TABLES

Table 1 Development Needs and Environmental Issues by Region (1/3)

1. Vardar River Upper Reach

Municipality	Geography	Development Needs	Environmental Issue
1) Skopje 2) Gostivar 3) Tetovo 4) Kichevo 5) M.Brod 6) Kumanovo 7) Kratovo 8) Kriva Palanka	1) Catchment (33%) and population (56%) to the whole country 2) Many factories in Skopje metropolitan, industrial water (60%) to the whole country 3) Along the Vardar "Polog irrigation system (15,000 ha), along the Pchinja river "Lipkovo irrigation system (11,000 ha), active in agriculture production and livestock 4) New development will be required by around 2015, "Vakuf irrigation system (22,000 ha)" 5) The Vardar River upper reach located in the west with rather much rain, whole area along the Pchinja located in the east with little rain	1) New water resources development and water supply system to cope with water shortage in urban area in summer 2) Rural water supply to reduce overpopulation in urban area and depopulation in rural area, to keep access to safe water in the rural mountainous area 3) Rehabilitation of the existing irrigation system with low cost and high efficiency to meet water shortage in agricultural sector 4) New water resources development and water supply system to cope with increase of agricultural water 5) Supplemental plan to produce clean energy as an alternative of thermal power plant	1) Protection of water in wells and the Vardar River from pollution due to wastewater from household, factories, etc. 2) Protection of water in the Pchinja river from pollution due to wastewater from livestock

2. Vardar River Middle Reach

Municipality	Geography	Development Needs	Environmental Issue
1) Veles 2) S.Nikole 3) Shtip 4) Probishtip 5) Kochani 6) Vinica 7) Delchevo 8) Berovo	1) Catchment (23%) and population (13%) to the whole country 2) Factories concentrated in Veles, industrial water (20%) to the whole country 3) Along the Bregalnica river "Bregalnica irrigation system (32,000 ha)" active in agricultural production (rice etc.), livestock, and so on 4) The Vardar River middle reach located in the central/south, east with little rain	1) New water resources development and water supply system to cope with water shortage in summer and water pollution protection in urban area 2) New water resources development and water supply system to cope with future increase of agricultural water 3) Rural water supply to keep access safety water in the rural mountainous area 4) Supplemental plan to produce clean energy as an alternative of thermal power plant	1) Protection of water in wells and the Vardar River from pollution due to wastewater from household and factories around Veles 2) Protection of water in the Bregalnica River from pollution due to wastewater from mining on the upper reach 3) Protection of water in the Bregalnica River and wells from pollution due to wastewater from agriculture, livestock on the middle reach

Table 1 Development Needs and Environmental Issues by Region (2/3)

3. Vardar River Lower Reach

Municipality	Geography	Development Needs	Environmental Issue
1) D.Hisar 2) Krushevo 3) Bitola 4) Prilep 5) Kavadarci 6) Negotino 7) Valandovo 8) Gevgelija	1) Catchment (28%) and population (16%) to the whole country 2) Light industry factories concentrated on Pelagonija ,industrial water (17%) to the whole country 3) Along the Vardar and its tributary Crna, "Tikvesh irrigation system (20,000 ha)", and on Pelagonija "Prilep irrigation system (6,000 ha)", Strezevo irrigation system (20,000 ha)", active in agricultural production (fruits, etc.) 4) New development will be required by around 2025, "Bucin irrigation system (27,000 ha)" 5) The Vardar River located in central/south, eastern part, and southwest of the Crna River basin with little rain	1) Rehabilitation of the existing irrigation system with low cost and high efficiency to meet water shortage in agricultural sector 2) Rural water supply to continue agricultural production, to keep population, watershed conservation, to keep the view, and to keep access to safe water 3) New water resources development and water supply to cope with water shortage in urban area in summer 4) New water resources development and water supply system to cope with increase of agricultural water	1) Protection of water in the Vardar River from pollution due to wastewater from households and agricultural system on the lower reach 2) Protection of Dojran lake from water pollution due to lowering of water level

Table 1 Development Needs and Environmental Issues by Region (3/3)

4. Crn Drim River Basin

Municipality	Geography	Development Needs	Environmental Issue
1) Ohrid 2) Struga 3) Debar 4) Resen	1) Catchment (10%) and population (8%) to the whole country 2) Little factories except for light industry 3) Along the Crn Drim river little irrigation system, in the north of the Prespa Lake, "Asamati/Sirhan (5,200 ha)" active in cultivation of apple 4) Located in the southwest with rather much rain	1) Rehabilitation of the existing irrigation system with low cost and high efficiency to meet water shortage in agricultural sector 2) Rural water supply to continue agricultural production, to keep population, watershed conservation, to keep the view, and to keep access to safe water	1) Protection of Ohrid Lake from water pollution due to muddy flow in torrents

5. Strumica River Basin

Municipality	Geography	Development Needs	Environmental Issues
1) Radovish 2) Strumica	1) Catcment (7%) and population (6%) to the whole country 2) Light industry dominant, mining on the upper reach 3) Along the Strumica River "Mantovo irrigation system" (6,000 ha)", "Turija irrigation system (10,000 ha)", "Vodocha (4,000 ha)", active in agricultural and livestock 4) Located on southeast with little rain	1) New water resources development and water supply to cope with water shortage in urban area in summer as well as to dilute contaminated water in the Strumica River to reduce pollutant load 2) Rehabilitation of the existing irrigation system with low cost and high efficiency to meet water shortage in agricultural sector 3) As for rural water supply, common to that in the Vardar River lower reach	1) Protection of water in the Strumica River from pollution due to wastewater from households, agricultural system, industrial water and livestock

