3. Economic and Financial Evaluation for the Master Plan

3.1 Background

This section presents economic and financial evaluation for the proposed master plan. Two conditions need to be satisfied in the project evaluation. First, any environmental project should be checked for viability from the national economy point of view. Second, any project should be examined if its financial and social costs would be within affordable and acceptable limits.

3.2 Conceptual and Analytical Frameworks

(1) Objectives of Improving Environmental Quality

The objective of improving environmental quality in general is to attain such a level of environmental quality that is sustainable, while supporting various socio-economic activities by human beings at the maximum level possible under such conditions. It is not to realize the cleanest environment nor to restore the pristine natural environment.

Most, if not all, of the human activities involve some pollution or loads to the environment to different degrees. In maximizing the level of various socio-economic activities, the environmental quality would be degraded to such an extent that those human activities could not be sustained. Human activities may be maximized only to the level that would maintain the environmental quality at a sustainable level. The sustainability is the key in both ways in defining the appropriate level of environmental quality. The objective of improving environmental quality, expressed conversely, is to attain the optimum level of pollution from the viewpoint of human beings at present and in the future.

The environment is not static, but rather represents a dynamic state of various elements incessantly interacting one another. Also the environment, however broadly it may be

defined, is subject to external forces. For the environment to be sustainable any constituent elements should not become excessively dominant over others nor should they be dominantly affected by any external forces or stress.

To be sustainable, the environment should be sufficiently robust with strong internal structure, resilient to changes caused by internal or external factors, and not vulnerable to external forces. Such conditions can be ensured only by a certain degree of bio-diversity. Thus, the objective of improving environmental quality is to attain an appropriate degree of bio-diversity.

The environment, if narrowly defined to treat human activities as external, should have sufficient bio-diversity to ensure that it would be robust, resilient and non-vulnerable to changes caused directly or indirectly by human activities. The environment, if broadly defined with human activities, should be sufficiently robust, resilient and non-vulnerable to maintain the bio-diversity that would allow the maximum level of human activities.

(2) Benefits of Improving Environmental Quality

As clarified above, the key in defining the appropriate level of environmental quality is sustainability in two ways: sustainability of environment under the stress of human activities, and sustainability of human activities under given environmental conditions or the degree of bio-diversity. Accordingly, the benefit of improving environmental quality may be defined with respect either to incremental level of human activities that may be supported by the improved environmental quality or to the bio-diversity of the environment itself. The former is measurable at least conceptually, while the latter generally is not.

Measurable benefits of improving water-related environmental quality consist of the following.

1) Increase in regional income derived from:

i) Agriculture due to

- improved land use and management,
- increased availability of productive land, and
- increased availability of water

ii) Other production activities due to

- increased availability of land, and
- increased availability of water,

iii) Recreational and related activities due to

- improved landscape and amenity, and
- higher bio-diversity:

2) Lower social costs for medical and related services due to reduced incidence of water-borne diseases and other health hazards as a result of improved ambient water quality, better availability of drinking water, and rehabilitation of polluted land; and

3) Saving in water treatment costs in downstream areas resulting from improved ambient water quality.

Regional income benefits are more directly measurable. Benefits of lower social costs for medical and related services may also be measurable as savings in medical and hygienic costs. Alternatively, they may also be measured indirectly by increase in regional income, as they would allow more resources, including financial resources and time, to be devoted to other productive activities.

(3) Evaluation Methods for the Master Plan

Based on the perception clarified in the previous subsection and within the frameworks established above, the Master Plan for the integrated environmental management of the Maritza river basin is evaluated in two ways: 1) Evaluation from the national economy point of view and 2) Evaluation of affordability from households and municipality points of view. The evaluation from the national economy point of view assesses the total investment for the Master Plan projects over the planning period up to the year 2015 in the light of public investments that are expected and likely to be devoted to water and wastewater works.

Affordability from households point of view is evaluated by using the results of the survey conducted by the JICA Study Team and other national statistics. This involves estimating the unit value of water for consumers, as the value of improved water quality is measured as increased availability (quantity) of better quality water.

Some kind of user charges need to be introduced to ensure the financial viability of the projects from the municipality point of view. To determine an appropriate level of the user charges, the willingness –to pay by family for improved water quality is estimated. Also, financial conditions of the municipalities are examined to see if initial investment costs would not be excessive loads.

3.3 Evaluation from the National Economy Point of View

(1) Public Investments in the Past

Public investments in Bulgaria in the recent past are analyzed by the national statistics. The fixed capital expenditure by the public sector has been decreasing in real terms since 1992. Its proportion to the GDP was at its peak with 20.3 percent in 1992. It has declined since then, largely compensated by increase in private investments to maintain the total at more

or less 15 percent of the GDP in recent years

Fixed Capital Expenditure in Bulgaria and Its Proportion to GDP

(Unit: Lev. x 10^6; ratio to GDP in parenthesis)

	1990	1991	1992	1993	1994	1995	1996
Fixed Capital expenditure	9, 793	24, 778 (15. 9)	43, 627 (20. 7)	43, 547 (14. 2)	84, 208 (15. 7)	125, 876 (14. 3)	268, 207 (15. 3)
Public	9, 440	24, 193 (15. 5)	42, 695 (20. 3)	33, 630 (11. 0)	51, 330 (9. 6)	69, 928 (7. 9)	164, 876 (9. 4)
Private	359	635	928	9, 642	32, 517	55, 948	103, 322
GDP		155,747	210, 320	306, 197	536, 577	880, 322	1,748, 701

Source: Statistical Yearbook 1995, 1997

The fixed capital expenditure by the public sector on environment increased its share in the total fixed capital expenditure from 2.2 percent in 1992 to the peak of 4.4 percent in 1994. The share declined since then. The share of public expenditure on water works also increased to reach 2.6 percent of the total in 1994, and declined since then.

Fixed Capital Expenditure on Environment and Its Share in Public Capital Expenditure

(Unit: Lev. x 10^6; % share in parenthesis)

	1990	1991	1992	1993	1994	1995	1996
Public capital expenditure	9, 440	24, 193	42, 695	33, 630	51, 330	69, 928	164, 876
Capital Expenditure on Environment	245 (2. 6)	672 (2. 8)	956 (2. 2)	1, 191 (3. 5)	2, 233 (4. 4)	2, 158 (3. 1)	4, 640 (2. 8)
Expenditure on water and wastewater	100 (1. 1)	339 (1. 4)	562 (1. 3)	728 (2. 2)	1, 309 (2. 6)	982 (1. 4)	2, 134 (1. 3)

Source: Statistical Yearbook 1995, 1997

(2) Projection of Public Investments

The total public investment may not increase as rapidly as investments by the private sector, as more privatization is implemented. It is expected, however, both public and private investments will increase in real terms, as the Bulgarian economy recovers from the

present turmoil. In the Maritza river basin, the GRDP is projected to increase at rates higher than expected at the national level, according to the socio-economic framework for the basin to the year 2015 (Section 2). Both public and private investments are expected to increase more rapidly. In general, the following relationship is observed over some extended period of time:

$$\frac{\text{Ratio of total investment to GRDP (\%)}}{\text{Growth rate of GRDP (\% p. a.)}} = \text{ICOR}$$

Where ICOR is the incremental capital-to output ratio.

According to the socio-economic framework for the Maritza river basin, the GRDP is projected to increase at an average rate of 6.8 percent per annum. Assuming a reasonable ICOR value in the range of 3.5 - 4.0, the ratio of the total investment to the GRDP may be more or less 25 percent. This level of investment is larger than observed at the national level in the recent past, but necessary for the Maritza river basin to attain the projected economic growth. Of this total investment 15 percent may be contributed by the public sector, while remaining 10 percent by the private sector.

The share of public investments on environment in general should increase in the future after attaining stability of the national economy. Especially in the Maritza river basin, the shares of public investments in environment in general and water and wastewater works in particular should increase to the levels higher than attained at the national level in the recent past. It is assumed for the projection purpose, these shares will become 5 percent and 3 percent respectively of the total public investment.

Based on these assumptions, the GRDP, the total fixed capital expenditure, and its allocations to the environment and the water and wastewater works are projected.

Projection of Fixed Capital Expenditure and Investment Requirements for Water and Wastewater Works

(Unit: US$ x 10^6)

Year	GRDP	Stage	Cumulative GRDP	Public capital expenditure			Investment requirements for water and wastewater works
				Total	Environment	Water and Wastewater works	
1995	2, 300						
2000	3, 000						
2001	3, 200						
2002	3, 400						
2003	3, 600	I	18, 100	2, 715	135. 8	81. 5	186.5
2004	3, 800						
2005	4, 100						
2006	4, 400						
2007	4, 800						
2008	5, 200	II	25, 900	3, 885	194. 3	116. 6	56.6
2009	5, 500						
2010	6, 000						
2011	6, 400						
2012	6, 900						
2013	7, 400	III	37, 300	5, 595	279. 8	167. 9	90.8
2014	8, 000						
2015	8, 600						
Total				12, 195	609. 9	366. 0	333.9

Source: JICA Study Team

(3) Evaluation of Master Plan Investments

Investment costs necessary for the Master Plan implementation have been estimated. The total investment is compare by stage with the projected public fixed capital expenditure. As seen from the table, the total investment cost for water and wastewater works estimated by the Master Plan at US$ 333.9 million is smaller than the projected total public fixed capital expenditure of US$ 366.0 million up to the year 2015. However, the investment requirement for Stage I is much larger than the projected public fund allocation during the stage.

Given the expected recovery and the renewed growth of the Bulgarian economy, the

estimated investments on water and wastewater works in the Maritza river basin may be tolerable over the medium to the long term. Whether larger public investments can be made on water and wastewater works in the Maritza river basin during Stage I depends on the recovery of the Bulgarian economy in the next few years and the national policy on environmental improvement as a prerequisite to sustainable economic growth in the median to the long term.

Public investment requirements during initial stages may be reduced in two ways. One way is to defer the implementation of some priority schemes or adopt stage-wise implementation if technically feasible. The other way is to mobilize more financial resources in the private sector: i.e. to fast track the privatization.

However, there is some flexibility between expenditure between environment and water/wastewater fields. The combined total is US$ 217.3 million for Stage I and US$ 975.9 million up to Year 2015. Therefore, considering the combined public capital expenditure for environment with water/wastewater works, financial viability for the M/P will become higher. Actual implementation for the Stage I projects is necessary to be conducted from the highest priority projects such as WWTPs of Pazardijk, Dimitrovgrad and Stara Zagora as well as strengthening of monitoring systems. It is reasonable to introduce some concessional loans to reinforce the investment to implement the Stage I Projects.

3.4 Evaluation of Affordability

(1) Unit Value of Water

As clarified above, the value of improved water quality may be measured on the basis of increased availability (quantity) of better quality water. The unit value of water to consumers is estimated here by two methods: one by using domestic water and the other based on irrigation water.

The JICA Study Team conducted a survey on domestic water use in the Maritza river basin. Results related to water charges are summarized in the following table. The overall average for water charges is calculated to be Lev. 267/m^3. Considering the slightly biased sampling against rural areas having smaller unit water charges, the average water charge in the river basin may be more or less Lev. 250/ m^3.

User Charges for Domestic Water Use according to Sample Survey

Item	Urban areas	Semi-urban areas	Rural areas	River basin
Number of families	110	125	70	305
No. of family members	355	426	267	1,048
Monthly water charge (Lev./family)				
Summer	3,598	4,217	3,537	3,838
Winter	1,538	2,264	1,489	1,824
Unit water charge (Lev./m^3)				
Summer	308	357	250	312
Winter	195	238	160	206

Source: JICA Study Teams survey in 1997.

The water charge in general represents the marginal value of water for consumers. The unit value of water, as the average, is usually much larger than the marginal value: i.e. the value of the last unit of water consumed. The difference is most likely larger than the difference in value between water supplied to consumers and its source of water. Therefore, the established value of Lev. 250/m^3 may represent rather a conservative estimate of the water that can be used as a source of water supply.

Unit value-added of irrigated agriculture has been estimated at Lev. 20,000/ha (in 1995 prices), and that of non- irrigated arable land at Lev. 8,000/ha (Section 3. 2). Therefore, the incremental value-added due to irrigation is Lev. 12,000/ ha. The average irrigation water use is assumed to be 800mm per annum or 8,000 m3/ha. The unit value of irrigation water is thus calculated at Lev. 1.5/m^3 in 1995 prices or Lev. 40/m^3 in 1997 prices.

The calculated value of Lev. 40/m^3 of irrigation water is a legitimate estimate of economic value of water to be used for irrigation, which yields lower returns although lower quality water can be used. In accordance with the system of ambient water quality standards for surface water in Bulgaria, the unit value of first class water may be taken to be Lev. 250m^3, while that of third class water to be Lev. 40/m^3.

