffics and tourists will move on this corridor, so that service industries will have a large potential.

The present land cover and vegetation map derived from the Corine database is shown in Fig. B.1.1.

TABLE B.1.1 SUMMARY TABLE OF LANDUSE AND PHYSICAL CONDITIONS

		Name of Catchment	Area (km2)	Population (1992)		Existing Land Use					Natural Condition								
				Total	Density per km2	Main Urban Center	Forest		Agricultural Land (Irrigated+non)		Geology Rock Type	Elevation			Slope				
							Area (km2)	Ratio (%)	Area (km2)	Ratio (%)		< 500m (%)	500-1000m (%)	>1000m (%)	<3° (%)	3°-8° (%)	8°-12° (%)	12°-15° (%)	>15° (%)
Maritza River	Upstream	Topolnitza (TOP) (TOP1~TOP4)	1,857	43,785	24	Ihitiman (12,860)	852	46	559	30	PR3,MC1 MC2,MC3	16	64	20	28	48	16	5	3
		Main Upstream1 (MU1) (MU1-1~MU1-10)	1,173	67,187	57	Kostinetz (10,641)	630	54	278	24	PC2,PR3 MC1	22	39	39	25	38	18	10	9
		Main Upstream2 (MU2) (MU2-1~MU2-6)	429	133,619	311	Pazardjik (80,921)	70	16	236	55	PR3, Qa, Qr	85	15		66	21	8	3	2
		Chepinska (CPI) (CPI-1~CPI-3)	919	59,937	65	Velingrad (26,020)	657	71	142	15	PR3, PC2	2	27	71	20	47	20	7	6
		Stara (STA)	366	44,996	123	Peshtera (20,002)	198	54	90	24	PR3, TP4	30	21	49	19	43	24	8	6
		Luda Yana (LUD) (LUD-1~LUD-3)	739	38,426	52	Panagyurishte (20,944)	262	35	363	49	PC2, MC1 MC4, Qd	38	62		41	47	9	2	1
	Mid-Central Stream	Vacha (VAC) (VAC-1~VAC-4)	1,689	46,353	27	Krichim (8,761)	1,139	67	220	13	PR3, PR2 TP4, Qa	7	12	81	16	38	25	11	10
		Chepelarska (CPE) (CPE-1~CPE-3)	979	84,454	86	Assenovgrad (52,360)	650	66	146	15	PR3, PR2 TP4	4	23	73	8	28	30	18	16
		Main-mid Stream (MM1) (MM1-1MM1-12)	1,518	434,329	286	Plovdiv (341,058)	222	15	929	61	Qd, TN1 PR3, Qr	83	17		78	11	6	3	2
		Pyassachnik (PYA)	419	16,393	39	-	164	39	174	42	PC2, PR3 TN1	62	32	6	54	31	11	3	1
		Stryama (STR) (STR-1~STR-3)	1,694	104,539	62	Karlovo (27,291)	539	32	640	38	PR3, PC2 TN1, Qa, Qd	52	26	22	48	27	11	5	9
	Mid-Lower Stream	Main-mid Upper Stream (MM2) (MM2-1~MM2-16)	1,993	130,783	66	Chirpan (19,694)	309	15	1,317	66	PC2, TP4 TN1, Qr	90	10		80	14	4	1	1
		Main-mid Lower Stream (MM3) (MM3-1~MM3-12)	1,576	86,282	55	Dimitrovgrad (50,977)	231	15	947	60	TN1, TP1 TP4	96	4		85	13	2	-	-
	Sazliyka	Sazliyka (SAZ) (SAZ-1~SAZ-8)	3,343	273,543	82	Stara Zagora (149,666) Nova Zagora (26,260)	440	13	2,179	65	TN1, TP1 Qd, MC3	94	6	-	83	16	1	-	-
	Downstream	Harmanliyska (HAR) (HAR-1~HAR-3)	986	132,092	134	Haskovo (80,700) Harmanli (21,349)	220	22	492	50	TP4, TN1 PR3, Qr	94	6		76	22	1	-	-
		Main down Stream (MD) (MD-1~MD-21)	1,634	50,630	31	Svilengrad (18,643)	308	19	852	52	PC2, PR3 TN1, TP1	96	4		79	20	1	-	-
Total		Maritza	21,314	1,747,348	82	Urban Pop. (1,177,038)	6,891	32	9,562	45	PR3, PC2 TN1, TP4 Qd, Qa, Qr	60	19	21	56	26	10	4	4

TABLE B.1.2 POPULATION BY SUB-BASIN

Main Basin	Sub Basin	Population	Area (km2)	Density (PE/km2)
CPE	CPE-1	68699	195	352
	CPE-2	5200	335	16
	CPE-3	10555	449	24
Sub-Total		84454	979	86
CPI	CPI-1	0	171	0
	CPI-2	16288	235	69
	CPI-3	43649	513	85
Sub-Total		59937	919	65
HAR	HAR-1	24999	177	141
	HAR-2	98753	167	591
	HAR-3	8340	642	13
Sub-Total		132092	986	134
LUD	LUD-1	0	212	0
	LUD-2	32001	363	88
	LUD-3	6425	164	39
Sub-Total		38426	739	52
MD	MD-1	1081	3	360
	MD-2	0	3	0
	MD-3	246	2	123
	MD-4	0	4	0
	MD-5	341	67	5
	MD-6	1032	46	22
	MD-7	348	128	3
	MD-8	19788	195	101
	MD-9	2816	96	29
	MD-10	0	95	0
	MD-11	139	55	3
	MD-12	870	56	16
	MD-13	1765	88	20
	MD-14	785	41	19
	MD-15	0	15	0
	MD-16	685	73	9
	MD-17	0	119	0
	MD-18	10715	42	255
	MD-19	6727	394	17
	MD-20	2443	37	66
	MD-21	849	75	11
Sub-Total		50630	1634	31
MM1	MM1-1	2117	19	111
	MM1-2	12915	340	38
	MM1-3	0	12	0
	MM1-4	4650	22	211
	MM1-5	18643	431	43
	MM1-6	5257	43	122
	MM1-7	0	102	0
	MM1-8	0	34	0
	MM1-9	371407	251	1480
	MM1-10	4729	205	23
	MM1-11	354	40	9
	MM1-12	14257	19	750
Sub-Total		434329	1518	286
MM2	MM2-1	28834	99	291
	MM2-2	178	23	8
	MM2-3	11858	303	39
	MM2-4	4662	68	69
	MM2-5	0	153	0
	MM2-6	11647	152	77
	MM2-7	0	2	0
	MM2-8	4480	242	19
	MM2-9	17795	117	152
	MM2-10	5711	88	65
	MM2-11	0	7	0
	MM2-12	7965	291	27
	MM2-13	20646	106	195
	MM2-14	7281	253	29
	MM2-15	9726	80	122
	MM2-16	0	9	0
Sub-Total		130783	1993	66