Table 2 Projects Identified/Selected for Project Evaluation

River Basin	No.	Code	Project Name	Purpose
(except Rural Water Supply Projects)				
1. Vardar River Upper Reach	1	A1-1	Water Supply Project for Tetovo - River Pena Intake	M&I
	2	A1-2	Studena Voda Groundwater Development Project	M
	3	A1-3	Kichevsko Pole Area Irrigation Rehabilitation Project	RI
	4	A1-4	Construction of By-pass Channel Raven - Rechica	A
	5	A1-5	Patishka Reka Water Supply Project	M
	6	A1-6	Paligrad Multipurpose Dam Project	M&I,A,P
	7	A1-7	Slupchanka Dam Project	M
	8	A1-8	Lipkovo - Glaznja Area Irrigation Rehabilitation Project	RI
	9	A1-9	Kiselichka Dam Project	M&I,A
	10	A1-10	Vakuf Multipurpose Dam Project	M&I,A,P
	11	A1-11	Pelince Dam Project	A
2. Vardar River Middle Reach	12	A2-1	Razlovci Dam Project	M&I,A
	13	A2-2	Blatec Dam Project	M&I,A
	14	A2-3	Rechani Multipurpose Dam Project	M&I,P
	15	A2-4	Zletovica Multipurpose Dam Project	M&I
	16	A2-5	Construction of Irrigation of Sub-system "Shtipskpo - Pole",left side	A
3. Vardar River Lower Reach	17	A3-1	Krapa Dam Project	M&I,A
	18	A3-2	Zhvan Dam Project	A
	19	A3-3	Obednik Dam Project	A
	20	A3-4	Kochiste Dam Project	A
	21	A3-5	Zhurche Dam Project	A
	22	A3-6	Konjarka Dam Project	A
	23	A3-7	Studencica Supplemental Water Supply Project	M&I
	24	A3-8	Petrushka Dam Project	A
	25	A3-9	Kovanska Dam Project	A
	26	A3-10	Konsko Dam Project	M&I,A
	27	A3-11	Valandovo Area Irrigation Rehabilitation Project	RI
4. Crn Drim	28	A4-1	Irrigation System Betterment Project in Resen	RI
	29	A4-2	Ohrid Area Irrigation Rehabilitation Project	RI
5. Strumica	30	A5-1	Podares Dam Project	M&I,A
	31	A5-2	Oraovica Dam Project	M&E
	32	A5-3	Mantovo Area Irrigation Rehabilitation Project	RI
	33	A5-4	Strumica Area Irrigation Rehabilitation Project	RI
(Rural Water Supply Project)				
1. Vardar River Upper Reach	34	B1-1	Vardar River Upper Reach Rural Water Supply Project	RS
	35	B1-2	Treska River Upper Reach Rural Water Supply Project	RS
	36	B1-3	Regional Water Supply "Petrovec"	RS
	37	B1-4	Skopje Circle Rural Water Supply Project	RS
	38	B1-5	Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS
2. Vardar River Middle Reach	39	B2-1	Bregalnica River Basin Rural Water Supply Project	RS
3. Vardar River Lower Reach	40	B3-1	Pelagonia Circle Rural Water Supply Project	RS
	41	B3-2	Regional Water Supply "Medzitlija"	RS
3/5. Vardar River Lower Reach/Strumica	42	B3-3	Vardar River Lower Reach/Strumica River Basin	RS
4. Crn Drim	43	B4-1	Southwest Mountainous Area Rural Water Supply Project	RS
-whole country-	44	B6-1	Nationwide Rural Water Supply Extension/Improvement Project	RS

Remarks : M : Municiapl, I : Industrial, A : Agricultural, P : Power, E : Environmental,
RI : Irrigation Rehabilitation, RS : Rural Water Supply

Table 3 Evaluation Criteria

1. First/tentative prioritization

No.	Aspect	Criteria	Class
(1)	Economical	EIRR more than 15% (8%)	A
		EIRR 8 - 15% (4 - 8%)	B
		EIRR less than 8 % (4%)	C
(2)	Financial	FIRR more than 15% (8%)	A
		FIRR 8 - 15 % (4 - 8%)	B
		FIRR less than 8 % (4%)	C
(3)	Technical	Difficulty of technique adopted in construction	A/B/C
		- judged through common sense internationally	
		recognized	
(4)	Social	1) Social contribution/Satisfying development need	A/B/C
		(except for Rural Water Supply Project)	
		2) Satisfying BHN	
		(for Rural Water Supply Project)	
(5)	Organizational	Current organization/Reinforcement/	A/B/C
		New organization/Combination of Organization	
(6)	Priority in	Listed in PIP	A/B/C
	Macedonia	(Program for Public Sector Investment 1998-2000)	

Note: Figures of EIRR and FIRR in parentheses are those for Rural Water Supply Projects.

2. Final prioritization

No.	Filter	Criteria	Class
(1)	First Evaluation	1) Results of item 1.	-
(2)	Output in	2) Consistency with output from PCM Workshop	-
	PCM Workshop		
(3)	IEE	3) Necessity of EIS for study in the next steps	-
(4)	Water Quality	4) Harmony with natural environment	-
	Conservation Plan		
(5)	Other	5) Donors' activity, and so on	-

Table 4 Result of Project Evaluation (1/2)