(2) Willingness-to-pay for Improved Water Quality

The willingness-to pay for improved water quality is estimated here by two indirect method: one based on domestic water use and the other based on expenditure for hygienic and health purposes. According to the same survey, the domestic water use is some 120 liter/capita/day in summer and 80 liter/capita/day in winter. Differences between urban, semi-urban and rural areas are small. Of the total amount, some 30 liter/capita/day may be used for most basic needs that can not be sacrificed under any conditions. If the water quality of water supply source is degraded excessively, this would be the amount of water used by individuals as water treatment costs and thus water charges would become extremely high. In other words, better water quality would allow individuals to enjoy the use of additional water at 90 liter/capita/day in summer and 50 liter/capita/day in winter.

Consumers use the additional amount of water by paying the water charge as they derive at least that amount of benefit equivalent to the water charge. Actually, however, the unit value of water for consumers is much higher than the water charge as clarified above. The estimated value Lev. 250/m^3 is regarded as a conservative estimate of value of the additional water. The total amount of water used additionally in excess of the basic needs is 21.9/m^3/capita/year. Thus the total value of the additional water use is calculated at Lev. 5,475/capita/year. An average family, therefore, would be willing to pay some Lev. 19,000/year.

According to the national statistics, the average household expenditure on hygiene and

health care shared 3.3 – 3.7 percent of the total household expenditure during 1994-1997 with the average share at 3.4 percent. According to the sample survey of the JICA Study Team, majorities of families in urban, semi-urban and rural areas have average annual income in the range of US$ 500-1,000 in 1997. The overall average family income may be US$ 800 or Lev. 1,400,000. Applying the ratio at the national level above, Lev. 49,000 may have been used for hygiene and health care. Prevention and treatment of water-borne diseases constitute a good portion of the total medical bill. Thus this expense may represent the upper bound of the willingness-to-pay for improved water quality.

(3) Affordability

The sample survey shows that affordability for household consumers to pay the water charge is about Lev. 2,400/month or Lev. 29,000/year per family on an average. On the other hand, the willingness-to-pay by family for improved water quality has been estimated indirectly to be in the range of Lev. 19,000 – 49,000/year. This implies that the user charge for water supply and sewerage system may be more or less doubled once a domestic wastewater treatment plant becomes operational.

Subsidies from the National Government to the municipalities were in the range of Lev. 3,500 – 8,000/capita in 1996 and Lev. 30,000 – 65,000/capita in 1997 for most municipalities in the Maritza river basin. Subsidy data of the 1st Stage towns for wastewater treatment plant installation according to the Master Plan are shown in the following table.

Government Subsidies for Municipalities Selected for 1st Stage Implementation of Water and Wastewater Plants

		Government Subsidies			
		1996 (Lev x10^3)		1997 (Lev x10^3)	
Municipality	Population	Total	Per capita(Lev)	Total	Per capita(Lev)
Pazardjik	90 286	713 074	7 898	5 453 725	60 405
Plovdiv	344 336	1 159 054	3 366	10 884 008	31 609
Assenovgrad	52 360	196 199	3 747	1 356 707	25 911
Dimitrovgrad	50 977	232 322	4 557	1 619 347	31 766
Haskovo	80 959	427 704	5 246	4 111 133	50 780
Stara Zagora	149 666	679 238	4 538	5 637 145	37 665
Velingrad + Rakitovo	58 672	375 706	6 403	2 905 801	49 526

Source: Ministry of Finance

The per capita subsidies on an average decreased in real terms from some US$ 35 in 1996 to US$ 25 in 1997. Per capita investment costs of wastewater treatment plants have been estimated by the Master Plan for municipalities in the river basin. They range in US$ 41 – 75 for primary treatment and US$ 86 – 148 for primary and secondary treatment. Thus even the investments for primary and secondary treatment are equivalent to a few years subsidies from the national government except a few municipalities.

While the government subsidies constitute the bulk of revenues for many small municipalities, larger municipalities have much larger local revenues. Therefore, the larger municipalities, responsible for the bulk of wastewater discharges, can afford investments for primary and secondary treatment.

TABLE J.1.1 POPULATION IN THE STUDY AREA

Region	Municipality	Population		
		Urban	Rural	Total
		1 177 038	**570296**	**1 747 334**
Plovdiv	Assenovgrad	52 360	15513	67 873
	Brezovo	2 280	8 103	10 383
	Kaloyanovo		15144	15 144
	Karlovo	45243	31126	76 369
	Maritza		32130	32130
	Plovdiv	341 058		341058
	Parvomay	16 809	18762	35 571
	Rakovski	15 799	12723	28 522
	Rodoppi	27362	51440	78 802
	Sadovo	2 647	14360	17 007
	Saedinenie	6 801	6547	13 348
	Hisarya	9 149	8811	17960
	Borino		4329	4329
	Devin	6 411	10164	16575
	Lakki	3 461	1738	5199
	Chepelare	6 264	4291	10555
	Smolyan		2153	2153
	Batak	4 468	3 062	7530
	Belovo	5 016	6 406	11422
	Bratzigovo	5 022	7 160	12182
	Velingrad	26 020	17 629	43649
	Lessichevo		7 042	7042
	Pazardjik	80 921	51 471	132392
	Panagyurishte	20 944	11 057	32001
	Peshtera	20 002	2 785	22787
	Rakitovo	8 672	7 616	16288
	Septemvri	9 365	23 600	32965
	Strelcha	5 063	1 362	6425
	Sub-total	**721 137**	**376 524**	**1097661**
Haskovo	Dimitrovgrad	53 579	19 239	72818
	Lyubimetz	8 499	3567	12066
	Mineralniv.Bani		7583	7583
	Svilengrad	18 643	6343	24986
	Simeonovgrad	8 294	3655	11949
	Stambolovo		5409	5409
	Topolovgrad		2666	2666
	Harmanli	21 349	9680	31029
	Haskovo	80 700	21301	102001
	Bratya Daskalovi		11 707	11707
	Galabovo	9 473	7 800	17273
	Opan		4 425	4425
	Radnevo	14 203	11 885	26088
	Stara Zagora	149 666	25 022	174688
	Chirpan	19 694	9 140	28834
	Sub-total	**384 100**	**149 422**	**533522**
Burgas	Nova Zagora	26 260	23 306	49566
Sofia	Anton		1 768	1768
	Zlatitza	5 635	955	6590
	Ihtiman	12 860	5 578	18438
	Koprivshtitza	3 006		3006
	Kostenetz	10 641	5 365	16006
	Mirkovo		3 293	3293
	Pirdop	8 373	947	9320
	Samokov	5 026		5026
	Chavdar		1 504	1504
	Chelopech		1 634	1634
	Sub-total	**45 541**	**21 044**	**66585**

Source: National Statistical Institute
Note: The population is calculated according census 1992

TABLE J.1.2 URBAN POPULATION IN THE STUDY AREA

Region	Municipality	Populated place	Urban Population
Burgas	Nova Zagora	Nova Zagora	26 260
Haskovo	Chirpan	Chirpan	19 694
Haskovo	Dimitrovgrad	Dimitrovgrad	50 977
Haskovo	Galabovo	Galabovo	9 473
Haskovo	Harmanli	Harmanli	21 349
Haskovo	Haskovo	Haskovo	80 700
Haskovo	Lyubimetz	Lyubimetz	8 499
Haskovo	Dimitrovgrad	Merichleri	2 602
Haskovo	Radnevo	Radnevo	14 203
Haskovo	Simeonovgrad	Simeonovgrad	8 294
Haskovo	Stara Zagora	Stara Zagora	149 666
Haskovo	Svilengrad	Svilengrad	18 643
Plovdiv	Assenovgrad	Assenovgrad	52 360
Plovdiv	Batak	Batak	4 468
Plovdiv	Belovo	Belovo	5 016
Plovdiv	Bratzigovo	Bratzigovo	5 022
Plovdiv	Brezovo	Brezovo	2 280
Plovdiv	Chepelare	Chepelare	6 264
Plovdiv	Devin	Devin	6 411
Plovdiv	Hisarya	Hisarya	9 149
Plovdiv	Karlovo	Kalofer	4 273
Plovdiv	Karlovo	Karlovo	27 291
Plovdiv	Karlovo	Klilsura	1 905
Plovdiv	Rodoppi	Krichim	8 761
Plovdiv	Lakki	Lakki	3 461
Plovdiv	Panagyurishte	Panagyurishte	20 944
Plovdiv	Parvomay	Parvomay	16 809
Plovdiv	Pazardjik	Pazardjik	80 921
Plovdiv	Rodoppi	Perushtitza	5 586
Plovdiv	Peshtera	Peshtera	20 002
Plovdiv	Plovdiv	Plovdiv	341 058
Plovdiv	Rakitovo	Rakitovo	8 672
Plovdiv	Rakovski	Rakovski	15 799
Plovdiv	Sadovo	Sadovo	2 647
Plovdiv	Saedinenie	Saedinenie	6 801
Plovdiv	Septemvri	Septemvri	9 365
Plovdiv	Karlovo	Sopot	11 774
Plovdiv	Rodoppi	Stamboliyski	13 015
Plovdiv	Strelcha	Strelcha	5 063
Plovdiv	Velingrad	Velingrad	26 020
Sofia	Samokov	Dolna Banya	5 026
Sofia	Ihtiman	Ihtiman	12 860
Sofia	Koprivshtitza	Koprivshtitza	3 006
Sofia	Kostenetz	Kostenetz	10 641
Sofia	Pirdop	Pirdop	8 373
Sofia	Zlatitza	Zlatitza	5 635
		TOTAL	**1 177 038**

Source: National Statistical Institute
Note: The population is calculated according census 1992

TABLE J.1.3 BASIN-WISE POPULATION IN THE STUDY AREA

Major tributary basin	Sub-basin	Urban	Rural	Total
Chepelarska R.	CPE-1	52 360	19 391	71 751
	CPE-2	3461	1738	5 199
	CPE-3	6264	4291	10555
Total		62 085	25 420	**87 505**
Chepinska R.	CPI-2	8672	7 616	16288
	CPI-3	26 020	17 629	43 649
Total		34692	25 245	**59937**
Harmanliyska R.	HAR-1	21 349	3 650	24 999
	HAR-2	80 700	18053	98 753
	HAR-3		8340	8340
Total		102 049	30 043	**132 092**
Luda Yana R.	LUD-2	20 944	11 057	32 001
	LUD-3	5 063	1 362	6 425
Total		26 007	12 419	**38 426**
Maritza R.	MD	27142	23488	50630
	MM	479976	168353	648329
	MU	110969	89837	200806
		618087	281678	**899765**
Pyassachnik R.	PYA		16393	16393
Total			16393	**16393**
Sazliyka R.	SAZ-2		2 666	2 666
	SAZ-3		1647	1647
	SAZ-4	9 473	11062	20 535
	SAZ-6	40463	21659	62122
	SAZ-7	149 666	36907	186 573
Total		199 602	73 941	**273 543**
Stara R.	STA	29 492	15504	44 996
Total		29 492	15504	**44 996**
Striyama R.	STR-1	9 149	19 021	28 170
	STR-2	4 273	6196	10 469
	STR-3	40970	24930	65900
Total		54 392	50 147	**104 539**
Topolnitza R.	TOP-2	12860	8871	21731
	TOP-3	17014	5040	22054
Total		29874	13911	**43785**
Vacha R.	VAC-1	14347	9937	24284
	VAC-2		2957	2957
	VAC-3	6411	12701	19112
Total		20758	25595	**46353**

TOTAL	**1 177 038**	**570 296**	**1 747 334**

TABLE J.1.4 GROSS DOMESTIC PRODUCT BY ECONOMIC SECTOR, 1989-95

(Unit: million leva in 1995 prices)

	1989	1990	1991	1992	1993	1994	1995
Agriculture	143,304	197,555	135,630	98,470	82,915	97,968	111,041
Industry	777,852	570,832	423,228	330,993	272,831	255,832	272,699
Services	388,529	344,889	323,777	388,347	423,691	433,829	401,262
GDP	1,309,685	1,113,277	882,636	817,809	779,436	787,629	785,002

Sources: Statistical Yearbook 1996 (1991-95)
Statistical Reference Book, Economics of Bulgaria,1993

TABLE J.1.5 EMPLOYMENT BY ECONOMIC SECTOR

	1989	1990	1991	1992	1993	1994	1995
Agriculture	814,246	757,527	696,454	694,007	712,575	751,503	782,918
Industry	2,032,306	1,864,016	1,510,133	1,298,869	1,218,696	1,167,564	1,144,164
Services	1,518,482	1,475,305	1,357,450	1,280,869	1,290,567	1,322,534	1,355,101
Total	4,365,034	4,096,848	3,564,037	3,273,661	3,221,838	3,241,601	3,282,183

Source: Statistical Yearbook 1994,1996

TABLE J.1.6 CONTRIBUTION OF PRIVATE SECTOR IN GDP BY SECTOR

(Private sector share in parenthesis) (Unit: million leva in current prices)

	1991		1992		1993		1994		1995	
	Total	Private sector	Total	Private sector	Total	Private sector	Total	Private sector	Total	Private sector
Agriculture	20,139	7,272 (36.1)	23,329	13,384 (57.2)	29,694	21,414 (72.1)	60,184	49,956 (83.0)	111,041	90,297 (81.3)
Industry	62,843	3,495 (5.6)	78,417	8,376 (10.7)	97,708	17,891 (18.3)	180,790	34,546 (19.1)	272,699	80,090 (29.4)
Services	48,076	25,202 (30.0)	92,005	29,647 (32.2)	151,735	66,361 (43.7)	268,668	123,452 (45.9)	401,262	219,268 (54.6)
Total	131,058	25,202 (17.5)	193,751	51,407 (26.5)	279,137	105,666 (37.9)	509,642	207,954 (40.8)	785,002	389,607 (49.6)

Source: NSI, Macro-Economic Indicators 1995.