Main Basin	Sub Basin	Population	Area (km2)	Density (PE/km2)
MM3	MM3-1	8294	157	53
	MM3-2	1992	338	6
	MM3-3	5668	125	45
	MM3-4	0	145	0
	MM3-5	0	45	0
	MM3-6	1295	4	324
	MM3-7	134	40	3
	MM3-8	0	6	0
	MM3-9	53860	156	345
	MM3-10	10084	285	35
	MM3-11	4379	58	76
	MM3-12	576	217	3
Sub-Total		86282	1576	55
MU1	MU1-1	0	244	0
	MU1-2	32965	119	277
	MU1-3	11422	134	85
	MU1-4	0	36	0
	MU1-5	0	105	0
	MU1-6	0	29	0
	MU1-7	0	88	0
	MU1-8	10641	6	1774
	MU1-9	1768	146	12
	MU1-10	10391	266	39
Sub-Total		67187	1173	57
MU2	MU2-1	0	71	0
	MU2-2	132392	37	3578
	MU2-3	0	21	0
	MU2-4	1227	56	22
	MU2-5	0	197	0
	MU2-6	0	47	0
Sub-Total		133619	429	311
PYA	PYA	16393	419	39
Sub-Total		16393	419	39
SAZ	SAZ-1	0	109	0
	SAZ-2	2666	319	8
	SAZ-3	1647	653	3
	SAZ-4	20535	440	47
	SAZ-5	0	30	0
	SAZ-6	62122	611	102
	SAZ-7	186573	1156	161
	SAZ-8	0	25	0
Sub-Total		273543	3343	82
STA	STA	44996	366	123
Sub-Total		44996	366	123
STR	STR-1	28170	608	46
	STR-2	10469	244	43
	STR-3	65900	842	78
Sub-Total		104539	1694	62
TOP	TOP-1	0	410	0
	TOP-2	21731	669	32
	TOP-3	22054	588	38
	TOP-4	0	190	0
Sub-Total		43785	1857	24
VAC	VAC-1	24284	612	40
	VAC-2	2957	237	12
	VAC-3	12701	428	30
	VAC-4	6411	412	16
Sub-Total		46353	1689	27
Total		1747348	21314	82

TABLE B.1.3 EXISTING LANDUSE BY SUB-BASIN (1/2)