Municipal, industrial, agricultural water and hydropower development project

River Name	No.	Code No.	Project Name	Purpose	Initial Evaluation							Second Evaluation		
					Economic	Financial	Technical	Institutional	Social	Priority in Macedonia#	Overall	PCM	Environmental (IEE)	Final
Vardar River Upper Reach	1	A1-1	Water Supply Project for Tetovo - River Pena Intake	M & I	A	A	B	B	A	C	A	–	–	A
	2	A1-2	Studena Voda Groundwaer Developmenrt Project	M	B	B	A	B	A	C	B	–	–	B
	3	A1-3	Kichevsko Pole Area Irrigation Rehabilitation Project	RI	A	A	B	B	B	C	A	–	–	A
	4	A1-4	Construction of By-pass Channel Raven Rechica	A	C	C	C	B	C	B	C	–	–	C
	5	A1-5	Patishka Reka Water Supply Project	M	A	B	A	B	A	B	A	A	–	A
	6	A1-6	Paligrad Multipurpose Dam Project	M & I,A,P	B	C	A	B	A	C	B	C	–	B
	7	A1-7	Slupchanka Dam Project	M	A	B	A	A	A	C	A	A	–	A
	8	A1-8	Lipkovo - Glaznja Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	A	–	B
	9	A1-9	Kiselichka Dam Project	M & A	B	B	B	B	A	C	B	A	EIS	B
	10	A1-10	Vakuf Maltipurpose Dam Project	M & I, A,P	B	B	B	C	A	C	B	A	EIS	B
	11	A1-11	Pelince Dam Project	A	C	C	C	B	B	C	C	–	–	C
Vardar River Middle Reach	12	A2-1	Razlovci Dam Project	M & I, A	B	B	B	B	A	C	B	–	–	B
	13	A2-2	Blartec Dam Project	M & I, A	C	C	B	B	B	C	C	A	EIS	C
	14	A2-3	Rechani Multipurpose Dam Project	M & I, P	C	C	B	C	A	A	B	A	–	B
	15	A2-4	Zletovica Multipurpose Dam Project (Phase I)	M & I	B	B	A	A	A	B	A	A	–	A
	16	A2-5	Construction of Irrigation Sub-system Shtipsko Pole, left side	A	A	B	B	B	B	B	B	–	–	B
Vardar River Lower Reach	17	A3-1	Krapa Dam Project	M & I, A	C	C	C	B	B	C	C	B	EIS	C
	18	A3-3	Zhvan Dam Project	A	B	B	C	C	C	C	C	A	EIS	C
	19	A3-4	Obednik Dam Project	A	C	C	C	C	C	C	C	A	EIS	C
	20	A3-5	Kochishte Dam project	A	C	C	C	C	C	C	C	A	EIS	C
	21	A3-6	Zhurche Dam Project	A	C	C	C	C	C	C	C	A	EIS	C
	22	A3-7	Konjarka Dam Project	A	B	C	C	B	C	C	C	A	EIS	C
	23	A3-8	Studencica Supplemental Water Supply Project	M & I	C	C	B	B	B	A	B	A	–	B
	24	A3-9	Petrushka Dam Project	A	B	C	C	B	C	C	C	A	EIS	C
	25	A3-10	Kovanska Dam Project	A	C	C	B	B	B	C	B	A	EIS	B
	26	A3-11	Konsko Dam Project	M & I, A	B	C	B	B	A	B	B	A	EIS	B
	27	A3-12	Valandovo Area Irrigation Rehablitaion Project	RI	A	A	B	B	B	C	A	B	–	A
Crn Drim River Basin	28	A4-1	Irrigation System Betterment Project in Resen	RI	A	A	A	B	B	C	A	–	–	A
	29	A4-2	Ohrid Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	–	–	B
Strumica River Basin	30	A5-1	Podares Dam Project	M & I,	C	C	B	B	B	C	C	A	EIS	C
	31	A5-2	Oraovica Dam Project*)	M & E	B	B	A	B	A	C	B	–	–	A
	32	A5-3	Mantovo Area Irrigation Rehabilitation Project	RI	B	B	B	B	B	C	B	A	–	B
	33	A5-4	Strumica Area Irrigation Rehabilitation Project	RI	B	B	B	B	A	C	B	A	–	B

*): Aming at abatement of pollution in the international river that is deteriorating water quality and at harmonizing with river environment, the Rank B was raised to Rank A .

#, Relation with the "Program for Public Sector Investment of Macedonia 1998 - 2000".

EIS: Environmental Impact Survey to be conduced as the result of the Initial Environmental Examination (IEE)

M: Municipal, I: Industrial, A: Agricultural, P: Power, E: Environmental, RI: Irrigatin rehabilitation

Table 4 Result of Project Evaluation (2/2)

Rural water supply project

River Name	No.	Code No.	Project Name	Purpose	Initial Evaluation							Secondary Evaluation		
					Economic	Financial	Technical	Institutional	Social	Priority in Macedonia	Overall	PCM	Environmental (IEE)	Final
Vardar River Upper Reach	34	B1-1	Vardar River Upper Reach Rural Water Supply Project	RS	A	C	B	C	B	C	B	–	–	B
	35	B1-2	Treska River Upper Reach Rural Water Supply Project	RS	C	C	B	C	A	C	A	A	–	A
	36	B1-4	Petrovec Rural Water Supply Project*1)	RS	A	C	A	C	B	A	A	A	–	A*1)
	37	B1-5	Skopje Circle Rural Water Supply Project	RS	A	C	B	C	A	C	A	A	–	A
	38	B1-6	Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS	B	C	B	C	A	C	A	A	–	A
Vardar River Middle Reach	39	B2-1	Bregalnica River Basin Rural Water Supply Project	RS	C	C	B	C	A	C	B	A	–	B
Vardar River Lower Reach	40	B3-1	Pelagonija Circle Rural Water Supply Project	RS	C	C	B	C	A	C	A	A	–	A
	41	B3-2	Medzitlija Rural Water Supply Project*2)	RS	C	C	B	C	B	A	A	A	–	A*2)
Vardar River Lower	42	B3-3	Vardar River Lower Reach/Strumica River Basin Rural Water Supply Project	RS	B	C	B	C	B	B	B	A	–	B
Crn Drim River	43	B4-1	Southwest Mountains Area Rural Water Supply Project	RS	C	C	B	C	B	B	B	–	–	B
Nationwide	44	B6-1	Nationwide Rural Water Supply Extension/Improvement Project	RS	A	C	B	C	C	C	C	–	–	C

*1): Considering the size of the project, this is integrated in (B1-5).
(The result of the initial evaluation is "A")

*2): Considering the size of the project, this is integrated in (B3-1).
(The result of the initial evaluation is "B")

Remark 1 : For the evaluation of rural water supply project, Basic Human Need (BHN) was given more priority than economic and financial aspects taking its contribution to local communities as well as public benefit into consideration, based on a consent in the meeting with the Macedonian side.

Remark 2 : There is no difference between the Treska River upper reach rural water supply project (Code No.B1-2) and the Bregalnica River basin rural water supply project (Code No.B2-1) regarding contribution to BHN of each project. However, the former has more beneficiaries as well as low- income population than the latter, and hence the former was ranked as A, while the latter was as B.