TABLE J.1.7 SOCIO-ECONOMIC CHARACTERISTICS OF THE STUDY AREA

	Unit	Upstream	Mid-central	Mid-lower	Sazliika	Downstream	Study Area	Bulgaria
1.Area								
Total land area	km^2	5,482	6,299	3,569	3,343	2,620	21,314	111,011
2.Population (1995)								
Total population		378,950	689,119	214,000	273,543	182,722	1,747,334	8,384,715
Population density	km^2	70,8	109,0	60,3	81,8	69,7	82,0	75,5
Urbanization ratio	%	59.6	72.3	55.7	73.0	70.7	67.4	67.8
3.Land use								
Agricultural land	km^2	1,801	2,344	2,412	2,292	1,448	10,296	62,786
Arable land	%	84.4	75.9	92.3	51.4	94.9	78.5	74.8
Irrigation land	%	15.6	24.1	7.7	48.6	5.1	21.5	16.2
Forest land	km^2	2,669	2,715	539	440	528	6,891	38,107
4.Economic structure (1995)								
Agriculture	%						13.0	14.1
Industry	%						40.3	34.7
Services	%						46.8	51.1
5.Employment structure (1995)								
Agriculture	%						22.8	23.8
Industry	%						39.5	33.9
Services	%						37.8	42.3
6.Main crops		Wheat, Vegetables, Rice, Fruits, Potatoes	Wheat, Vegetables, Rye, Tobacco	Wheat, Cotton, Grapes, Barley	Grapes, Barley, Sunflower, Tobacco	Cotton, Tobacco, Grapes, Vegetables		
7.Characteristic industries		Mining, Metallurgy, Pharmaceuticals Pulp & paper, Wood processing, Wines	Textile, Dairy, Cosmet.&perfum, Electric device, Pharmaceuticals, Tobacco, Agric.mashinery, Pulp & paper	Textile, Electricity, Cement, Fertilizer, Coal mining, Cosmet.&perfum, Dairy, Meat products	Vegetable oils, Fertilizer &agro Chemicals, Coal mining, Briquetts, Electricity, Tobacco	Textile, Tobacco, Dairy, Wines		
8.Municipal water supply								
Unit domestic water use	l/cap/day	186	165	208	126	119	160	
Loss ratio	%	42.7	41.4	33.3	51.5	32.4	42.7	
9.Urban sewerage systems								
Service ratio	%	77.9	88.3	88.3	88.7	80.0	85.3	
10.Municipal account								
Per capita revenue	Lev.	4,137	5,076	3,255	5,125	4,332	4,587	4,553
Per capita expenditure	Lev.	7,977	8,811	7,683	8,184	8,411	8,350	8,114

Source: *1, 4, 5, 6, 7* – JICA Study Team; *2, 3, 8, 9, 10* - NSI

TABLE J.1.8 SHARES OF DISTRICT POPULATION WITHIN MARITZA RIVER BASIN, 1995

(Unit: 1,000)

Chapter 3 District	Total population	Population in Maritza River Basin	Share (%)
Plovdiv	1,214.0	1,092.9	90.0
Haskovo	897.9	549.9	61.2
Sofia	966.5	66.6	6.9
Bourgas	846.5	48.7	5.8
Maritza river basin		1,758.0	20.9 % of total national population

TABLE J.1.9 SHARES OF MARITZA RIVER BASIN BY VARIOUS INDICES

Index	Unit	Bulgaria	Maritza river basin	Share (%)
Land area	km^2	110,994	21,084	19.0
Population, 1995	1.000	8,406.1	1,758.0	20.9
Arable land	km^2	4,693	823.9	17.6
Livestock population*				
Cattle		631,739	160,300	25.4
Pigs		2,140,011	378,200	17.7
Sheep		2,386,451	575,000	24.1
Livestock products*				
Milk	10^3 l	1,404,221	327,500	23.3
Eggs	10^3	1,954,955	313,300	16.0

* District statistics allocated to Maritza river basin by population share

TABLE J.2.1 EXPENDITURE OF CROP PRODUCTION WITH AND WITHOUT IMPROVED FARM MANAGEMENT

(1) Without improved farm management

(Unit: US$/ha)

Crop	Labor cost	Other variable costs*	Fixed costs**	Total costs	Total costs less labor costs
Wheat	11.8	208.9	37.8	258.4	246.6
Barley	11.8	187.9	37.8	237.4	225.6
Maize	44.4	175.0	86.1	305.5	261.1
Sunflower	7.8	69.7	10.0	87.5	79.7
Sugar beet	58.8	49.0	10.0	117.8	59.0
Tobacco	459.5	357.0	118.0	934.6	475.1
Vegetables	277.6	119.8	38.5	435.9	158.3
Fruit orchard	84.4	64.8	32.5	181.7	97.3
Grapes-vineyard	57.7	76.4	22.5	156.6	98.9
Melons	97.7	45.4	23.5	166.6	68.9
Other crops	46.6	52.2	16.0	114.8	68.2
Alfalfa	16.7	13.1	22.5	52.3	35.6

(2) With improved farm management

(Unit: US$/ha)

Crop	Labor cost	Other variable costs*	Fixed costs**	Total costs	Total costs less labor costs
Wheat	12.1	233.0	43.4	288.5	276.4
Barley	12.1	211.7	43.4	267.2	255.1
Maize	50.0	219.5	86.1	355.6	305.6
Sunflower	7.8	78.9	23.0	109.7	101.9
Sugar beet	71.0	49.2	43.7	163.9	92.9
Tobacco	466.2	355.4	118.0	939.6	473.4
Vegetables	306.4	141.1	38.5	486.0	179.6
Fruit orchard	126.6	75.4	32.5	234.5	107.9
Grapes-vineyard	73.3	83.0	22.5	178.8	105.5
Melons	115.4	60.8	23.5	199.7	84.3
Other crops	128.8	67.6	16.0	212.4	83.6
Alfalfa	21.1	13.1	22.5	56.7	35.6

* Seed, fertilizer, chemicals, mechanization and others

** Water fee, insurance and others

Source: JICA, Feasibility Study on the Project for Agricultural Reform in Bulgaria.

TABLE J.2.2 INDICATIVE BUDGETS OF CROP PRODUCTION WITH AND WITHOUT IMPROVED FARM MANAGEMENT

Crop	Yield ton/ha		Price* Lev./kg '95 prices	Gross production value Lev./ha		Value-added V/A Lev/ha		% V/A
	Without	with		without	with	without	with	
Wheat	2.5	3.0	10	25,000	30,000	8,000	11,000	37.5
Barley	2.8	3.4	9	25,000	31,000	10,000	14,000	40.0
Maize	4.0	4.8	10	40,000	48,000	22,000	27,000	22.7
Sunflower	1.2	1.5	7.5	9,000	11,000	4,000	4,000	0.0
Sugar beet	16	19	0.7	11,000	13,000	7,000	7,000	0.0
Tobacco	1.4	1.7	100	140,000	170,000	108,000	138,000	27.8
Vegetables	15	18	10	150,000	180,000	139,000	168,000	20.9
Fruit orchard	4.5	5.4	7	32,000	38,000	25,000	31,000	24.0
Grapes-vineyard	4.5	5.4	12	54,000	65,000	47,000	58,000	23.4
Melons	12	14	2.0	24,000	28,000	19,000	22,000	15.8
Other crops				25,000	30,000	20,000	24,000	20.0
Alfalfa	3.5	4.2	1.4	5,000	6,000	3,000	4,000	33.3

* Farmgate price expressed in US dollars converted at US$ 1 = Lev. 68.1 (1995
Source: JICA Study Team

TABLE J.2.3 ESTIMATION OF AGRICULTURAL VALUE ADDED BY AGRICULTURAL LAND USE CATEGORY, 1995

Agricultural land use	Area ha	Unit V/A* Lev./ha	Value added* Million Lev.	Explanation
Annual crops associated with permanent crops	3,328	50,000	166	Mixed cropping of permanent crops and annual crops
Complex cultivation	71,268	15,000	1,069	Mixture of maize, sunflower and other upland crops
Fruit trees and berries	29,249	25,000	731	Fruit orchards
Agriculture with significant natural vegetation	208,945	2,000	418	Some 20% of land under crops of low unit V/A
Grassland	68,152	0	0	
Non-irrigated arable land	419,206	8,000	3,353	Mostly grains
Pastures	55,308	0	0	
Irrigated land	198,974	20,000	3,979	Mixture of maize, vegetables, fodder and other crops
Paddy fields	22,813	20,000	456	Paddy only
Vineyards	43,201	40,000	1,728	Some 85% of land productive
Total-agricultural land	1,120,444		11,900	
Livestock and others			8,100	Difference between agricultural V/A and crop V/A
Total agricultural value-added			20,000	Estimated separately

* in 1995 prices
Source: JICA Study Team

TABLE J.2.4 PROJECTION OF AGRICULTURAL VALUE ADDED BY AGRICULTURAL LAND USE CATEGORY, 2015

Agricultural land use	**Area ha**	**Unit V/A* Lev./ha**	**Value added* million Lev.**	**Explanation**
Annual crops associated with permanent crops Complex cultivation	74,596	50,000	3,730	Mixed farming with diversified crops
Fruit trees and berries	29,249	30,000	877	Yield increase through improved farm management
Agriculture with significant natural vegetation	208,945	8,000	1,672	Horizontal expansion to use area under natural vegetation
Grassland	68,152	0	0	
Non-irrigated arable land	419,206	15,000	6,288	Mostly grains under improved farm management
Pastures	55,308	-	-	Partly managed pastures reflected in livestock V/A
Irrigated land	198,974	24,000	4,775	More diversified crops and yield increase of existing crops
Paddy	22,813	24,000	548	Yield increase through improved farm management
Vineyards	43,201	40,000	1,728	Yield increase but reduction in area of productive land (~70%)
Total-agricultural land			19,600	2.53% p.a.
Livestock and others			16,400	3.59% p.a.
Total agricultural value-added			36,000	2.98% p.a.