Landuse / Sub-basin	FOREST (km2)	FOREST Ratio* (%)	GRASS-LAND (km2)	BARE LANDS (km2)	Agricultural Land: NON IRRIGATED (km2)	Agricultural Land: IRRIGATED (km2)	Agricultural Land: Sub-Total (km2)	Agricultural Land: Ratio* (%)	URBAN AREA (km2)	FRUIT TREE (km2)	WATER BODY (km2)	TOTAL (km2)
CPE-1	127	65	23	5	27	2	29	15	9	2	0	195
CPE-2	231	69	38	28	36	0	36	11	1	0	0	335
CPE-3	292	65	47	22	80	0	80	18	8	0	0	449
CPE: Sub-total	**650**	**66**	**108**	**56**	**144**	**2**	**146**	**15**	**18**	**2**	**0**	**979**
CPI-1	108	63	25	2	32	2	34	20	3	1	0	171
CPI-2	132	56	16	3	51	1	51	22	12	0	21	235
CPI-3	418	82	23	5	57	0	57	11	10	0	0	513
CPI: Sub-total	**657**	**72**	**65**	**9**	**140**	**2**	**142**	**15**	**24**	**1**	**21**	**919**
HAR-1	31	17	24	21	88	0	88	50	9	4	0	177
HAR-2	24	14	6	6	102	0	102	61	15	14	0	167
HAR-3	165	26	89	46	302	0	302	47	19	16	5	642
HAR: Sub-total	**220**	**22**	**119**	**73**	**492**	**0**	**492**	**50**	**44**	**33**	**5**	**986**
LUD-1	22	10	11	2	92	63	155	73	11	11	0	212
LUD-2	159	44	27	15	147	0	147	40	10	4	0	363
LUD-3	81	50	11	5	61	0	61	37	3	2	0	164
LUD: Sub-total	**262**	**36**	**49**	**22**	**300**	**63**	**363**	**49**	**24**	**17**	**0**	**739**
MD-1	0	2	0	0	3	0	3	97	0	0	0	3
MD-2	0	2	0	0	1	2	3	97	0	0	0	3
MD-3	0	3	0	0	1	1	1	71	1	0	0	2
MD-4	1	14	0	0	0	2	2	60	0	1	0	4
MD-5	5	7	15	2	43	0	43	63	2	0	1	67
MD-6	1	2	3	3	33	1	34	73	2	4	0	46
MD-7	20	16	19	11	69	0	69	54	2	7	0	128
MD-8	42	22	55	16	66	4	70	36	5	7	0	195
MD-9	5	6	7	2	54	11	65	68	4	10	3	96
MD-10	15	15	15	15	45	0	45	47	3	3	0	95
MD-11	8	14	12	4	28	1	29	53	0	0	1	55
MD-12	3	5	14	3	24	4	28	50	3	6	0	56
MD-13	7	6	12	13	45	4	49	56	2	4	1	88
MD-14	8	19	10	2	20	0	20	49	2	0	0	41
MD-15	1	4	1	4	10	0	10	65	0	0	0	15
MD-16	10	14	5	0	33	14	47	65	3	6	1	73
MD-17	40	34	8	1	63	3	65	55	3	4	0	119
MD-18	6	15	2	0	17	7	25	59	7	2	0	42
MD-19	124	31	29	38	165	10	175	45	13	12	2	394
MD-20	7	19	3	0	13	8	21	57	1	4	1	37
MD-21	5	7	9	9	46	0	46	62	3	1	1	75
MD: Sub-total	**308**	**19**	**216**	**122**	**778**	**74**	**852**	**52**	**56**	**70**	**10**	**1634**
MM1-1	0	0	0	0	9	2	11	57	3	5	1	19
MM1-2	21	6	40	3	133	91	224	66	22	23	6	340
MM1-3	0	0	0	0	8	2	10	87	1	0	1	12
MM1-4	1	5	0	0	11	0	11	48	10	1	0	22
MM1-5	6	1	27	3	187	164	351	81	25	19	1	431
MM1-6	0	0	1	0	21	14	36	83	4	2	1	43
MM1-7	2	2	1	0	36	52	88	86	6	6	0	102
MM1-8	0	0	3	0	26	0	26	77	2	3	0	34
MM1-9	42	17	12	2	56	52	108	43	52	33	1	251
MM1-10	144	70	7	5	35	3	38	18	5	7	0	205
MM1-11	6	14	1	0	6	15	21	52	2	10	0	40
MM1-12	0	0	1	1	5	2	7	37	5	5	0	19
MM1: Sub-total	**222**	**15**	**93**	**14**	**532**	**397**	**929**	**61**	**137**	**115**	**9**	**1518**
MM2-1	2	2	6	0	80	0	80	81	5	5	1	99
MM2-2	1	4	2	0	18	0	18	78	0	0	1	23
MM2-3	80	26	13	5	176	0	176	58	17	12	0	303
MM2-4	6	9	8	2	45	0	45	67	3	4	1	68
MM2-5	31	20	4	1	100	0	100	66	5	12	0	153
MM2-6	46	30	7	7	78	3	81	53	9	3	0	152
MM2-7	0	2	0	0	1	0	1	47	0	1	1	2
MM2-8	27	11	14	2	86	84	170	70	10	16	2	242
MM2-9	2	1	5	1	36	59	95	81	12	2	1	117
MM2-10	1	1	7	1	70	0	70	80	4	6	0	88
MM2-11	0	1	2	0	5	0	5	74	0	0	0	7
MM2-12	66	23	25	4	169	0	169	58	15	10	2	291
MM2-13	4	4	8	1	79	0	79	74	6	7	1	106
MM2-14	43	17	19	8	155	0	155	61	15	12	1	253
MM2-15	1	1	2	0	64	0	64	80	8	5	1	80
MM2-16	0	1	0	1	7	0	7	78	0	0	0	9
MM2: Sub-total	**309**	**16**	**123**	**32**	**1171**	**146**	**1317**	**66**	**109**	**95**	**9**	**1993**

TABLE B.1.3 EXISTING LANDUSE BY SUB-BASIN (2/2)