Table 5 Projects in Water Resources Development

Phase	River Basin	No.	Project Name (Code)	Purpose
(except Rural Water Supply Project)				
I	1. Vardar River Upper Reach	1	Water Supply Pipeline for Tetovo - River Pena Intake (A1-1)	M&I
		2	Kichevsko Pole Area Irrigation Rehabilitation Project (A1-3)	RI
		3	Patishka Reka Water Supply Project (A1-5)	M
		4	Slupchanka Dam Project (A1-7)	M
	2. Vardar River Middle Reach	5	Zletovica Multipurpose Dam Project (A2-4)	M&I
	3. Vardar River Lower Reach	6	Valandovo Area Irrigation Rehabilitation Project (A3-11)	RI
	4. Crn Drim	7	Irrigation System Betterment Project in Resen (A4-1)	RI
	5. Strumica	8	Oraovica Dam Project (A5-2)	M&E
II	1. Vardar River Upper Reach	9	Studena Voda Groundwater Development Project (A1-2)	M
		10	Paligrad Multipurpose Dam Project (A1-6)	M&I,A,P
		11	Lipkovo - Glaznja Area Irrigation Rehabilitation Project (A1-8)	RI
		12	Kiselichka Dam Project (A1-9)	M&I,A
		13	Vakuf Multipurpose Dam Project (A1-10)	M&I,A,P
	2. Vardar River Middle Reach	14	Razlovci Dam Project (A2-1)	M&I,A
		15	Rechani Multipurpose Dam Project (A2-3)	M&I,P
		16	Construction of Irrigation of Sub-system "Shtipskpo - Pole",left side (A2-5)	A
	3. Vardar River Lower Reach	17	Studencica Supplemental Water Supply Project (A3-7)	M&I
		18	Kovanska Dam Project (A3-9)	A
		19	Konsko Dam Project (A3-10)	M&I,A
	4. Crn Drim	20	Ohrid Area Irrigation Rehabilitation Project (A4-2)	RI
	5. Strumica	21	Mantovo Area Irrigation Rehabilitation Project (A5-3)	RI
		22	Strumica Area Irrigation Rehabilitation Project (A5-4)	RI
III	1. Vardar River Upper Reach	23	Construction of By-pass Channel Raven - Rechica (A1-4)	A
		24	Pelince Dam Project (A1-11)	A
	2. Vardar River Middle Reach	25	Blatec Dam Project (A2-2)	M&I,A
	3. Vardar River LowerReach	26	Krapa Dam Project (A3-1)	M&I,A
		27	Zhvan Dam Project (A3-2)	A
		28	Obednik Dam Project (A3-3)	A
		29	Kochiste Dam Project (A3-4)	A
		30	Zhurche Dam Project (A3-5)	A
		31	Konjarka Dam Project (A3-6)	A
		32	Petrushka Dam Project (A3-8)	A
	4. Crn Drim	-	-	-
	5. Strumica	33	Podares Dam Project (A5-1)	M&I,A
(Rural Water Supply Project)				
I	1. Vardar River Upper Reach	34	Treska River Upper Reach Rural Water Supply Project (B1-2)	RS
		35	Skopje Circle Rural Water Supply Project (B1-4)*1)	RS
		36	Kriva Palanka/Kumanovo Circle Rural Water Supply Project (B1-5)	RS
	3. Vardar River Lower Reach	37	Pelagonia Circle Rural Water Supply Project (B3-1)*2)	RS
II	1. Vardar River Upper Reach	38	Vardar River Upper Reach Rural Water Supply Project (B1-1)	RS
	2. Vardar River Middle Reach	39	Bregalnica River Basin Rural Water Supply Project (B2-1)	RS
	3/5. Vardar River Lower Reach/Strumica	40	Vardar River Lower Reach/Strumica River Basin (B3-3)*3)	RS
	4. Crn Drim	41	Southwest Mountainous Area Rural Water Supply Project (B4-1)*4)	RS
III	-whole country-	42	Nationwide Rural Water Supply Extension/Improvement Project (B6-1)	RS

Remark : M : Municipal, I : Industrial, A : Agricultural, P : Power, E : Environmental, RI : Irrigation Rehabilitation
RS : Rural Water Supply

*1) : includes Regional Water Supply "Petrovec" (B1-3)

*2) : includes Regional Water Supply "Medzitlija" (B3-2)

*3) : includes Regional Water Supply "a part of Grvgelija, Bogdanci, Dojran and Valndovo"

*4) : includes Regional Water Supply "Belchista"

Table 6 Water Resources Development Plan and Water Resources Management Plan (Water Quality Conservation Plan (1/4)

River Basin	River Course	Results of Survey on Current Water Quality and Future Forecast				Water Resources Development Plan			Water Resources Management Plan		
		Current and Pollution Conditions	BOD (mg/l)	Future Forecast	BOD (mg/l)	PHASE I	PHASE II	PHASE III	BOD (mg/l)	Basic Guideline	Water Quality Conservation Plan
1. Vardar River Upper Reach: Vardar Main Stream	Most upstream～confluence with the Pchinja (L: 150km)	Around Gostivar and its suburbs, water pollution in the Vardar River due to wastewater from agricultural area	4～5	Gostivar～Skopje: water quality is forecasted to be Class III by 2025	6～7	・Water Supply Project for Tetovo - River Pena Intake (1)	・Studena Voda Groundwater Development Project (9)	・Construction of By-pass Channel Raven - Rechica (23)	2～4	・To provide wastewater treatment facilities so as to control the current water pollution reducing pollutant load within the water quality standard. ・Improvement and modernization of deteriorated wastewater treatment facilities owned/operated by only a part of factories. ・To implement EIS for development project and formation of countermeasure if required.	1. Provision of wastewater treatment facilities: (1) Skopje (M,I) (2) Tetovo (M,I) (3) Kumanovo (M,I,A) (4) Gostivar (M,A) (5) Kriva Palanka (M,I) (6) Makedonski Brod (M) (7) Kratovo (M,I) (8) Kichevo (M) (M: for reduction of pollutant load from households, I: for reduction of pollutant load from factories, A: for reduction of pollutant load from agricultural activities including livestock water, prioritization will be based on its urgency, etc.)
		Tetovo is supplied water from 4 springs on the Popova Shapka mountainous region. In the Vardar River near Tetovo, water is polluted by wastewater from households and factories.	3～6		4～7						
		Skopje metropolitan is supplied water from the Rasheche spring (Q=3.0 m^3/s). In the Vardar River near Skopje, water is polluted by wastewater from households and factories	6～8	Skopje～Confluence with the Pchinja river: It is forecasted water pollution will progress due to wastewater from households and factories site in Skopje metropolitan area.	7～10	・Patishka Reka Water Supply Project (3) ・Skopje Circle Rural Water Supply Project (35)	・Paligrad Multipurpose Dam Project (10)		4～7		
Treska River (right bank tributary)	All the Course (L: 110km)	This river course is in a canyon, where pollutant load is small resulting in good water quality.	2～4	Kichevo～Confluence with the Pchinja river: It is forecasted water pollution around 2025 between quiche ～Makedonski.	2～4	・Kichevsko Pole Area Irrigation Rehabilitation Project (2) ・Treska River Upper Reach Rural Water Supply Project (34)			2～4		2. Improvement and modernization of deteriorated wastewater treatment facilities owned by only some factories)
Pchinja River (left bank tributary)	All the Course (L: 120km)	In the Kriva River near Kriva Palanka and Kratovo, water is polluted by wastewater from households and mining.	4～7	Kriva Palanka～Confluence with the Pchinja river: It is forecasted water pollution due to wastewater from household and factories sited in Kriva Palanka.	8～9		・Kiselichka Dam Project (12)		2～4		
		Kumanovo is the second largest city next to Skopje. Reduction of pollutant load by wastewater from households due to increase of population. Water in the Kumanovska where wastewater from households and livestock fields is discharged resulting in serious pollution.	10～20	Kumanovo～Confluence with the Varadr River: In the Kumanovska river, water will be polluted due to wastewater from households in Kumanovo and from livestock farm around Kumanovo.	20～30	・Slupchaka Dam Project (4) ・Kriva Palanka/Kumanovo Circle Rural Water Supply Project (36)	・Lipkovo - Glaznja Area Irrigation Rehabilitation Project (11) ・Vakuf Multipurpose Dam Project (13)	・Pelince Dam Project (24)	2～4		3. Implementation of Environmental Impact Study (EIS) and formation of countermeasures for the project proposed in PHASE I. EIS will be carried out for projects proposed in PHASE II and III depending on the necessity.