* in 1995 prices
Source: JICA Study Team

TABLE J.2.5 PRODUCTION AND EXPORT VALUE BY SUB-SECTOR OF BULGARIAN ECONOMY AND STUDY AREA'S CONTRIBUTION TO PRODUCTION

(10^6 Lev., 1995 prices)

	1989			1991			1993			1995			
	Production	Export	Export/production %	Production	Export	Export/production %	Production	Export	Export/production %	Production	Export	Export/production %	Study Area's share %
Coal	21,442	-	0.0	27,073	-	0.0	19,490	3	0.0	13,158	38	0.3	73
Oil and gas	695	-		593	-		947	-	-	720	-	-	0
Ferrous metallurgy	83,454	8,504	10.2	72,162	13,341	18.5	36,953	29,319	79.3	51,427	39,081	76.0	1
Non-ferrous metallurgy	49,205	-	0.0	39,391	-	-	28,339	-	-	42,696	-	-	39
Machinery & metal works	342,782	144,704	42.2	135,940	68,936	50.7	72,240	31,790	44.0	66,382	41,398	62.4	23
Electrical & electronics	285,006	127,695	44.8	89,592	48,874	54.6	34,373	16,349	47.6	31,051	14,058	45.3	15
Chemicals & oil products	263,001	47,451	18.0	229,485	107,627	46.9	122,557	75,470	61.6	181,478	93,293	51.4	11
Building materials	65,882	1,655	2.5	32,145	2,593	8.1	16,187	3,920	24.2	18,301	6,089	33.3	12
Wood products	50,529	3,640	7.2	29,134	6,283	21.6	19,527	9,111	46.7	18,524	9,432	50.9	25
Pulp & paper	20,714	844	4.1	21,026	1,394	6.6	9,664	2,396	24.8	15,857	4,583	28.9	49
China & glass products	15,420	850	5.5	11,799	1,993	16.9	9,044	2,008	22.2	11,197	3,762	33.6	18
Textile	93,844	7,147	7.6	44,961	11,496	25.6	26,988	9,756	36.2	26,911	11,846	44.0	26
Apparel	41,363	6,608	16.0	17,153	4,149	24.2	9,541	9,502	99.6	8,725	11,339	130.0	16
Leather & footwear	30,079	4,004	13.3	13,409	3,287	24.5	9,706	8,511	87.7	9,290	8,992	96.8	23
Printing	8,868	453	5.1	8,870	290	3.3	7,235	144	1.6	9,463	355	3.8	50
Food, beverages & tobacco	423,125	55,961	13.2	274,917	71,213	25.9	147,696	49,611	33.6	112,733	60,782	53.9	23
Others	84,645			28,596			7,397			1,641			
Total	1,962,086	433,979	22.1	1,170,342	367,236	31.4	577,885	278,226	48.1	619,554	339,998	54.9	
Crops				118,234	9,449	8.0	87,469	5,233	6.0	59,087	6,984	11.8	
Livestock				100,509	3,933	3.9	94,185	3,798	4.0	57,141	3,107	5.4	

Source: NSI, Statistical Yearbook, 1994 and 1996

TABLE J.2.6 PAST PERFORMANCE AND FUTURE PROSPECT OF INDUSTRY BY SUB-SECTOR

Sub-sector	Performance in recent past (1989-95)	Prospect for future
Coal Oil and gas	- Produced almost exclusively for domestic market - Production value decreased but not much - Production quantity of coal was steady	-Production will increase only in response to domestic demand as the economy recovers
Ferrous metallurgy	-Production value declined ,but export value increased -Dependence on export market has become significant -Production quantity recovering fast for most products	-Comparative advantage for export -Domestic market will recover also.
Non-ferrous metallurgy	-Produced exclusively for domestic market -Production value declined but sign of recovery seen	-Production will increase steadily as the economy recovers.
Machinery and metal works	-Production declined sharply, no sign of recovery, yet -Export decline sharply, but sign of recovery seen	-Both export and domestic markets will recover only slowly
Electrical and electronics	-Production and export declined sharply, no sign of recovery -Impact value increasing	-No comparative advantage for most products -Only slaw growth with specialization
Chemicals and oil products	-Production value declined, but export value increased -production quantity recovering fast for most products	-Comparative advantage for export -Domestic market will recover steadily
Building materials Wood products Pulp and paper China and glass products	-Production value declined but started to increase -Export processing increased with increased import	-Export may taper off as domestic demand increases -Import will also increase
Textile Apparel Leather and footwear	-Production value declined sharply , but export value increased -Export processing increased with increased import	-Domestic demand and export processing will determine future production
Printing	-Production value steady -No trend for export value	-Will increase only marginally
Food, beverages and tobacco	-Production value declined sharply -Export value steady due to established markets and reputation -Production quantity increasing for some products -Import increasing rapidly	-Domestic market will recover with products diversification -Export market may expand with further specialization

Source: JICA Study Team based on Table 2.6 and NSI, Statistical Yearbook 1996

TABLE J.2.7 CHANGES IN EXPORT AND IMPORT STRUCTURE BY COUNTRY

(%)

Country	**Export**		**Import**	
	1989	1995	1989	1995
Former USSR	66.1	34.8	55.8	45.7
Eastern Europe (excluding E. Germany)	12.7	13.6	14.5	7.5
Western Europe (including E. Germany)	12.9	39.4	21.1	38.4
Asia	3.9	5.1	2.4	1.5
Africa	2.3	2.8	1.9	1.6
America	2.1	4.3	4.2	4.6
Oceania	0.0	0.1	0.0	0.7
Total export/import value (10^6 Lev.)				
in current prices	**13,673**	**359,664**	**12,796**	**380,012**
in 1995 price	**452,443**	**359,664**	**423,422**	**380,012**

Source: NSI, Statistical Yearbook, 1994 and 1996

TABLE J.2.8 ASSESSMENT OF INDUSTRIAL DEVELOPMENT BY SUB-SECTOR IN THE MARITZA RIVER BASIN

Sub-sector	Constraints	Prospects
Coal	-Air pollution associated with coal thermal power -Land degradation -No export market	-Production will increase but only slowly in response to domestic demand.
Oil & gas	-No resources	N.A.
Ferrous metallurgy	-No resources	-Low growth may be induced by companies in other regions
Non-ferrous metallurgy	-Depreciated facilities -Air and water pollution -Soil contamination -No export market	-This is the most promising sub-sector in the Study Area due to the availability of raw materials -Domestic demand will increase steadily as the economy recovers.
Machinery & metal works	-Significant reduction in export market -Heavy debts by some companies -Outdated equipment or inadequate production lines	-Some existing companies will survive, as they are competitive in foreign markets. -Others need substantial investments to improve their operation, or otherwise will be closed.
Electrical & electronics	-Significant reduction in domestic and export markets -Outdated equipment or inadequate production lives -Depreciated assets	-Only limited products will be viable in domestic and export markets. -The sub-sector as a whole will grow only slowly with specialization.
Chemicals & oil products	-Some outdated equipment	-This sub-sector is promising with additional foreign investments especially for high value products such as perfumery, cosmetics, pharmaceuticals and condiments.
Building materials	-Depressed construction industry -Limited production capacity -Outdated facilities	-This sub-sector seems viable supported by good quality raw materials as indicated by good export performance even during the depressed domestic market.
Wood products	-Insufficient raw materials due to dominant export of forestry products	-Domestic processing for high value products seems promising.
Pulp & paper	-Reduction in domestic market -Depreciated assets	-The sub-sector itself seems viable as manifested by good export performance even during the depressed domestic market, but in the Study Area renovation of facilities may be necessary.
Textile Apparel	-Reduction in domestic and export markets	-Export-processing will survive and expand. -Existing production capacities can be utilized if markets recover.
Leather & footwear	-Lack of raw and other materials -Reduction in domestic ad export markets	-Raw materials base may be expanded by import for export-processing in medium term and by boosting livestock sector in long term.
Food	-Reduced raw materials availability due to decline in agricultural production	-This sub-sector has very good prospects for product diversification in domestic market and for specialization in export market.

Source: JICA Study Team based on:
- Production and export/import statistics on industrial goods by NSI,
- Ministry of Territorial Development and Construction , National Center for Territorial Development and Housing Policy, "Strategy for Territorial Development of the Republic of Bulgaria"
- Organization and Development of Transboundary Areas of the Republic of Bulgaria with the Republic of Greece, and
- Limited field observations and interviews.

TABLE J.2.9 QUALITATIVE ASSESSMENT OF INDUSTRIAL GROWTH PROSPECT IN MID- TO LONG TERM BY SUB-SECTOR IN BULGARIA AND ASSUMED GROWTH IN THE MARITZA RIVER BASIN

	Growth prospect			Study Area's contribution	Prospect in Study Area*	Assumed growth** % p.a.
	Domestic market	Export market	Overall			
Coal	medium	n.a.	Low	Large	Medium	65
Oil and gas			n.a.	n.a.	n.a.	-
Ferrous metallurgy	medium	high	High	Very small	Low	6.0
Non-ferrous metallurgy	medium	n.a.	Medium	Large	High	8.5
Machinery & metal works	low	low	Low	Large	Medium	7.5
Electrical & electronics	low	low	Low	Medium	Low	6.0
Chemicals & oil products	medium	high	High	Medium	High	8.5
Building materials	medium	low	Medium	Medium	Medium	6.5
Wood products	medium	low	Low	Large	Medium	6.5
Pulp & Paper	medium	low	Medium	Large	High	8.5
China & glass products	medium	low	Medium	Medium	Medium	6.5
Textile	medium	medium	Medium	Large	High	9.5
Apparel	medium	medium	Medium	Medium	Medium	7.5
Lather & footwear	medium	medium	Medium	Large	High	9.5
Printing	medium	low	Low	Large	Medium	7.5
Food, beverage & tobacco	medium	high	High	Large	High	8.5

* Prospects in Study Area

	Study Area's contribution		
	Large	*Medium*	*Small*
Overall *High* prospect *Medium* *Low*	High	High	Medium
	High	Medium	Low
	Medium	Low	Low

** Assumed growth (% p.a.)

	Indigenous resource-based	More foot-loose
Prospect in Maritza river basin *High*	6.0	-
Low *Medium*	6.5	7.5
	8.5	9.5

Source: JICA Study Team based on Tables 2.7 and 2.9

TABLE J.2.10 INDICATIVE PROJECTION OF INDUSTRIAL VALUE ADDED BY SUB-SECTOR

	Estimated Value Added 1995 million Lev.	Assumed growth* 1995-2015 % p.a.	Projected Value Added 2015 million Lev.
Coal	2,100	6.5	7,400
Oil and gas	0	-	0
Ferrous metallurgy	100	6.0	300
Non-ferrous metallurgy	5,800	8.5	29,600
Machinery & metal work	6,300	7.5	26,800
Electrical & electronics	1,500	6.0	4,800
Chemicals & oil products	4,900	8.5	25,000
Building materials	700	6.5	2,500
Wood products	1,500	6.5	5,300
Pulp & paper	2,300	8.5	11,800
China & glass products	700	6.5	2,500
Textile	2,600	9.5	16,000
Apparel	800	7.5	3,400
Leather & footwear	900	9.5	5,500
Printing	1,700	7.5	7,200
Food, beverages & tobacco (including "others")	8,100	8.5	41,400
Private sector	6,100	-	-
Total – Mining and manufacturing	46,100		189,500
Construction	9,200		35,600
Utilities	6,500		37,900
Total industrial value-added	61,800		263,000