Landuse / Sub-basin	FOREST	Ratio*	GRASS-LAND	BARE LANDS	Agricultural Land NON IRRIGATED	IRRIGATED	Sub-Total	Ratio*	URBAN AREA	FRUIT TREE	WATER BODY	TOTAL
	(km2)	(%)	(km2)	(km2)	(km2)	(km2)	(km2)	(%)	(km2)	(km2)	(km2)	(km2)
MM3-1	31	20	12	10	86	2	87	56	8	6	2	157
MM3-2	30	9	11	13	220	37	257	76	17	10	0	338
MM3-3	4	3	7	4	102	0	102	82	5	2	0	125
MM3-4	18	12	24	3	83	0	83	58	6	10	1	145
MM3-5	2	5	5	1	31	0	31	68	5	2	0	45
MM3-6	0	0	1	0	3	0	3	87	0	0	0	4
MM3-7	1	2	3	1	29	0	30	74	5	1	0	40
MM3-8	0	0	1	1	4	0	4	61	0	1	0	6
MM3-9	34	22	18	11	71	0	71	46	15	4	2	156
MM3-10	71	25	51	18	133	0	133	47	8	3	1	285
MM3-11	6	10	4	1	43	0	43	75	3	1	0	58
MM3-12	35	16	47	12	101	0	101	47	8	13	2	217
MM3: Sub-total	**231**	**15**	**183**	**76**	**908**	**39**	**947**	**60**	**79**	**54**	**7**	**1576**
MU1-1	73	30	28	9	74	11	86	35	11	36	1	244
MU1-2	49	41	3	3	29	19	48	41	8	7	1	119
MU1-3	114	85	3	7	8	0	8	6	1	0	0	134
MU1-4	21	58	1	7	7	0	7	18	0	0	0	36
MU1-5	60	57	17	18	4	0	4	4	2	0	4	105
MU1-6	22	76	1	1	6	0	6	19	0	0	0	29
MU1-7	54	62	11	5	15	0	15	17	3	0	0	88
MU1-8	1	11	0	0	3	0	3	56	2	0	0	6
MU1-9	76	52	11	2	48	3	52	35	5	1	0	146
MU1-10	160	60	26	23	49	2	50	19	7	1	0	266
MU1: Sub-total	**630**	**54**	**99**	**76**	**243**	**35**	**278**	**24**	**40**	**45**	**5**	**1173**
MU2-1	0	0	0	1	40	12	52	73	9	9	0	71
MU2-2	0	0	0	0	14	12	26	69	11	0	0	37
MU2-3	1	5	1	1	3	11	13	64	1	2	2	21
MU2-4	1	1	14	12	15	10	24	44	2	3	1	56
MU2-5	68	35	16	10	26	61	86	44	11	5	0	197
MU2-6	0	0	1	0	18	17	34	73	7	3	1	47
MU2: Sub-total	**70**	**16**	**32**	**23**	**114**	**121**	**236**	**55**	**43**	**22**	**3**	**429**
PYA	164	39	30	8	159	15	174	42	12	18	14	419
PYA: Sub-total	**164**	**39**	**30**	**8**	**159**	**15**	**174**	**42**	**12**	**18**	**14**	**419**
SAZ-1	12	11	11	7	74	0	74	68	3	2	1	109
SAZ-2	47	15	31	22	187	0	187	59	15	13	3	319
SAZ-3	18	3	21	83	185	281	466	71	31	18	16	653
SAZ-4	21	5	15	11	230	127	357	81	26	8	2	440
SAZ-5	1	4	1	0	10	15	24	81	4	0	0	30
SAZ-6	39	6	43	27	101	330	431	71	39	29	3	611
SAZ-7	299	26	63	34	271	361	632	55	83	42	2	1156
SAZ-8	3	11	2	4	8	0	8	30	7	1	2	25
SAZ: Sub-total	**440**	**13**	**186**	**189**	**1065**	**1114**	**2179**	**65**	**208**	**113**	**29**	**3343**
STA	198	54	35	13	84	5	90	24	18	12	1	366
STA: Sub-total	**198**	**54**	**35**	**13**	**84**	**5**	**90**	**24**	**18**	**12**	**1**	**366**
STR-1	92	15	57	24	232	127	359	59	30	43	3	608
STR-2	101	41	59	9	60	0	60	25	7	7	1	244
STR-3	346	41	165	54	215	6	221	26	31	19	5	842
STR: Sub-total	**539**	**32**	**281**	**88**	**507**	**133**	**640**	**38**	**68**	**69**	**9**	**1694**
TOP-1	125	31	34	15	142	53	195	48	15	24	2	410
TOP-2	366	55	64	5	206	0	206	31	16	6	6	669
TOP-3	274	47	143	35	117	0	117	20	17	2	1	588
TOP-4	87	46	26	27	42	0	42	22	4	5	0	190
TOP: Sub-total	**852**	**46**	**268**	**82**	**506**	**53**	**559**	**30**	**51**	**36**	**9**	**1857**
VAC-1	386	63	62	27	73	17	90	15	10	33	5	612
VAC-2	141	59	28	19	46	0	46	19	3	0	0	237
VAC-3	297	69	38	26	63	1	64	15	4	0	0	428
VAC-4	316	77	42	27	20	0	20	5	2	0	5	412
VAC: Sub-total	**1139**	**67**	**171**	**98**	**202**	**18**	**219**	**13**	**18**	**33**	**10**	**1689**
Total	**6891**	**32**	**2056**	**982**	**7345**	**2216**	**9562**	**45**	**949**	**735**	**139**	**21314**

*:Ratio to total area of sub- or main-basin

TABLE B.1.4 ELEVATION DISTRIBUTION BY SUB-BASIN (1/2)

(unit:km2)

Main Basin	Sub-Basin	Elevation							Total
		0 - 100m	100 - 250m	250 - 500m	500 - 1000m	1000 - 1500m	1500 - 2000m	over 2000m	
CPE	CPE-1	0	22.7	16.4	67.4	88.0	0.4	0	195
	CPE-2	0	0	0	85.9	196.5	52.7	0	335
	CPE-3	0	0	0	73.5	268.8	106.7	0	449
Sub-Total		0	22.7	16.4	226.8	553.3	159.8	0	979
CPI	CPI-1	0	10.0	8.9	103.4	47.2	1.4	0	171
	CPI-2	0	0	0	92.2	129.5	13.7	0	235
	CPI-3	0	0	0	49.5	308.4	152.1	3.1	513
Sub-Total		0	10.0	8.9	245.1	485.1	167.2	3.1	919
HAR	HAR-1	5.6	160.8	10.7	0	0	0	0	177
	HAR-2	0	125.3	41.7	0	0	0	0	167
	HAR-3	0	240.3	344.6	57.0	0	0	0	642
Sub-Total		5.6	526.4	397.0	57.0	0	0	0	986
LUD	LUD-1	0	83.4	120.7	7.8	0	0	0	212
	LUD-2	0	0	47.9	266.7	48.4	0	0	363
	LUD-3	0	0	25.6	95.5	42.8	0	0	164
Sub-Total		0	83.4	194.3	370.1	91.2	0	0	739
MD	MD-1	3.0	0	0	0	0	0	0	3
	MD-2	3.4	0	0	0	0	0	0	3
	MD-3	1.7	0	0	0	0	0	0	2
	MD-4	4.0	0	0	0	0	0	0	4
	MD-5	7.8	37.0	22.1	0	0	0	0	67
	MD-6	5.6	29.5	10.6	0	0	0	0	46
	MD-7	9.5	47.3	61.7	9.5	0	0	0	128
	MD-8	11.5	46.4	98.0	39.0	0	0	0	195
	MD-9	30.4	51.0	14.3	0	0	0	0	96
	MD-10	2.3	37.8	47.5	8.0	0	0	0	95
	MD-11	4.1	21.9	27.1	1.8	0	0	0	55
	MD-12	2.8	32.0	21.7	0	0	0	0	56
	MD-13	14.0	65.0	9.4	0	0	0	0	88
	MD-14	0.6	25.7	14.3	0	0	0	0	41
	MD-15	4.0	10.9	0	0	0	0	0	15
	MD-16	41.3	25.2	6.3	0	0	0	0	73
	MD-17	20.0	65.9	29.2	4.0	0	0	0	119
	MD-18	22.7	17.6	2.1	0	0	0	0	42
	MD-19	14.3	252.0	124.9	2.3	0	0	0	394
	MD-20	25.2	11.5	0	0	0	0	0	37
	MD-21	14.9	59.5	0.5	0	0	0	0	75
Sub-Total		243.1	836.2	489.7	64.6	0	0	0	1634
MM1	MM1-1	0	18.9	0	0	0	0	0	19
	MM1-2	0	185.0	135.6	18.3	0.6	0	0	340
	MM1-3	0	11.5	0	0	0	0	0	12
	MM1-4	0	22.3	0	0	0	0	0	22
	MM1-5	0	260.3	168.1	3.1	0	0	0	431
	MM1-6	0	43.0	0	0	0	0	0	43
	MM1-7	0	95.1	6.9	0	0	0	0	102
	MM1-8	0	33.8	0	0	0	0	0	34
	MM1-9	0	163.3	34.4	42.4	10.9	0	0	251
	MM1-10	0	13.6	18.2	33.7	102.4	37.1	0	205
	MM1-11	0	29.2	5.7	5.2	0	0	0	40
	MM1-12	0	19.0	0	0	0	0	0	19
Sub-Total		0	895.0	368.9	102.7	113.9	37.1	0	1518
MM2	MM2-1	0	73.7	23.9	1.5	0	0	0	99
	MM2-2	0	22.9	0	0	0	0	0	23
	MM2-3	0	95.9	152.6	54.7	0.0	0	0	303
	MM2-4	0	68.0	0	0	0	0	0	68
	MM2-5	0	82.7	66.7	3.7	0	0	0	153
	MM2-6	0	67.8	31.7	51.2	1.3	0	0	152
	MM2-7	0	1.7	0	0	0	0	0	2
	MM2-8	0	158.7	59.0	24.1	0	0	0	242
	MM2-9	0	117.0	0	0	0	0	0	117
	MM2-10	0	87.3	0.7	0	0	0	0	88
	MM2-11	0	6.9	0	0	0	0	0	7
	MM2-12	0	126.2	111.9	48.3	4.8	0	0	291
	MM2-13	0	106.0	0	0	0	0	0	106
	MM2-14	0	123.6	77.2	37.6	14.7	0	0	253
	MM2-15	0	80.2	0	0	0	0	0	80
	MM2-16	0	9.2	0	0	0	0	0	9
Sub-Total		0	1227.6	523.6	221.0	20.7	0	0	1993