Note: Class I= BOD 2.0 mg/l under, Class II= BOD 2.0~4.0 mg/l, Class III= BOD4.0~7.0 mg/l, Class IV= BOD 7.0~20.0 mg/l

Table 6 Water Resources Development Plan and Water Resources Management Plan (Water Quality Conservation Plan (2/4)

River Basin	River Course	Results of Survey on Current Water Quality and Future Forecast				Water Resources Development Plan			Water Resources Management Plan		
		Current and Pollution Conditions	BOD (mg/l)	Future Forecast	BOD (mg/l)	PHASE I	PHASE II	PHASE III	BOD (mg/l)	Basic Guideline	Water Quality Conservation Plan
2. Vardar River Middle Reach: Vardar Main Stream	Confluence with the Pchinja River~ Confluence with the Crna River (L: 50km)	In Veles, water is polluted due to wastewater from household and factories. Big pollutant sources are smelters of zinc and lead, and leather processing factories.	6~8	Confluence with the Pchinja River~Confluence with the Bregalnica River: Water is polluted around Veles and downstream reach of Veles.	7~10				4~7	・To provide wastewater treatment facilities so as to control the current water pollution reducing pollutant load within the water quality standard. ・Improvement and modernization of deteriorated wastewater treatment facilities owned/operated by only a part of factories. ・To implement EIS for development project and formation of countermeasure if required.	1. Provision of wastewater treatment facilities: (1) Veles (M,I) (2) Shtip (M,I) (3) Sveti Nikole (M,I) (4) Probishtip (I) (5) Kochani (M,I) (6) Vinica (M) (7) Delchevo (M) (8) Berovo (M) (M: for reduction of pollutant load from households, I: for reduction of pollutant load from factories, A: for reduction of pollutant load from agricultural activities -including wastewater from livestock field, prioritization will be based on its urgency ,etc.)
Bregalnica River (left bank tributary)	All the Course (L: 180km)	At Delchevo, water is polluted due to wastewater from irrigation area. At Kamenica,water is polluted due to wastewater from mining.	4~5	Dechevo~Kalimanci Reservoir: Water pollution due to wastewater from irrigation water and factories progresses.	5~6	・Zletovica Multipurpose Dam Project (5)	・Razlovci Dam Project (14)	・Blatec Dam Project (25)	2~4		
		At Kochani, where drinking water is supplied through wells, water is polluted due to wastewater from irrigation area.	8~10	Kocjani~Confluence with the Vardar: Water pollution progresses.	10~15		・Rechani Multipurpose Dam Project (15)		4~7		2. Implementation of Environmental Impact Study (EIS) and formation of countermeasures for the project proposed in PHASE I. EIS will be carried out for projects proposed in PHASE II and III depending on the necessity.
		At Shtip, drinking water supplied through wells is polluted.	8~10		10~15				4~7		
		At Sveti Nikole, water is polluted due to wastewater from livestock farms.	-		-		・Construction of Irrigation of Sub-system "Shtipsko Pole", left side (16) ・Begalnica River Basin Rural Water Supply Project (39)		-		

Note: Class I= BOD 2.0 mg/l under, Class II= BOD 2.0~4.0 mg/l, Class III= BOD4.0~7.0 mg/l, Class IV= BOD 7.0~20.0 mg/l

Table 6 Water Resources Development Plan and Water Resources Management Plan (Water Quality Conservation Plan (3/4)

River Basin	River Course	Results of Survey on Current Water Quality and Future Forecast				Water Resources Development Plan			Water Resources Management Plan		
		Current and Pollution Conditions	BOD (mg/l)	Future Forecast	BOD (mg/l)	PHASE I	PHASE II	PHASE III	BOD (mg/l)	Basic Guideline	Water Quality Conservation Plan
3. Vardar River Lower Reach: Vardar Main Stream	Confluence with the Crna River~Border with Greece (L:95km)	At Negotino, water is polluted due to wastewater from wineries	5~6	Confluence with the Crna River~Border with Greece: Dilution after joining of the Crna River is expected, but there is much pollutant load due to wastewater from winery, food processing factories and wastewater from irrigation area, from newly developed area in particular.	6~7		・Konso Dam Project (19) ・Kovanska Dam Project (18)		2~4	・To provide wastewater treatment facilities so as to control the current water pollution reducing pollutant load within the water quality standard. ・To implement EIS for development project and formation of countermeasure if required.	1. Provision of wastewater treatment facilities (1) Bitola (M,I) (2) Prilep (M) (3) Kavadarci (M,I) (4) Gevgelija (M) (5) Krushevo (M) (6) Demir Hisar (M) (7) Negotino (M,I) (8) Valandovo (M)
		At Gevgelija, water is polluted due to wastewater from wineries and food processing factories.	5~6		6~7	・Valandovo Area Irrigation Rehabilitation Project (6)	・Vardar River Lower Reach/Strumica River Basin (40)		2~4		(M: for reduction of pollutant load from households, I: for reduction of pollutant load from factories, A: for reduction of pollutant load rom agricultural activities -including wastewater from livestock field, prioritization will be based on its urgency ,etc.)
Crna River	All the Course (L:220km)	At Krushevo, where drinking water is supplied through the Studencica system, water is polluted due to wastewater from households discharged to sub-tributaries of the Crna river.	9~12	Demir Hisar~Bitola: Water pollution will progress due to increase of wastewater from households and irrigation in the agricultural development on the Pelagonija field.	10~15	・Pelagonia Circle Rural Water Supply Project (37)	・Studencica Supplemental Water Supply Project (17)	・Krapa Dam Project (26) ・Zhvan Dam Project (27) ・Obednik Dam Project (28) ・Kochiste Dam Project (29) ・Zhurche Dam Project (30) ・Konjarka Dam Project (31)	2~4		2. Implementation of Environmental Impact Study (EIS) and formation of countermeasures for the project proposed in PHASE I. EIS will be carried out for projects proposed in PHASE II and III depending on the necessity.
		At Demir Hisar, where drinking water is supplied through springs, water is polluted due to wastewater from households discharged to the Crna river.									
		Bitola is located on the south of Pelagonia field (area: 56,000ha) with population of 86,000 and the third largest city next to Kumanovo. Water in the Crna river is polluted due to wastewater from households and irrigation area.		Bitola~Confluence with the Vardar River: Water pollution due to wastewater from factories sited in the Pelagonija area.							
	Dojran Lake	Water pollution due to lowering of water level	-	Water pollution due to lowering of water level	-				-		