* Table 3.10
Source: JICA Study Team

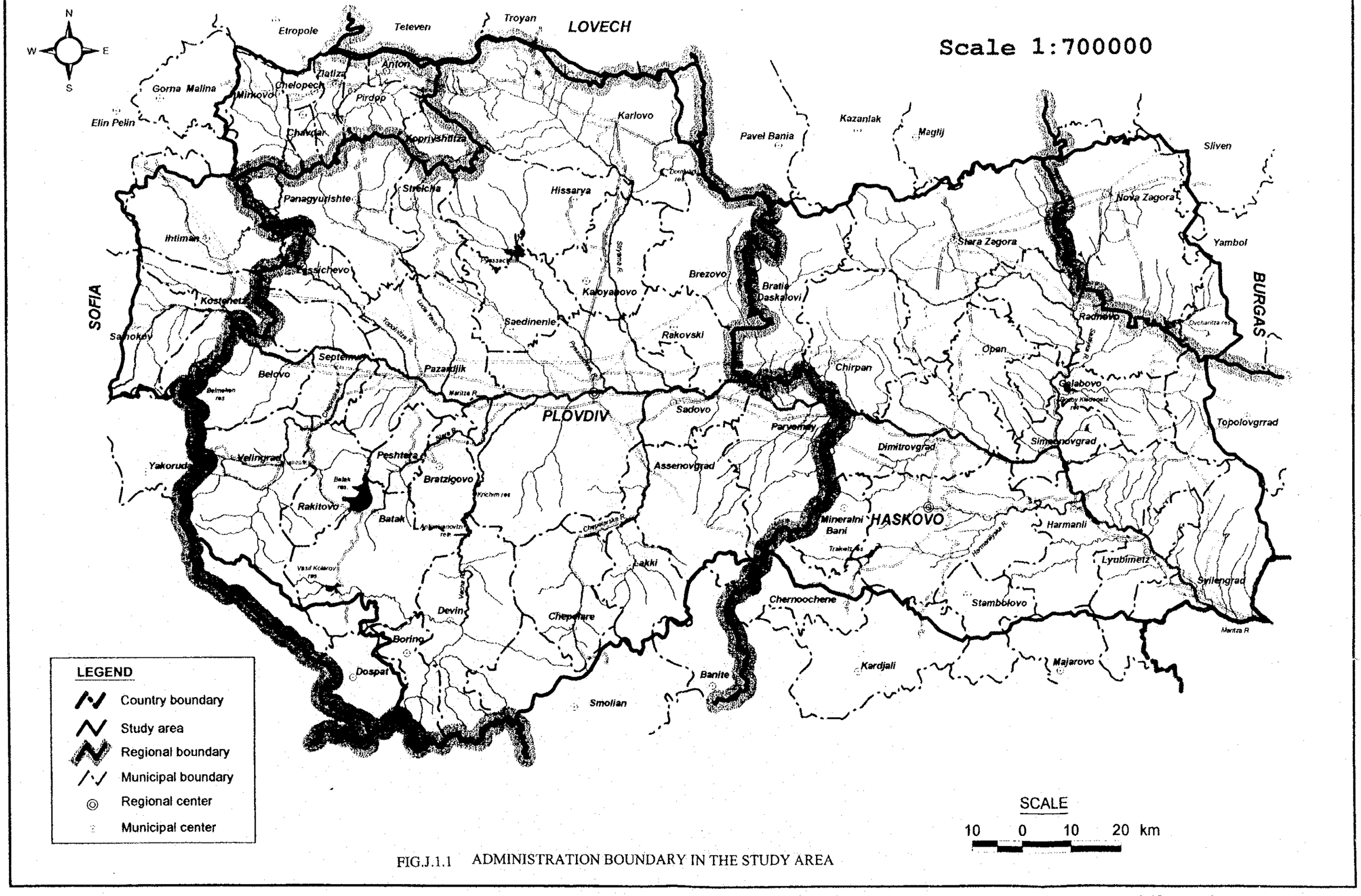

FIG.J.1.1 ADMINISTRATION BOUNDARY IN THE STUDY AREA

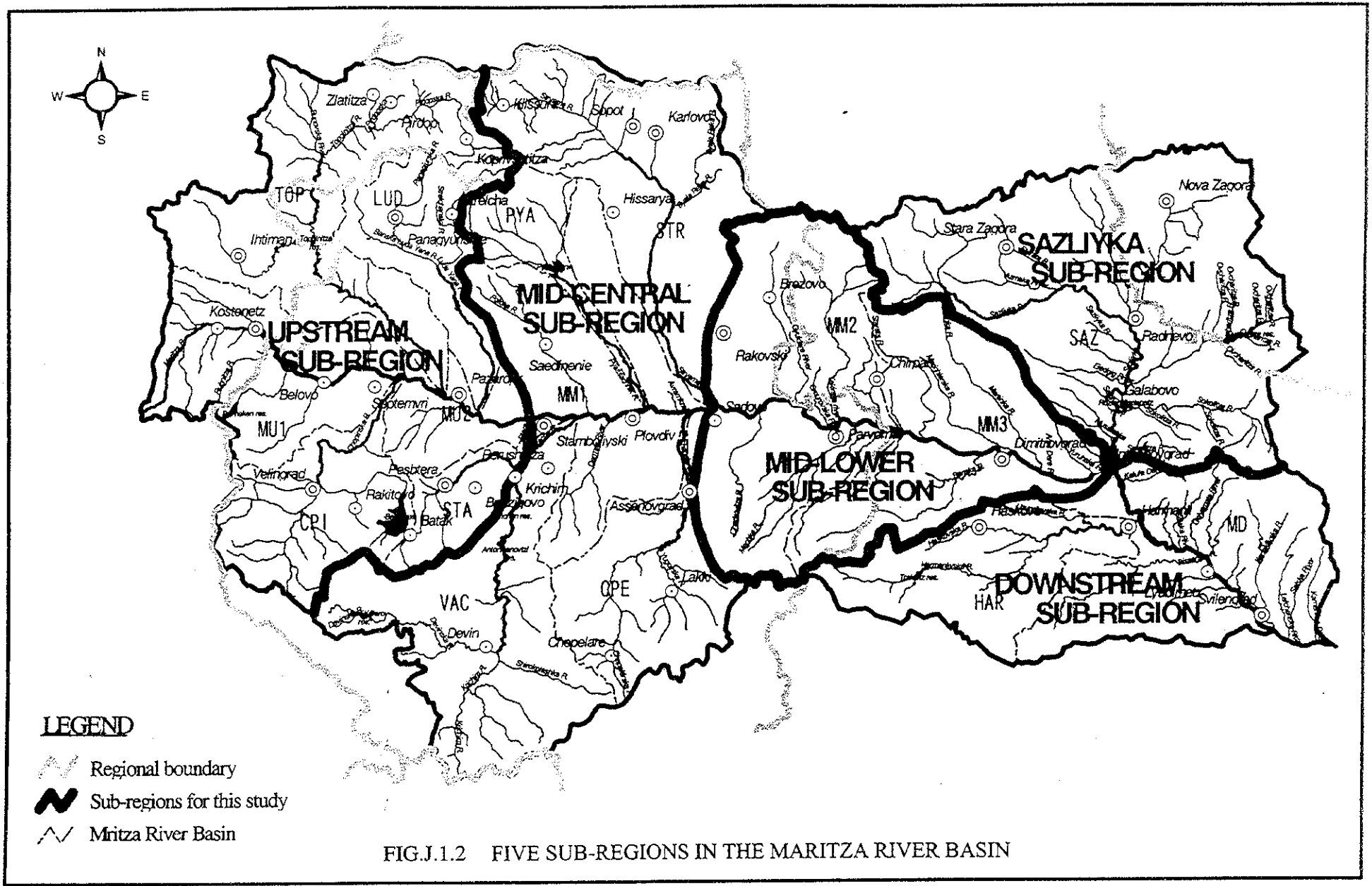

FIG.J.1.2 FIVE SUB-REGIONS IN THE MARITZA RIVER BASIN

SUPPORTING REPORT K

ENVIRONMENT

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SUPPORTING REPORT K ENVIRONMENT

1. Introduction

The purpose of this report is to provide a concise summary of environmental aspects, which are specifically concerned with the protection and conservation of the natural environment especially its freshwater and terrestrial heritage, its wildlife resources and the diversity of species. It finally summarises the main conclusions and proposed actions which are needed to ensure that sustainable development can take place while maintaining and hopefully improving the existing environmental quality.

2. Legal Aspects and Policy for Environmental Conservation

The need for Environmental Protection and Conservation is a fundamental requirement of the new National Constitution of the Republic of Bulgaria which was promulgated in 1991. Article 15 states: "The Republic of Bulgaria shall endure the protection and reproduction of the environment, the conservation of the living nature in all its variety, and the sensible utilization of the country's natural and other resources". Furthermore, the new Constitution provides for the right of all citizens to a healthy environment, the obligation of the State to protect the environment, to preserve natural diversity and rationally use natural resources.

Since 1991 the Bulgarian Parliament has been active in revising the existing environmental legislation and in framing new laws which *inter alia* should prepare the way for implementation of European (EC) environmental legislation. Revised laws include the Environmental Protection Act and the draft Protected Areas Act while new legislation includes the draft Water Law which is intended to set up River Basin Councils.

(1) Environmental Protection Act, 1997

This Act is essentially a revised and strengthened version of the 1991 Act of the same name, a landmark piece of legislation, which (a) provided a new foundation for environmental policy based on the "polluter pays" principle and (b) required an

Environmental Impact Assessment for all major investment projects (or changes to existing ones) or other activities which may have an adverse impact on the environment,

The revised Act provides a more extensive, more clearly defined, list of projects which will require Assessment of the Impact Factor on the Environment (AIFE). Annex 2, Article 20 lists over 90 projects or activities which will require mandatory assessment. Assessment will also be mandatory if any of these projects or activities is subsequently reconstructed or expanded. The Act further requires that projects, activities or facilities which are not subject to an obligatory AIFE shall be subject to an environmental impact assessment to be carried out by the appropriate Municipal Authority.

The Act furthermore requires that the obligatory AIFE shall be assigned by the investor or initiator of the project or activity to *independent experts* who:

1) are professionally competent and licensed the Ministry of Environment and Waters (MOEW);

2) have no direct interest in the project or activity and have not taken part in the design process.

(2) Protected Areas Act (Draft)

This proposed Act is necessary because of deficiencies in the **Nature Protection Act (1967).** This Act covers the preservation, restoration and rational use of nature and natural resources, monuments, historical sites and the development of related science and scientific research. The national conservation of nature in Bulgaria is based on a network of protected areas by means of regulations which define these areas in accordance with the International Union for the Conservation of Nature (IUCN) as follows:

1) Strict nature reserve (IUCN category I)

2) National park (IUCN category II)

3) Natural landmark or nature sanctuary (IUCN category III)

4) Protected site (criteria by IUCN category IV)

5) Historical site

Although the 1967 Act had been amended five times between 1977 and 1991 it had become apparent that there was no effective system for management of National Parks and the other "protected" areas. Various proposals for rectifying the situation were made but never implemented. However, in 1997, the Bulgarian Global Environmental Facility Biodiversity Project (GEF) examined the situation in detail and, in its second report July 1997), recommended a coherent structure within MOEW. These recommendations have been incorporated in the **Draft Protected Areas Act** (February 1998).

Chapter I; redefines the protected areas in six categories.

Chapter II; sets out the purpose and regimes of protected areas

Chapter III; deals with the declaration of protected areas and changes to such areas.

Chapter IV; deals with the management of protected areas and incorporates most of the changes proposed by GEF, setting the management of protected areas firmly within MOEW which will also have responsibility for developing strategies, preparing secondary legislation, co-ordinating the activities of other Ministries, public and scientific organizations in relation to protected areas. MOEW will also represent the State before International bodies and propose to them the inclusion of protected areas in, for example, the List of Biosphere Reserves, Global Heritage Sites and the List of Internationally Significant Wetlands

Chapter V; deals with financing of protected areas

Chapter VI; deals with Administrative and Penal Provisions.

This draft Act is of major importance and, hopefully, will mark the beginning of a new era for the conservation and maintenance of Bulgaria's rich heritage of natural wildlife reserves. Fig. K.2.1 and K.2.2 illustrate the present and proposed new lines of management for protected areas.

(3) Draft Water Act

This legislation, now in draft form, is of fundamental importance to Bulgaria's plans for joining the European Community and should lay the foundations for fully integrated river basin management as envisaged in the EC water policy and particularly the draft Water Framework Directive which will set a timetable within which member states must set up River Basin District Authorities one of whose main tasks will be the preparation of River Basin Management Plans.

The Bulgarian proposal is to create a system of river basin councils which, to accord with EC policy, should act as administrative bodies for co-ordinating all water users interests with those of local authority administrators while also meeting the requirements of EC environmental quality directives. In addition to preparation of river basin management plans the councils will need to have adequate powers to control abstractions and to allocate water between competing users by means of water usage permits. The new river basin councils will also require strong enforcement policies to ensure that all dischargers meet the required standards for pollution control.

It is important to reiterate here that rivers naturally integrate all the physical, chemical and biological factors within their catchments and, therefore, *effective* water quality management can only be achieved by adequate monitoring and understanding of these factors and modifying (controlling) those which adversely affect water quantity and quality. The aim must be to restore the quality of the inland waters as far as reasonably possible to ensure that the needs of all water users are met while attaining *environmental quality standards* which are essential for restoring and maintaining a high biodiversity of aquatic species.

Thus, true integrated environmental management in the context of a river basin, requires the close collaboration of all those bodies responsible for the management of the component sectors of the total environment i.e. agriculture, forestry, industry, urban development and the protected areas. It is important to draw attention to the latter because while everyone recognises the pollution potential of farming, industry and urban development, it is often not recognised that forestry operations such as road building,

ploughing, clear felling and the spraying of fertilizers or pesticides can have a serious impact on water quality. Even national parks need to be managed to enhance water quality and not to damage it.

It is important to note here that Article 25 of the Regulation for the enforcement of Protection of Air, Water and Soil against pollution will need to be amended together with Regulation 7, 1986, in order to bring Bulgarian surface waters up to EC standards.

Moreover, there appear to be no regulations for classifying lakes and reservoirs or for setting quality parameters in such waters.

(4) Land Use Regulation

Land use is governed by the **Regional Development and Town Planning Act,1973,** which distinguishes three categories of land use plans i.e. Arable Land, Forest Land and Development Land. Changes in the use of land, other than within the protected areas, are subject to the **Protection of Arable Land and Pastures Act, 1973.** Detailed provision for change of land use is contained within the corresponding ordinance and this may require an Environmental Impact Assessment.

3. Protected Areas and Species

Table K.3.1 provides an up to date list of the protected areas while Table K.3.2 provides a list of all the known species of freshwater fish in the Maritza and its tributaries. Fig. K.3.1 shows the environmental protection area to be considered.

Proposed and Projected Protection Areas

Attention is drawn here to the Fig. K.3.1 includes 11 sites which have been proposed for protection. These have not been examined in any way but it is hoped that with the imminent implementation of new legislation outlined below these will be given early consideration by the MOEW.

Attention is likewise drawn to 11 Wetland Areas with conservation potential (see Table K.3.3). Among them, Vinitza - is of special interest for the Maritza basin. This island near Vinitza village (between Popovitza and Parvomay) is about 1km by 0.5km and comprises 17 hectares of natural flood - plain forest, the last in the Maritza basin except for the Tundza river. Thus this type of wetland is threatened with extinction, there being only six of this type in Bulgaria. The Vinitza forest comprises 185 species of vascular plants, the dominant tree species being old white poplars (Populus alba), black poplars (Populus nigra), white willows (Salix alba), crack willows (S.fragilis) etc. Also single trees of European white elm (Ulmus laevis), common oak (Quercus robur), common maple (Acer campestre) etc. are found. There is an abundance of lianas and climbing plants. This unique biotope represents the penultimate stage of tree community succession (the final stage being wet oak and elm forest).

