

TABLES

Table 3.1 Existing Laboratory in the Prahova River Basin

Municipality Name	Organization Name	Laboratory	Purpose	Ranking
Ploiesti	Romanian Waters	Head Office Labo.	river water/wastewater analysis	B
		Maneciu Labo.	water supply purification plant operation	C
		Valenii de Munte Labo.	water supply purification plant operation	B
		Paltinu Labo.	water supply purification plant operation	B
Cimpina	R.A.G.C.P. Cimpina	Drinking Water Labo.	water supply purification plant operation	C
		Sewerage Labo.	sewage treatment plant	C
Ploiesti	R.A.G.C.P. Ploiesti	Drinking Water Labo.	water supply purification plant operation	C
		Sewerage Labo.	sewage treatment plant operation	C
Azuga	A.D.P.P. Azuga	No Laboratory	-	-
Baicoi	S.G.C.L. Baicoi	No Laboratory	-	-
Boldesti Scaieni	S.G.C.L. Boldesti	Drinking Water Labo.	water supply purification plant operation	C
		Sewerage Labo.	sewage treatment plant operation	C
Breaza	CIVITAS Breaza	Drinking Water Labo.	water supply purification plant operation	C
		Sewerage Labo.	sewage treatment plant operation	C
Busteni	A.D.P.P. Busteni	No Laboratory	-	-
Comanic	A.D.P.P. Comanic	No Laboratory	-	-
Ploeni	S.G.C.L. Ploeni	No Laboratory	-	-
Sinaia	A.D.P.P. Sinaia	Drinking Water Labo.	water supply purification plant operation	B
		Sewerage Labo.	sewage treatment plant operation	C
Slanic	GOSCOM Slanic	No Laboratory	-	-
Urlati	R.A.G.C.L. Urlati	Sewerage Labo.	sewage treatment plant operation	C
Valenii de Munte	R.A.G.C.L. Valeni	No Laboratory	-	-
Maneciu	N.M.S. Maneciu*	No Laboratory	-	-
	N.M.S. Cheia*	No Laboratory	-	-
Predeal	APEVITA Predeal	Drinking Water Labo.	water supply purification plant operation	B
		Sewerage Labo.	sewage treatment plant operation	C
Bucharest	ICIM, MWFEF		river water/wastewater analysis	A
Cimpina	ICPT, PETROM R.A.		river water/wastewater analysis	A

Note: N.M.S. : Nerga Maneciu Sector

Table 3.2 Surface Water Intake Volume

Model	Code	Name of Establishment	Municipality	Activity Code	Activity	River	Volume (1000m ³ /yr.)	Remarks
Block								
195	4008	A.D.P.P. AZUGA	Azuga	41A1	Water Supply (Drinking)	Prabhova	3622	
195	4004	SINTERREF AZUGA	Azuga	26	Non-Metallic Mineral Products	Azuga	83	
195	4006	BERE AZUGA	Azuga	15	Food/Beverage	Azuga	674	
195	4007	POSTAV AZUGA	Azuga	17	Textiles	Azuga	465	
195	4348	ROMSILVA R.A. - OCOL SILVIC AZUGA	Azuga	05B	Fish Farming (Clean Water)	Azuga	7540	
195	4009	STIAZ AZUGA	Azuga	26	Non-Metallic Mineral Products	Prabhova	119	
195	4014	HARTIA BUSTENI	Busteni	21	Paper/Paper Products	Prabhova	4221	
195	4317	APEVITA PREDEAL	Predeal	41A3	Water Supply (Industry/Drinking)	Azuga	871	
					Sub-total		17595	
A	4018	A.D.P.P. SINAIA	Sinaia	41A1	Water Supply (Drinking)	Prabhova	1382	
A	4021	MEFIN SINAIA	Sinaia	29	Machinery/Equipment	Prabhova	275	
					Sub-total		1657	
200	4026	A.D.P.P. COMARNIC	Comarnic	41A1	Water Supply (Drinking)	Prabhova	316	
200	4027	PRESCON COMARNIC	Comarnic	14	Mining/Quarrying	Prabhova	36	
200	4213	VULTURUL COMARNIC	Comarnic	26	Non-Metallic Mineral Products	Prabhova	47	
					Sub-total		399	
Dam	4375	PRIMARIA VALEA DOFTANEI	Valea Doftanei	41A1	Water Supply (Drinking)	Doftana	40	
B	4036	A.R.R.A. FILIALA PLOIESTI S.H. PALTINU	Cimpina	41A1	Water Supply (Drinking)	Doftana	68424	Voia Intake
C	4034	R.A.G.C.L. CAMPINA	Cimpina	41A3	Water Supply (Industry/dringing)	Doftana	8675	
C	4035	S.C.STEALUA ROMANA SA	Cimpina	23	Petroleum Refinery	Doftana	218	
C	4341	ASOCIATIA VINATORILOR SI PESCARILOR SPORTIVI CIMP PLOIESTI	Cimpina	05A	Fish Farming	Doftana	57	
C	4551	SOCIETATEA COMERCIALA APASCO S.A. MANECIU	Maneciu	45	Construction	Doftana	24	
					Sub-total		8974	
217	4292	S.C. PETROUTILAJ S.A.	Cimpina	29	Machinery/Equipment	Prabhova	189	
217	4190	S.C. EXPLOATARE LUCRARI MBUNATIRI FUNCIARE S	Ploiesti	0143A	Irrigation (Crops)	Prabhova	1121	
217	4216	POMICOLA BAICOI	Baicoi	012B	Livestock Farm (small)	Prabhova	201	
217	4045	A.R.R.A. FILIALA PLOIESTI S.H. NEDELEA	Arcestii Rahdvani	41A2	Water Distribution (Industry)	Prabhova	16861	Nedelea Intake
217	4235	SCHELA DE PRODUCTIE PETROLIERA MORENI	Moreni	11	Crude Oil Extraction	Prabhova	343	
					Sub-total		18715	
E	4273	COPIEX BRAZI	Brazi	012B	Livestock Farm (small)	Prabhova	1	
J	4275	A.R.R.A. FILIALA PLOIESTI S.H. MANECIU	Maneciu	41A1	Water Supply (Drinking)	Teleajen	1102	
J	4088	NERGA MANECIU SECTOR MANECIU	Maneciu (Maneciu Unguren)	41A1	Water Supply (Drinking)	Teleajen	58	
J	4089	S.E.P.P.L. MANECTU	Maneciu (Maneciu Unguren)	20	Wood	Teleajen	40	
J	4212	A.R.R.A. FILIALA PLOIESTI S.H. VALENI	Valenii de Munte	41A1	Water Supply (Drinking)	Teleajen	38157	Valenii de Munte Intake
					Sub-total		39357	
240	4506	R.A.G.C.L. VALENI	Valenii de Munte	41A1	Water Supply (Drinking)	Teleajen	417	
240	4095	STICLOVAL VALENI	Valenii de Munte	14	Mining/Quarrying	Teleajen	1764	
					Sub-total		2181	
K	4127	GOSCOM SLANIC	Slanic	41A1	Water Supply (Drinking)	Varbilau	352	
K	4206	S.C.P.P. MAGURELE	Magurele	0149C	Irrigation (Wine)	Varbilau	248	
					Sub-total		600	
L	4209	PREFABRICATE BLEJOI	Blejoii	45	Construction	Teleajen	44	
L	4326	DELTA DESIGN S.A. COMPLEX DE AGREMENT DACIA	Bucov	92	Recreational/Cultural/Sporting Activit	Teleajen	11	
L	4117	S.C.ROMFOSFOCHIM SA	Valea Calugarcasca	24	Chemicals/Chemical Products	Teleajen	1694	Paniasi Intake
					Sub-total		1749	
O	4217	VIDELMAR SEDIU	Albestr-Falcolegu	15	Food/Beverage	Cricovul Sarai	80	
O	4287	POMICOLA MEHEDINTA	Podenii Noi			Cricovul Sarai	176	
					Sub-total		256	
					TOTAL		159548	

Table 3.3 Inventory of Existing Sewerage System of Cities/Towns

City/Town	Population		Household		Main Sewer Networks			Receiving Indust. Wastewater		Treatment Plant			
	Total	Served (%)	Total	Served (%)	Type	Diameter (mm)	Length (km)	No.	Discharge (l/s)	Pre-Treatment	Process	Capacity (l/s)	
Prodeal	6,940	5,890	1,380	1,110	80.4	Separate	300-500	5.0	0	0.00	none	M+B	90
Azuga	6,260	5,320	1,700	1,600	94.1	Combined	300-500	7.6	1	0.51	with	none	none
Busteni	12,050	7,240	2,850	2,200	77.2	Combined	100-1,000	17.0	1	3.68	with	none	none
Sinaia	15,060	12,000	4,300	3,430	79.8	Combined	150-400	37.2	6	34.85	5 with	M+B	109
Comarnic	13,580	0	6,000	0	0.0								
Breaza	19,040	9,000	6,300	3,000	47.3	Combined	500	4.0	2	19.41	1 with	M+B	76
Cimpina	40,900	26,250	14,690	10,500	71.5	Separate	150-800	40.0	15	71.18	14 with	M+B	150
Baicoi	20,290	4,830	6,360	1,210	19.0	Separate	250-400	10.0	6	12.49	all with	M+B	26
Plopieni	10,320	8,100	5,300	4,750	89.6	Separate	300-500	13.9	1	47.88	with	M	190
Slanic	7,380	2,400	2,500	800	32.0	Separate	300	4.0	0	0.00	none	M+B	27
Valeni	14,010	3,190	3,740	1,100	29.4	Separate	500	8.3	2	0.64	all with	M+B	106
Boldesti	11,580	3,660	2,750	1,070	38.9	Combined	200-500	10.5	4	10.17	2 with	M+B	40
Urleti	11,890	5,000	3,500	1,700	48.6	Combined	250-600	7.0	2	2.54	all with	M+B	32
Ploiesti	253,410	220,000	101,000	88,000	86.8	Combined	200-3000	276.3	40	168.48	35 with	M	1,200
Sub-total	442,710	312,880	162,370	120,470	74.2			440.8	80	371.83	70 with		2,046
Floresti*	7,630	6,100											
Maneciu**	11,450	2,860											
Other Com.**	293,210	0											
Sub-total	312,290	8,960											
Total	755,000	321,840											

Note: (1) Receiving Indust. Wastewater: Receiving wastewater of major industrial establishments

(2) No.: Number of establishments

(3) Discharge: Average discharge to sewer

(4) Treatment Plant Capacity: original design capacity but not actual one.

(5) M : mechanical treatment, B : biological treatment

Table 3.4 Average Sewerage Effluent Quantity, Quality and Pollution Load during 1995-1997

Parameter	Code No.	Q (l/s)		BOD (mg/l)		SS (mg/l)		Oil Products (mg/l)		Calculated Pollution Load (kg/d)			Treatment
		Permitted	Actual	Permitted	Actual	Permitted	Actual	Permitted	Actual	BOD	SS	Oil	
Municipality													
Predeal	4317	64	49.28	19.7(9.7)	14.2(66.3)	25	7.93	3.12(5.30)	83.9	315.9	13.3	W/T	
Azuga	4008	50	31.42	144.0*	187	187.0*	7.93	390.9	507.6	21.5	W/O/T		
Busteni	4011	90	25.18	143.0*	187.0*	187.0*	7.93*	311.1	406.8	17.3	W/O/T		
Sinaia	4018	103	60.57	39.6	118.8	40	3.05	207.2	621.7	16.0	W/T		
Comarnic	4026	0.4		100	200	200					W/O/S		
Breaza	4028	48.07	30.16	20	66.5(9.9)	60	114.51(2.80)	173.3	209.5	37.8	W/T		
Campina	4034	144	234.68	40	28.2	20	5	7.56	571.8	2,672.4	153.3	W/T	
Baicoi	4041	25	50.48	20	63	50	2	1.9	274.8	424.4	8.3	W/T	
Plopieni	4578	175	77.44	20	36.6	60	0	2.93	244.9	1,391.7	19.6	W/T	
Slanic	4127	11.91	6.6	20	16.4	33	0.1	1.93	9.4	48.1	1.1	W/T	
Valeni de Munte	4506	85	30.25	30	21.8	60		3.47	57.0	389.9	9.1	W/T	
Boldesti Scaeni	4022	34.15	21.88	33	33.6	55	1	3.19	63.5	191.9	6.0	W/T	
Urlati	4374	32	21.82	12	23.4	60	1	5.23	44.1	98.0	9.9	W/T	
Floresti	4162	1641	1,522.42	100	49.3	150	8	12.07	6,484.8	16,534.2	1,587.7	W/T	
Floresti**	4301		18.17	20	33.1*		1	4.46*	52.0	152.8	7.0	W/T	
Maneciu**	4088		10.72	5	33.1		1	4.46	30.7	90.1	4.1	W/T	
Total		2503.53	2,191.07						8,999.4	24,055.0	1,912.0		

Note: (1) : Permitted quantity and quality are the latest average ones.

(2) : Actual quantity and quality (without parentheses) are average during 1995-1997.

(3) : Actual quality (with parentheses) of Predeal and Breaza are those after completion of new plant (Predeal: after Oct. 1997, Breaza: after Nov. 1997).

(4) : National Standards : National new standards were published in Nov. in 1997. However, the existing permission will be effective for the time-being until the license expires.

(5) : * : JICA estimate

1) : For BOD of Azuga and Busteni, the estimated sewerage influent quality in Appendix D, Table D.2.4 is applied since they have no treatment plant.

2) : SS and Oil of Busteni are assumed to be the same as those of Azuga

3) : BOD, SS and Oil of Floresti are assumed to be the same as those of Maneciu.

(6) : W/T: with treatment, W/O/T: without treatment, W/O/S: without sewerage system

(7) : ** : commune

Data Source: Romanian Waters

Table 3.5 Existing Baseline Sewerage Discharge and Influent/Effluent Quality

Municipality	Major Industry		Gross Domestic		Groundwater		Total Discharge (l/s)	Influent BOD		Effluent BOD		Treatment
	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)		Content (mg/l)	Load (kg/d)	Content (mg/l)	Load (kg/d)	
Predal	0		19.1	200	6.8	0	25.9	147	330	9.7	22	W/T
Azuga	0.5	6.3	17.2	200	6.2	0	23.9	144	297	144.0	297	WO/T
Busteni	3.7	100	23.5	200	8.4	0	35.5	143	438	143.0	439	WO/T
Sinaia	34.9	105.1	38.9	200	13.9	0	87.7	131	989	39.6	300	W/T
Comarnic	-	-	-	-	-	-	-	-	-	-	-	WO/S
Breaza	19.4	49	29.2	200	10.4	0	59.0	115	587	9.9	50	W/T
Cimpina	71.2	125.9	112.4	200	30.4	0	214	147	2,717	28.2	521	W/T
Baicoi	12.5	40.9	15.7	200	5.6	0	33.7	108	315	63.0	183	W/T
Plopieni	47.9	20.3	26.3	200	9.4	0	83.5	75	538	36.6	264	W/T
Slanic	0		7.8	200	2.8	0	10.6	147	135	16.4	15	W/T
Valenii de Munte	0.6	52.1	10.3	200	3.7	0	14.6	143	181	21.8	27	W/T
Boldesti Scaeni	10.2	51.3	11.9	200	4.2	0	26.3	110	251	33.6	76	W/T
Urlati	2.5	231.2	16.2	200	5.8	0	24.5	156	330	23.4	50	W/T
Ploiesti	168.5	85.5	942.1	200	407.4	0	1,518.0	134	17,524	49.3	6,466	W/T
Floresti*	4.8	13.9	12.7	200	7.1	0	24.6	106	225	33.1	70	W/T
Maneciu*	0		6.0	200	3.3	0	9.3	129	104	33.1	27	W/T
Total	376.7		1,289.3		525.4		2,191.10		24,961		3,808	

* : comarune

Table 3.6 Existing Industrial Wastewater Discharge and BOD Load by Municipality

Municipality	Receiving Body						Total	
	River		Domestic Sewer S.		Industrial Sewer.S		Discharge (l/s)	BOD load (kg/d)
	Discharge (l/s)	BOD load (kg/d)	Discharge (l/s)	BOD load (kg/d)	Discharge (l/s)	BOD load (kg/d)		
ALBESTI	-	-	2.5	50	0.0	-	2.5	50
ARICESTI RAHIVAN	8.1	723	0.0	-	0.0	-	8.1	723
AZUGA	32.2	109	0.5	0	0.0	-	32.7	109
BAICOI	-	-	12.5	44	0.0	-	12.5	44
BARCANESTI	1.3	1	0.6	2	0.0	-	1.9	3
BERCENI	244.2	2,021	0.0	-	40.6	505	284.8	2,526
BLEJOI	3.2	149	0.0	-	0.0	-	3.2	149
BOLDESTI-SCAIENI	19.1	56	10.2	45	0.0	-	29.3	101
BRAZI	283.5	537	0.0	-	0.0	-	283.5	537
BREAZA	0.7	6	19.4	82	0.0	-	20.1	88
BUCOV	20.2	23	0.0	-	0.0	-	20.2	23
BUSTENI	117.5	125	3.7	32	0.0	-	121.1	157
CERASU	1.0	64	0.0	-	0.0	-	1.0	64
CIMPINA	100.2	537	71.2	774	0.0	-	171.4	1,311
CIORANI	0.3	2	0.0	-	0.0	-	0.3	2
COMARNIC	2.6	12	0.0	-	0.0	-	2.6	12
DRAJNA	0.3	4	0.0	-	0.0	-	0.3	4
FILIPESTI DE TARG	0.4	5	0.0	-	0.0	-	0.4	5
FLORESTI	146.8	155	4.8	6	0.0	-	151.6	161
GURA VITIOAREI	0.2	0	0.0	-	0.0	-	0.2	0
MAGURELE	9.8	26	0.0	-	0.0	-	9.8	26
MANECIU	1.5	17	0.0	-	0.0	-	1.5	17
PAULESTI	1.0	1	10.8	5	0.0	-	11.7	5
PLOIESTI	783.1	5,451	157.1	1,244	136.8	1,652	1,077.0	8,347
PLOPENI	4.6	7	47.9	84	0.0	-	52.5	91
SCORTENI	2.0	5	0.0	-	0.0	-	2.0	5
SINAIA	1.9	16	34.8	316	0.0	-	36.7	333
SLANIC	0.5	0	0.0	-	0.0	-	0.5	0
TARGSORUL VECHI	2.7	2	0.0	-	0.0	-	2.7	2
VALEA CALUG.	54.8	282	0.0	-	0.0	-	54.8	282
VALENI DE MUNTE	4.1	7	0.6	3	0.0	-	4.7	10
Total	1,847.7	10,342	376.6	2,688	177.4	2,157	2,401.7	15,187

Table 3.7 Existing Industrial Wastewater Discharge and BOD Load by Category

Code	Industrial Category	Receiving Body												Total		
		River				Domestic Sewer S.				Industrial Sewer S.				Discharge (l/s)	Ave. BOD (mg/l)	BOD load (kg/d)
		Discharge (l/s)	Ave. BOD (mg/l)	BOD load (kg/d)		Discharge (l/s)	Ave. BOD (mg/l)	BOD load (kg/d)		Discharge (l/s)	Ave. BOD (mg/l)	BOD load (kg/d)				
012	Livestock Farm	13.0	986.3	1,104	-	-	-	-	-	-	-	-	-	13.0	986.3	1,104
0141	Agricultural Activities	1.7	10.0	2	-	-	-	-	-	-	-	-	-	1.7	10.0	2
11	Crude Oil Extraction	-	-	-	5.6	100.0	49	-	-	-	-	-	-	5.6	100.0	49
14	Mining/Quarrying	1.7	10.7	2	0.5	40.0	2	-	-	-	-	-	-	2.2	17.6	3
15	Food/Beverage	28.8	31.8	79	28.6	463.8	1,147	-	-	-	-	-	-	57.5	247.0	1,226
17	Textile	11.2	54.1	52	51.8	5.1	23	-	-	-	-	-	-	63.0	13.8	75
19	Tanning/Dressing Leather	-	-	-	1.7	62.8	9	-	-	-	-	-	-	1.7	62.8	9
20	Wood	5.7	106.1	52	5.3	31.7	14	-	-	-	-	-	-	11.0	70.3	67
21	Paper/Paper Products	129.6	13.9	155	-	-	-	-	-	-	-	-	-	129.6	13.9	155
23	Petroleum Refinery	1,205.0	75.6	7,872	11.8	4.6	5	164.1	149.6	2,121	1,380.8	83.8	9,997	1,380.8	83.8	9,997
24	Chemical/Chemical Products	57.4	57.0	282	15.3	80.0	106	-	-	-	-	-	-	72.7	61.8	388
25	Rubber/Plastics Products	9.8	3.7	3	2.6	6.5	1	-	-	-	-	-	-	12.4	4.3	5
26	Non-metallic Mineral Products	6.0	6.7	4	1.1	6.3	1	-	-	-	-	-	-	7.1	6.6	4
27	Basic Metals	11.1	12.9	12	0.4	12.5	0	-	-	-	-	-	-	11.5	12.9	13
28	Metal Products Fabricated	3.8	5.0	2	31.3	43.7	118	9.7	39.1	33	44.7	39.4	152	44.7	39.4	152
29	Machinery/Equipment	40.5	21.6	75	140.9	23.3	283	0.9	22.0	2	182.3	22.9	360	182.3	22.9	360
31	Electronical Machinery/Apparatus	1.5	972.7	129	6.5	972.0	546	-	-	-	-	-	-	8.0	972.1	675
36	Furniture	-	-	-	3.2	14.0	4	-	-	-	-	-	-	3.2	14.0	4
40	Electricity/Gas/Water Supply	278.6	15.9	383	-	-	-	-	-	-	-	-	-	278.6	15.9	383
45	Construction	17.4	26.6	40	8.9	8.9	7	1.1	10.5	1	27.3	20.2	48	27.3	20.2	48
51	Wholesale Trade/Commission	-	-	-	3.4	50.0	15	-	-	-	-	-	-	3.4	50.0	15
55	Hotel/Restaurant	2.4	100.0	21	22.4	100.0	193	-	-	-	-	-	-	24.8	100.0	214
60	Land Transport	0.2	224.5	3	21.3	49.9	92	0.2	30.2	0	21.6	51.1	95	21.6	51.1	95
63	Transport Activities	-	-	-	3.0	8.0	2	1.6	8.0	1	4.6	8.0	3	4.6	8.0	3
64	Post/Telecommunication	0.1	6.7	0	-	-	-	-	-	-	-	-	-	0.1	6.7	0
75	Public Administration/Defence	13.8	9.2	11	3.6	99.8	31	-	-	-	17.4	27.8	42	17.4	27.8	42
80	Education	0.8	32.6	2	2.2	49.9	9	-	-	-	3.0	45.1	12	3.0	45.1	12
85	Health/Social Work	7.6	85.1	56	5.1	60.3	27	-	-	-	12.7	75.1	83	12.7	75.1	83
92	Recreation/Cultural/Sport	-	-	-	0.2	201.4	4	-	-	-	0.2	201.4	4	0.2	201.4	4
	Total	1,847.7	-	10,342	376.6	-	2,688	177.4	-	2,158	2,401.7	-	-	2,401.7	-	15,187