TABLE B.1.4 ELEVATION DISTRIBUTION BY SUB-BASIN (2/2)

(unit:km2)

Main Basin	Sub-Basin	Elevation							Total
		0 - 100m	100 - 250m	250 - 500m	500 - 1000m	1000 - 1500m	1500 - 2000m	over 2000m	
MM3	MM3-1	11.5	145.5	0	0	0	0	0	157
	MM3-2	5.9	285.5	46.6	0	0	0	0	338
	MM3-3	1.1	120.9	2.9	0	0	0	0	125
	MM3-4	0	92.4	50.6	1.9	0	0	0	145
	MM3-5	0	44.7	0	0	0	0	0	45
	MM3-6	3.2	0.9	0	0	0	0	0	4
	MM3-7	6.9	33.2	0	0	0	0	0	40
	MM3-8	0	6.0	0	0	0	0	0	6
	MM3-9	19.3	136.8	0	0	0	0	0	156
	MM3-10	0.9	128.1	117.8	38.2	0	0	0	285
	MM3-11	1.1	56.7	0	0	0	0	0	58
	MM3-12	0	101.4	99.6	16.1	0	0	0	217
Sub-Total		49.8	1152.0	317.5	56.2	0	0	0	1576
MU1	MU1-1	0	20.0	135.2	88.8	0	0	0	244
	MU1-2	0	29.7	40.7	26.7	20.9	0.8	0	119
	MU1-3	0	0	6.5	18.0	68.4	41.2	0	134
	MU1-4	0	0	12.2	16.8	7.0	0	0	36
	MU1-5	0	0	1.3	11.1	26.5	47.7	18.5	105
	MU1-6	0	29.0	0	0	0	0	0	29
	MU1-7	0	0	1.0	26.8	17.1	21.1	22.2	88
	MU1-8	0	0	2.2	3.9	0	0	0	6
	MU1-9	0	0	1.1	138.0	6.8	0	0	146
	MU1-10	0	0	0	111.5	50.8	47.4	56.5	266
Sub-Total		0	78.7	200.1	441.5	197.4	158.1	97.1	1173
MU2	MU2-1	0	71.0	0	0	0	0	0	71
	MU2-2	0	37.2	0	0	0	0	0	37
	MU2-3	0	14.5	6.5	0	0	0	0	21
	MU2-4	0	26.9	29.2	0	0	0	0	56
	MU2-5	0	57.9	78.5	41.8	18.3	0	0	197
	MU2-6	0	47.0	0	0	0	0	0	47
Sub-Total		0	254.5	114.2	41.8	18.3	0	0	429
PYA	PYA	0	62.7	198.7	133.2	24.3	0	0	419
Sub-Total		0	62.7	198.7	133.2	24.3	0	0	419
SAZ	SAZ-1	12.6	68.2	28.1	0	0	0	0	109
	SAZ-2	2.6	178.4	130.9	7.1	0	0	0	319
	SAZ-3	4.4	603.6	45.1	0	0	0	0	653
	SAZ-4	18.1	419.7	2.7	0	0	0	0	440
	SAZ-5	1.7	28.1	0	0	0	0	0	30
	SAZ-6	0	497.2	110.6	3.4	0	0	0	611
	SAZ-7	0	584.9	385.5	185.6	0	0	0	1156
	SAZ-8	6.8	18.3	0	0	0	0	0	25
Sub-Total		46.1	2398.3	702.8	196.1	0	0	0	3343
STA	STA	0	35.5	72.7	80.2	139.2	38.4	0	366
Sub-Total		0	35.5	72.7	80.2	139.2	38.4	0	366
STR	STR-1	0	326.6	243.0	38.5	0	0	0	608
	STR-2	0	0	72.5	125.2	19.3	18.7	8.4	244
	STR-3	0	0	247.0	285.4	209.8	96.4	3.6	842
Sub-Total		0	326.6	562.5	449.1	229.1	115.1	12.0	1694
TOP	TOP-1	0	60.6	187.2	158.0	4.5	0	0	410
	TOP-2	0	0	38.7	603.5	27.2	0	0	669
	TOP-3	0	0	1.0	286.8	253.0	44.5	2.1	588
	TOP-4	0	0	0	144.6	38.7	6.6	0	190
Sub-Total		0	60.6	227.0	1193.0	323.5	51.2	2.1	1857
VAC	VAC-1	0	67.1	32.2	162.8	245.2	103.2	1.8	612
	VAC-2	0	0	0	10.9	130.0	93.9	1.7	237
	VAC-3	0	0	0	15.1	263.7	143.4	5.9	428
	VAC-4	0	0	0	14.8	127.7	268.0	1.6	412
Sub-Total		0	67.1	32.2	203.6	766.6	608.5	11.0	1689
Total		344.6	8037.4	4426.5	4081.9	2962.7	1335.3	125.3	21314