Vinitza island is important as a resting-place for prey avifauna and as a wintering place for the pygmy cormorant (Halietor pygmeus) and cormorant (Phalocrocorax carbo). It is a potential breeding site for the little egret (Egretta garzetta), night heron (Nycticorax nycticorax), squacco heron (Ardeola ralloides), grey heron (Ardea cinerea), pygmy cormorant (Halietor pygmeus) and even glossy ibis (Plegadis falcinellus). The importance of this island is emphasised by the fact that there was a 600 nest colony of 4 species of egret, herons and pygmy cormorant on the next island until it was deforested 10 years ago.

There are a great number of small islands (between Plovdiv and Dimitrovgrad) with important ecological value covered by natural willow and poplar forests but they are not typical flood plain forests of sub-Mediterranean type as is Vinitza island and *the importance of the Vinitza site for designation as a protected area cannot be over-emphasised.*

4. Environmental Overview of the Maritza Basin

(1) Forestry

Forested land covers 35% of the land area but, as some of this is bare rock or otherwise unsuitable for tree growth, the actual area is estimated at 30% mostly in the upland or mountain zones. The Bulgarian forests are thought to be in a reasonably healthy condition and certainly better than in central Europe. However, international surveys across Europe have shown a steady increase in defoliation of trees partly due to air pollution and, in southern Europe, to a long period of drought. A 1997 report on Forest Conditions in Europe showed that for Bulgaria the degree of defoliation, averaged for all forest species, was 39% (classed as moderate to severe).

Thus, despite a considerable reduction in sulphur deposition in Eastern Europe this still remains at 25kg/hectare/year and efforts are clearly desirable for further reductions. This is further emphasised by a report that 60% of Bulgaria is covered by acid soils.

From the standpoint of water quality management, research is desirable into the extent of soil acidification, particularly in areas of coniferous forest and where the underlying rocks are deficient in calcium. It is a well known fact that coniferous forests are liable to increase the acidity of run-off from acid rain and therefore forest streams - which also may suffer from lack of sunlight - are liable to suffer from poor species diversity and reduced productivity.

Afforestation and clear felling can have a serious impact on water quality because they can damage the soil structure resulting in high levels of suspended solids in rivers, lakes and reservoirs. However, the Committee of Forest states that the problem has been well known for the last 60 - 70 years and great care is taken to keep erosion under control. Moreover, pesticide usage is minimal and fertilizers are not normally used. Thus, as far as could be ascertained, forest operations are not a threat to groundwater or surface water quality.

(2) National parks, Reserves and Other Protected Areas

Discussions with NCESD, GEF and the Wilderness Fund, have all indicated that the Bulgarian protected areas are generally in good health and are showing no degradation, acidification or loss of species. However, there is at present very little monitoring or

research to prove such statements. The protected areas themselves should not present a problem as far as water quality is concerned but the future Maritza Basin Council will need to examine all these aspects because, as indicated earlier, even national parks need to be managed to enhance and not damage water quality. The Council will also need to concern itself with controlling pollution from tourist resorts, visitor centres and restaurants and with careful control of all abstractions. In Rila National Park, for example, considerable amounts of water are taken for public water supply to surrounding areas, especially the City of Sofia. It has been observed that downstream of various reservoirs little or no compensation water is left in the streams. It may be that existing legislation needs to be revised and strengthened to deal with this problem which could get worse as the demand for potable water increases.

This is a clear example where catchment management planning in collaboration with the National Nature Protection Service (NNPS) and the water supply companies will be essential for safeguarding the interests of the protected areas, their aquatic ecosystems, the water companies and the interests of the Maritza river.

Attention is drawn here to a notable exception to the view that protected areas are all in good shape. The Pirdop Copper Smelter in the Pirdop Zlatitsa region was causing severe pollution in the Topolnica and Pirdopska rivers and also substantial air pollution. Of particular concern, in a report prepared for MOEW, it was found that, as a result of the air pollution, ecosystems of the Central Balkans National Park were affected by acid depositions and heavy metal pollution. Without careful long term monitoring in protected areas it will not be possible to ensure that adequate protection is being given.

(3) Agriculture

Since 57% of the surface area of the Maritza Basin comprises farmland, it follows that agricultural activity has a major impact on groundwater and surface water quality. The problems, in approximate order of importance, are:

1) Soil erosion: 80% of agricultural land is considered to be subject to erosion by water and 30% potentially threatened by wind erosion;

2) The former excessive use of artificial fertilizers and pesticides, while increasing agricultural productivity has had a serious impact on water quality. Many groundwater have high nitrate levels which are a serious problem for drinking waters while traces of the non-biodegradable pesticides such as DDT, BHC and Dieldrin will probably continue to be found for many years.

3) Trans-boundary atmospheric pollution has resulted in the acidification of soils in 60% of the area of Bulgaria. Much more study of this problem is required to ascertain its severity and extent in view of the consequences for water quality.

The application of fertilizers and even the ploughing of soil releases nutrients, especially nitrates, into the run-off into streams. Intensive farming of animals can also result in the pollution of surface waters with ammonia which is extremely toxic to fish before it is oxidised to nitrate.

There is little doubt that the major source of nitrate in the groundwaters of the Maritza Basin is agriculture, especially livestock while in the rivers the major sources are sewage discharges from towns and villages and effluents from fertilizer factories.

Catchment management planning in respect of agriculture will require:

- Regular inspection and monitoring of farms
- Development of codes of good agricultural practice
- Education of the farming community
- Control of all point sources
- Implementation of EC nitrate and phosphate directives

(4) Urban and Industrial Land

Urban and industrial land comprises about 5% of the Maritza Basin (compared with 3.6% for Bulgaria) but, as expected, due to the concentration of population and industry, most of the environmental "blackspots" are found in these areas and in the rivers immediately downstream. These problems in the towns and cities are " priority" areas for action.

It is important, therefore, to draw attention to the particular environmental problems caused by the mining industry. The Maritza basin is particularly rich in a wide range of heavy, highly toxic, metals such as copper, chromium, lead and zinc and also gold and silver. The mines are located generally in the headwaters of tributary streams in the mountain areas well away from the heavily populated areas and where the surface waters are otherwise very clean. Information from NCESD indicates that at present pollution control measures are almost totally inadequate. Considerable quantities of water are used in metal extraction and processing and the waste waters contain excessive amounts of a wide range of pollutants including sulphates, iron, copper, manganese, lead and arsenic which are precipitated into the stream sediments for a considerable distance downstream from the mining areas. These streams are almost invariably dead in biological terms - i.e. the invertebrate fauna is destroyed and fish can no longer survive.

The problem is made worse in most cases by air pollution which results in metal deposition on the surrounding forests or agricultural land with subsequent contamination of food crops, groundwater and run-off into the streams. Soils in these areas may be seriously affected by acidification. In a particular case (referred to above in the section on protected areas) it has been shown that a part of the natural ecosystem of the National Park, Central Balkan mountain range has been affected by air pollution and metal deposition.

Little or no attention has been given so far to environmental problems from coal mining in the Maritza basin. However, experience elsewhere suggests that there may be local pollution by acid ferruginous waters and future studies should examine the impact of coal mining, whether by deep mining or opencast methods.

Finally, the Maritza basin contains substantial Uranium deposits, many of which were being worked until 1996 when, for economic and environmental reasons, they were closed by order of Parliament. Although no scientific data has been seen, verbal reports indicate that very serious problems of radioactive soil and discharges to streams exist in the vicinity of the abandoned mines and spoil heaps. It seems that a thorough investigation of these mines deserves a high priority but, because of the potentially serious danger to human health of exposure to radiation, a highly experienced team is essential.

(5) Other Problems

Two other problems which have become apparent in the course of this study deserve separate mention here:

1) Erosion

At a number of points along the Maritza river it was evident that erosion of the banks was taking place. Although this is a natural process in all rivers it was evident that erosion was greatly speeded up wherever trees lining the river bank had been cut down. In one case, near Plovdiv, alongside the village of Tselopitsa, hundreds of metres of river bank were observed to be collapsing into the river and thus seriously threatening the stability of a major landfill waste site for the town of Plovdiv. Urgent attention is required here but there are certainly many other parts of the river where remedial work will be required. Legislation may be desirable to ensure that vegetation, especially trees, which stabilise river banks is specially protected.

2) Illegal waste disposal

A survey of the river near Plovdiv indicated that there was a widespread practice of dumping of waste materials e.g. bottles, plastics, drink cans, vegetable waste offal and light industrial waste in amounts carried by one person or, more often, by numerous truckloads. Dumping was most evident at the edge of roads, in ditches, in streams where roads crossed these and along river banks creating a hazard to

children and to wild life as well as a serious eyesore. This has become a problem in many countries and requires a combination of education and legislation to control the problem.

5. Initial Environmental Examination

The **Environment Protection Act, 1997,** as seen above, requires that all significant new developments or activities shall be subject to stringent environmental impact assessment procedures described in the Act as **Assessment of the Impact Factor on the Environment (AIFE).**

An annex to Article 20 of the Act lists over 90 activities or developments which require AIFE according to specified criteria. It follows that all proposed sewerage and sewage treatment schemes will require a full AIFE to be carried out by independent experts approved by MOEW.

JICA has carried out its own Initial Environmental Examination (IEE) for three priority wastewater treatment plants according to JICA guidelines in accordance with its own standard procedures. This will in no way obviate the need for a full AIFE under Bulgarian law which will become necessary at a later stage when the full designs plans have been completed. The purpose of the IEE is to anticipate any problems which will have to be taken account of in completing the design specifications and to ensure that there are no unexpected environmental problems likely to emerge when the full AIFE is carried out.

IEEs have been completed for wastewater treatment plants at Dimitrovgrad, Pazardjik and Stara Zagora. In each case the method used was to carry out a detailed site examination in relation to the surrounding landscape and habitations, to examine the receiving river both upstream and downstream of the point of discharge. Also meetings were held with the Municipalities, the local Water Companies and the Regional Environmental Inspectorates. Specially prepared questionnaires were used to collect and collate the environmental data.

The **overall conclusions** were as follows:

- The construction and operation of the three wastewater treatment plants will have no significant adverse effects on the social or natural environment. Indeed, there will be positive benefits to the communities and the immediate environments, especially in terms of improved river water quality. Although, in each case there will be some problems of noise, air pollution and vibration during the construction phase, these are inevitable with all construction projects but can be mitigated to some extent and will be temporary.

- Arrangements for treatment and disposal of sewage sludge have not been finalised but will have to meet the requirements of the Municipalities and the NCESD and thus should present no problem. Since it has been decided that heavy industries will not be connected to these plants there should be no problems with heavy metals or other toxic substances in the discharges or in the sludges which should therefore be suitable as fertilizers on agricultural land.

- Finally it was ascertained that local flora and fauna would be unaffected and, in any case, that there were no protected species from the Red Data Book of Bulgaria in their vicinities. Moreover, there are no archaeological, historical or architectural monuments which would be affected by these plants.

Important footnote

While the IEEs summarised here indicate that there should be no significant adverse environmental effects - indeed the effects should be almost entirely beneficial - there is one aspect of the design that gives cause for serious environmental concern.

It has been noted that *under current Bulgarian law* it is a requirement that each treatment plant shall be fitted with facilities for terminal chlorination of the effluent "under emergency conditions" (though these conditions do not appear to be specified).

Such practice would not be permitted in most western countries because (a) chlorine is extremely toxic to aquatic life especially fish and (b) chlorine combines with many organic substances to form chlorinated compounds which are carcinogenic and/or mutagenic. These compounds are now stringently controlled at very low levels in the latest WHO Guidelines for Drinking Water and the EC Drinking Water Directive. It is possible, if this practice became common in Bulgaria, that downstream countries would raise objections since the removal of trace amounts of chlorinated compounds is extremely expensive.

It is therefore strongly recommended that early steps should be taken, if necessary by amending the law, to obviate the requirement for terminal chlorination.

6. Conclusions and Recommendations

(1) Future Management of the Environment

Significant steps have been taken by the Bulgarian Government to ensure that future management of the environment will be greatly improved and will help to bring Bulgarian laws closer to those of the European Union. Thus, the Environment Protection Act, 1997, should, if fully implemented, do much to ensure that future developments are environmentally friendly. Also, the Protected Areas Act, when approved by Parliament should provide an excellent new management system for the administration and protection of sensitive conservation areas. However, this will only be effective if staffing levels are increased together with the introduction of in-house training and the increasing use of scientific monitoring which is an essential component of good management. For example, an international survey has shown that defoliation is a significant problem in Bulgarian forests. Only regular monitoring will show whether this problem is getting worse or is decreasing. Also, unless very swift action is taken, it may be too late to save the last remaining important wetland, Vinitza Island, in the Maritza River. With regard to a number of projected areas for protection it is clearly desirable not to delay too long in making decisions. At the same time, there is little point in designating many more areas when protection of the existing ones is inadequate.