Table 3.8 Existing BOD Load Effluent to River of Each Pollutant Source (1/3)

Code	Company Name	Industrial Activity	Name of Community	Discharging Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4082	COMPORSA STANCESTI	Livestock Farm	Aricești Rahtivani(Stancesti)	Prahova	6.7	1,249.0	722	W/T
4075	PENITENCIARUL TG.NOU	Public Administration/Defense	Aricești Rahtivani(TG. Nou)	Leaotul	0.8	8.4	1	W/T
4076	U.M.01991	Public Administration/Defense	Aricești Rahtivani(TG. Nou)	Leaotul	0.6	8.4	0	W/T
4004	SINTERREF AZUGA	Non-Metallic Mineral Products	Azuga	Azuga	2.0	6.5	1	W/T
4006	BERE AZUGA	Food/Beverage	Azuga	Prahova	15.1	32.3	42	W/T
4007	POSTAV AZUGA	Textile	Azuga	Azuga	11.2	54.1	52	W/T
4009	STIAZ AZUGA	Non-Metallic Mineral Products	Azuga	Prahova	2.5	8.8	2	W/T
4010	SPITALUL AZUGA	Health/Social Work	Azuga	Prahova	1.4	98.3	12	W/T
4053	S.C.SERPLO S.A.PLOIESTE	Irrigation (Flowers)	Barcanesti(Tatarani)	Pinul Rece	1.3	10.0	1	W/T
4150	MATZOL	Construction	Berceni	Iazul Morlort	10.7	35.4	33	W/T
4151	U.M. 01959	Public Administration/Defence	Berceni	Teleajen	0.3	8.4	0	W/T
4137	S.C. VEGA S.A.	Petroleum Refinery	Berceni(Corlatesti)	Dimbu	9.2	51.3	41	W/T
4158	S.C. ASTRA ROMANA SA	Petroleum Refinery	Berceni(Corlatesti)	Dimbu	224.0	100.6	1,947	W/T
4042	AVICOLA BLEJOI	Livestock Farm	Blejo	Teleajen	2.2	767.0	147	W/T
4209	PREFABRICATE BLEJOI	Construction	Blejo	Teleajen	1.0	22.0	2	W/T
4101	GES SCAJENI	Wood	Boldesti-Scajeni	Teleajen	2.2	12.1	2	W/T
4102	S.C. CAHIRO S.A.	Paper/Paper Products	Boldesti-Scajeni	Teleajen	15.0	25.1	32	W/T
4517	POLIGON P.S.I.BOLDESTI	Public Administration/Defence	Boldesti-Scajeni	Teleajen	1.1	15.0	1	WO/T
4577	S.C. AGROS SCAJENI	Livestock Farm	Boldesti-Scajeni	Teleajen	0.8	284.9	20	W/T
4273	COPIMEX BRAZI	Livestock Farm	Brazi	Viisoara	2.3	767.0	151	W/T
4322	T.C.I. PLOIESTI	Construction	Brazi	Prahova	0.4	22.0	1	WO/T
4568	U.M.1065	Public Administration/Defence	Brazi(Negoiesti)	Leaotul	2.2	8.4	2	W/T
4047	RENEL BRAZI	Electricity/Gas/Water Supply	Brazi(Pisculesti))	Prahova	278.6	15.9	385	W/T
4591	SPITAL BREAZA	Health/Social Work	Breaza	Prahova	0.7	97.0	6	W/T
4091	S.C.CHIMFOREX BUCOV	Petroleum Refinery	Bucov	Iazul Morlort	0.9	60.0	5	W/T
4103	SOCERAM BUCOV	Construction	Bucov	Teleajen	4.4	8.6	3	W/T
4103	SOCERAM BUCOV	Construction	Bucov	Teleajen	0.4	11.4	0	W/T
4112	ARPACOR	Chemical/Chemical Products	Bucov	Teleajen	3.4	8.9	3	WO/T
4106	REAL PLEASA	Basic Metals	Bucov(Pleasa)	Teleajen	11.1	12.9	12	W/T

Note: W/T : with treatment, WO/T : without treatment

Table 3.8 Existing BOD Load Effluent to River of Each Pollutant Source (2/3)

Code	Company Name	Industrial Activity	Name of Municipality	Discharging Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4012	SANATORIUL T.B.C. BUSTENI	Public Administration/Defense	Busteni	Prahova	2.8	8.4	2	W/T
4014	HARTIA BUSTENI	Paper/Paper Products	Busteni	Prahova	114.6	12.4	123	W/T
4270	S.C.AGROINDUSTRIALA CERE Livestock Farm		Cerasu	Drajna	1.0	767.0	64	W/T
4017	S.E.P.P.L. CIMPINA	Wood	Cimpina	Doftana	2.2	139.8	26	W/T
4017	S.E.P.P.L. CIMPINA	Wood	Cimpina	Prahova	0.1	139.8	2	W/T
4033	S.C. CONCORDIA S.A.	Electrical Machinery/Apparatus	Cimpina	Doftana	1.5	972.0	129	W/T
4035	S.C.STEAUA ROMANA SA	Petroleum Refinery	Cimpina	Doftana	83.1	46.9	337	W/T
4292	S.C. PETROUTILAJ S.A	Machinery/Equipment	Cimpina	Prahova	3.1	23.8	6	W/T
4292	S.C. PETROUTILAJ S.A	Machinery/Equipment	Cimpina	Prahova	4.9	23.8	10	W/T
4566	GR.SC.CIMPINA	Education	Cimpina	Prahova	0.6	29.1	1	W/T
4593	SPITAL VOILA	Health/Social Work	Cimpina	Doftana	2.9	97.0	25	W/T
4598	U.M.0865 SCOALA DE JANDAR	Public Administration/Defence	Cimpina	Prahova	1.8	8.4	1	W/T
4071	S.C.AGROMEC CIORANI S.A.	Agricultural Activities	Ciorani	Cricovul Sarat	0.2	10.0	0	W/T
4239	SECTIA EXTERIOARA CIORAN	Health/Social Work	Ciorani	Cricovul Sarat	0.1	97.0	1	W/T
4213	VULTURUL COMARNIC	Non-Metallic Mineral Products	Comarnic	Prahova	1.5	3.5	0	W/T
4025	SECTIA POSADA	Wood	Comarnic(Posada)	Prahova	0.6	139.8	7	W/T
4342	COMPLEX MUZEAL	Hotel/Restaurant	Comarnic(Posada)	Prahova	0.5	100.0	5	W/T
4092	SPIT. T.B.C. DRAJNA	Health/Social Work	Drajna	Prahova	0.3	165.7	4	W/T
4003	SPITALUL FILIP.TG.	Health/Social Work	Filipesti de Targ	Prahova	0.3	200.0	5	W/O/T
4005	SOCIAL AJUTATOARE FILIPESTI DE TIRG	Education	Filipesti de Targ	Prahova	0.1	50.0	1	W/O/T
4039	VICTORIA FLORESTI	Petroleum Refinery	Floresti	Prahova	146.8	12.3	155	W/T
4298	UNIT. TERIT. 440	Public Administration/Defence	Gura Vitoarei	Teleajen	0.2	7.0	0	W/T
4098	AGROMEC MAGURELE	Agricultural Activities	Magurele	Teleajen	0.2	10.0	0	W/T
4223	CONSERVE MAGURELE	Food/Beverage	Magurele	Teleajen	9.5	31.2	26	W/T
4310	U.M.01562	Public Administration/Defence	Magurele	Teleajen	0.1	8.4	0	W/T
4551	SOCIETATEA COMERCIALA APASCO S.A.MA	Construction	Maneciu	Teleajen	0.2	22.0	0	W/O/T
4551	SOCIETATEA COMERCIALA APASCO S.A.MA	Construction	Maneciu	Teleajen	0.2	22.0	0	W/O/T

Note: W/T : with treatment, W/O/T : without treatment

Table 3.8 Existing BOD Load Effluent to River of Each Pollutant Source (3/3)

Code	Company Name	Industrial Activity	Name of Municipality	Discharging Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4087	U.M. 01035 CHEIA	Public Administration/Defence	Maneciu(Cheia)	Teleajen	0.2	8.4	0	W/T
4166	MANASTIREA SUZANA	Education	Maneciu(Cheia)	Teleajen	0.1	29.1	0	W/T
4535	STATIA SOL CHEIA	Post/Telecommunication	Maneciu(Cheia)	Gropsoarele	0.1	7.9	0	W/T
4089	S.E.P.L. MANECIU	Wood	Maneciu(Maneciu Ungureni)	Teleajen	0.7	267.6	15	W/T
4257	U.M.01532	Public Administration/Defence	Paulesti	Dimbu	0.1	8.4	0	W/T
4585	U.M. 01958	Public Administration/Defence	Paulesti	Prahova	0.9	8.4	1	W/T
4051	S.C. PETROBRAZI S.A.	Petroleum Refinery	Ploiesti	Prahova	468.7	99.0	4,008	W/T
4136	VINALCOOL SEDIU	Food/Beverage	Ploiesti	Dimbu	2.5	31.2	7	WO/T
4138	PROGRESUL PLOIESTI	Rubber/Plastics Products	Ploiesti	Dimbu	9.8	3.7	3	W/T
4139	EXTRAPAN SEDIU	Food/Beverage	Ploiesti	Dimbu	0.8	31.2	2	W/T
4140	SECTIA L6	land Transport	Ploiesti	Dimbu	0.2	224.0	3	W/T
4141	24 IANUARIE	Machinery/Equipment	Ploiesti	Dimbu	3.7	8.2	3	WO/T
4147	DACIA PLOIESTI	Metal Products Fabricated	Ploiesti	Dimbu	3.8	5.0	2	W/T
4148	S.C.PETROTEL SA PL.	Petroleum Refinery	Ploiesti	Teleajen	271.4	58.7	1,376	W/T
4149	PETROTRANS PLOIESTI	Petroleum Refinery	Ploiesti	Dimbu	0.9	51.7	4	W/T
4160	UPETROM PLOIESTI	Machinery/Equipment	Ploiesti	Dimbu	21.3	23.8	44	W/T
4305	INDUSTRIE MICA	Mining/Quarrying	Ploiesti	Prahova	0.0	20.0	0	WO/T
4100	U.M. PLOPENI	Machinery/Equipment	Plopeni	Teleajen	4.6	16.8	7	WO/T
4507	CAMINUL DE BATRINI MISLE/Health/Social Work		Scorteni	Telega	2.0	27.1	5	W/T
4016	CERBUL SINAIA	Hotel/Restaurant	Sinaia	Prahova	0.8	100.0	7	W/T
4019	S.C.ALPIN S.A.COTA 1400	Hotel/Restaurant	Sinaia	Peles	1.0	100.0	9	W/T
4218	CABANA C.DORULUI	Hotel/Restaurant	Sinaia	Izvorlu Dorului	0.1	100.0	1	W/T
4532	SALINA SLANIC	Mining/Quarrying	Slanic	Slanic	0.5	8.7	0	W/T
4316	U.M. 01819	Public Administration/Defence	Targosorul Vechi(Crangul Lui)	Leaot	2.7	9.9	2	W/T
4115	I.C.V.V.VALEA CALUGAREASCA	Food/Beverage	Valea Calugareasca	Teleajen	0.8	30.1	2	W/T
4117	S.C.ROMFOFOCHIM SA	Chemical/Chemical Products	Valea Calugareasca	Teleajen	53.9	60.0	280	W/T
4095	STICLOVAL VALENI	Mining/Quarrying	Valenii de Munte		1.2	11.6	1	W/T
4211	U.M.VALENII DE MUNTE-SECTIA IZVOARE	Machinery/Equipment	Valenii de Munte	Teleajen	2.9	23.8	6	W/T
	Total				1,847.6		10,343	

Note: W/T : with treatment, WO/T : without treatment

Table 3.9 Existing Average Wastewater Effluent Quantity and Quality of Selected Factories

Parameter	Code No.	Receiving Body	Q (l/s)		SS (mg/l)		BOD (mg/l)		COD-Mn (mg/l)		Oil (mg/l)	
			Permitted	Actual	Permitted	Actual	Permitted	Actual	Permitted	Actual	Permitted	Actual
National Standards					60.0 (300)		20.0 (300)	40.0 (-)		5.0 (20.0)		
Factory					Permitted	Actual	Permitted	Actual	Permitted	Actual	Permitted	Actual
Bere Azuga	4006	River	22.0	15.1	60	123.7	20	32.3	40	18.0	1	14.9
Postav Azuga	4007	River	30.4	11.2	33	22.7	20	54.1	-	29.9	1	6.4
Spitalul Azuga	4010	River	1.8	1.4	100	121.0	60	98.3	-	78.2	-	-
Harita Busteni	4014	River	551.0	114.6	60	67.8	4	12.4	-	9.5	-	-
S.C. Steaua Romana S.A.	4035	River	137.0	83.1	30	109.1	60	46.9	-	26.5	8	8.0
S.C. Petrobrazi S.A.	4051	River	2,028.0	468.7	100	199.3	50	99	140	61.5	7	19.9
S.C. Caharo S.A.	4102	River	179.0	15.0	50	173.1	28	25.1	40(Cr)	94.1	-	0.9
S.C. Dero Lever Ploiesti	4124	Domestic Sewerage	41.2	15.0	180	61.0	100	80.0	30	60.0	0	-
S.C. Vega S.A.	4137	Industrial Sewerage	105	9.0	160	120.1	175	51.3	100(Cr)	94.2	200	23.6
Progresul Ploiesti	4138	River	30.4	9.8	200	61.0	-	6.3	-	1.3	-	2.0
INCAF. Ploiesti	4143	Industrial Sewerage	6.9	6.3	100	778.5	60	632	30	317.3	5	10.4
Feroemail Ploiesti	4146	Domestic Sewerage	18.9	7.7	100	118.0	100	62.2	30	26.4	0	0.7
S.C. Petrotel SAPL.	4148	River	568.2	271.4	40	158.7	25	58.7	100(Cr)	65.0	8	37.3
Maizol	4150	River	35.0	11.0	100	127.5	40	35.4	-	19.9	-	4.3
S.C. Astra Romana S.A.	4158	River	300.9	244.0	60	164.3	20	100	40	97.7	5	30.0
Coca Cola Ploiesti	4311	Domestic Sewerage	19.7	7.0	180	133.5	250	304.5	-	94.2	-	-
Prahoveana Ploiesti	4318	Domestic Sewerage	4.6	1.7	150	119.3	100	62.8	30	112.7	0	53.1
Electroulaj	4554	Domestic Sewerage	6.9	6.5	300	100.9	250	972.0	500	732.0	30	3.0
Neptun Campina	4559	Domestic Sewerage	15.0	12.0	60	22.4	60	45.7	100	165.0	2	6.8
I.R.A. Campina	4575	Domestic Sewerage	7.7	8.1	150	124.0	100	70.0	200(Cr)	29.3	-	5.0
Total			4,109.6	1,185.6								

Note: (1) National Standards : without parentheses are discharge for river, while with parentheses are discharge for domestic sewerage

(2) The new national standards were published in November 1997. However, the existing permission will be effective for the time-being until the license expires.

Table 3.10 Accidental Pollution Record

No	Pollutant Name	Accident Period	Affected River	Accident Location	Accident Features
1	Petrotrans Ploiesti	19/6/1989	Vlucelul Cerbului	upstream of Paltinu Dam	diesel oil leakage due to pipeline damage
2	Petrotrans Ploiesti	1/1/92		upstream of Paltinu Dam	diesel oil leakage due to pipeline damage
3	S.C. Petrobrazi S.A	5/7/93	Prahova	Pisculesti bridge	Sulphide (S ²⁻) discharge due to pump damage
4	F.E. Ploiesti	30/9/1995	Prahova	Pisculesti bridge	fuel oil discharge due to pipeline damage
5	Petrotrans Ploiesti	1/1/95		upstream of Paltinu Dam	diesel oil leakage due to pipeline damage
6	Petrotrans Ploiesti	7/3/1995-24/5/1995	Doftana	upstream of Voilu Purification Plant	diesel oil leakage due to pipeline damage
7	S.C. Vega S.A.	15/6/1995	Dimbu	downstream of Ploiesti sewage T.P	oil products overflow from wastewater T.P. due to heavy rain
8	Compet Sectia Sirt	4/8/95	Recea Spring	upstream of Teleajen confluence	crude oil discharge due to pipeline damage
9	Astro Romana	1/9/95	Dimbu/Teleajen	downstream of Ploiesti City	oil products overflow from T.P. due to heavy rain
10	S.C. Petrobrazi S.A	29/11/1995	Prahova	Pisculesti bridge	biological sludge/oil discharge due to misoperation/valve damage
11	Petrotrans Ploiesti	27/12/1995-31/7/1996	Doftana	upstream of Voilu Purification Plant	diesel oil leakage due to pipeline damage
12	F.E. Ploiesti	30/12/1996-10/12/1997	Prahova	common channel (GIB II)	fuel oil discharge due to fuel truck accident
13	Petrotrans Ploiesti	1/1/97	Doftana	Valea Doftana	diesel oil leakage due to pipeline damage
14	S.C. Vega S.A.	26/4/1997	Dimbu	Ploiesti City	n-Hexane/Volatile discharge due to pump damage
15	S.P. Baicoi	14/6/1997-22/6/1997	Runcu	Bordeni Village	crude oil/salt water discharge due to valve damage
16	S.P. Baicoi	9/9/1997-30/9/1997	Runcu	Bordeni Village	crude oil/salt water discharge due to pipeline damage
17	Petrotrans Ploiesti	19/11/1997	Doftana	Valea Doftana	diesel oil leakage due to pipeline damage
18	Petrotrans Ploiesti	10/7/1998-13/7/1998	Doftana	near by basin boundary	diesel oil leakage due to pipeline damage

Note: T.P. : treatment plant

Table 4.1 Public Awareness Activities by EPA Ploiesti (1/2)

Year	Brief Description of the Activity	Products of the Activity
1997	<p>Information dissemination for the citizens of Ploiesti and Prahova County on environmental quality</p> <p>Presentation on the soil and underground water pollution in the southern area of Ploiesti and Campina.</p> <p>International Environment Day 1997: awareness campaign on environmental protection; 100 posters and 100 folders</p> <p>Information campaign on community behavior and environmental protection</p> <p>Public debate regarding the impact of industrial pollutants to promote the civic spirit of the community</p> <p>Information dissemination for the citizens on the main pollution problems in Prahova County and on the EPA activities through frequent interviews with local press, radio and television</p> <p>Presentation on the complex pollution in Valea Calugareasca and SC ROMFOSFOCHIM SA activity, a series of articles in the press and TV show</p> <p>Awareness campaign for drivers on engine verification and adjustment, and on the reduction of exhaustion</p>	<p>Daily reports on air quality were sent to 4 local newspapers and 2 local radio stations.</p> <p>Videotapes TVR 1 transmission (10 minutes)</p> <p>Posters and folders were prepared and distributed with the help of NGO, People and Environment.</p> <p>4 live transmissions at the local radio Q & A with listeners</p> <p>4 debates with the citizens from Comarnic, Azuga, Busteni, Valeni de Munte.</p> <p>Numerous articles in local daily papers, radio and TV shows</p> <p>A series of 6 articles in "Prahova Telegraph," 10 minutes videotapes for TV Antena 1</p> <p>Testing cars with the cooperation of the police department Articles and shows</p>

Source: EPA Ploiesti

Table 4.1 Public Awareness Activities by EPA Ploiesti (2/2)