TABLE B.1.5 AREA OF SUB-BASIN CATEGORIZED WITH SLOPE OF DEGREE BY SUB-BASIN (1/2)

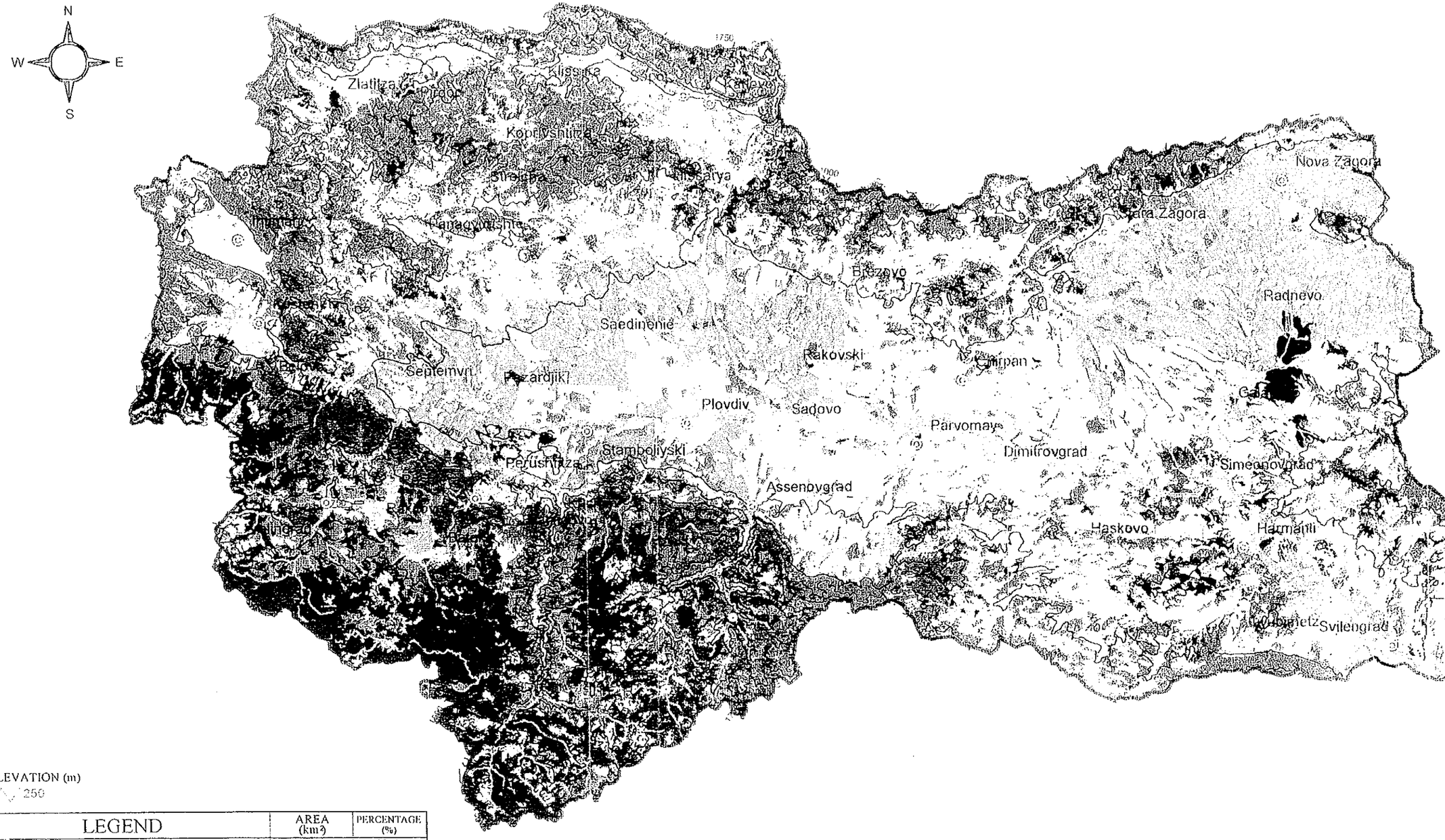
(unit:km2)