The draft Water Act, which will set up River Basin Councils, marks an important step towards the implementation in Bulgaria of the draft EC Water Framework Directive which embodies the concept of catchment management planning. However, the success of the River Basin Councils will depend to a large extent on (1) adequate funding (2) the transfer to these bodies of adequate numbers of trained staff (e.g. the REIs) (3) adequate legal powers to enforce environmental laws, especially the EC directives, and (4) a sufficient degree of independence from central and local government.

The long history of attempts to control pollution in most European countries has shown that it is not sufficient to have environmental laws - it is equally important to have strong, independent, regulatory bodies with effective enforcement powers. The present seriously polluted state of the Maritza and its tributaries cannot be overcome overnight - indeed it is likely to get worse in some areas before any improvement is recorded - and will require many years of dedicated effort and investment.

(2) Recommendations

1) When the new Protected Areas Act is approved by Parliament, priority should be given to early implementation, particularly to recruit qualified staff to ensure that the provisions in Chapter IV of the Act are brought into force on a priority basis. Urgent attention should be given, under Chapter III, to the designation of 11 new wetland sites. Of particular importance is site no 6, the threatened wetland site of Vinitza Island which is in urgent need of protection. In this specific case ideally a warden should be appointed to keep a regular watch on the island or, as an alternative, the local members of the "Green" movement in the Plovdiv area should be requested to inform NCESD of any further cutting down of trees or damage to the wetland ecosystem.

2) Careful scrutiny should be given to the draft Water Act with a view to strengthening the proposed new River Basin Councils. To be effective these new bodies need to have adequate powers to enforce compliance with environmental legislation, to carry out their own monitoring and, in consultation with the other key bodies, to develop

catchment management policies which will require active collaboration on the part of agriculture, forestry, industry, municipal authorities and the NNPS for the protected areas.

3) The control of environmental pollution from mining appears to be seriously inadequate at present. The new River Basin Council for the Maritza Basin will be the ideal body to enforce EC environmental standards and should be required to give priority attention to this problem. Problems of erosion and illegal dumping of litter into rivers or on riverbanks should also be drawn to its attention. Another matter for early attention is the compensation flow from water supply dams e.g. as mentioned earlier in the Rila National Park and also abstractions for irrigation schemes which at present often leave the rivers dry.

4) The requirement, under Bulgarian law for chlorination of sewage effluents is most undesirable from an environmental standpoint. Such practice is unacceptable in most European countries and it is recommended that early steps should be taken to repeal this regulation.

TABLE K.3.1 PROTECTED AREAS IN MARITZA BASIN

Protected areas	Places	Total Areas (ha)	Year of Establi shment
Strict Reserves			
Central Balkan National Park		53242.2	1991
Dzhendema	Karlovo town	2511.10	1967
Rayskoto pruskalo	Kalofer town	0.50	1965
Steneto	Cherni osum village	1607.50	1979
Boatin	Cherni vit village	1225.70	1967
Stara reka	Karlovo town	1905.90	1981
Rila National Park		83211.1	1992
Ibur	Kostenets town	1701.00	1985
Central Rila Reserve	Rila mountain	12393.7	
Marichini esera - Studenets	Borovets village	1734.50	1967
Rodopi Mountains			
Beglika /Vasil Kolarov/	Batak village	420.00	1960
Koupena	Peshtera town	818.60	1977
Doupkata	Fotinovo Village	65.20	1951
Mantaritsa	Rakitovo town	301.70	1977
Kazanite	Mougla Village	161.00	1968
Kastrakliy	Borino village	124.00	1968
Soskovcheto	Smolyan town	177.50	1968
Chervenata stena	Bachkovo village	229.50	1977
Chamdzha	Hristo Danovo village	5.00	1949
Shabanitsa /Starata gora/	Trigrad village	23.00	1956
Izgoryaloto gyune	Krichim town	32.00	1949
Sredna Gora			
Bogdan	Koprivshtitsa town	114.80	1972
Natural Monuments			
Pazardjik – RI			
Kiselchitsata	Strelcha town	60.50	1972
Goranitsa	Strelcha town	46.70	1972
Garvanov kamuk	Strelcha town	18.00	1972
Tourchanov kamuk	Strelcha town	16.80	1972
Ognyanovsko - Sinitevski Rid	Ognyanovo & Sinit villages	140.00	1982
Sofia – RI			
Donkina gora - Tsarski orel	Koprivshtitsa town	16.00	1979
Golashka peshtera	Golak village	0.50	1981
Smolian – RI			
Bouynovskoto zhdrelo	Bouynovo village	608.60	1971
Trigradsko zhdrelo	Trigrad village	314.00	1963
Nastanska mogila	Devin town	3.00	1968
Ledenitsata	Gela village	6.80	1962

Protected areas	Places	Total Areas (ha)	Year of Establi shment
Choudnite Mostove - Er Kyupriya	Oryahovo village	0.00	1949
Haskovo – RI			
Dervishka mogila	Dervishka mogila village	33.00	1976
Plovdiv – RI			
Lale bair	Asenovgrad town	2.00	1978
Ousoykata	Dobrostan village	4.00	1977
Nahodishte na blatno kokiche	Vinitsa village	19.00	1970
Protected Sites			
Pazarjik - RI			
Arapchal	Velingrat town	220.80	1981
Atolouka - Vasil Petleshkov	Bratsigovo town	177.90	1969
Kleptouza	Velingrat town	344.00	1966
Tumra	Bratsigovo town	735.40	1973
Batashki Snezhnik - Karluka	Batak town	1063.00	1972
Valyavitsite	Velingrat town	82.70	1951
Skalen obraz - Arabushka Polyana	Strelcha town	42.00	1972
Skalen obraz - Gabrovitsa	Strelcha town	42.00	1972
Manzoul	Panagyurishte town	36.60	1968
Patjova koriya	Oborishte village	81.20	1968
Sokola	Pestera village	127.20	1973
Kamera	Fotinovo village	102.50	1975
Rogachitsa	Velingrat town	126.90	1981
Shiroka polyana	Batak town	100.20	1984
Kaval tepe	Batak town	83.00	1984
Studenata chouchourka	Batak town	73.10	1984
Sluncheva polyana	Batak town	69.30	1984
Toshkov Chaark	Batak town	57.40	1984
Chatuma	Batak town	27.30	1984
Batluboaz	Batak town	154.00	1984
Samodivska polyana	Batak town	132.60	1984
Venetsa	Panagyurishte town	100.50	1968
Sivata Gramada	Panagyurishte town	16.00	1968
Haydushki kladenets	Panagyurishte town	65.40	1968
Kalpazanov grob	Velingrat town	16.20	1968
Byalata skala	Velingrat town	86.60	1968
Aramliets	Ihtiman & Sredna gora towns	140.80	1969
Biljov rut	Teerovo Village	89.70	1972
Yordanovi polyani	Lesichevo village	71.90	1972
Milevi skali	Semchinovo village	50.00	1976
Petljovo burdo	Batak town	93.50	1972
Rovno	Batak town	47.70	1973
Vinishte	Ravnogor village	148.10	1973
Koriyata	Ravnogor village	27.50	1973

Protected areas	Places	Total Areas (ha)	Year of Establi shment
Kara Bouroun - Balabanliy	Fotinovo village	123.50	1973
Fotinska reka - Ougljovo Popchelovo	Fotinovo village	314.30	1973
Zarnjovets	Belovo town	37.10	1983
Kreposta Krasen	Panagyurishte town	33.91	1983
Sofia – RI			
Ouloutsite	Doina banya village	370.60	1974
Eledzhik	Mouhovo village	668.00	1975
Smolian – RI			
Chairite	Trigrad village	300.00	1973
Valevitsa	Bostina village	82.30	1975
Mezar Gedik	Hvoyna village	63.00	1971
Srednite livadi	Oryahovo village	70.40	1972
Chutal uluk	Oryahovo village	24.00	1974
Byalata voda - Endeka	Zaburdo village	55.30	1975
Haskovo – RI			
Fosilni nahodki	Ahmatovo village	9100.00	1966
Plovdiv – RI			
Dubite - Konska polyana	Krustevich	294.70	1975
Bolyarinskata gora	Bolyarino & Shishmantsi villages	323.30	1978
Chivira	Karavelovo village	106.50	1966
Vurlishnitsa	Kliseura town	176.80	1966
Gonda voda	Asenovgrad town	74.10	1970
Besaparski ridove	Ognjanovo village	148	1975
Stara Zagora – RI			
Chirpanskata koriya	Chirpan town	58.00	1966
Bozdouganovska koriya	Groudevo village	310.80	1975
Sokolna	Skobelevo, Asenovgrad	1178.20	1979
Historical Sites			
Obrochishte	Petkovo village	101.50	1966
Barikadite		120	1962
Theren	Batak village	170	1964
Gonda Voda		74	1970
Eledzhik		517	

RI = Regional Inspectorates

TABLE K.3.2 LIST OF FRESH WATER FISH SPECIES IN MARITZA BASIN

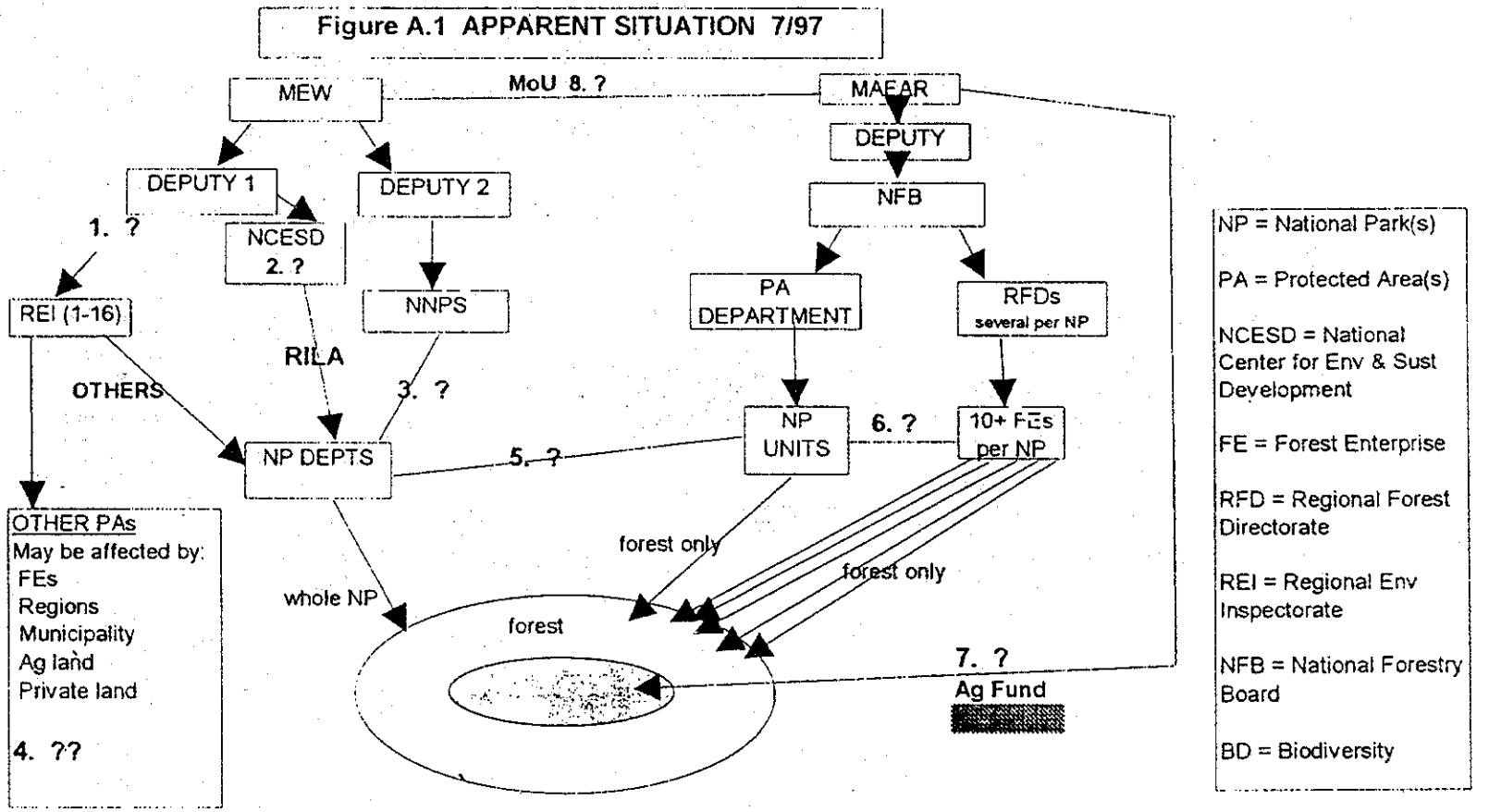
Species *– introduced sp.	usual	often occur	rare	medium rare	very rare	become extinct
Acipenser sturio						+
Acipenser stellatus						+
Salmo gairdneri irideus *		+				
Salmo trutta fario		+				
Salvelinus fontinalis *				+		
Coregonus peled *			+			
Coregonus albula *			+			
Thymallus thymallus *			+			
Esox lucius	+					
Rutilus rutilus	+					
Phoxinus phoxinus	+					
Scardinius erythrophthalmus	+					
Aspius aspius			+			
Tinca tinca	+					
Alburnus alburnus	+					
Abramis brama	+					
Vimba melanops	+					
Chandrostoma nasus	+					
Rhodeus sericeus amarus	+					
Pseudorasbora parva *	+					
Gobio gobio	+					
Barbus cyclolepis	+					
Cyprinus carpio	+					
Carassius carassius	+					
Carassius auratus gibelio *	+					
Hypophthalmichthys molitrix *		+				
Ctenopharyngoton idella *		+				
Ictiobus ciprinellus *			+			
Ictiobus bubalis *			+			
Ictiobus niger *			+			
Noemacheilus barbatulus					+	
Misgurnus fossilis		+				
Cobitis taenia	+					
Cobitis peshevi			+			