Year Month	Brief Description of the Activity	Products of the Activity
1998	Information dissemination on environmental problems in Prahova County by publishing EPA activities in the press	A daily special page in a local newspaper
	Ecology course "Life in Community" at the University of Ploiesti	Monthly free course for 10-15 persons
	Educational courses for the member of NGO, ECO-VALAHIA on environmental problems (air, water and soil pollution), pollution sources and its countermeasures	35 certified environmental volunteers
	Raising public awareness on individual water deposits from ROMFOSFOCHIM- Valea Calugareasca	TV show (national channel) Articles in newspapers
	International Environment Day 1998: educational campaign for pupils on environmental problems - drawing contests, scientific papers, taking care of school garden, and talks with pupils	Meetings between EPA inspectors and pupils from 12 schools
	International Environment Day 1998: certification of the first group of environmental volunteers (MWFEF order # 194/96) graduated from the special courses offered by NGO, ECO-VALAHIA	35 environmental volunteers
	International Environment Day 1998: popularization campaign on the first local scheme (Ploiesti) of recyclable waste collection	1000 folders, newspaper articles, radio and TV shows
8	Educational campaign on oil waste collection	Folders, articles, radio and TV shows
8-9	Informational campaign on the ozone layer protection, in cooperation with School Board and NGOs	Drawing contests for children, 1000 posters and folders, articles, radio and TV shows
7-12 (planned)	Educational campaign for green areas and vegetation in the cities, and tourist education, in cooperation with NGO, ECO-VALAHIA and Biology Museum in Ploiesti	Meetings with pupils, folders, articles in the newspapers, radio and TV shows
6-12 (planned)	Album production on Bucegi natural reservation to popularize the area, and ecological education for the tourists.	1000 albums of Bucegi reservation

Source: EPA Ploiesti

Table 4.2 Environmental NGOs in Prahova County

No.	Name, Location and Year of Foundation	Membership	Main Activities
1	"GREEN SHIELD" ECOLOGICAL GROUP - SATURN FEDER Ploiesti, 1992	20	Protection of the citizens' rights to a clean and healthy environment Promotion of the citizens' initiatives concerning the preservation of a clean environment
2	"GREEN SHIELD" ECOLOGICAL GROUP Ploiesti, 1993	55	Forestry, ecological education Legislation
3	TRAINING, INFORMATION AND MEDIATION CENTER for ECO-DEVELOPMENT (TIMCED) Ploiesti, 1993	22	Environmental conflict resolution
4	"PEOPLE AND ENVIRONMENT" Ploiesti, 1994	35	Pollution impact assessment Management for NGOs
5	"LYNX" - ECOLOGICAL TOURISM AND MOUNTAINEERING Ploiesti, 1997	15	Development of ecologic tourism and mountain sports Environmental protection projects
6	ECO - VALAHIA Ploiesti, 1997	85	Training for environmental volunteers Waste products collection
7	THE CULTURAL-SPORTIVE-ECOLOGIC ASSOCIATION of THE FOREST SCHOOL GROUP Campina	N/A	An increase in the education level of the pupils in the FOREST SCHOOL GROUP
8	"NATURE AND US" Campina, 1992	25	Environmental education Protection of natural resources and the ecosystem
9	"SILVA" TOURISM CLUB Campina, 1993	29	Promotion of new relationship between tourism-ecology-people
10	ECO VALEA PRAHOVEI Busteni, 1990	500	Biodiversity, Education, Environmental Protection
11	ROMANIAN ENVIRONMENTAL CENTER Busteni, 1997	3	Ecological education Touristic informations, advice on environmental problems
12	QUEEN'S FLOWER ENVIRONMENTAL CLUB Sinia, 1996	25	Public participation
13	ROMANIAN ECOLOGISTS and RADIO AMATEURS Azuga, 1993	246	Education, Information campaign

Sources: Romanian NGOs Catalogue 1997

Regional Environmenta Center (REC) - Romania (1996)

Table 5.1 Required Additional Surface Water Extraction

(unit : 1000 m³/year)

Model Point	Code	Name of Establishment	Activity Code	River	Present Volume	Loss Reduction	(B) Domestic Use			(C) Industrial Use			(D) Agricultural Use			Total Additional Water Use (B)+(C)+(D) -(A)	Remarks
							Direct			Direct			Direct				
							Surface Water Intake	Network Water Supply	Surface Water Intake	Network Water Supply	Surface Water Intake	Network Water Supply	Surface Water Intake	Network Water Supply			
195	4008	A.D.P.P. AZUGA	41A1	Prabova	3622.0		43.9		1,324.2					1,903.7			
195	4004	SINTERREF AZUGA	26	Anaga	83.0			56.4						56.4			
195	4006	BERE AZUGA	15	Anaga	674.0			458.3						458.3			
195	4007	POSTAV AZUGA	17	Anaga	465.0			316.2						316.2			
195	4348	ROMSILVA R.A.- OCOL SILVIC AZUGA	05B	Anaga	7,540.0									0.0			
195	4009	STIAZ AZUGA	26	Prabova	119.0			121.7						121.7			
195	4014	HARTIA BUSTENI	21	Prabova	4221.0			210.4						3,497.7			
195	4317	APEVITA PREDEAL	41A3	Anaga	871.0			544.3						544.3			
		Sub-total			17,595.0	0.0		779.9	254.3					6,598.4			
A	4018	A.D.P.P.SINAVA	41A1	Prabova	1,382.0			30.8						1,380.0			
A	4021	MEFIN SINAVA	29	Prabova	275.0			30.8	0.0					199.1			
		Sub-total			1,657.0	0.0		75.2	107.3					337.1			
200	4026	A.D.P.P. COMARNIC	41A1	Prabova	316.0									796.3			
200	4027	PRESCON COMARNIC	14	Prabova	36.0			24.5						24.5			
200	4213	VULTURUL COMARNIC	26	Prabova	47.0			49.4						49.4			
		Sub-total			399.0	0.0		73.2	43.1					870.1			
Dumf	4375	PRIMARIA VALEA DOFTANEI	41A1	Doftana	40.0			407.3						407.3			
B	4036	A.R.R.A. FILIALA PLOESTI S.H.(Vojia)	41A1	Doftana	68,424.0	20,527.2		22,597.3						43,103.8	10,286.5*		
C	4034	R.A.G.C.L. CAMPINA	41A3	Doftana	8,675.0			1,358.0						3,498.2			
C	4035	S.C.STEAVIA ROMANA SA	23	Doftana	218.0			148.2						160.5			
C	4341	ASOCIATA VINATORILOR	05A	Doftana	57.0			16.3						0.0			
C	4551	SOCIETATEA COMERCIALA	45	Doftana	24.0			164.6						16.3			
		Sub-total			8,974.0	0.0		1,358.0	2,152.4					3,675.0			
217	4292	S.C. PETROUILAU S.A.	29	Prabova	1,890.0			128.5						128.5			
217	4190	S.C. EXPLOATARE LUCRARI	0143A	Prabova	1,121.0			230.5						230.5			
217	4216	POMICOLA BAICOI	012B	Prabova	201.0			14,718.3						14,718.3			
217	4045	A.R.R.A. FILIALA PLOESTI S.H.(Nedelea)	41A2	Prabova	16,861.0			128.5						17,654.9			
217	4235	SCHELA DE PRODUCTE	11	Prabova	343.0			0.0						0.0			
		Sub-total			18,715.0	0.0		0.0	14,948.8					2,577.6			
E	4273	COPMEX BRAZI	012B	Prabova	1.0			0.0						0.0			
J	4275	A.R.R.A. FILIALA PLOESTI S.H.(maneciu)	41A1	Teleajen	1,102.0			407.4						18.4	425.7		
J	4088	NERGA MANECIU SECTOR	41A1	Teleajen	58.0			1,001.9						2.0	1,003.9		
J	4089	S.E.P.F.L. MANECIU	20	Teleajen	40.0			27.2						27.2	27.2		
J	4212	A.R.R.A. FILIALA PLOESTI S.H.(Valenii)	41A1	Teleajen	38,157.0	11,447.1		11,295.3						4,020.4	3,868.6		
		Sub-total			39,357.0	11,447.1		12,704.5						27.2	5,325.4		
240	4506	R.A.G.C.L. VALENI	41A1	Teleajen	417.0			150.9						150.9	38,142.70		
240	4095	STICLOVAL VALENI	14	Teleajen	1,764.0			1,199.5						1,199.5			
		Sub-total			2,181.0	0.0		0.0	1,199.5					1,350.5			
K	4127	GOSCOM ISLANIC	41A1	Varbilau	352.0			859.3						240.7	1,000.3		
X	4206	S.C.P.P. MAGURELE	0143C	Varbilau	248.0			859.5						0.0	0.0		
		Sub-total			600.0	0.0		0.0	0.0					240.7	1,000.3		
L	4209	PREFABRICATE BLEIUI	45	Teleajen	44.0			48.3						48.3			
L	4326	DELTA DESIGN S.A. COMPLEX	92	Teleajen	11.0			15.0						15.0			
L	4117	S.C.ROMFOSFOCHM SA	24	Teleajen	1,694.0			-1,694.0						-1,694.0			
		Sub-total			1,749.0	0.0		0.0	-1,694.0					593.6	-1,037.2		
O	4217	VIDELMAR SEDIU	15	Cricovul	800.0			560						560			
O	4287	POMICOLA MEHEDINTA		Cricovul	176.0			560						560			
		Sub-total			256.0	0.0		560						560			
		Total			159,948.0	31,974.3		4,188.7	35,556.1	0	4,417.0	64,083.0	0	3171.2	0		
															79,441.7		

Note: Figures with * are surface water extractions adjusted between code 4036 and code 4212.

Table 5.2 Existing and Future Probable River Flow Rates

(unit : m³/s)

Model Point	Existing Flow Rate			Flow Rate in 2015 w/o Dam Dev.			Flow Rate in 2015 with Dam Dev.		
	50%	75%	95%	50%	75%	95%	50%	75%	95%
190	1.316	0.766	0.399	1.316	0.766	0.399	1.316	0.766	0.399
195	2.911	1.678	0.572	2.863	1.630	0.525	2.863	1.630	0.525
A	4.669	2.768	1.216	4.653	2.752	1.201	4.653	2.752	1.201
200	5.262	3.646	2.547	5.346	3.729	2.630	5.346	3.729	2.630
Dam1	2.611	2.378	2.139	2.611	2.378	2.139	2.611	2.378	2.516
B	0.679	0.364	0.072	0.353	0.038	-0.254	0.353	0.038	0.123
C	0.827	0.390	0.007	0.443	0.006	-0.377	0.443	0.006	0.000
217	7.105	4.654	2.910	6.540	4.088	2.341	6.540	4.088	2.721
220	7.282	5.416	4.261	7.504	5.638	4.483	7.504	5.638	4.860
E	8.177	6.009	4.656	8.437	6.269	4.916	8.437	6.269	5.293
M	0.097	0.059	0.042	0.102	0.064	0.047	0.102	0.064	0.047
250	2.203	2.000	1.910	2.913	2.709	2.620	2.913	2.709	2.620
Dam2	2.185	1.531	1.141	3.338	2.359	1.846	3.338	2.359	2.351
J	2.193	1.186	0.660	1.025	0.018	-0.508	1.025	0.018	0.000
240	2.278	1.242	0.704	1.151	0.114	-0.423	1.151	0.114	0.084
K	3.835	2.234	1.446	2.951	1.351	0.563	2.951	1.351	1.071
L	5.497	3.560	3.040	4.325	2.976	2.206	4.325	2.976	2.713
260	7.700	5.560	4.950	7.287	5.735	4.875	7.287	5.735	5.383
270	16.033	12.706	10.636	16.702	13.375	11.305	16.702	13.375	12.189
275	0.161	0.106	0.066	0.173	0.118	0.078	0.173	0.118	0.078
O	0.688	0.454	0.282	0.751	0.516	0.345	0.751	0.516	0.345
280	0.849	0.560	0.348	0.963	0.674	0.463	0.963	0.674	0.463
H	18.455	14.305	11.674	19.257	15.107	12.476	19.257	15.107	13.361

Table 6.1 Future Baseline Sewerage Discharge and Influent/Effluent Quality

Municipality	Major Industry		Gross Domestic		Groundwater		Total Discharge (l/s)	Influent BOD		Effluent BOD		Treatment
	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)		Content (mg/l)	Load (kg/d)	Content (mg/l)	Load (kg/d)	
Predeal	0.0	0	23.6	200	6.8	0	30.4	155.3	408	11.9	31	A
Azuga	0.9	10.1	21.3	200	6.2	0	28.4	150.3	369	150.3	369	WO/T
Busteni	7.7	190.0	29.0	200	8.4	0	45.1	161.0	628	161.0	627	WO/T
Sinaia	65.3	182.7	48.0	200	13.9	0	127.2	169.3	1,860	65.3	718	A
Comarnic	-	-	-	-	-	-	-	-	-	-	-	WO/S
Breaza	32.6	68.2	36.0	200	10.4	0	79.0	119.3	814	13.4	91	A
Cimpina	120.3	198.7	141.1	200	30.4	0	291.8	178.6	4,503	43.7	1,101	A
Baicoi	21.0	65.4	19.3	200	5.6	0	45.9	114.0	452	74.8	297	A
Plopeni	80.4	32.5	32.4	200	9.4	0	122.2	74.4	786	43.3	458	A
Slanic	0.0	0.0	9.6	200	2.8	0	12.4	154.8	166	19.8	21	A
Valenii de Munte	1.1	83.4	12.8	200	3.7	0	17.6	150.7	229	26.9	41	A
Boldesti Scarieni	17.1	80.2	14.6	200	4.2	0	35.9	119.5	371	44.8	139	A
Urlati	4.3	369.2	20.0	200	5.8	0	30.1	185.6	483	33.1	86	A
Ploiesti	283.1	137.0	1,182.5	200	407.4	0	1,873.0	147.0	23,785	71.7	11,602	S
Floresti	8.1	22.2	16.0	200	7.1	0	31.2	108.3	292	39.6	107	A
Maneciu	0.0	0	7.5	200	3.3	0	10.8	138.9	130	39.7	37	A
Total	641.9		1,613.6		525.4		2,780.9		35,275		15,726	

Note: WO/T : without treatment, WO/S : without sewerage, A : activated sludge, S : coagulation settling

Table 6.2 Future Baseline BOD Load Effluent to River of Each Pollutant Source (1/3)

Code	Company Name	Industrial Activity	Name of Municipality	Discharging Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4082	COMPORSA STANCESII	Livestock Farm	Arcestii Rahivani (Stancesi)	Prahova	6.7	1,249.0	722	AS
4075	PENITENCIARUL TG.NOU	Public	Arcestii Rahivani (T.G. Nou)	Leotul	1.4	13.4	2	AS
4076	U.M. 01991 TG. NOU	Public	Arcestii Rahivani (T.G. Nou)	Leotul	1.0	13.4	1	AS
4004	SINTERREF AZUGA	Non-Metallic Mineral	Azuga	Azuga	3.4	10.4	3	CO
4006	BERE AZUGA	Food/Beverage	Azuga	Prahova	25.4	51.7	114	AS
4007	POSTAV AZUGA	Textiles	Azuga	Azuga	18.8	86.5	140	AS
4009	STIAZ AZUGA	Non-Metallic Mineral	Azuga	Prahova	4.2	14.2	5	CO
4010	SPIITALUL AZUGA	Health/Social Work	Azuga	Prahova	2.3	157.2	31	AS
4053	S.C. SERPLO S.A. PLOIESTI	Irrigation (Flowers)	Barcanesti (Tatarani)	Pirul Rece	1.3	10.0	1	AS
4150	MATIZOL	Construction	Bereceni	Iazul Morilor	18.0	56.7	88	AS
4151	U.M. 01959 BERECENI	Public	Bereceni	Teleajen	0.5	13.4	1	AS
4137	S.C. VEGA S.A.	Petroleum Refinery	Bereceni (Corlatesi)	Dimbu	15.5	82.0	110	AS
4158	S.C. ASTRA ROMANA SA	Petroleum Refinery	Bereceni (Corlatesi)	Dimbu	376.3	161.0	5,234	AS
4042	AVICOLA PLOIESTI-BLEJOI	Livestock Farm	Blejoii	Teleajen	2.2	767.0	147	AS
4209	PREFABRICATE BLEJOI	Construction	Blejoii	Teleajen	1.6	35.2	5	AS
4101	GES SCAIENI	Wood	Boldesti-Scaieni	Teleajen	3.6	19.3	6	CO
4102	S.C. CAIRO S.A.	Paper/Paper Products	Boldesti-Scaieni	Teleajen	25.2	40.1	87	AS
4517	POLIGON P.S. BOLDESTI	Public	Boldesti-Scaieni	Teleajen	1.9	15.0	2	W/O
4577	S.C. AGROS SCAIENI	Livestock Farm	Boldesti-Scaieni	Teleajen	0.8	284.9	20	AS
4273	COPIMEX BRAZI	Livestock Farm	Brazi	Viisoara	2.3	767.0	151	AS
4322	T.C.I. PLOIESTI	Construction	Brazi	Prahova	0.7	22.0	1	W/O
4568	U.M. 1065	Public	Brazi (Negreesti)	Leaotul	3.7	13.4	4	AS
4047	F.E. PLOIESTI	Electricity/Gas/Water	Brazi (Pisculesti)	Prahova	468.1	25.4	1,027	CO
4591	SPTAL BREAZA	Health/Social Work	Breaza	Prahova	1.1	155.2	15	AS
4091	S.C. CHIMFOREX BUCOV	Petroleum Refinery	Bucov	Iazul Morilor	1.5	96.0	12	AS
4103	SOCERAM BUCOV	Construction	Bucov	Teleajen	7.5	13.8	9	AS
4103	SOCERAM BUCOV	Construction	Bucov	Teleajen	0.7	18.2	1	AS
4112	ARPACOR	Chemicals/Chemical	Bucov	Teleajen	5.8	8.9	4	W/O
4106	REAL PLEASA	Basic Metals	Bucov (Pleasa)	Teleajen	18.6	20.7	33	CO
4012	SANATORIUL T.B.C.	Public	Busteni	Prahova	4.7	13.4	5	AS
4014	HARTIA BUSTENI	Paper/Paper Products	Busteni	Prahova	192.6	19.9	331	AS
4270	S.C. AGROINDUSTRIALA	Livestock Farm	Ceraru	Drajna	1.0	767.0	64	AS

Table 6.2 Future Baseline BOD Load Effluent to River of Each Pollutant Source (2/3)

Code	Company Name	Industrial Activity	Name of Municipality	Discharging Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4017	S.E.P.P.L. CIMPINA	Wood	Cimpina	Dofana	3.6	223.7	70	CO
4017	S.E.P.P.L. CIMPINA	Wood	Cimpina	Prahova	0.2	223.7	4	CO
4033	S.C. CONCORDIA S.A.	Electrical	Cimpina		2.6	1,555.2	346	CO
4035	S.C. STEAUA ROMANA SA	Petroleum Refinery	Cimpina	Dofana	139.6	75.0	905	AS
4292	S.C. PETROUTILAJ S.A	Machinery/Equipment	Cimpina	Prahova	5.2	38.1	17	CO
4292	S.C. PETROUTILAJ S.A	Machinery/Equipment	Cimpina	Prahova	8.3	38.1	27	CO
4566	GR.SC.CIMPINA	Education	Cimpina	Prahova	1.0	46.6	4	AS
4593	SPITAL VOILA	Health/Social Work	Cimpina	Dofana	5.0	155.2	66	AS
4598	U.M.0865 SCOALA DE	Public	Cimpina	Prahova	3.0	13.4	3	AS
4071	S.C. AGROMEC CIORANI	Agricultural Activities	Ciorani	Cricovul Sarat	0.2	10.0	0	AS
4239	SECTIA EXTERIOARA	Health/Social Work	Ciorani	Cricovul Sarat	0.2	155.2	3	AS
4213	VULTURUL COMARNIC	Non-Metallic Mineral	Comarnic	Prahova	2.6	5.6	1	CO
4025	SEPL PLOIESTI SEC.	Wood	Comarnic (Posada)	Prahova	1.0	223.7	19	CO
4342	COMPLEX MUZEAL	Hotel/Restaurant	Comarnic (Posada)	Prahova	1.1	190.0	18	AS
4092	SPIT. T.B.C. DRAJNA	Health/Social Work	Drajna		0.4	265.1	10	AS
4003	SPITALUL FILIP.TG.	Health/Social Work	Filipesti de Tag	Prahova	0.5	200.0	8	W/O
4005	SCOALA AJUTATOARE	Education	Filipesti de Tag	Prahova	0.2	50.0	1	W/O
4039	VICTORIA FLORESTI	Petroleum Refinery	Floresti	Prahova	246.7	19.6	418	AS
4298	UNIT. TERIT. 440	Public	Gura Vitoarei	Teleajen	0.3	11.2	0	AS
4098	AGROMEC MAGURELE	Agricultural Activities	Magurele	Teleajen	0.2	10.0	0	AS
4223	CONSERVE MAGURELE	Food/Beverage	Magurele	Teleajen	16.0	49.9	69	AS
4310	U.M.01562	Public	Magurele	Teleajen	0.2	13.4	0	AS
4551	SOCIETATEA	Construction	Maneciu	Teleajen	0.4	22.0	1	W/O
4551	SOCIETATEA	Construction	Maneciu	Teleajen	0.3	22.0	1	W/O
4087	U.M. 01035 CHEIA	Public	Maneciu (Cheia)	Teleajen	0.4	13.4	0	AS
4166	MANASTIREA SUZANA	Education	Maneciu (Cheia)	Teleajen	0.2	46.6	1	AS
4535	STATIA SOL CHEIA	Post/Telecommunication	Maneciu (Cheia)	Gropsoarele	0.2	12.6	0	AS
4089	S.E.P.P.L. MANECIU	Wood	Maneciu (Maneciu Ungurem)	Teleajen	1.1	428.2	41	CO
4257	U.M.01532	Public	Paulesti	Dimbu	0.1	13.4	0	AS
4585	U.M. 01958	Public	Paulesti	Prahova	1.5	13.4	2	AS

Table 6.2 Future Baseline BOD Load Effluent to River of Each Pollutant Source (3/3)