Main Basin	Sub-Basin	Slope (Degree)									Total
		0-3	3-8	8-12	12-15	15-20	20-25	25-30	30-35	35-40	
CPE	CPE-1	32.5	56.9	50.0	27.5	20.9	7.1	0.5	-	-	195
	CPE-2	19.8	78.3	97.6	64.8	60.4	12.5	1.3	0.3	-	335
	CPE-3	22.9	135.2	150.3	88.0	45.1	6.7	0.5	-	-	449
Sub-Total		75.2	270.5	297.9	180.3	126.3	26.3	2.3	0.3	-	979
CPI	CPI-1	26.7	48.1	35.0	24.8	29.4	6.8	-	-	-	171
	CPI-2	62.2	116.3	44.0	11.6	1.3	-	-	-	-	235
	CPI-3	97.8	272.0	104.9	25.3	11.7	1.2	-	-	-	513
Sub-Total		186.7	436.4	183.9	61.6	42.3	8.0	-	-	-	919
HAR	HAR-1	146.4	30.4	-	-	-	-	-	-	-	177
	HAR-2	164.5	2.3	-	-	-	-	-	-	-	167
	HAR-3	442.4	188.4	10.6	0.8	-	-	-	-	-	642
Sub-Total		753.3	221.1	10.6	0.8	-	-	-	-	-	986
LUD	LUD-1	180.2	31.9	-	-	-	-	-	-	-	212
	LUD-2	85.3	221.5	45.6	9.0	1.3	-	-	-	-	363
	LUD-3	36.8	95.9	22.2	6.9	2.3	-	-	-	-	164
Sub-Total		302.4	349.3	67.8	16.0	3.5	-	-	-	-	739
MD	MD-1	3.4	-	-	-	-	-	-	-	-	3
	MD-2	3.1	-	-	-	-	-	-	-	-	3
	MD-3	2.0	-	-	-	-	-	-	-	-	2
	MD-4	3.3	0.3	-	-	-	-	-	-	-	4
	MD-5	54.5	12.5	-	-	-	-	-	-	-	67
	MD-6	44.9	1.3	-	-	-	-	-	-	-	46
	MD-7	88.6	38.0	1.1	-	-	-	-	-	-	128
	MD-8	125.8	65.2	3.8	0.3	-	-	-	-	-	195
	MD-9	86.6	8.9	-	-	-	-	-	-	-	96
	MD-10	67.4	27.1	0.5	-	-	-	-	-	-	95
	MD-11	40.8	14.0	-	-	-	-	-	-	-	55
	MD-12	51.3	4.8	-	-	-	-	-	-	-	56
	MD-13	74.9	13.3	-	-	-	-	-	-	-	88
	MD-14	38.7	2.2	-	-	-	-	-	-	-	41
	MD-15	15.0	-	-	-	-	-	-	-	-	15
	MD-16	64.1	8.8	-	-	-	-	-	-	-	73
	MD-17	80.2	35.3	3.5	-	-	-	-	-	-	119
	MD-18	39.5	2.8	-	-	-	-	-	-	-	42
	MD-19	309.6	83.0	1.8	-	-	-	-	-	-	394
	MD-20	27.7	9.1	-	-	-	-	-	-	-	37
	MD-21	71.5	3.6	-	-	-	-	-	-	-	75
Sub-Total		1292.7	330.3	10.7	0.3	-	-	-	-	-	1634
MM1	MM1-1	19.3	-	-	-	-	-	-	-	-	19
	MM1-2	315.1	16.5	4.8	3.0	0.3	-	-	-	-	340
	MM1-3	12.5	-	-	-	-	-	-	-	-	12
	MM1-4	22.3	-	-	-	-	-	-	-	-	22
	MM1-5	414.4	16.2	-	-	-	-	-	-	-	431
	MM1-6	43.2	-	-	-	-	-	-	-	-	43
	MM1-7	101.0	0.6	-	-	-	-	-	-	-	102
	MM1-8	33.9	-	-	-	-	-	-	-	-	34
	MM1-9	157.2	42.5	28.9	18.3	4.0	-	-	-	-	251
	MM1-10	24.1	80.2	61.8	25.4	12.0	1.8	-	-	-	205
	MM1-11	29.9	9.5	0.8	-	-	-	-	-	-	40
	MM1-12	18.6	-	-	-	-	-	-	-	-	19
Sub-Total		1191.5	165.4	96.4	46.7	16.3	1.8	-	-	-	1518
MM2	MM2-1	89.3	9.5	0.3	-	-	-	-	-	-	99
	MM2-2	23.3	-	-	-	-	-	-	-	-	23
	MM2-3	182.3	110.1	11.1	-	-	-	-	-	-	303
	MM2-4	67.7	-	-	-	-	-	-	-	-	68
	MM2-5	136.8	15.7	0.1	-	-	-	-	-	-	153
	MM2-6	86.7	40.8	20.5	2.5	1.3	-	-	-	-	152
	MM2-7	2.3	-	-	-	-	-	-	-	-	2
	MM2-8	196.1	34.6	11.0	-	-	-	-	-	-	242
	MM2-9	117.0	-	-	-	-	-	-	-	-	117
	MM2-10	88.0	-	-	-	-	-	-	-	-	88
	MM2-11	6.7	-	-	-	-	-	-	-	-	7
	MM2-12	225.2	29.4	22.4	7.0	5.6	1.2	-	-	-	291
	MM2-13	104.8	0.9	-	-	-	-	-	-	-	106
	MM2-14	180.3	31.9	18.7	11.4	9.5	1.0	-	-	-	253
	MM2-15	80.0	-	-	-	-	-	-	-	-	80
	MM2-16	9.4	-	-	-	-	-	-	-	-	9
Sub-Total		1596.1	272.8	84.2	20.9	16.4	2.2	-	-	-	1993

TABLE B.1.5 AREA OF SUB-BASIN CATEGORIZED WITH SLOPE OF DEGREE BY SUB-BASIN (2/2)

(unit:km2)