Note: Class I= BOD 2.0 mg/l under, Class II= BOD 2.0~4.0 mg/l, Class III= BOD4.0~7.0 mg/l, Class IV= BOD 7.0~20.0 mg/l

Table 6 Water Resources Development Plan and Water Resources Management Plan (Water Quality Conservation Plan (4/4)

River Basin	River Course	Results of Survey on Current Water Quality and Future Forecast				Water Resources Development Plan			Water Resources Management Plan		
		Current and Pollution Conditions	BOD (mg/l)	Future Forecast	BOD (mg/l)	PHASE I	PHASE II	PHASE III	BOD (mg/l)	Basic Guideline	Water Quality Conservation Plan
4. Crn Drim River Basin	Ohrid lake~Shpilje Dam~Border with Albania (L:40km)	In this river basin, pollutant load is relatively low and water quality is good condition. In the Ohrid and Prespa lakes, water is polluted in summer season when tourists increase.	2~4	Ohrid Lake~Shpilje Dam: In this river basin, pollutant load is relatively low and water quality is good condition. In the Ohrid and Prespa Lakes, water is polluted in summer season when tourists increase.	2~4	·Irrigation System Betterment Project in Resen (7)	·Ohrid Area Irrigation Rehabilitation Project (20) ·Southwest Mountains Area Rural Water Supply Project (41)		2~4	·To provide wastewater treatment facilities so as to control the current water pollution reducing pollutant load within the water quality standard. ·To implement EIS for development project and formation of countermeasure if required.	1. Provision of wastewater treatment facilities (1) Resen (M) (2) Ohrid (M) (3) Struga (M) (4) Debar (M)
5. Strumica River	Most upstream~Border with Bulagaria (L: 70km)	At Radovish where drinking water is supplied through groundwater. Water is polluted in summer season due to wastewater from mining.	15~18	Strumica~Border with Bulgaria: At present, water in the Strumica River is seriously polluted with Class IV corresponding to BOD more than 20 in the course of downstream from Radovish up to the border with Bulgaria. From now on, further pollution will progress with adverse effects in the river. Suitable countermeasures will be required.	20~25	·Orsovica Dam Project (8)	·Mantovo Area Irrigation Rehabilitation Project (21)	·Podares Dam Project (33)	4~7	·To provide wastewater treatment facilities so as to control the current water pollution reducing pollutant load within the water quality standard. ·To implement EIS for development project and formation of countermeasure if required.	1. Provision of wastewater treatment facilities (1) Radovish (M,I) (2) Strumica (M,I)
		At Strumica, water is polluted due to wastewater from household, factories, irrigation area and livestock farms.	15~20	Strumica~Border with Bulgaria: At present, water in the Strumica River is seriously polluted with Class IV corresponding to BOD more than 20 in the course of downstream from Radovish up to the border with Bulgaria. From now on, further pollution will progress with adverse effects in the river. Suitable countermeasures will be required.	25~30		·Strumica Area Irrigation Rehabilitation Project (22)		4~7		2. Implementation of Environmental Impact Study (EIS) and formation of countermeasures for the project proposed in PHASE I. EIS will be carried out for projects proposed in PHASE II and III depending on the necessity.

Note: Class I= BOD 2.0 mg/l under, Class II= BOD 2.0~4.0 mg/l, Class III= BOD4.0~7.0 mg/l, Class IV= BOD 7.0~20.0 mg/l

Table 7 Surface Water and Groundwater Monitoring System Improvement Plan

(a) Water Level Monitoring Network Improvement and Expansion Plan

- Renewal of instruments and new installation of limunigraph

No.	Name of Gauging Station	River Name	Related Water Resources Development Projects
1	Balin Dol (existing)	Vardar River mainstream	Projects located in Vardar Upper Reach
2	Pena	Pena River	Water Supply Pipeline for Tetovo - River Pena Intake
3	Paligrad	Kadina River	Paligrad Multipurpose Dam Project
4	Kiselichka	Kriva River	Kiselichaka dsam Project
5	Vakuf	Kriva River	Vakuf Multipurpose Dam Project
6	Slupchanka	Slupchanska River	Slupchanka Dam Project
7	Berovo (existing)	Bregalnica River	Razlovci Dam Priject
8	Bolotino (existing)	Bolotinska River (Crna River)	Development Projects in Pelagonija field (northern part)
9	Bucin (existing)	Crna River	Development Projects in Pelagonija field (western part)
10	Konsko	Konska River	Konsko Dam Project
11	Oraovica	Oraovica River	Oraovica Dam Project
12	Smolarski Most	Strumica River	Development Projects in Strumica River

(b) Flood Forecasting and Warning System Enhancement Plan

- Introducing telemetering system including development of software for prediction of flood discharge

No.	Name of Gauging Station	River Name	Existing or New
1	Balin Dol	Vardar River mainstream	Existing
2	Radusha	Vardar River mainstream	Existing
3	Skopje	Vardar River mainstream	Existing
4	Veles	Vardar River mainstream	Existing
5	Demir Kapija	Vardar River mainstream	Existing
6	Gevgelija	Vardar River mainstream	Existing
7	Vliv	Lepenec River	Existing
8	Nov Dojran	Lake Dojran	Existing
9	Makedonski Brod	Treska River	Existing
10	Modrishte	Treska River	New
11	Sveta Bogorodica	Treska River	New
12	Pelince	Pchinja River	New
13	Katlanovska Banja	Pchinja River	Existing
14	Kriva Palanka	Pchinja River	Existing
15	Berovo	Bregalnica River	Existing
16	Ochi Pale	Bregalnica River	Existing
17	Shtip	Bregalnica River	Existing
18	Dolenci	Crna River	New
19	Buchin	Crna River	Existing
20	Skochivir	Crna River	Existing
21	Vozarci	Crna River	New
22	Borotino	Borotinska River	Existing
23	Sushevo	Strumica River	Existing
24	Novo Selo	Strumica River	Existing
25	Stenje	Lake Prespa	Existing
26	Ohrid	Lake Ohrid	Existing
27	Boshkov Most	Radika River	Existing
28	Shpilje	Crn Drim River	Existing