Code	Company Name	Industrial Activity	Name of Municipality	Discharge Place	Discharge (l/s)	BOD Content/Load		Treatment
						(mg/l)	(kg/d)	
4051	S.C. PETROBRAZI S.A.	Petroleum Refinery	Ploiesti	Prahova	787.3	158.4	10,775	AS
4136	S.C.VINALCOOL S.A.	Food/Beverage	Ploiesti	Dimbu	4.2	31.2	11	W/O
4138	PROGRESUL PLOIESTI	Rubber/Plastic Products	Ploiesti	Dimbu	16.5	5.9	8	CO
4139	EXTRAPAN SEDIU	Food/Beverage	Ploiesti	Dimbu	1.4	49.9	6	AS
4140	SECTIA L6 PLOIESTI	Land Transport	Ploiesti	Dimbu	0.3	358.4	9	CO
4141	24 IANUARIE	Machinery/Equipment	Ploiesti	Dimbu	6.3	8.2	4	W/O
4147	DACIA PLOIESTI	Metal Products Fabricated	Ploiesti	Dimbu	6.4	8.1	4	CO
4148	S.C.PETROTEL SA PL.	Petroleum Refinery	Ploiesti	Teleajen	455.9	93.9	3,699	AS
4149	PETROTRANS PLOIESTI	Petroleum Refinery	Ploiesti	Dimbu	1.6	82.7	11	AS
4160	UPEFROM PLOIESTI	Machinery/Equipment	Ploiesti	Dimbu	35.7	38.1	118	CO
4305	INDUSTRIE MICA MOARA	Mining/Quarrying	Ploiesti	Prahova	0.0	20.0	0	W/O
4100	U.M. PLOPENI	Machinery/Equipment	Ploieni	Teleajen	7.8	16.8	11	W/O
4507	CAMINUL DE BATRINI	Health/Social Work	Scorteni	Telega	3.3	43.3	12	AS
4016	CERBUL SINAJA	Hotel/Restaurant	Sinaja	Prahova	1.6	190.0	27	AS
4019	S.C.ALPIN S.A. COTA 1400	Hotel/Restaurant	Sinaja	Peles	2.1	190.0	34	AS
4218	CABANA CDORULUI	Hotel/Restaurant	Sinaja	Izvorul	0.2	190.0	4	AS
4332	SALINA SLANIC	Mining/Quarrying	Slanic	Slanic	0.8	13.9	1	CO
4316	U.M. 01819	Public	Targosorul Vechi (Crangul Lui	Leaotul	4.5	15.8	6	AS
4115	I.C.V.V.VALEA	Food/Beverage	Valea Calugareasca	Teleajen	1.4	48.5	6	AS
4117	S.C.ROMFOSFOCHIM SA	Chemicals/Chemical	Valea Calugareasca	Teleajen	0.0	0.0	0	CO
4095	STICLOVAL VALENI	Mining/Quarrying	Valenii de Munte		2.0	18.5	3	CO
4211	U.M. VALENI DE MUNTE-	Machinery/Equipment	Valenii de Munte	Teleajen	4.8	38.1	16	CO
	Total				3,004.5		25,183	

Note: AS : activated sludge, CO : coagulation settling, W/O : without treatment

Table 7.1 Future Sewerage Served Population and Service Ratio

Municipality	Existing		Future without Extension		Future with Extension				
	Total Population	Served Population	Total Population	Served Population	Total Population	Served Population			
			Ratio(%)	Ratio(%)	Ratio(%)	Ratio(%)			
Predeal	6,940	5,890	84.9	7,757	6,586	84.9	7,757	6,981	90
Azuga	6,260	5,320	85.0	6,756	5,743	85.0	6,756	6,080	90
Busteni	12,050	7,240	60.1	13,017	7,823	60.1	13,017	11,715	90
Sinaia	15,060	12,000	79.7	16,268	12,966	79.7	16,268	14,641	90
Comarnic	13,580	0	0.0	14,662	0	0.0	14,662	5,865	40
Breaza	19,040	9,000	47.3	20,558	9,724	47.3	20,558	12,335	60
Cimpina	40,900	26,250	64.2	44,176	28,361	64.2	44,176	39,758	90
Baicoi	20,290	4,830	23.8	21,915	5,216	23.8	21,915	8,766	40
Plopeni	10,320	8,100	78.5	11,140	8,745	78.5	11,140	10,026	90
Slanic	7,380	2,400	32.5	7,973	2,591	32.5	7,973	3,189	40
Valeni	14,010	3,190	22.8	15,125	3,449	22.8	15,125	6,050	40
Boldesti	11,580	3,660	31.6	12,510	3,953	31.6	12,510	5,004	40
Urleti	11,890	5,000	42.1	12,844	5,407	42.1	12,844	7,706	60
Ploiesti	253,410	220,000	86.8	273,687	237,560	86.8	273,687	246,318	90
Sub-total	442,710	312,880	70.7	478,388	338,124	70.7	478,388	384,434	80.4
Floresti*	7,630	6,100	79.9	8,240	6,584	79.9	8,240	6,584	79.9
Maneciu*	11,450	2,860	25.0	12,366	3,092	25.0	12,366	3,092	25.0
Total	461,790	321,840	69.7	498,994	347,800	69.7	498,994	394,110	79.0

Note: Extension of the sewr networks of Floresti and Maneciu is not considered in this study.

Table 7.2 Future Sewerage Influent Discharge and Quality without Sewer Extension

Municipality	Major Industry		Gross Domestic		Groundwater		Average Quality/Load		
	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Total Discharge (l/s)	Ave. BOD (mg/l)	BOD Load (kg/d)
Predeal	0.0	0.0	23.6	200	6.8	0	30.4	155.3	407.8
Azuga	0.9	10.1	21.3	200	6.2	0	28.4	150.3	368.8
Busteni	7.7	190.0	29.0	200	8.4	0	45.1	161.0	627.5
Sinaia	65.3	140.2	48.0	200	13.9	0	127.2	147.4	1,620.4
Comarnic	0.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0
Breaza	32.6	68.2	36.0	200	10.4	0	79.0	119.3	814.2
Cimpina	120.3	84.8	141.1	200	30.4	0	291.8	131.7	3,319.6
Baicoi	21.0	65.4	19.3	200	5.6	0	45.9	114.0	452.2
Plopeni	80.4	32.5	32.4	200	9.4	0	122.2	74.4	785.6
Slanic	0.0	0.0	9.6	200	2.8	0	12.4	154.8	165.9
Valenii de Munte	1.1	83.4	12.8	200	3.7	0	17.6	150.7	229.1
Boldesti Scaieni	17.1	80.2	14.6	200	4.2	0	35.9	119.5	370.8
Urlati	4.3	150.3	20.0	200	5.8	0	30.1	154.4	401.4
Ploiesti	283.1	75.0	1,182.5	200	407.4	0	1,873.0	137.6	22,268.1
Sub-total	633.8		1,590.2		515.0		2,739.0		31,831.4
Floresti*	8.1	22.2	16.0	200	7.1	0	31.2	108.3	291.9
Maneciu*	0.0	0.0	7.5	200	3.3	0	10.8	138.9	129.6
Total	641.9		1,613.7		525.4		2,781.0		32,253.1

*: commune

Table 7.3 Future Sewerage Influent Discharge and Quality with Sewer Extension

Municipality	Major Industry		Gross Domestic		Groundwater		Average Quality/Load		
	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Discharge (l/s)	BOD (mg/l)	Total Discharge (l/s)	Ave. BOD (mg/l)	BOD Load (kg/d)
Predeal	0.0	0.0	25.9	200	7.2	0	33.0	156.6	446.8
Azuga	0.9	10.1	22.5	200	6.4	0	29.8	151.6	389.9
Busteni	7.7	190.0	43.4	200	10.6	0	61.7	164.3	876.2
Sinaia	65.3	140.2	56.2	200	15.2	0	136.6	149.2	1,761.6
Comarnic	0.0	0.0	21.7	200	3.4	0	25.1	173.0	375.3
Breaza	32.6	68.2	45.7	200	11.9	0	90.2	125.9	981.5
Cimpina	120.3	84.8	197.9	200	37.0	0	355.2	140.2	4,300.6
Baicoi	21.0	65.4	32.5	200	7.6	0	61.1	128.7	679.7
Plopeni	80.4	32.5	37.1	200	10.1	0	127.6	78.7	867.4
Slanic	0.0	0.0	11.8	200	3.1	0	14.9	158.2	204.1
Valenii de Munte	1.1	83.4	22.4	200	5.2	0	28.7	159.3	395.1
Boldesti Scaieni	17.1	80.2	18.5	200	4.8	0	40.5	125.5	438.7
Urlati	4.3	150.3	28.5	200	7.1	0	40.0	159.0	549.0
Ploiesti	283.1	75.0	1,225.9	200	412.5	0	1,921.4	138.7	23,017.9
Subtotal	633.8		1,790.0		542.1		2,965.8		35,283.8
Floresti*	8.1	22.2	16.0	200	7.1	0	31.2	108.3	291.9
Maneciu*	0.0	0.0	7.5	200	3.3	0	10.8	138.9	129.6
Total	641.9		1,813.5		552.5		3,007.9		35,705.6

Note: 1) *: commune

2) per capita groundwater infiltration of the extension area is assumed to be half of the existing one.

Table 7.4 Salient Features of Proposed Sewerage Facilities (1/2)

Municipality	Facilities	Existing	Additional Facilities without Sewer Extension	Additional Facilities with Sewer Extension
Predeal	Main Sewer	φ (300-500mm)x5,000 m	-	φ 300mmx600 m
	Primary S.T.	L(21.3m)xW(16m)xH(5m)x1 set	-	-
	Aeration Tank	L(28m)xW(7.15m)xH(4.35m)x1 set	-	-
	Secondary S.T.	L(28m)xW(3.6m)xH(4.4m)x1 set	-	-
Azuga	Main Sewer	φ (300-500mm)x7,600 m	φ 500mmx250m	φ 500mmx250 m
	Primary S.T.	-	φ 10mxH(4m)x2set	φ 11mxH(4m)x2set
	Aeration Tank	-	L(22m)xW(12m)xH(4m)x1 set	L(24m)xW(12m)xH(4m)x1 set
	Secondary S.T.	-	φ 10mxH(4m)x2set	φ 11mxH(4m)x2set
Busteni	Main Sewer	φ (300-1,000mm)x11,500 m	φ (300-600mm)x6,700 m	φ (300-600mm)x6,700 m
	Primary S.T.	-	L(27m)xW(11m)xH(4.5m)x1 set	L(27m)xW(16m)xH(4.5m)x1 set
	Aeration Tank	-	L(39m)xW(11m)xH(5m)x1 set	L(39m)xW(16m)xH(5m)x1 set
	Secondary S.T.	-	L(42m)xW(11m)xH(5m)x1 set	L(42m)xW(16m)xH(5m)x1 set
Sinaia	Main Sewer	φ (250-400mm)x31,500 m	-	φ 300mmx1,500 m
	Primary S.T.	L(21m)xW(10.5m)xH(4m)x2set	-	L(21m)xW(2.5m)xH(4m)x1 set
	Aeration Tank	L(35m)xW(9m)xH(3m)x2set	L(35m)xW(18m)xH(3m)x1 set	L(35m)xW(21m)xH(3m)x1 set
	Secondary S.T.	L(35m)xW(9m)xH(3m)x2set	-	-
Comarnic	Main Sewer	-	-	φ 400mmx2,700m
	Primary S.T.	-	-	φ 9mxH(4m)x2set
	Aeration Tank	-	-	L(16m)xW(18m)xH(4m)x1 set
	Secondary S.T.	-	-	φ 9mxH(4m)x2set
Breaza	Main Sewer	φ (300-500mm)x5,200 m	-	φ 300mmx1,300m
	Primary S.T.	φ 7.5mxH(5m)x6set	-	-
	Aeration Tank	φ 10mxH(5m)x2set	-	-
	Secondary S.T.	L(21m)xW(10m)xH(5m)x2set	-	-
Cimpina	Main Sewer	φ (300-800mm)x29,000 m	-	φ (300-600mm)x4,900m
	Primary S.T.	φ 25mxH(3m)x1 set	φ 30mxH(3m)x1 set	φ 38mxH(3m)x1 set
	Aeration Tank	L(41m)xW(7.5m)xH(3.5m)x2set	L(50m)xW(36m)xH(4m)x1 set	L(51m)xW(36m)xH(4m)x1 set
	Secondary S.T.	φ 30mxH(3.5m)x1 set	φ 30mxH(3.5m)x1 set	φ 37mxH(3.5m)x1 set

Table 7.4 Salient Features of Proposed Sewerage Facilities (2/2)

Municipality	Facilities	Existing	Additional Facilities without Sewer Extension	Additional Facilities with Sewer Extension
Baicoi	Main Sewer	φ (300-400mm)x8,450 m	-	φ (300-400mm)x2,800m
	Primary S.T.	φ 8mxH(5m)x4set	-	φ 8mxH(5m)x2set
	Aeration Tank	L(16m)xW(9m)xH(5m)x1set	L(16m)xW(9m)xH(5m)x1set	L(21m)xW(9m)xH(5m)x1set
	Secondary S.T.	φ 10mxH(5m)x1set	φ 10mxH(5m)x1set	φ 14mxH(5m)x1set
Plopieni	Main Sewer	φ (300-500mm)x7,800 m	-	φ 300mmx600m
	Primary S.T.	φ 8mxH(5m)x6set	-	φ 12mxH(5m)x1set
	Aeration Tank	L(16m)xW(16m)xH(5m)x1set	L(16m)xW(16m)xH(5m)x2set	L(17m)xW(16m)xH(5m)x2set
	Secondary S.T.	φ 12mxH(5m)x2set	φ 12mxH(5m)x2set	φ 13mxH(5m)x2set
Slanic	Main Sewer	φ 300x4,000 m	-	φ 300mmx2,000m
	Primary S.T.	φ 10mxH(5m)x2set	-	-
	Aeration Tank	L(16m)xW(8m)xH(5m)x1set	-	-
	Secondary S.T.	φ 7mxH(5m)x1set	φ 7mxH(5m)x1set	φ 8.5mxH(5m)x1set
Valenii de Munte	Main Sewer	φ 500mmx8,300 m	-	φ 500mmx1,700m
	Primary S.T.	φ 25mxH(4m)x1set	-	-
	Aeration Tank	L(24m)xW(14m)xH(4m)x1set	-	-
	Secondary S.T.	φ 25mxH(4m)x1set	-	-
Boldesti Scaieni	Main Sewer	φ (300-500mm)x8,500 m	-	φ 300mmx1,600m
	Primary S.T.	φ 8mxH(5m)x4set	-	-
	Aeration Tank	L(20m)xW(10m)xH(5m)x2set	-	-
	Secondary S.T.	L(20m)xW(6.5m)xH(5m)x2set	-	-
Urlati	Main Sewer	φ (300-600mm)x3,000 m	-	φ (300-600mm)x2,000m
	Primary S.T.	φ 9mxH(5m)x4set	-	-
	Aeration Tank	L(20m)xW(10m)xH(5m)x1set	-	L(4m)xW(10m)xH(5m)x1set
	Secondary S.T.	L(20m)xW(6.5m)xH(5m)x1set	-	L(8m)xW(6.5m)xH(5m)x1set
Ploiesti	Main Sewer	φ (900-3,000mm)x103,700 m	-	φ (900-1,200mm)x6,000m
	Primary S.T.	φ 30mxH(3.5m)x4set	φ 45mxH(3.5m)x3set	φ 46mxH(3.5m)x3set
	Aeration Tank	-	L(110m)xW(120m)xH(5m)x1set	L(114m)xW(120m)xH(5m)x1set
	Secondary S.T.	-	φ 50mxH(3.5m)x5set	φ 51mxH(3.5m)x5set

Table 7.5 Project Cost for Sewerage Development

(Without Sewer Extension) (unit : 1,000US\$)

Municipality	Rehabilitation/Construction Cost				Annual O&M Cost		
	Rehabilitation	Treatment Plant	Sewer	Total	Treatment Plant	Sewer	Total
Predeal	-	-	-	-	34	4	38
Azuga	-	839	39	878	32	4	35
Busteni	-	1,246	1,007	2,253	50	6	56
Sinaia	139	1,148	-	1,287	122	14	135
Comarnic	-	-	-	-	-	-	-
Breaza	449	56	-	505	78	9	87
Cimpina	356	2,963	-	3,319	219	24	243
Baicoi	1,025	870	-	1,896	51	6	57
Plopeni	748	1,970	-	2,718	117	13	130
Slanic	584	184	-	767	17	2	18
Valenii de Munte	823	26	-	849	24	3	26
Boldesti Scaieni	199	26	-	225	40	4	45
Urlati	381	284	-	665	34	4	37
Ploiesti	1,164	19,569	-	20,733	1,335	148	1,483
Floresti	116	230	-	345	19	2	21
Maneciu	39	78	-	117	6	1	7
Total	6,024	29,487	1,046	36,557	2,178	242	2,420

(With Sewer Extension) (Unit : 1,000US\$)

Municipality	Rehabilitation/Construction Cost				Annual O&M Cost		
	Rehabilitation	Treatment Plant	Sewer	Total	Treatment Plant	Sewer	Total
Predeal	-	-	79	79	37	4	41
Azuga	-	884	51	935	33	4	37
Busteni	-	1,709	1,251	2,960	61	7	68
Sinaia	139	1,233	216	1,588	131	15	146
Comarnic	-	761	490	1,251	28	3	31
Breaza	449	64	205	717	89	10	99
Cimpina	356	3,605	952	4,913	267	30	296
Baicoi	1,025	1,158	519	2,702	61	7	67
Plopeni	748	2,047	94	2,889	122	14	135
Slanic	584	221	315	1,119	20	2	22
Valenii de Munte	823	43	375	1,241	32	4	36
Boldesti Scaieni	199	29	252	480	45	5	50
Urlati	381	377	453	1,212	55	6	61
Ploiesti	1,164	20,074	2,873	24,112	1,369	152	1,522
Floresti	116	230	-	345	19	2	21
Maneciu	39	78	-	117	6	1	7
Total	6,024	32,512	8,124	46,660	2,375	264	2,639

Table 7.6 Wastewater Treatment Development of Industrial Establishments (1/3)

Code	Name of Factory	Activity	Receiving Body	Treatment	Discharge (m3/d)	Standard Effluent Quality (mg/l)						Development Measures	Total Rehab./ Const. Cost (US\$ 1,000)
						BOD	SS	COD	Oil	CN	Phenol		
4106A	REAL PLEASA	Basic Metals	River	CO	1,610	20.7	252.7	22.6				Rehab.	71
4112A	ARPACOR	Chemical Products	River	W/O	497		124.8	5.2				Const.	23
4103A	SOCERAM BUCOV	Construction Material	River	AS	646			8.8				Rehab.	95
4103B	SOCERAM BUCOV	Construction Material	River	AS	58			14.1				Rehab.	9
4150A	MATIZOL	Construction Material	River	AS	1,554	56.7	214.4					Rehab.	114
4209A	PREFABRICATE BLEJOI	Construction Material	River	AS	141	35.2						Rehab.	21
4322A	T.C.I.PLOIESTE	Construction Material	River	W/O	60	22.0						Const.	2
4551A	SOCIETATEA COMERCIALA AF	Construction Material	River	W/O	32	22.0						Const.	1
4551B	SOCIETATEA COMERCIALA AF	Construction Material	River	W/O	28	22.0						Const.	1
	Sub-total												242
4005A	SCOALA AJUTATOARE FILIPES	Education	River	W/O	22	50.0						Const.	168
4166A	MANASTREA SUZANA	Education	River	AS	18	46.6						Const.	153
4566B	GR.SC.CIMPINA	Education	River	AS	83	46.6						Const.	631
	Sub-total												952
4033A	S.C.CONCORDIA S.A.	Electrical	River	CO	222	1,555.2						Rehab./Const.	1,204
4554A	ELECTROUTILAJ	Electrical	Domestic S.	CO	944	1,555.2						Rehab./Const.	1,079
	Sub-total												2,283
4047A	F.E.PLOIESTI	Electricity/Gas Supply	River	CO	40,440	25.5	283.9	21.6				Rehab./Const.	214
4006A	BERE AZUGA	Food/Beverage	River	AS	2,197	51.7	196.9	23.8				Rehab.	154
4020A	SALSI SINAJA	Food/Beverage	Domestic S.	AS	534	749.3						Rehab./Const.	1,240
4094A	PROLA-PLOIESTI	Food/Beverage	Domestic S.	AS	940	749.3						Rehab./Const.	2,127
4115A	I.C.V.V.ALEA DE MUNTE	Food/Beverage	River	AS	123	48.2						Rehab./Const.	385
4136A	S.C. VINALCOOL S.A. PRAHOV.	Food/Beverage	Domestic S.	AS	304	749.3						Rehab./Const.	752
4136B	S.C. VINALCOOL PRAHOVA	Food/Beverage	River	W/O	365	31.2						Const.	22
4139A	EXTRAPAN SEDIU	Food/Beverage	Domestic S.	AS	160	749.3						Rehab./Const.	477
4139B	EXTRAPAN SEDIU	Food/Beverage	River	AS	118	49.9						Rehab./Const.	581
4143B	I.N.C.A.F.PLOIESTI	Food/Beverage	Domestic S.	AS	898	1,011.2						Rehab.	79
4217A	VIDELMAR SEDIU	Food/Beverage	Domestic S.	AS	177	749.3						Rehab./Const.	508
4223A	CONSERVE MAGURELE	Food/Beverage	River	AS	1,381	49.9						Rehab./Const.	2,911
4311A	COCA COLA PLOIESTI	Food/Beverage	Domestic S.	AS	1,013	487.2						Rehab.	71
4350A	AGROCOM PLOIESTE	Food/Beverage	Domestic S.	CO	130	749.3						Rehab./Const.	412
	Sub-total												9,520