Main Basin	Sub-Basin	Slope (Degree)									Total
		0-3	3-8	8-12	12-15	15-20	20-25	25-30	30-35	35-40	
MM3	MM3-1	152.5	4.0	-	-	-	-	-	-	-	157
	MM3-2	318.6	19.7	-	-	-	-	-	-	-	338
	MM3-3	123.5	1.6	-	-	-	-	-	-	-	125
	MM3-4	119.9	24.3	1.0	-	-	-	-	-	-	145
	MM3-5	44.7	0.3	-	-	-	-	-	-	-	45
	MM3-6	4.1	0.3	-	-	-	-	-	-	-	4
	MM3-7	36.4	3.4	-	-	-	-	-	-	-	40
	MM3-8	5.0	0.9	-	-	-	-	-	-	-	6
	MM3-9	143.6	12.2	-	-	-	-	-	-	-	156
	MM3-10	193.1	73.9	16.0	2.1	-	-	-	-	-	285
	MM3-11	56.2	2.0	-	-	-	-	-	-	-	58
	MM3-12	149.6	54.2	10.8	2.3	-	-	-	-	-	217
Sub-Total		1347.2	196.8	27.7	4.4	-	-	-	-	-	1576
MU1	MU1-1	110.7	119.0	11.3	2.6	0.4	-	-	-	-	244
	MU1-2	51.2	20.9	29.3	11.6	5.8	0.8	-	-	-	119
	MU1-3	10.2	48.1	39.6	18.9	15.1	2.0	0.3	-	-	134
	MU1-4	6.5	13.6	8.1	3.8	3.8	0.3	-	-	-	36
	MU1-5	4.4	31.4	28.7	21.1	17.2	1.8	-	-	-	105
	MU1-6	1.9	12.0	10.9	2.9	1.3	-	-	-	-	29
	MU1-7	12.1	20.1	18.9	16.4	16.9	3.6	0.5	-	-	88
	MU1-8	4.6	1.2	-	-	-	-	-	-	-	6
	MU1-9	37.3	92.4	11.6	4.4	0.5	-	-	-	-	146
	MU1-10	53.1	92.3	50.4	35.2	23.0	10.2	1.5	-	-	266
Sub-Total		292.0	450.9	208.8	116.8	84.0	18.6	2.3	-	-	1173
MU2	MU2-1	70.8	0.4	0.0	-	-	-	-	-	-	71
	MU2-2	36.9	-	-	-	-	-	-	-	-	37
	MU2-3	19.4	1.6	-	-	-	-	-	-	-	21
	MU2-4	25.2	26.1	4.7	-	-	-	-	-	-	56
	MU2-5	85.6	60.7	28.8	11.6	9.3	0.5	-	-	-	197
	MU2-6	46.9	-	-	-	-	-	-	-	-	47
Sub-Total		284.8	88.7	33.6	11.6	9.3	0.5	-	-	-	429
PYA	PYA	224.6	129.2	46.5	12.0	5.8	1.3	-	-	-	419
Sub-Total		224.6	129.2	46.5	12.0	5.8	1.3	-	-	-	419
SAZ	SAZ-1	103.6	5.4	-	-	-	-	-	-	-	109
	SAZ-2	277.0	41.8	0.3	-	-	-	-	-	-	319
	SAZ-3	641.6	11.4	-	-	-	-	-	-	-	653
	SAZ-4	436.2	3.5	-	-	-	-	-	-	-	440
	SAZ-5	29.3	0.2	-	-	-	-	-	-	-	30
	SAZ-6	520.4	90.1	0.3	-	-	-	-	-	-	611
	SAZ-7	751.6	373.0	30.2	1.5	-	-	-	-	-	1156
	SAZ-8	25.5	-	-	-	-	-	-	-	-	25
Sub-Total		2785.2	525.5	30.8	1.5	-	-	-	-	-	3343
STA	STA	68.9	156.6	92.8	27.5	20.0	0.3	-	-	-	366
Sub-Total		68.9	156.6	92.8	27.5	20.0	0.3	-	-	-	366
STR	STR-1	499.1	94.1	12.9	1.5	-	-	-	-	-	608
	STR-2	65.5	112.2	24.3	9.4	14.8	10.0	6.8	0.8	0.5	244
	STR-3	236.7	256.5	151.9	79.4	79.8	31.7	5.5	0.8	-	842
Sub-Total		801.2	462.8	189.2	90.2	94.6	41.7	12.3	1.5	0.5	1694
TOP	TOP-1	176.0	193.6	35.4	4.4	0.8	-	-	-	-	410
	TOP-2	205.8	366.1	82.6	11.9	2.5	-	-	-	-	669
	TOP-3	111.0	234.3	138.0	53.7	44.2	6.8	-	-	-	588
	TOP-4	34.6	90.7	38.7	15.1	10.8	-	-	-	-	190
Sub-Total		527.3	884.7	294.7	85.2	58.3	6.8	-	-	-	1857
VAC	VAC-1	91.2	154.2	180.8	97.6	70.1	16.2	2.0	0.3	-	612
	VAC-2	10.6	83.0	85.3	37.7	18.1	2.4	-	-	-	237
	VAC-3	63.6	188.0	93.0	42.7	34.7	5.6	0.3	-	-	428
	VAC-4	101.6	216.1	59.7	19.9	12.9	1.8	-	-	-	412
Sub-Total		266.9	641.3	418.8	197.9	135.8	25.9	2.3	0.3	-	1689
Total		11996.0	5582.4	2094.3	873.8	612.5	133.3	19.0	2.0	0.5	21314



ELEVATION (m)

250

LEGEND	AREA (km²)	PERCENTAGE (%)
BROAD-LEAVED FOREST	3497	16.4
CONIFEROUS FOREST	1867	8.8
MIXED FOREST	1573	7.4
GRASSLAND	2053	9.6
NON-IRRIGATED AGRICALTURAL LAND	7280	34.2
IRRIGATED LAND	2229	10.5
FRUIT TREES/VINEYARDS	740	3.5
URBAN AREA	935	4.4
WATER BODIES	137	0.4
BARE LAND	957	4.5

FIG.B.1.1 VEGETATION MAP

Scale 1:700000

10 0 10 20 km

LEGEND	AREA km²	PERCENTAGE
BROADLEAVED FOREST	3497	16.4
CONIFEROUS FOREST	1867	8.8
MIXED FOREST	1573	7.4
GRASSLAND	2058	9.6
SCLEROPHYLLOUS VEGETATION	7280	34.2
IRRIGATED LAND	2229	10.5
PASTURES AND MEADOWS	743	3.5
URBAN AREA	935	4.4
WATER BODIES	137	0.4
BARE LAND	957	4.5

FIG.B.1.1 VEGETATION MAP

Scale 1:700000

10 0 10 20 km