Species *– introduced sp.	usual	often occur	rare	medium rare	very rare	become extinct
Silurus glanis	+					
Ictalurus punctatus *			+			
Ictalurus nebulosus *			+			
Anguilla anguilla					+	
Gasterosteus aculeatus					+	
Gambusia affinis holbrooki *	+					
Lepomis gibbosus *	+					
Stizostedion lucioperca	+					
Perca fluviatilis	+					
Gymnocephalus cernuus			+			
Proterorhinus marmoratus			+			

TABLE K.3.3 IMPORTANT WETLANDS WITH CONSERVATION POTENTIAL IN MARITZA RIVER BASIN

No.	Location	Area [ha]	Short Description
1	Zvanicheve Fishponds near Pazardjik	220	Marshlands around fishponds and dry ponds not in operation, migrating and wintering water fowl (mainly *Anseridae*), Night Heron (*Nycticorax nycticorax*)
2	Trivodnitzi Fishponds	60	Wintering place for Pygmy Commorant (*Phalacrocarax pymeus*), wintering for water fowl, 3 km west of fishpond rare macrophytes
3	Orisare near Plovdiv	250	Resting place for Pygmy Commorant (*Phalacrocarax pymeus*) stable numbers over the last few years, wintering water fowl at sand quarry
4	Chepelarska Confluence	60	Only known wintering place for Night Heron (*Ardeola ralloides*), natural riparian forest (*Alnus nigra, Populus spec., Salix spec.* etc.)
5	Poponitza	>5	Only stand of water lily (*Nymphoidea alba*) inland of Bulgaria, small oxbow lake microhabitat, mainly ground water feded
6	Island Vinitza	17	Natural flood plain vegetation over 185 recorded species of vascular plants, resting place for prey avifauna
7	Upstream of Dimitrovgrad	n.a.	Stand of rare macrophytes. Oxbow water formerly river meander
8	Downstream of Dimitrovgras	n.a.	Important resting place for hundreds of Pygmy Commorant (*Phalacrocarax pymeus*)
9	Sladopole	n.a	Important oxbow, special habitat for rare macrophytes
10	Lyubimetz	n.a.	Breeding place for Gray Heron about 50 pairs, wintering habitat for water fowl
11.	North of Plovdiv	n.a.	Very important as only wintering place on the Balkan Peninsula for Black Stork (*Ciconia nigra*), extensively used rice fields, further resting place for White Heron (*Egretta alba*)

*protected, n.a. not available



COMMENTS

1. REIs may or may not be under same deputy as NNPS.
2. NCESD; no link to NNPS.
3. No formal reporting link NPPS with REIs or NPDs
4. Admin. links for other PAs (in and out of MEW) unclear.
5. Unclear mandates and relationship of NP units of MEW & MAFAR.
6. Unclear link betweem NP Units and FEs of MAFAR.
7. Ag sector interests in montane Ag Fund lands in PAs unclear.
8. MEW/MAFAR MoU has no subordination for PAs at national or PA level

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FIG.K.2.1 DIAGRAM TO ILLUSTRATE CURRENT LINES OF MANAGEMENT FOR PROTECTED AREAS
(Source: GEF - 2nd Annual Report)

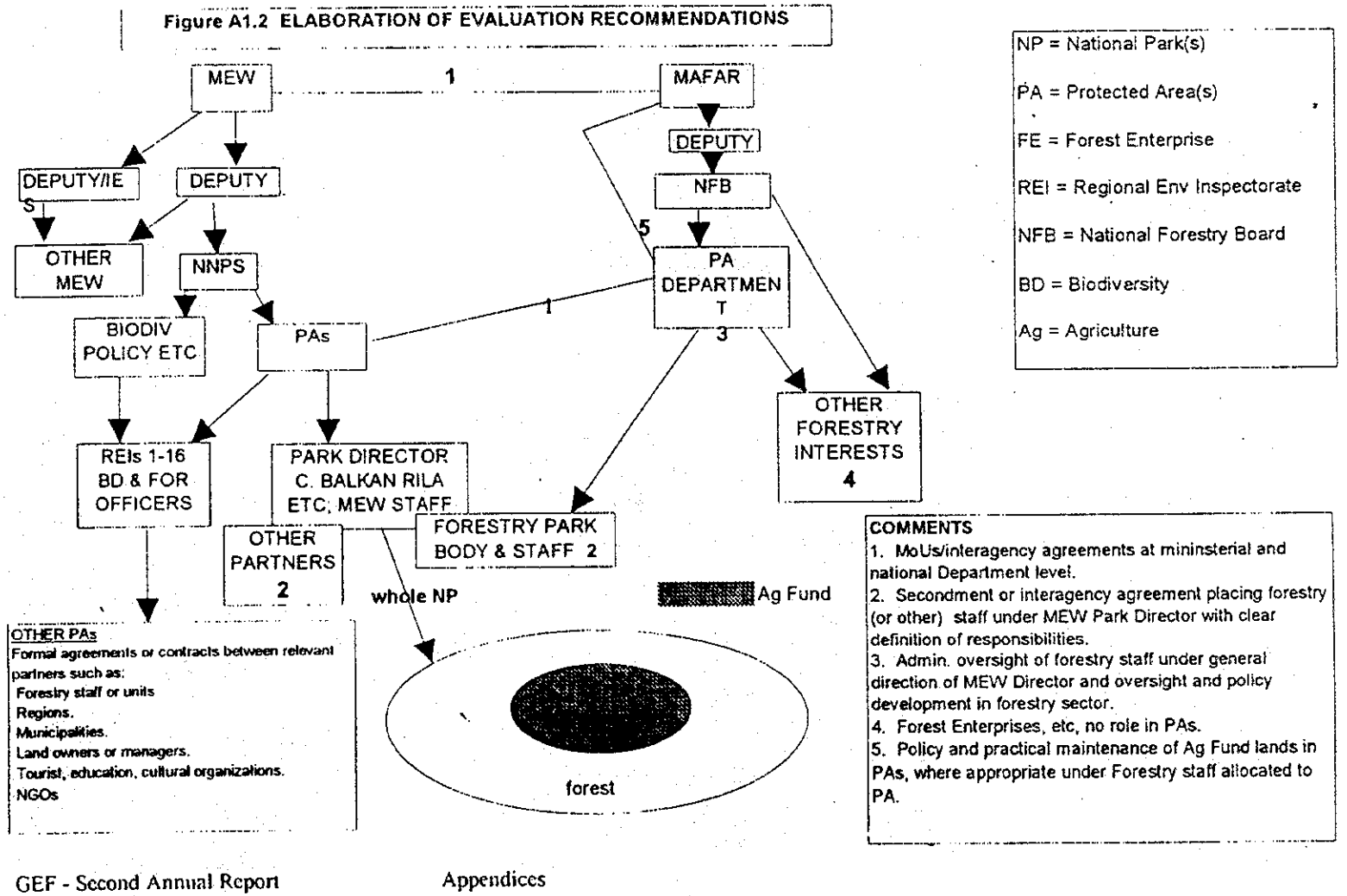

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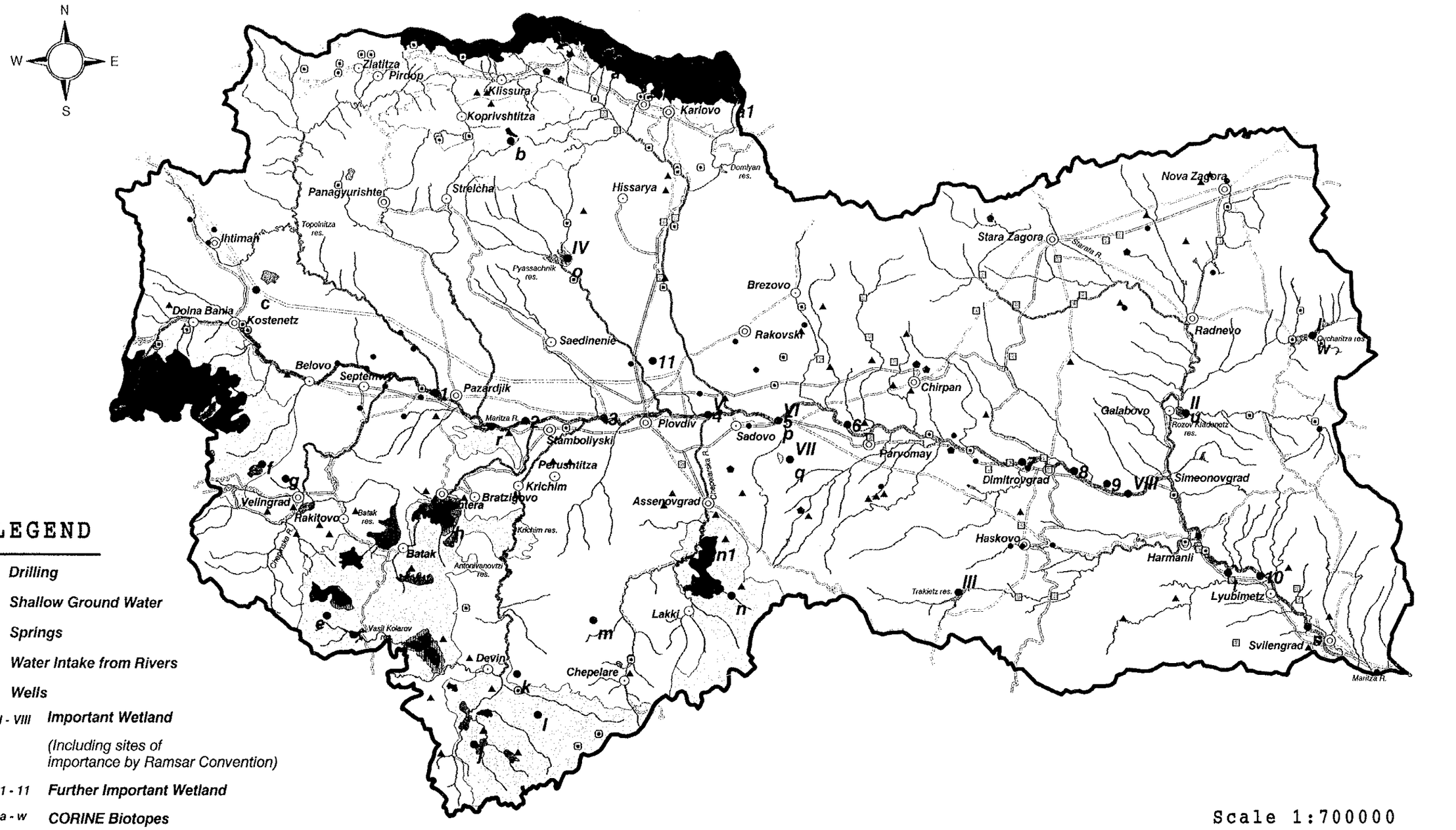
FIG.K.2.2 DIAGRAM TO ILLUSTRATE PROPOSED MANAGEMENT STRUCTURE FOR NATIONAL PARKS UNDER THE DRAFT PROTECTED AREAS (Source: GEF - 2nd Annual Report)



LEGEND

- Drilling
- Shallow Ground Water
- Springs
- Water Intake from Rivers
- Wells
- I - VIII **Important Wetland** (Including sites of importance by Ramsar Convention)
- 1 - 11 **Further Important Wetland**
- a - w **CORINE Biotopes**
- Strict Reserve (IUCN Category I)
- Buffer Zone
- National Park (IUCN Category I)
- Natural Monuments and Protected Sites (IUCN Categories IIIand IV)
- Projects and Proposals for new Protected Areas

Scale 1:700000

10 0 10 20 km

FIG. K.3.1 ENVIRONMENTAL PROTECTION AREA TO BE CONSIDERED