Table 7.6 Wastewater Treatment Development of Industrial Establishments (2/3)

Code	Name of Factory	Activity	Receiving Body	Treatment	Discharge (m3/d)	Standard Effluent Quality (mg/l)							Development Measures	Total Rehab. / Const. Cost (USS 1,000)
						BOD 20(300)	SS 60(300)	COD 40(500*)	Oil 5(20)	CN 0.05(0.5)	Phenol 0.05(30)	Cd 0.1(0.1)		
4003A	SPITALUL FILIPESII TARG	Health/Social Work	River	W/O	39	200.0						Const.	305	
4010A	SPITALUL AZUGA	Health/Social Work	River	AS	198	157.2	193.6	125.1				Const.	1,043	
4092A	SPIT. T.B.C. DRAJNA	Health/Social Work	River	AS	37	265.1	298.4	147.5	9.4			Const.	287	
4239A	SECTIA EXTERIOARA CIORANI	Health/Social Work	River	AS	18	155.2						Const.	153	
4507A	CAMINUL DE BATRANI MISLE	Health/Social Work	River	AS	284	43.3	356.8	133.4				Const.	1,414	
4591A	SPITAL BREAZA	Health/Social Work	River	AS	97	155.2						Const.	594	
4593A	SPITAL VOILA	Health/Social Work	River	AS	428	155.2						Const.	1,943	
	Sub-total												5,738	
4016A	CERBUL SINAI	Hotel/Restaurant	River	AS	142	190.0						Const.	751	
4019A	S.C.ALPIN S.A.	Hotel/Restaurant	River	AS	181	190.0						Const.	952	
4218A	CABANA C. DOHUTANA	Hotel/Restaurant	River	AS	19	190.0						Const.	156	
4342A	COMPLEX MUZEAL POSADA	Hotel/Restaurant	River	AS	97	190.0						Const.	630	
	Su-total												2,489	
4140A	SECTIA L6 PLOIESTI	Land Transport	River	CO	24	358.4	210.9	22.1				Rehab./Const.	191	
4042A	AVICOLA PLOIESTE	Livestock	River	AS	192	767.0						Const.	1,011	
4082A	COMPORSA STANCESTI	Livestock	River	AS	578	1249.0						Const.	2,505	
4270A	S.C.AGROINDUSTRIAL	Livestock	River	AS	84	767.0						Const.	547	
4273A	COMPIMEX BRAZI	Livestock	River	AS	197	767.0						Const.	1,069	
4577A	S.C.AGROS SCAENI	Livestock	River	AS	68	284.9						Const.	523	
	Su-total												5,655	
4029A	HIDROJET BREAZA	Machinery/Equipment	Domestic S.	CO	2,576			35.7				Rehab.	113	
4100B	U.M.PLOPENI	Machinery/Equipment	River	W/O	673		67.8	8.3				Const.	31	
4141A	24 IANUARIE	Machinery/Equipment	River	W/O	540		79.0	23.1				Const.	25	
4160B	UPETROM PLOIESTE	Machinery/Equipment	River	CO	3,087	38.1						Rehab.	136	
4211A	U.M.VALENI DE MUNTE	Machinery/Equipment	River	CO	419	38.1						Rehab.	31	
4292A	S.C.PETROUTILAJ S.A.	Machinery/Equipment	River	CO	446	38.1	296.0	146.8	10.8			Rehab.	33	
4292C	S.C.PETROUTILAJ S.A.	Machinery/Equipment	River	CO	713	38.1	291.0	14.4				Rehab.	52	
4560A	CAMEXIP	Machinery/Equipment	Domestic S.	CO	255			38.4				Rehab.	11	
	Su-total												431	
4147A	DACIA PLOIESTE	Metal Products Fabricat	River	CO	549		96.6	6.6				Rehab.	24	
4314A	TROMET	Metal Products Fabricat	Domestic S.	CO	222			0.574		0.19		Rehab.	10	
	Su-total												34	
4095A	STICLOVAL VALENI	Mining/Quarrying	River	CO	170		163.2					Rehab.	16	

Table 7.6 Wastewater Treatment Development of Industrial Establishments (3/3)

Code	Name of Factory	Activity	Receiving Body	Treatment	Discharge (m ³ /d)	BOD 20(300)	SS 60(300)	COD 40(500*)	Oil 5(20)	CN 0.05(0.5)	Phenol 0.05(30)	Cd 0.1(0.1)	Development Measures	Total Rehab./ Const. Cost (US\$ 1,000)
4004B	SINTERREF	Non-metallic Mineral	River	CO	293	134.9							Rehab.	24
4009A	STIAZ AZUGA	Non-metallic Mineral	River	CO	362	128.0							Rehab.	28
4213A	VULTURULCOMARNIC	Non-metallic Mineral	River	CO	222	153.6							Rehab.	19
	Su-total													71
4014A	HARTIA BUSTENI	Paper/Paper Products	River	AS	16,640	99.5							Rehab.	60
4102A	S.C.CAHIRO S.A	Paper/Paper Products	River	AS	2,176	103.0	217.6						Rehab.	159
	Su-total													219
4035A	S.C.STEAUA ROMANA	Petroleum Refinery	River	AS	12,065	75.0	48.6	7.2			0.64		Rehab./Const.	4,535
4039A	VICTORIA FLORESTI	Petroleum Refinery	River	AS	21,311	154.2							Rehab.	275
4051A	S.C.PETROBRAZI	Petroleum Refinery	River	AS	68,027	158.4	320.4	106.0	31.9		0.557		Rehab.	1,554
4091A	S.C.CHIMFORE	Petroleum Refinery	River	AS	127	96.0							Rehab./Const.	833
4137A	S.C. VEGA S.A.	Petroleum Refinery	River	AS	1,341	82.0	109.6	173.7	37.7		0.281		Rehab./Const.	2,218
4148A	S.C.PETROTEL PLOIESTI	Petroleum Refinery	River	AS	39,392	93.9	300.4	93.4	59.7		1.01		Rehab./Const.	7,129
4149B	PETROTRANS PLOIESTI	Petroleum Refinery	River	AS	137	82.7	479.5	112.3					Rehab./Const.	893
4158A	S.C.ASTRA ROMANA	Petroleum Refinery	River	AS	32,512	161.0	280.4	198.7	48.0		0.735		Rehab.	743
	Su-total													18,175
4535A	STATIA SOL CHEIA	Post/Telecom.	River	AS	14	125.4							Rehab.	2
4298A	UNIT. TERT. 440	Public Administration	River	AS	28	103.0							Rehab.	4
4138A	PROGRESUL PLOIESTE	Rubber/Plastic	River	CO	1,424	97.6							Rehab.	63
4318A	PRAHOVEANA PLOIESTI	Tanning/Leather	Domestic S.	CO	244	1,893			85.0				Const.	26
4007A	POSTAV AZUGA	Textile	River	AS	1,622	86.5	47.3	10.3					Rehab.	416
4017A	S.E.P.P.L.CIMPINA	Wood	River	CO	313	223.7							Rehab./Const.	1,498
4017B	S.E.P.P.L.CIMPINA	Wood	River	CO	18	223.7							Rehab./Const.	154
4025A	SEPL PLOIESTI	Wood	River	CO	83	223.7							Rehab./Const.	582
4089A	S.E.P.P.L.MANECTU	Wood	River	CO	97	428.2	568.0	316.0		0.074	0.256		Rehab./Const.	679
4101A	GES SCAIENI	Wood	River	CO	315	367.3							Rehab./Const.	14
	Su-total													2,928
	Total													49,761

Note: AS: activated sludge, CO: coagulation settling, W/O: without treatment, Re: rehabilitation only, F: floating, SF: sand filter, *: COD value measured in Cr, Rehab.: Rehabilitation, Const.: Construction

Table 7.7 Monitoring Parameters of Industrial Wastewater

Group Code	Activity	Characteristics of Wastewater			to River			to Domestic Sewerage System		
		No. of Channels	No. of Common Parameters	No. of Additional Parameters	No. of Channels	No. of Common Parameters	No. of Additional Parameters	No. of Channels	No. of Common Parameters	No. of Additional Parameters
1	0141 Agricultural Activities 0143B Irrigation (Flowers) 0143C Irrigation (Wine) 05A Fish Farming 05B Fish Farming (Clean Water)	5	13 (pH, NH ₄ ⁺ , NO ₃ ⁻ , NO ₂ ⁻ , T-N, Cl ⁻ , T-P, PO ₄ ³⁻ , BOD, COD _(Mn) , COD _(Cr) , SS, and Residue)	4 (Iron, Mn ²⁺ , Al ³⁺ , Mg ²⁺)	0	6 (pH, NH ₄ ⁺ , T-P, BOD, COD _(Cr) , SS)	2 (Mg ²⁺ , SO ₄ ²⁻)			
2	11 Crude Oil Extraction 14 Mining/Quarrying 23 Petroleum Refinery 24 Chemicals/Chemical Products 25 Rubber/Plastic Products 29 Machinery/Equipment 60 Land Transport 63 Transport Activities	21	13 (Phenol, Iron, H ₂ S (S ₂), Petroleum products, Substances extracted by petroleum ether, Cd ²⁺ , CN ⁻ , Pb ²⁺ , Cr ⁶⁺ , Cr ³⁺ , Hg, F)	12	36	5 (Phenol, H ₂ S (S ₂), Substances extracted by petroleum ether, Cd ²⁺ , CN ⁻ , Pb ²⁺ , Cr ⁶⁺ , Cr ³⁺ , SO ₄ ²⁻)	9			
3	012A Livestock Farm 012B Livestock Farm (Small) 15 Food/Beverage 21 Paper/Paper Products	12	13 High organic substances including inorganic substances	10 Phenol, Cd ²⁺ , CN ⁻ , Pb ²⁺ , Cr ⁶⁺ , Cr ³⁺ , Hg, Iron, H ₂ S (S ₂), Substance extracted by petroleum ether	8	6 (Phenol, Cd ²⁺ , CN ⁻ , Pb ²⁺ , Cr ⁶⁺ , Cr ³⁺ , H ₂ S (S ₂), Substance extracted by petroleum ether	8			
4	17 Textiles 19 Tanning/Dressing Leather 20 Wood 26 Non-Metallic Mineral Products 27 Basic Metals 28 Metal Products Fabricated Electrical 31 Machinery/Apparatus 36 Furniture 40A Electricity/Gas/Water Supply 45 Construction 85 Health/Social Work	27	13 Heavy metals and toxic substance	21 (Phenol, Iron, Mn ²⁺ , SO ₃ ²⁻ , Ag ⁺ , As, Al ³⁺ , Cd ²⁺ , CN ⁻ , Co ²⁺ , Cr ⁶⁺ , Cr ³⁺ , Cu ²⁺ , F ⁻ , Hg ²⁺ , MO ²⁺ , Ni ²⁺ , Pb ²⁺ , Mg ²⁺ , Se ²⁻ , Zn ²⁺)	25	6 (Phenol, SO ₃ ²⁻ , Cd ²⁺ , CN ⁻ , Cr ⁶⁺ , Cr ³⁺ , Cu ²⁺ , Ni ²⁺ , Pb ²⁺ , Mg ²⁺ , Zn ²⁺)	11			
5	51 Wholesale Trade/Commission 55 Trade 55 Hotel/Restaurant 64 Post/Telecommunication Public 75 Administration/Defense 90 Education 92 Recreational/Cultural/Sportin	21	13 Organic substances and coliform	10 (Ca ²⁺ , Cl ₂ , Anionic detergents, Iron, Mn ²⁺ , Mg ²⁺ , Total coliforms, Fecal coliforms, Fecal streptococci, Salmonella)	13	6 (Cl ₂ , Anionic detergents, SO ₄ ²⁻ , Mg ²⁺)	4			

Table 8.1 Phased Program of Sewerage Investment and O&M Costs

(unit: US\$ 1,000)

Municipality	Investment Cost				O&M Cost			
	2001- 2005	2006- 2010	2011- 2015	Total	2001- 2005	2006- 2010	2011- 2015	Annual 2016- *
Predeal	0	40	40	79	203	203	204	41
Azuga	0	910	26	935	15	15	183	37
Busteni	0	2,335	626	2,960	21	21	333	68
Sinaia	139	108	1,341	1,588	395	461	464	146
Comarnic	0	1,006	245	1,251	-	-	148	31
Breaza	449	103	167	718	438	460	470	99
Cimpina	356	2,279	2,279	4,913	513	647	662	297
Baicoi	1,025	260	1,418	2,702	231	277	286	68
Plopeni	748	47	2,094	2,889	490	551	555	136
Slanic	584	158	379	1,120	87	102	104	22
Valenii de Munte	823	188	231	1,241	161	174	176	36
Boldesti Scaieni	199	126	155	480	220	238	242	50
Urlati	381	227	604	1,211	245	258	269	61
Ploiesti	7,855	8,128	8,128	24,111	2,776	4,145	5,536	1,521
Floresti	116	0	230	346	74	83	85	21
Maneciu	39	0	78	117	25	28	28	7
Total	12,714	15,910	18,036	46,661	5,892	7,661	9,742	2,641

*: US\$ 1,000/year

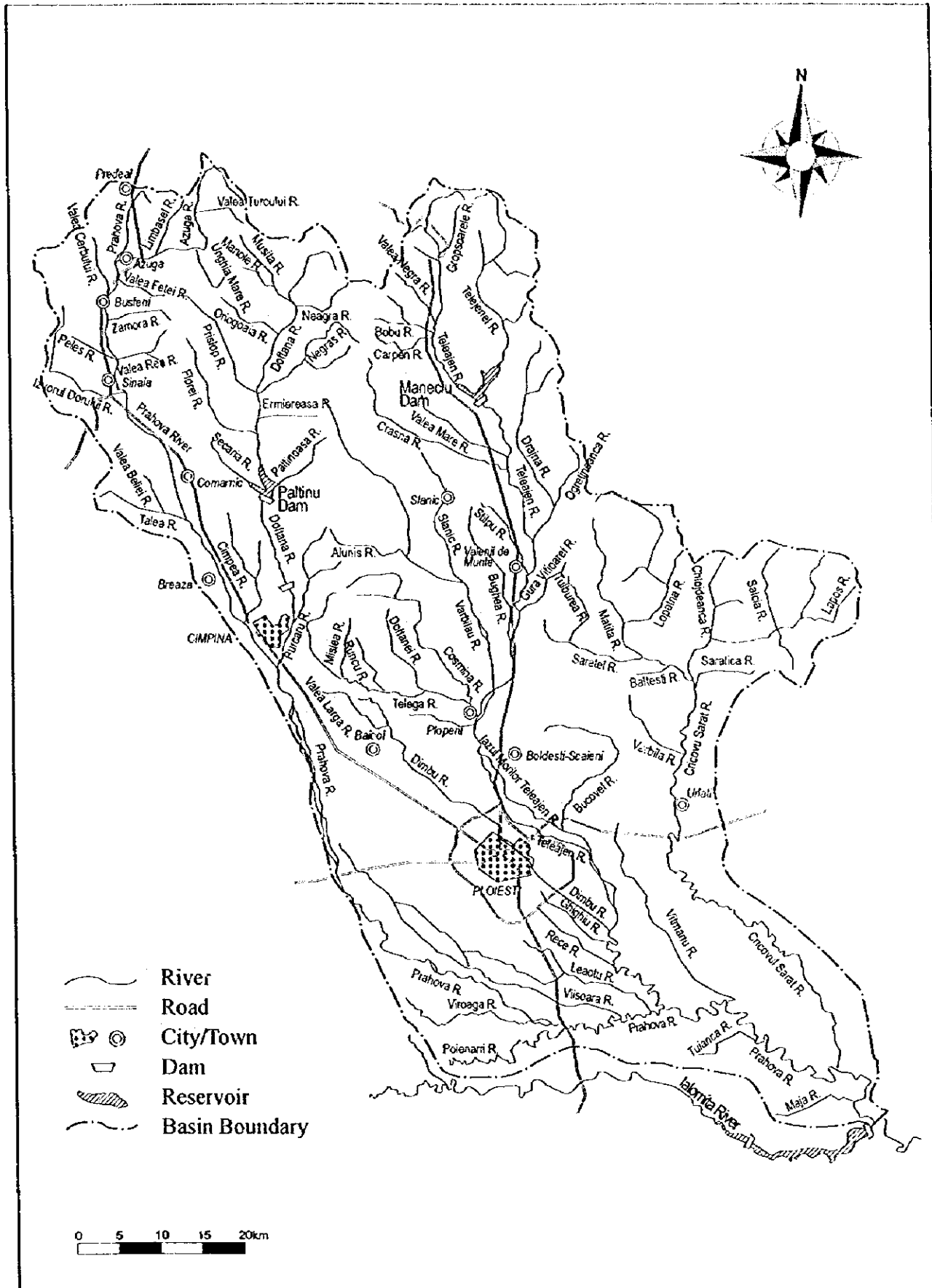
Table 8.2 Phased Program of Investment and O&M Costs of Industrial Wastewater Treatment

(unit: US\$ 1,000)

Industrial Category	Investment Cost				O&M Cost			
	2001-2005	2006-2010	2011-2015	total	2001-2005	2006-2010	2011-2015	Annual 2016-*
Agricultural Activities				-	6	6	6	1
Basic Metals			71	71	264	306	370	78
Chemical/Chemical Products			23	23	203	235	361	76
Construction Material			242	242	376	435	544	115
Crude Oil Extraction				-	91	105	127	27
Education			952	952	29	34	41	9
Electrical Machinery/Apparatus		895	1,389	2,284	107	124	150	32
Electricity/Gas Supply			214	214	686	796	960	203
Food/Beverage			9,520	9,520	991	1,149	1,443	305
Furniture				-	38	44	53	11
Health/Social Work		1,175	4,564	5,738	309	363	445	94
Hotel/Restaurant		914	1,575	2,489	429	531	685	147
Irrigation (Flowers)				-	15	15	15	3
Land Transport		119	72	191	328	380	459	97
Livestock Farm		5,042	613	5,655	740	740	740	148
Machinery/Equipment			431	431	2,544	2,966	3,792	802
Metal Products Fabricated			34	34	556	644	777	164
Mining/Quarrying			16	16	59	69	83	18
Non-metallic Mineral Products			71	71	179	207	250	53
Paper/Paper Products			219	219	2,842	3,296	3,976	841
Petroleum Refinery	9,616	4,162	4,398	18,175	35,950	41,688	50,296	10,633
Post/Telecommunication			2	2	4	4	5	1
Public Administration/Defense			4	4	392	454	548	116
Recreation/Culture/Sports				-	5	6	7	2
Rubber/Plastic Products			63	63	282	327	394	83
Tanning/Dressing Leather			26	26	12	14	17	4
Textiles			416	416	1,019	1,182	1,426	301
Transport Activities				-	44	51	62	13
Wholesale Trade/Communication				-	65	75	91	19
Wood		1,432	1,496	2,928	232	269	324	69
Total	9,616	13,738	26,407	49,761	48,793	56,514	68,445	14,463

*: US\$ 1,000/year

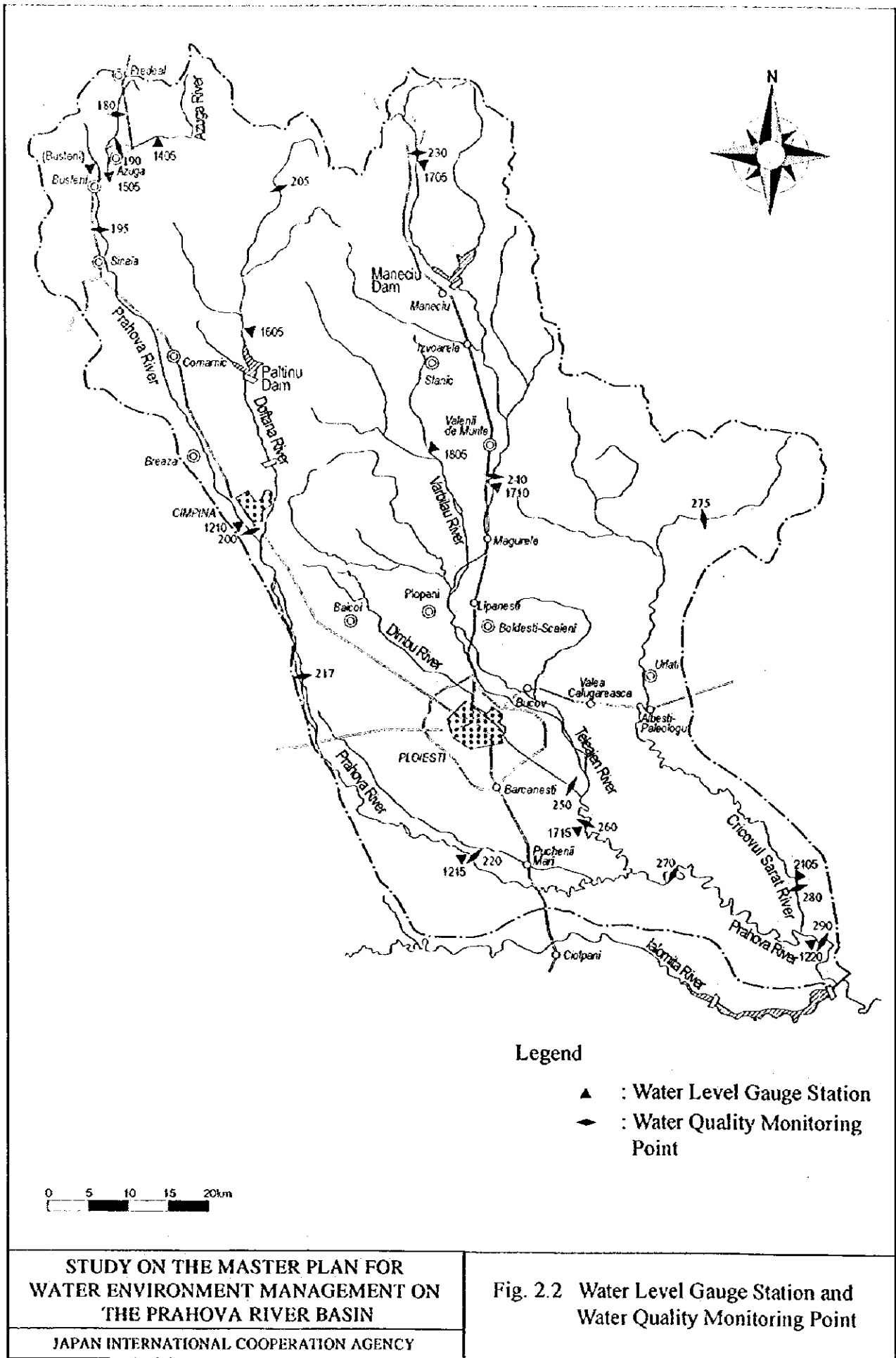
FIGURES



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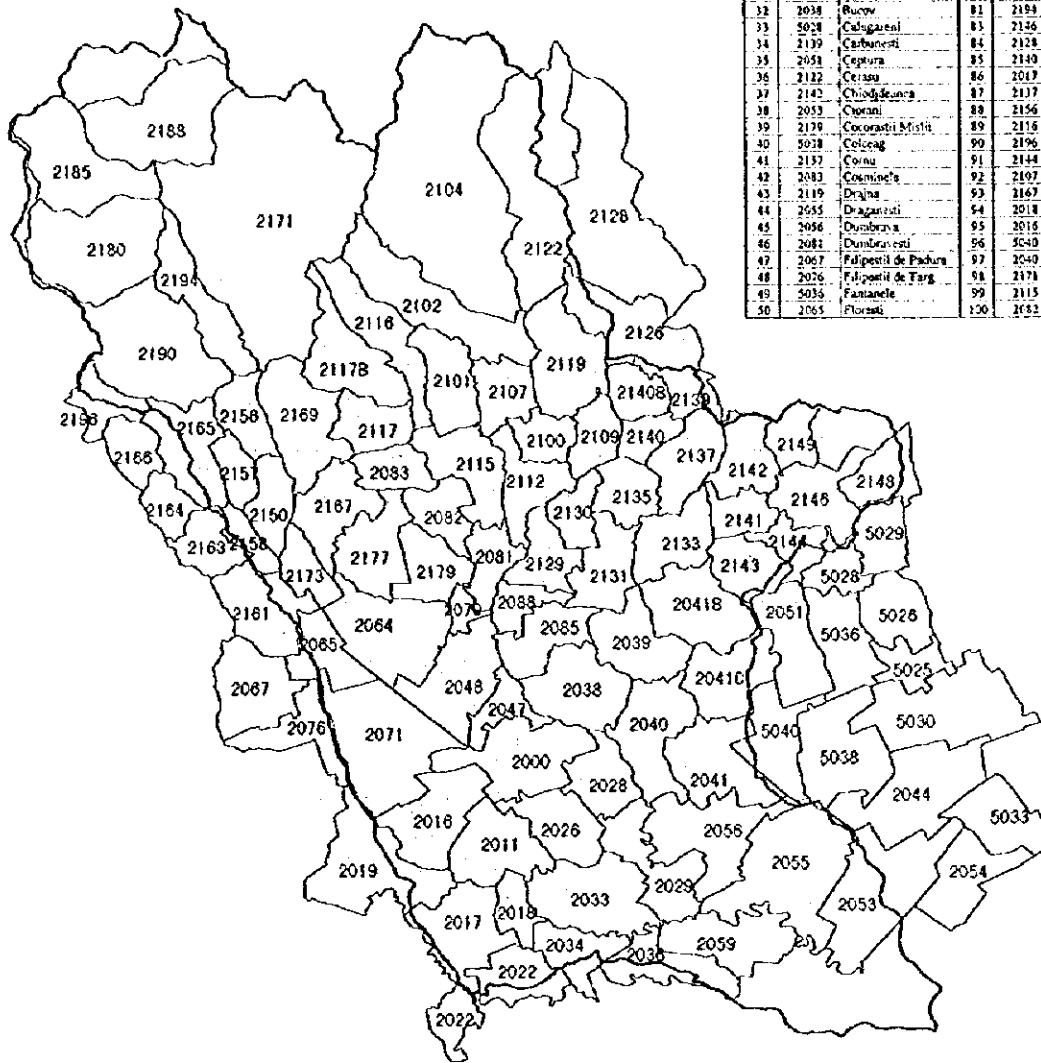
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Fig.2.1 Prahova River Basin





No	Code	Nume	No	Code	Nume
1	2150	Cungina	51	2041	Fulga
2	2000	Ploiesti	52	2059	Gheorghita
3	2188	Anapa	53	2034	Gorgola
4	2064	Balcoi	54	2143	Gornel Cracov
5	2085	Baldesti-Sraieni	55	2130	Gornel
6	2165	Bicaza	56	2026	Gura Vahului
7	2185	Borleni	57	2112	Gura Viihozei
8	2190	Comarnic	58	2041	Iordacheanu
9	2025	Miri	59	2102	Levanche
10	2079	Ploneni	60	2029	Jugurani
11	2180	Sructia	61	2148	Lapoa
12	2101	Stanic	62	2088	Liponesti
13	2041	Utlaru	63	2129	Lugarele
14	2100	Valanii de Munte	64	2161	Magureni
15	2166	Adarnali	65	2124	Manciu
16	2041	Albesti-Palochoga	66	2019	Manesti
17	2117	Alunisi	67	2135	Pacurari
18	2141	Apodolache	68	2048	Paufesti
19	2071	Aricesii Bahusani	69	2039	Plonoi
20	2149	Aricesii Zeletin	70	2133	Podeni Noi
21	2030	Babe Ana	71	2158	Podeni Carpatha
22	2036	Baba Doamna	72	2032	Pocurari Borchi
23	2131	Baltesti	73	2136	Poenari
24	2173	Banesti	74	2139	Predeal Sacul
25	2026	Barcanesti	75	2143	Predeal de Jos
26	2028	Borzeni	76	2164	Prota de Sus
27	2117	Berlea	77	2033	Puchenii Mari
28	2047	Bihoi	78	2029	Rafcu
29	2033	Buldesti Gradistea	79	2149	Sabia
30	2011	Brazi	80	2034	Salcuța
31	2169	Brabu	81	2177	Scorțeni
32	2038	Bucov	82	2199	Secaria
33	2028	Calugareni	83	2146	Singera
34	2139	Carbunesti	84	2128	Sinchișid
35	2051	Ceapura	85	2140	Sorani
36	2122	Cetasa	86	2017	Sima
37	2142	Chiojdeanca	87	2117	Solnari
38	2053	Choroni	88	2156	Socile
39	2179	Cocorati Mistii	89	2116	Stefesti
40	2028	Coleog	90	2196	Talca
41	2137	Coma	91	2144	Tataru
42	2082	Cominea	92	2107	Trosari
43	2119	Dragna	93	2167	Tulcea
44	2055	Draganesti	94	2018	Trosari
45	2056	Dumbrava	95	2016	Targu Vechi
46	2082	Dumbravesti	96	2040	Troscani
47	2067	Falgestii de Padure	97	2040	Valen Calugareana
48	2026	Falgestii de Targ	98	2171	Valen Doftanei
49	2035	Fantanele	99	2115	Varbitza
50	2065	Floristi	100	2182	Valuani



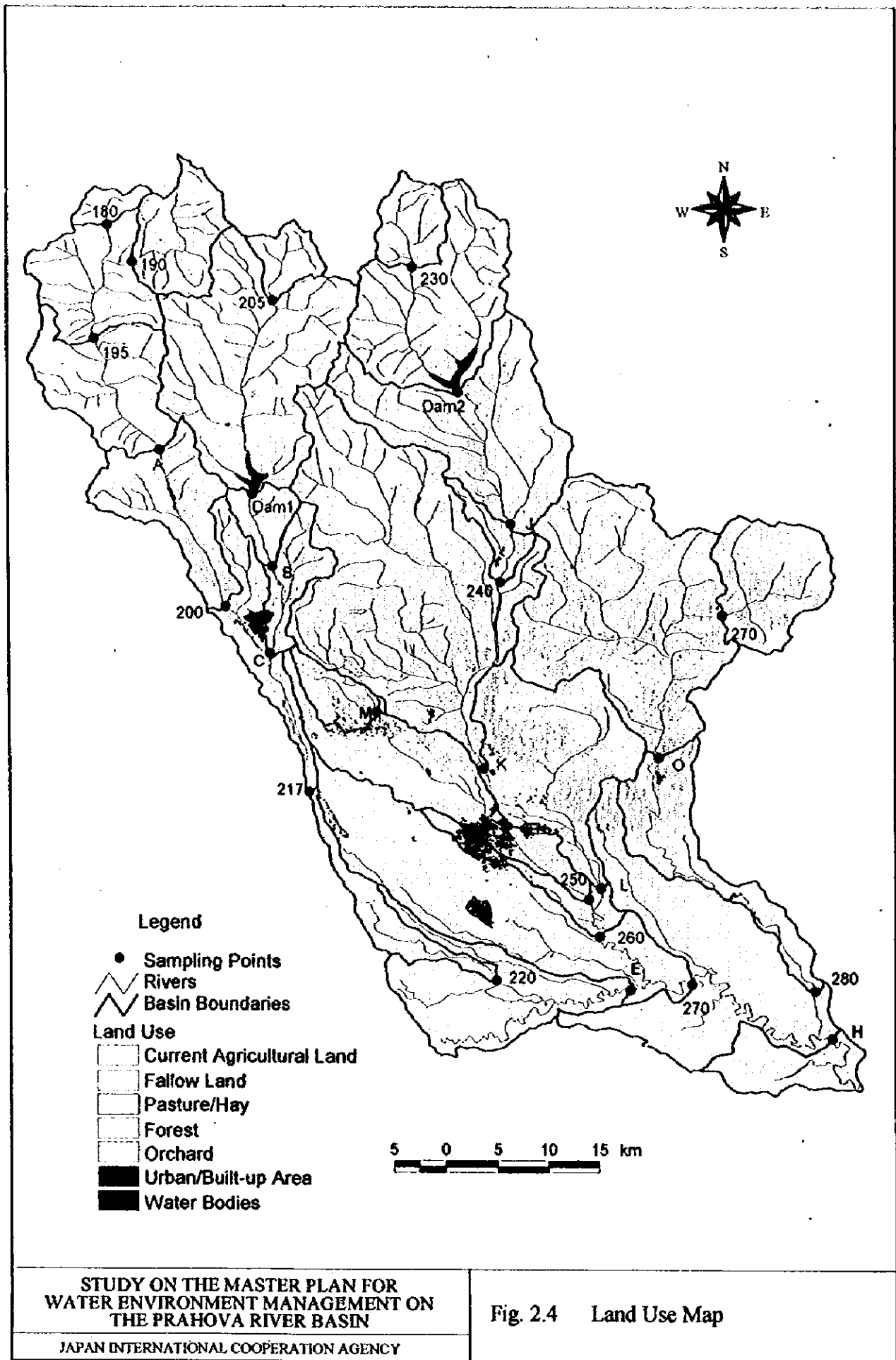
 Basin Boundary
 Administrative Boundary

5 0 5 10 15 20 km

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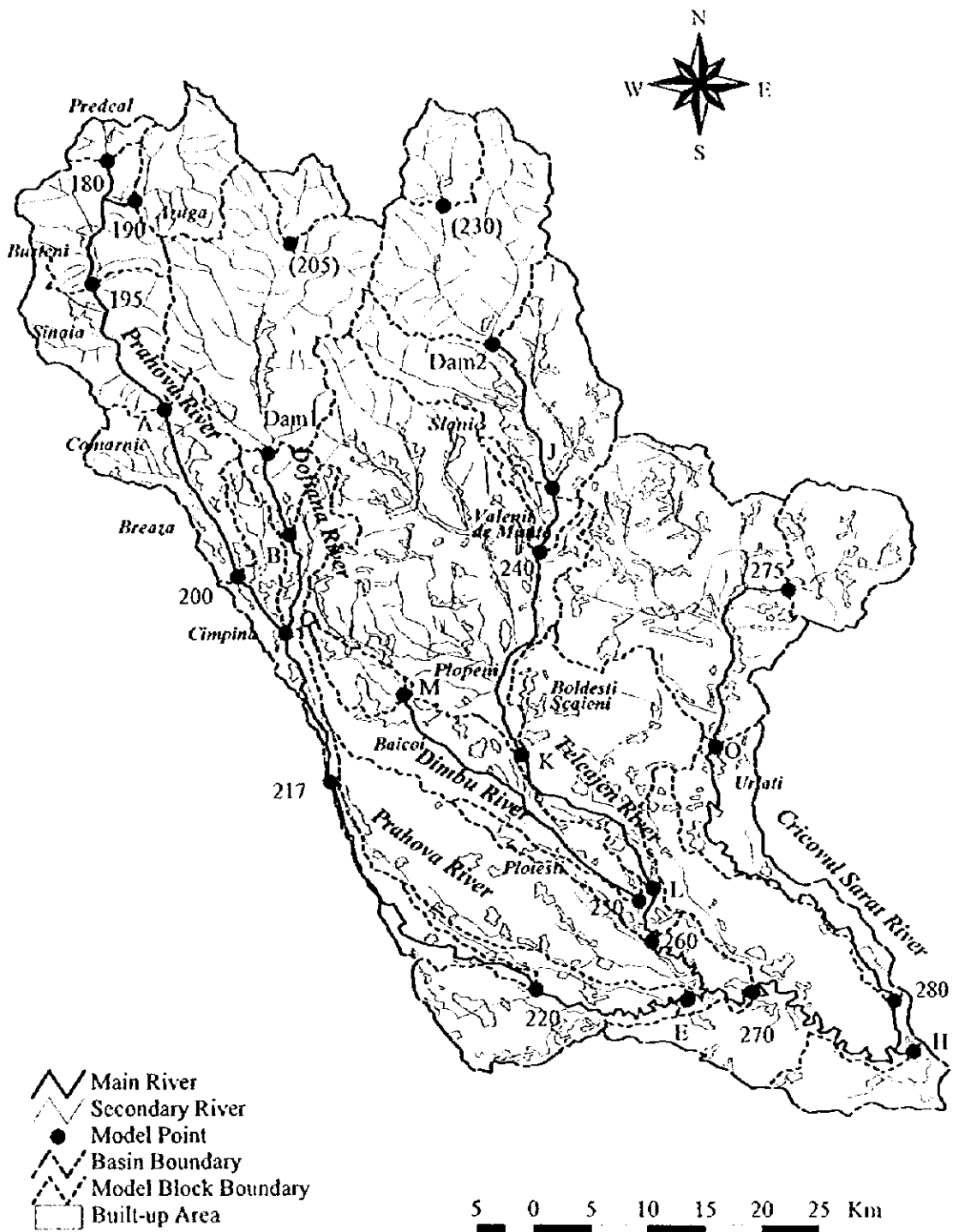
Fig. 2.3 Administrative Boundary in Prahova County



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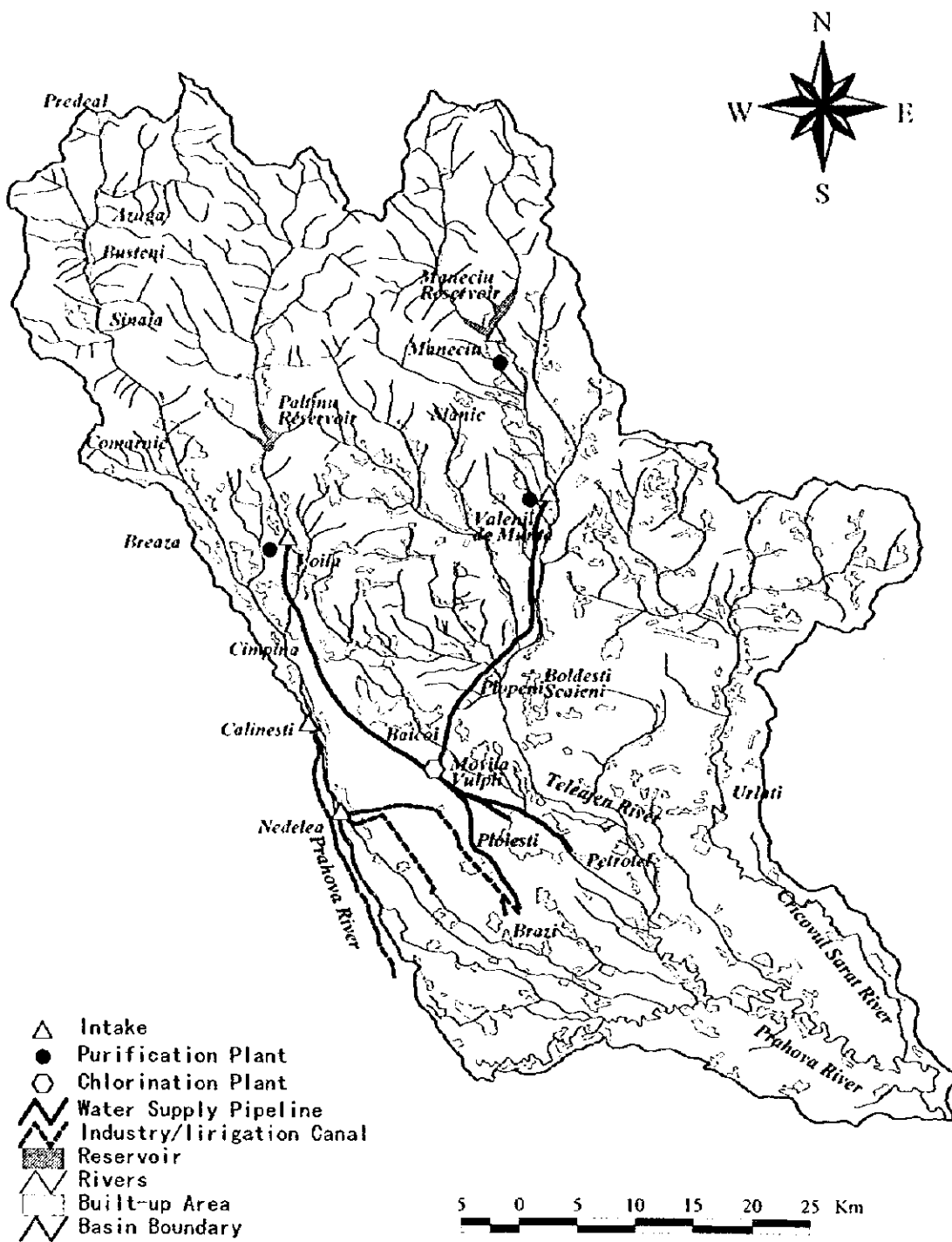
Fig. 2.4 Land Use Map



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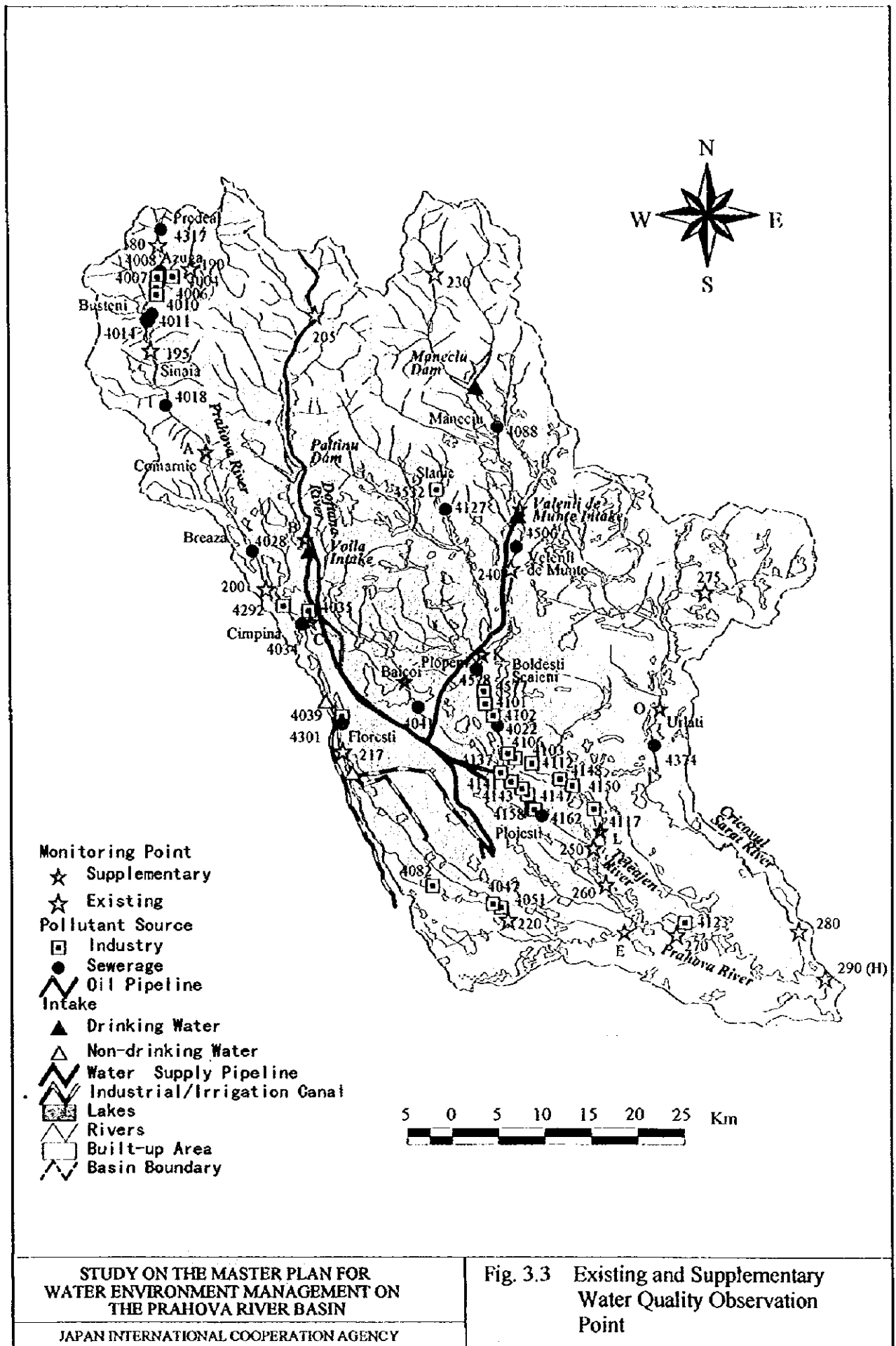
Fig. 3.1 Simulation Model Points and Blocks



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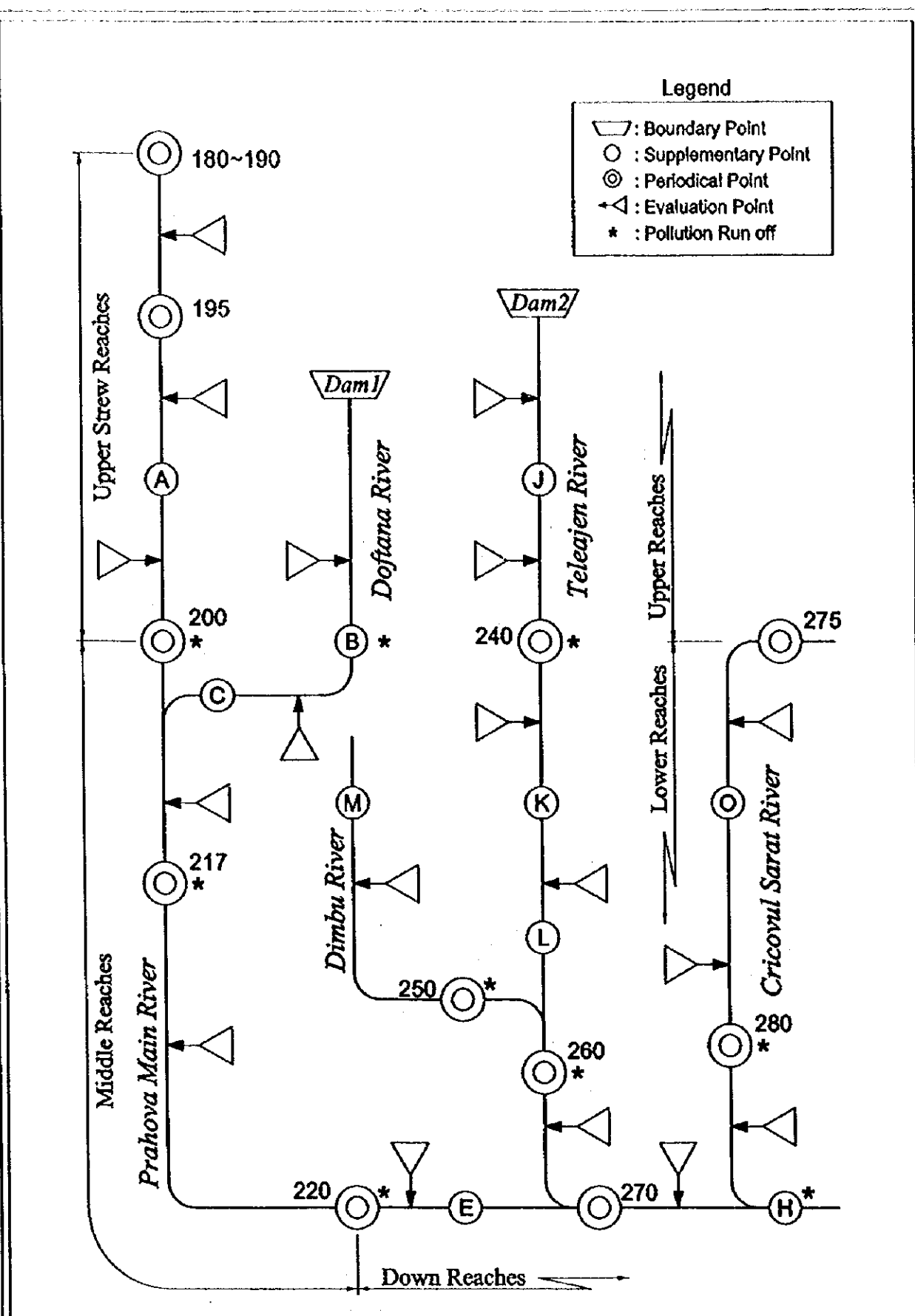
**Fig. 3.2 Major Water Supply System
in Prahova River Basin**



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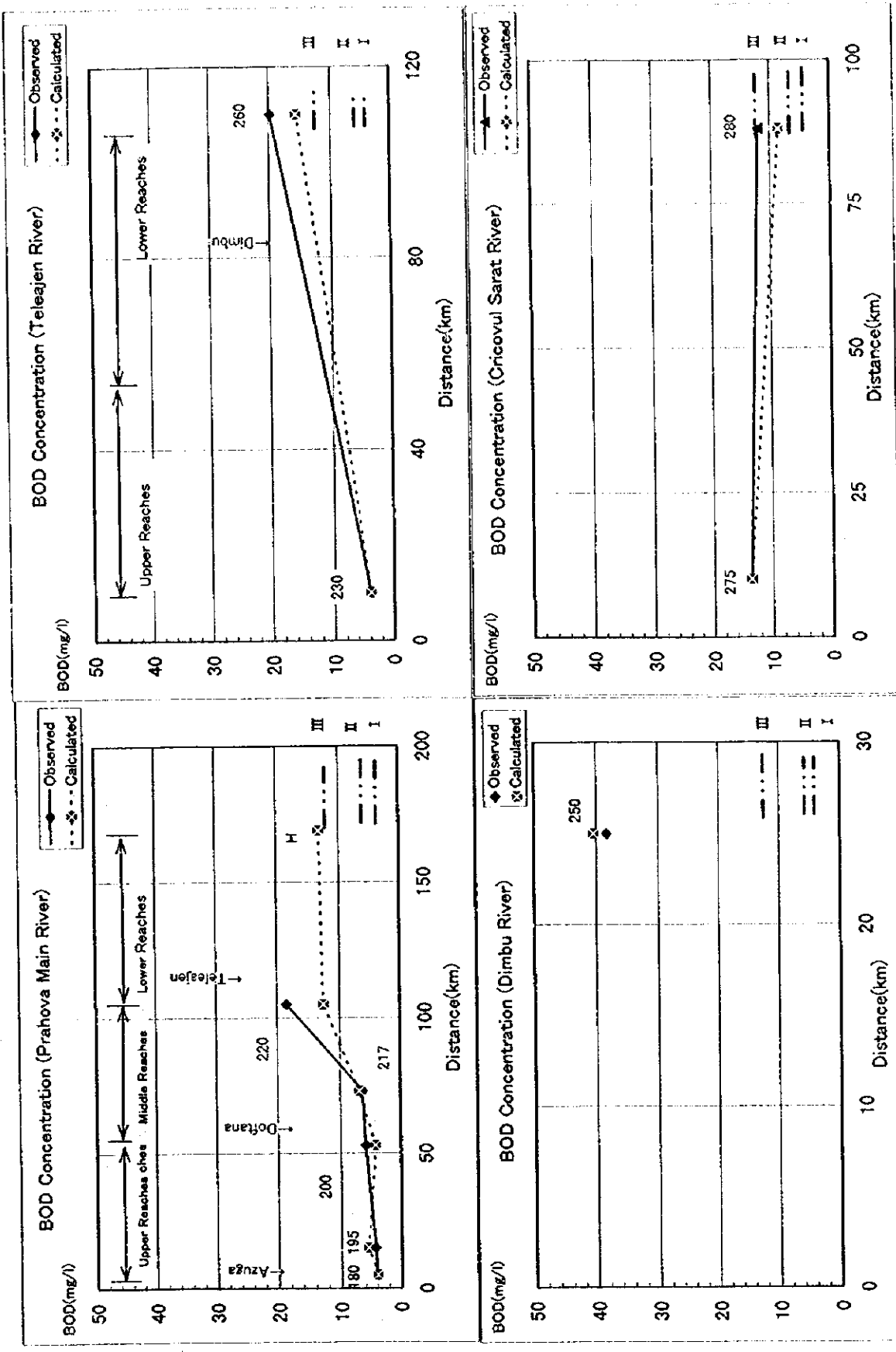
Fig. 3.3 Existing and Supplementary
Water Quality Observation
Point



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 THE PRAHOVA RIVER BASIN

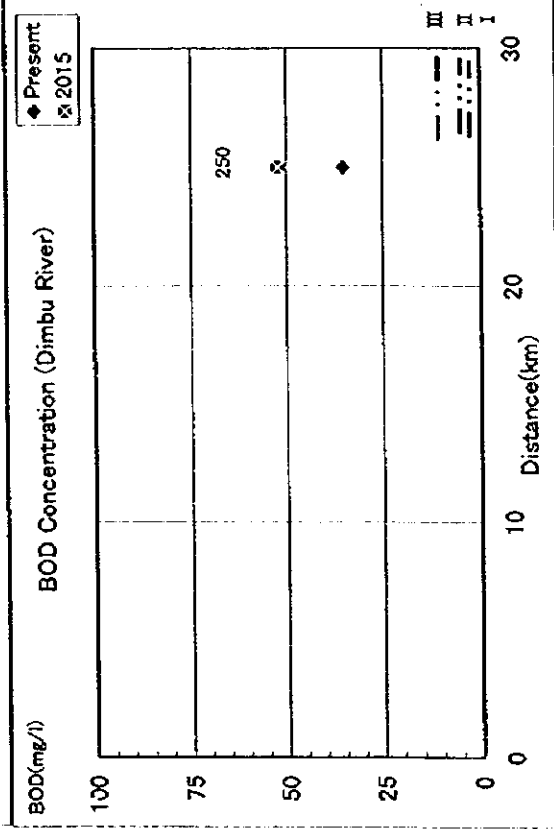
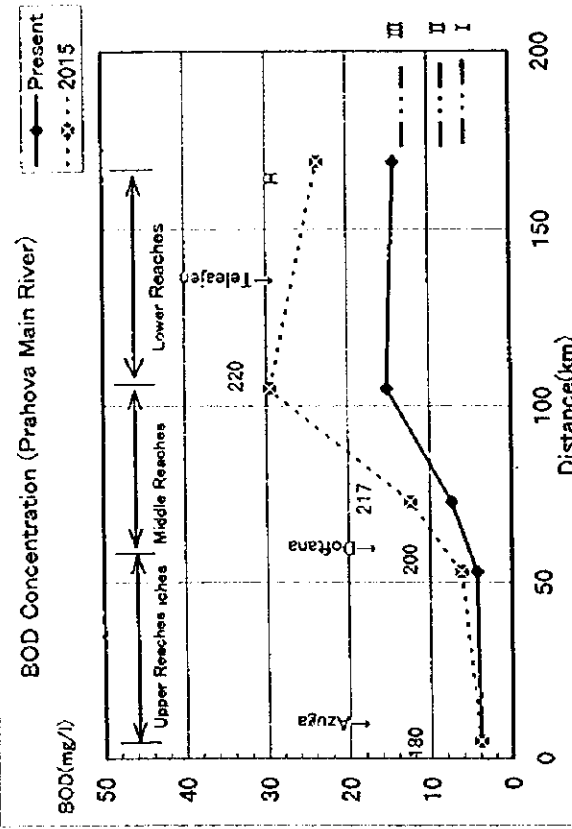
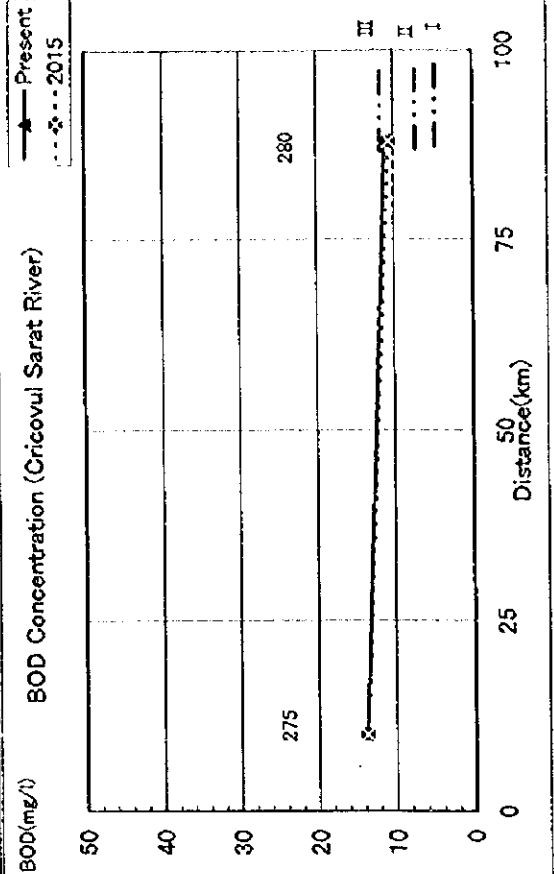
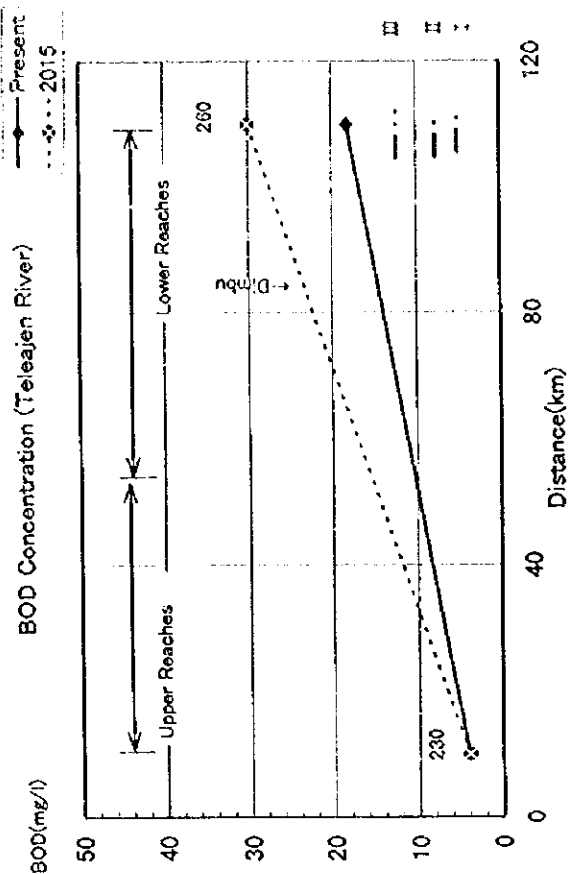
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Fig. 3.4 Schematic Diagram for Simulation



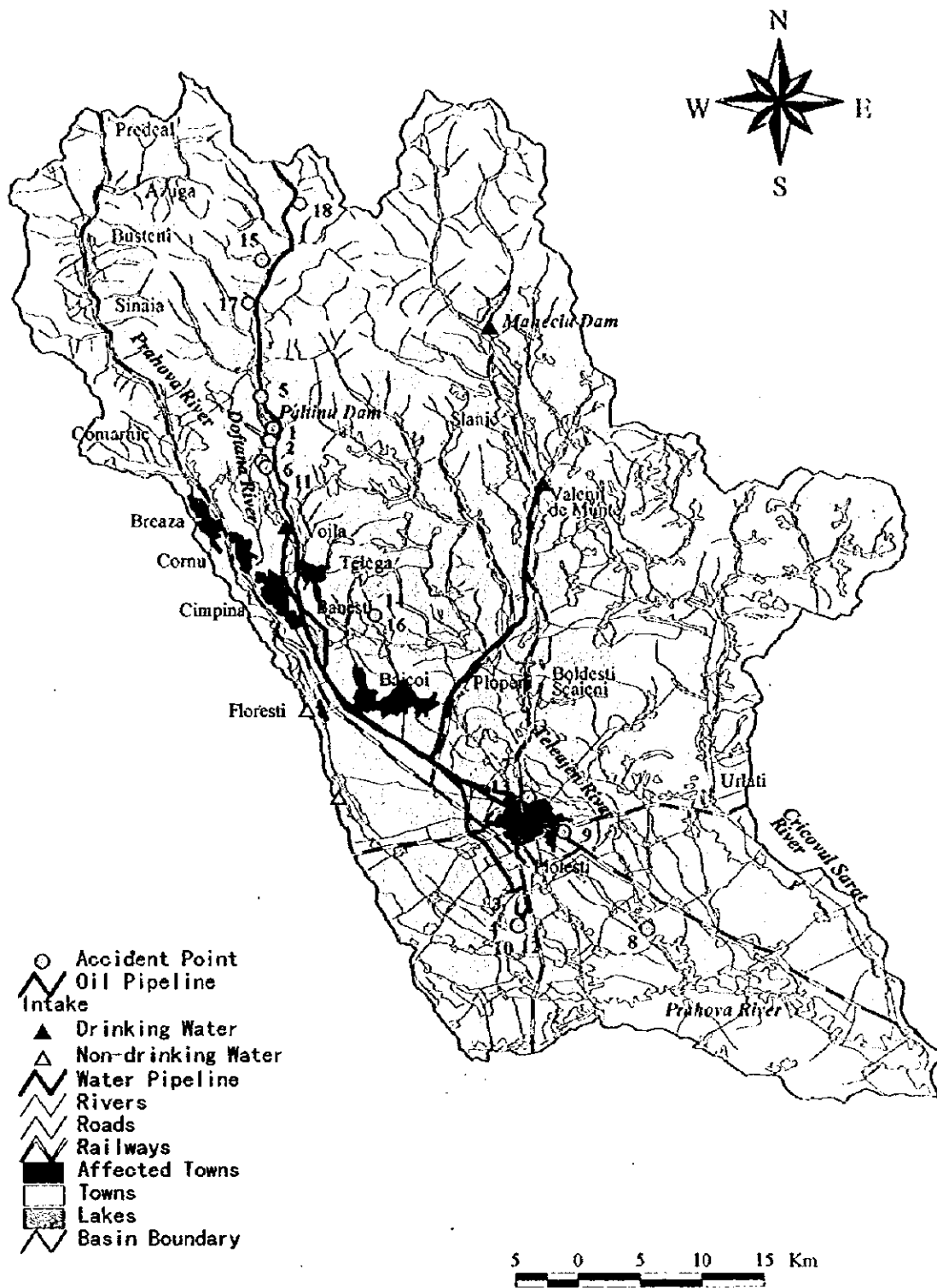
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Fig. 3.5 Calibration of Water Quality Simulation Model



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Fig. 3.6 Existing and Future Baseline River Water Quality

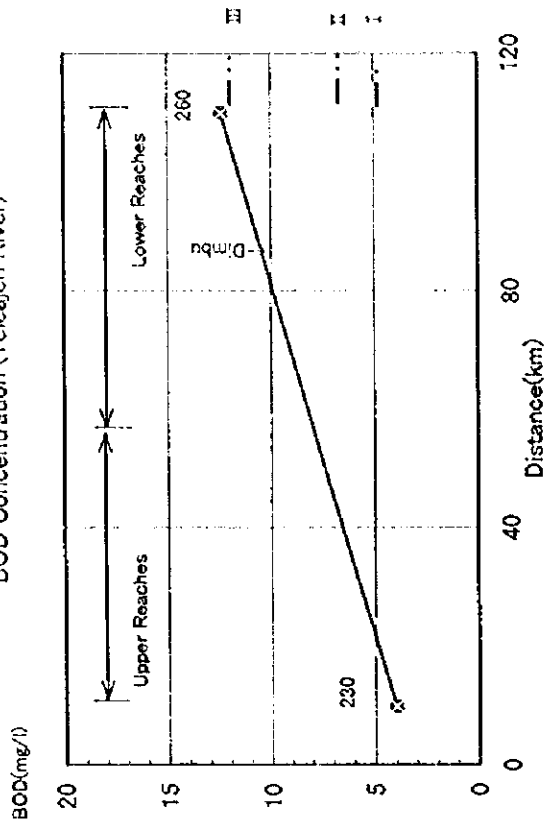


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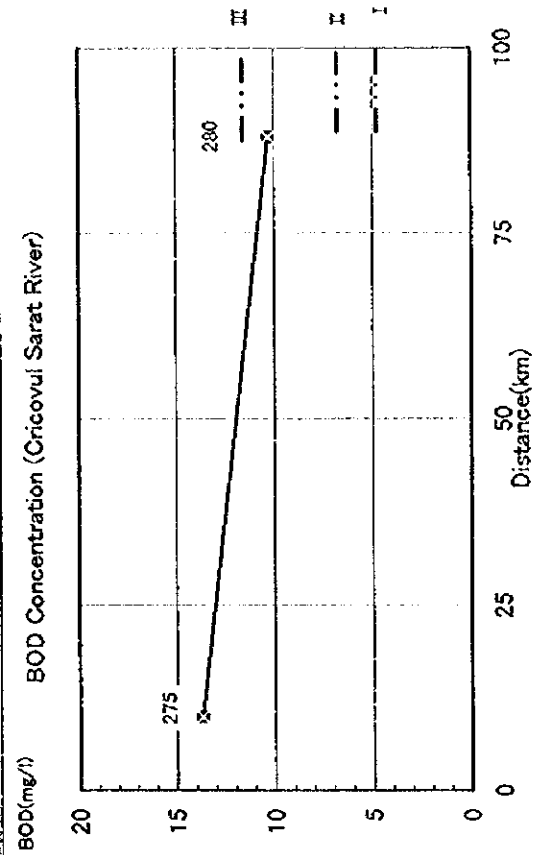
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Fig. 3.7 Past Accidental Pollution Map

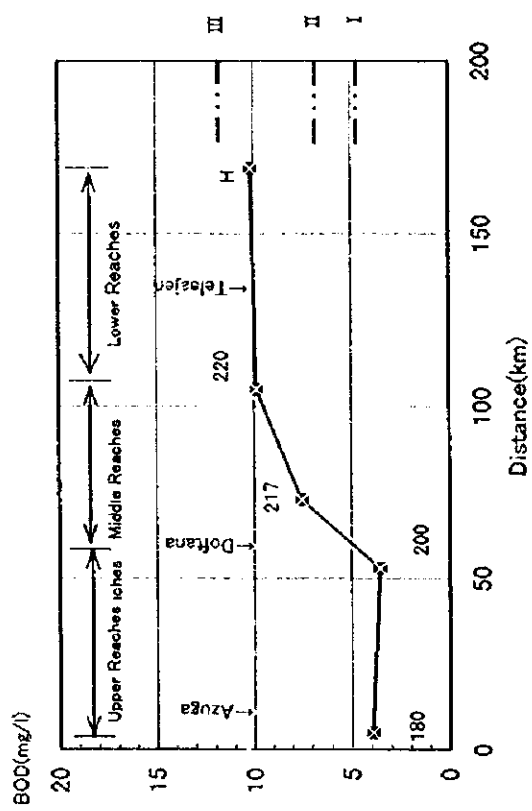
BOD Concentration (Teleajen River)



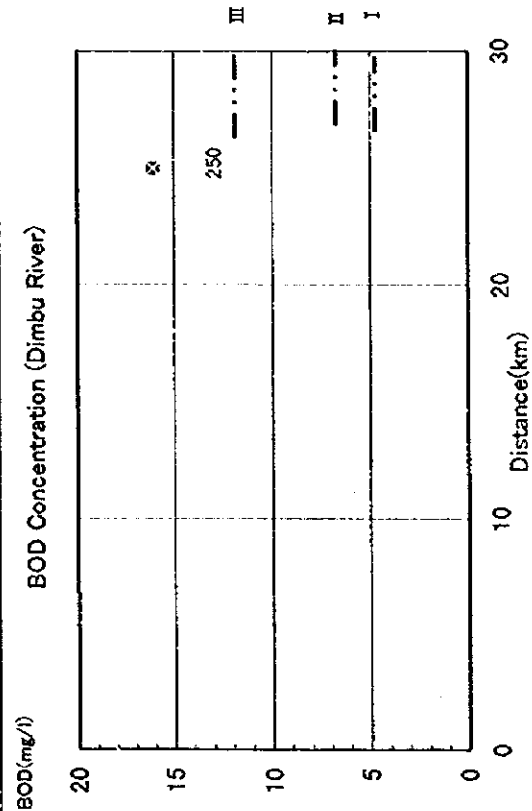
BOD Concentration (Cricovul Sarat River)



BOD Concentration (Prahova Main River)



BOD Concentration (Dimbu River)



STUDY ON THE MASTER PLAN FOR WATER ENVIRONMENT MANAGEMENT ON THE PRAHOVA RIVER BASIN

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Fig. 7.1 Future River Water Quality with Project

MINUTES OF MEETINGS

**Minutes of Meeting for
the Inception Report of the Study on
the Master Plan for Water Environment Management
on the Prahova River Basin**

The JICA Study Team presented the inception report of the captioned Master Plan Study to the MWFEP and the report was discussed between JICA Study Team and the officials concerned of the MWFEP through the following meetings. The participants of the meetings are listed in Annex.

(1) First Meeting

Date : December 15, 1997 (Monday), 9:00 AM to 10:00AM

Place : Conference Room in the MWFEP

(2) Second Meeting

Date : December 15, 1997 (Monday), 10:30 AM to 12:00AM

Place : Conference Room in the Headquarters of the Romanian Waters

(3) Third Meeting

Date : December 16, 1997 (Tuesday), 10:00 AM to 2:00 PM

Place : Conference Room in the Ploiesti Office of the Romanian Waters

(4) Forth Meeting

Date : December 17, 1997 (Wednesday), 9:00 AM to 10:00 AM

Place : Conference Room in the Headquarters of the Romanian Waters

(5) Fifth Meeting

Date : December 17, 1997 (Wednesday), 3:30 PM to 4:00 PM

Place : Conference Room in the MWFEP

The report was accepted by the MWFEP with the following major comments.

- (1) As one of the major existing water environmental problems in the Prahova River Basin, the serious accidental water pollution should be added in Chapter II.

- (2) "National Strategy for Water Management" prepared by MWFEP and approved by the Government in 1995 should be added in the Planning Policy of Section 3.1, Chapter III.
- (3) For the management of accidental river water pollution, accidental preparedness plan and emergency action manual should be proposed in addition to the preparation of potential risk map.

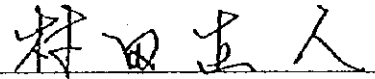
Further, it was confirmed that study on the groundwater pollution control is not included in this Master Plan Study according to the provisions of Scope of Work.

Bucharest, December 17, 1997



Ms. Liliana Mara

Director, MWFEP



Mr. Naohito Murata

Leader, JICA Study Team

Annex : List of the Meeting Attendants

List of the Meeting Attendants

Romanian Side

Ministry of Water, Forests & Environmental Protection (MWFEP)

Ms. Liliana Mara Director

Self Managed Public Company “Romanian Waters”

Mr. Petre Serhan Director

Mr. Ion Pop Leader of the Counterparts

Ms. Ana Drapa Project Coordinator

Mr. Serban Iliescu Biologist

Self Managed Public Company “Romanian Waters” - Branch Buzau

Mr. Dumitru Barbatu Chief of Regulation Activity

Mr. Dumitru Costin Chief of Water Quality Protection Office

Self Managed Public Company “Romanian Waters”

- Branch Buzau, Water Management System Prahova

Ms. Valeria Placinta Director, Co-team Leader

Mr. Petre Sentenai Technical Manager

Mr. Vasile Calamaz Head of Water Quality Protection Department

Ms. Luxandra Oancea Chemist Engineer

Ms. Irina Selaru Engineer - Water Quality Protection Department

Ms. Cornelia Sumedrea Engineer - Water Balance

Japanese side

JICA Study Team

Naohito Murata Team Leader of JICA Study Team

Susumu Heishi Co-team Leader of JICA Study Team

Kunio Ishikawa Member of JICA Study Team

Hiroko Kamata Member of JICA Study Team

Kazushi Endo Member of JICA Study Team

JICA Advisory Committee

Koji Nagano

Member of JICA Advisory Committee

Mikio Tani

Member of JICA Advisory Committee

JICA

Dai Masuda

JICA Headquarters

Hiroaki Okubo

Head of JICA/JOCV Romania Office

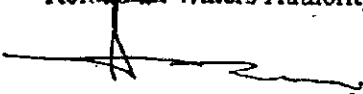
**Minutes of Meeting
for
Progress Report (I)
of
the Study on the Master Plan for Water Environment Management
on
the Prahova River Basin**

1. The JICA Study Team presented the progress report (I) of the captioned Master Plan Study to the MWFEP and the report was discussed between JICA Study Team and the officials concerned of the Ministry and the other related agencies. The meeting was held at the conference room of Hotel Tourist on 17th in March, 1998. The list of attendance is attached.
2. Chairperson Mrs. Placinta, director of the Romanian Waters Authority, Ploiesti opened the meeting and welcomed the participants. The JICA Study Team presented the contents of the progress report (I) consisting of the summary report and its appendixes. The Romanian authorities thank the JICA Study Team for its efforts and for the useful report resulting from this first phase of the Study. The JICA Study Team expressed its appreciation for the collaboration received from all Romanian agencies contacted during the first phase of the Study.
3. During the discussion, Romanian side emphasized the existing problems of groundwater pollution in the Basin. The groundwater in the downstream area of Ploiesti-Brazi-Valca Calugareasca is polluted. A number of people in this area use the groundwater for drinking at present. Romanian side strongly requested to include the issue of the existing groundwater quality in the scope of this Study.
4. The JICA Study Team replied that they recognized the importance of the groundwater quality analysis and would transmit the request of the Romanian side to the JICA Headquarter in Tokyo.
5. In the Meeting, the following technical comments were given for consideration of the JICA Study Team in the further study:
 - (1) There are many small laboratories in the River Basin for water quality analysis, with insufficient equipment and manpower. Integration of these laboratories into one (1) with improved equipment and manpower would be recommendable to attain more efficient operation and more water quality analytical results.
 - (2) For the river water pollution control, improvement of the existing wastewater treatment plants is considered to be more efficient than extension of the sewerage service area.
 - (3) A significant amount of domestic water supply is currently used as industrial water. When high water quality is not necessary, industrial water supply system should be used instead.

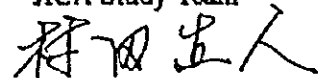
- (4) A considerable amount of clean groundwater is used for industrial purposes at present. This water source should be converted to domestic use to the extent possible, and industrial water should be supplied from surface water.
- (5) Ploiesti City Hall has an plan of urban extension toward the south of the city. An early study for the water supply to this area is needed.

Ploiesti, March 18, 1998

Ph. Dr. Peire Serban
Division Director,
Romanian Waters Authority, Bucuresti



Mr. Naohito Murata
Leader,
JICA Study Team



List of Attendance

Subject: Progress Report
 Place: Hotel Turist
 Time: 10:00 17-03-1998

No.	Name	Organization	Position	Signature
1	Irina Selaru	Apele Române	inginer	<i>[Signature]</i>
2	Florica Albu	Apele Române	inginer	<i>[Signature]</i>
3	Luxandra Oancea	Apele Române	inginer	<i>[Signature]</i>
4	Ileana Comea	Apele Române	inginer	<i>[Signature]</i>
5	Ana Drapa	Apele Române	inginer	<i>[Signature]</i>
6	Liliana Sara	M.A.P.P.M.	expert	<i>[Signature]</i>
7	Valeria Plăcintă	Apele Române	director	<i>[Signature]</i>
8	Vasile Calamaz	Apele Române	inginer	<i>[Signature]</i>
9	Doina Panait	Apele Române	inginer	<i>[Signature]</i>
10	Cristina Cristea	Apele Române	inginer	<i>[Signature]</i>
11	Ion Eftimie	Prefectura judetului Prahova	director	<i>[Signature]</i>
12	Corina Calota	Prefectura judetului Prahova	consilier	<i>[Signature]</i>
13	Ion Stoica	Consiliul judetean Prahova	director	<i>[Signature]</i>
14	Ligia Tinca	Apele Române	director	<i>[Signature]</i>
15	Dumitru Bărbatu	Apele Române	inginer	<i>[Signature]</i>
16	Dumitru Costin	Apele Române	inginer	<i>[Signature]</i>
17	M. Murata	JICA Study Team	JICA team leader	<i>[Signature]</i>
18	T. Kameyama	JICA Study Team	JICA member	<i>[Signature]</i>
19	K. Tamagawa	JICA Study Team	JICA member	<i>[Signature]</i>
20	K. Kaneko	JICA Study Team	JICA member	<i>[Signature]</i>
21	K. Ikari	JICA Study Team	JICA member	<i>[Signature]</i>
22	A. Demayo	JICA Study Team	JICA member	<i>[Signature]</i>
23	H. Kotani	JICA Study Team	JICA member	<i>[Signature]</i>
24	T. Matsushita	JICA Study Team	JICA member	<i>[Signature]</i>
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**Minutes of Meeting for the Interim Report of
the Study on the Master Plan for Water Environment Management on
the Prahova River Basin**

The JICA Study Team presented the Interim Report of the captioned Master Plan Study to the MWFEP and the report was discussed between JICA Study Team and the officials concerned of the MWFEP, the local public administration and other agencies. The participants of the meeting are listed in Appendix.

(1) First Meeting

Date : July 6, 1998 (Monday), 2:00 PM to 4:00 PM
Place : Conference Room in MWFEP

(2) Second Meeting

Date : July 7, 1998 (Tuesday) 1:30 PM to 5:00 PM
Place : Conference Room in Central Hotel, Ploiesti

(3) Third Meeting

Date July 8, 1998 (Wednesday) 2:00 PM to 4:00 PM
Place : Conference Room in MWFEP

The Interim Report was accepted by the MWFEP with the following comments.

1. Alternative projections of the population and industrial production in the Prahova River Basin will be discussed with the concerned agencies in assessment of the future river water quality.
2. The target water quality of the Prahova River will be proposed in consideration to both harmonization with EU standards and cost effectiveness of the project. In determination of the above target river water quality, the water use of Ialomita River will be considered as well.
3. Priority of the accidental water pollution control in the Prahova River Basin is given on the water source areas.
4. The following data and information will be supplied to the JICA Study Team from the concerned agencies.

- (1) Existing and future water use, and existing aquatic life of Ialomita River from MWFEP and Romanian Waters,
- (2) Previous study reports for the accidental water pollution control in the Prahova River Basin from Prahova Environmental Protection Agency,
- (3) Development plans of the sewerage treatment plant in the Prahova River Basin from Council of Prahova County.


5. Comments on legislative and institutional aspects

- (1) Provisions of Water Law should be described in addition to those of Environmental Protection Law.
- (2) NTPA 001 stipulates the quality standards of wastewater effluent to river. On the other hand, NTPA 002 regulates those to municipal sewerage system.
- (3) The issuing and enforcement of operating license is regulated not by the Governmental Decision HG-1001 but by Water Law. HG-1001 stipulates water tariff, pollution charge and fines. The cost of water tariff, pollution charge and fines are determined by MWFEP through consultation with Competition Bureau.
- (4) The latest Government Decision for the institution of MWFEP is the Government Decision 568/1997.
- (5) The affected organization chart of MWFEP is old and it should be corrected.

Bucharest, July 9, 1998

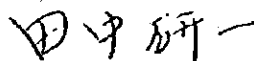


Ms. Liliana Mara
Director,
Ministry of Water, Forests
and Environmental Protection



Mr. Naohito Murata
Leader,
JICA Study Team

Witness



Mr. Kenichi Tanaka
Chairman,
JICA Advisory Committee

Appendix

LIST OF THE MEETING ATTENDANTS
on June 6th 1998 (First Meeting)

Romanian side:

Ministry of Water, Forests & Environmental Protection (MWFEP)

Ms. Liliana Mara	Director
Ms. Liliana Bara	Expert
Ms. Ruxandra Balaet	Expert

Japanese side

JICA Advisory Committee

Mr. Kenichi Tanaka
Mr. Mikio Tani

JICA Study Team

Mr. Naohito Murata
Mr. Susumu Heishi

LIST OF THE MEETING ATTENDANTS
on June 7th 1998 (Second Meeting)

Romanian side:

Self Managed Public Company "Romanian Waters" – Bucharest

Mr. Ion Pop	Team Leader of Project
Ms. Ana Drapa	Project Coordinator

Self Managed Public Company "Romanian Waters" –Buzau Basin Branch

Ms. Ligia Tinca	Manager
Mr. N. Barbatu	Engineer

Self Managed Public Company "Romanian Waters" –Buzau Basin Branch
Prahova Operating Office

Ms. Valeria Placinta	Manager
Mr. Vasile Calamaz	Head of Water Quality Protection Department
Ms. Cristina Cristea	Head of Laboratory
Ms. Albu Florica	Chemist Engineer
Ms. Irina Selaru	Engineer

Environmental Protection Agency – Ploiesti

Mr. I. S. I. Homoraceanu	Manager
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Prohova County

Mr. Ion Eftimie

Mr. Ion Stoica

Prahova Prefecture

Counselor of Prahova County

Japanese side

JICA Advisory Committee

Mr. Kenichi Tanaka

Mr. Mikio Tani

JICA Study Team

Mr. Naohito Murata

Mr. Susumu Heishi

Mr. Kunio Ishikawa

Ms. Setsuko Matsuzawa

LIST OF THE MEETING ATTENDANTS

on June 8th 1998 (Third Meeting)

Romanian side:

Ministry of Water, Forests & Environmental Protection (MWFEP)

Ms. Liliana Mara

Director

Ms. Liliana Bara

Expert

Self Managed Public Company "Romanian Waters" – Bucharest

Mr. Ion Pop

Team Leader of Project

Ms. Ana Drapa

Project Coordinator

Japanese side

JICA Advisory Committee

Mr. Kenichi Tanaka

Mr. Mikio Tani

JICA Study Team

Mr. Naohito Murata

Mr. Susumu Heishi

**Minutes of Meeting for the Progress Report (II) of
the Study on the Master Plan for Water Environment Management on
the Prahova River Basin**

The JICA Study Team presented the Progress Report (II) of the captioned Master Plan Study to the MWFEF and the Report was discussed between JICA Study Team and the officials concerned of the Romanian Government. The participants of the meeting are listed in Annex.

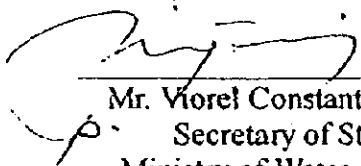
Date : September 18, 1998 (Friday), 9:30 AM to 3:00 PM
Place : Conference Room in MWFEF

The Progress Report (II) was accepted by the MWFEF with the following comments or agreements.

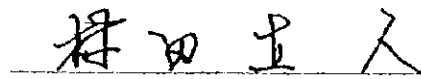
1. The river water quality is assessed under the standard flow rate of the river. The NTPA-001 defines the standard flow rate of the river as a minimum yearly mean monthly flow with a 95 % probability. JICA Study Team proposed a mean daily flow rate with a 50 % probability as a standard flow rate and estimated the required water pollution control cost. However, the final proposal will be made after an elaborate comparison of both cases including comparison of the required costs.
2. The Report concludes that the water supply development potentials of Paltinu and Maneciu reservoirs are enough large to meet the additional surface water demands at Voila and Valenii de Munte intakes respectively in Chapter V 5.2.2 (3). Both reservoirs can only meet the water demand in the middle and downstream areas in the Prahova River but can not cope with the water demand in the Prahova Valley with a higher ground elevation. This fact will be clearly mentioned to avoid misunderstanding of the readers.
3. The legal and institutional recommendations separately presented from the Report are accepted in principle. The contents of the recommendations will be more specified as far as possible.
4. Romanian side requested to determine the required minimum river flow rate (not river quality) to maintain the water related ecology. The Study Team replied that such river flow rate is different in every river section and the detailed ecological studies on

fauna and flora is necessary to determine such flow rate. Such studies are not included in the scope of this master plan study. The methodology on determination of such river flow rate has not been developed yet. However, the Study Team will introduce some reference documents for this matter to Romanian side if available in Japan.

Bucharest, September 18, 1998



Mr. Viorel Constantin Raicu
Secretary of State
Ministry of Water, Forests
and Environmental Protection



Mr. Naohito Murata
Leader,
JICA Study Team

The meeting was held on September 18th 1998 and the minutes of the meeting was signed on September 21st 1998.

**Minutes of Meeting for the Draft Final Report of
the Study on the Master Plan for Water Environment Management on
the Prahova River Basin**

The meeting on the draft final report of the captioned Master Plan Study was held at the Conference Room in the MWFEP on November 16th 1998 from 2:00 PM to 4:00 PM with the attendance listed in Annex.

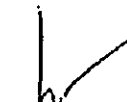
The JICA Study Team submitted the draft final report and presented the contents which include the followings:

- (1) Comparative study to decide standard flow rate, water supply area from the Paltinu and the Maneciu dams and detailed legal and institutional recommendation, which are study results based on the comments made in the meeting for the Progress Report (II), and
- (2) Phasing of the Master Plan, evaluation and recommendations, which are newly added in the draft final report

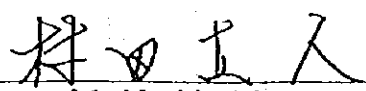
In addition to the above, the JICA study team submitted to the MWFEP and officials concerned the reference manual of instream flow needs (minimum flow rate for ecology) in Japan which was requested in the meeting for the Progress Report (II).

The draft final report was discussed between JICA Study Team and officials concerned of the Romanian Government and the report was accepted by the MWFEP without major comment.

Bucharest, November 18th, 1998



Mr. Viorel Constantin Raicu
Secretary of State
Ministry of Water, Forests
and Environmental Protection



Mr. Naohito Murata
Leader
JICA Study Team

Appendix

LIST OF THE MEETING ATTENDANTS
on November 16th, 1998

Romanian Side

Ministry of Water, Forest and Environmental Protection (MWFEP)

Mr. Viorel Constantin Raicu	Secretary of State
Ms. Liliana Mara	Director
Mr. Cornel Mitoiu	Chief State Inspector
Mr. Gheorghe Constantin	Expert
Ms. Ruxandra Balaet	Expert

Self Managed Public Company "Romanian Waters"

Mr. Petre Serban	Director
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Japanese Side

JICA Advisory Committee

Mr. Kenich Tanaka
Mr. Mikio Tani

JICA

Mr. Kyoichiro Takada

JICA Study Team

Mr. Naohito Murata
Mr. Sumumu Heishi
Mr. Kinji Kaneko
Mr. Hiroyuki Kotani

JICA