(c) Surface Water Quality Monitoring Network Enhancement Plan

- Support of regular monitoring works of water quality at existing/planned monitoring stations (by EU-PHARE and Swiss Government) and technology transfer of water quality sampling/analysis and procurement of monitoring instruments

(d) Groundwater Monitoring Network Enhancement Plan

• Improvement of existing groundwater monitoring stations	61 nos. (See Appendix B of Supporting Report 1)
• Installation of land subsidence monitoring stations	10 nos. (Polog (2), Skopje (2), Kochani (2) Pelagonija (2), Vardar lower reach (Gevgelija) (1), Strumica (1)
• Installation of groundwater quality monitoring stations	150 nos. (See Appendix B of Supporting Report 1)

FIGURES

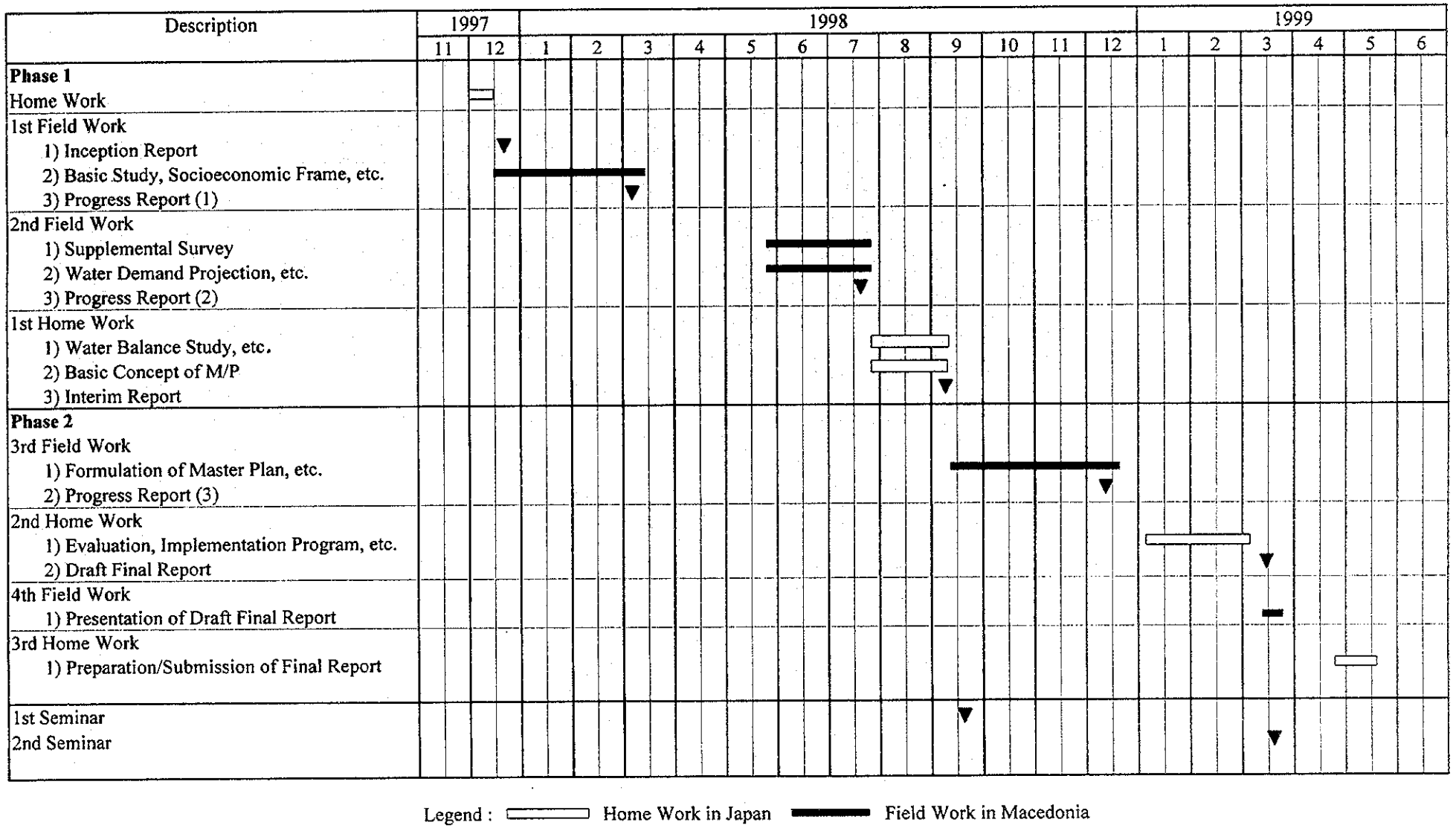


Figure 1 Overall Work Schedule

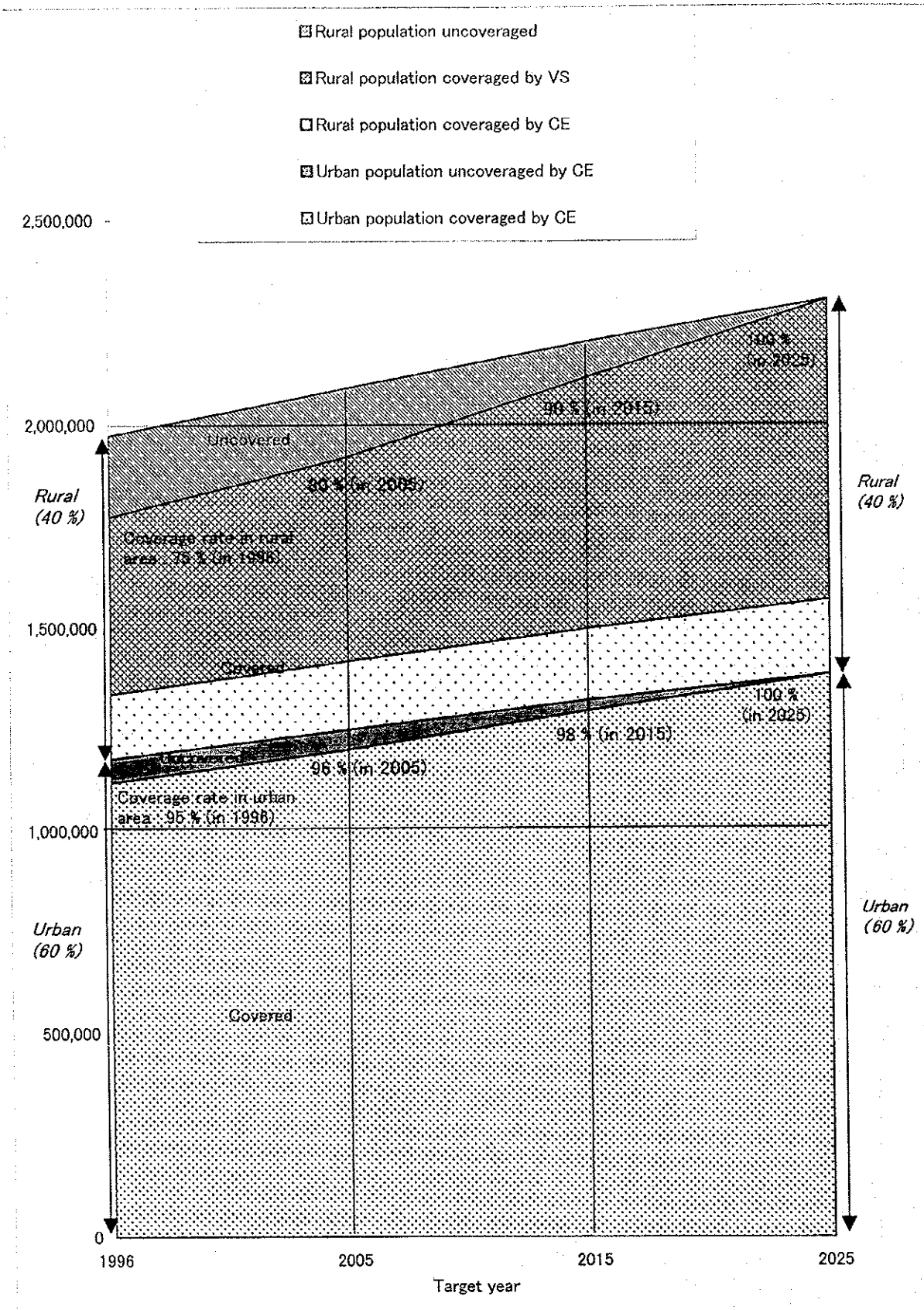


Figure 2 Development Directions of Municipal Water Supply

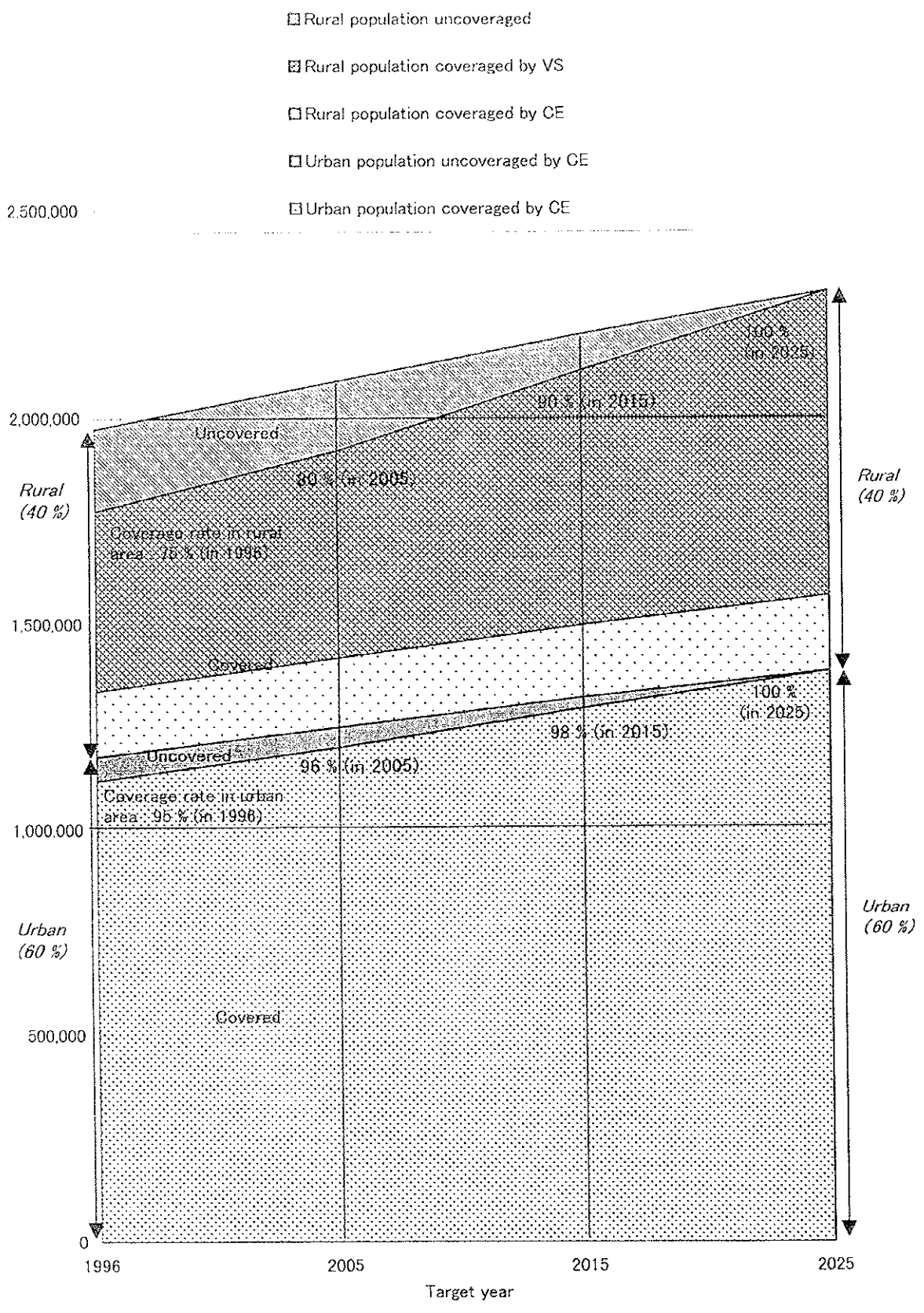


Figure 2 Development Directions of Municipal Water Supply

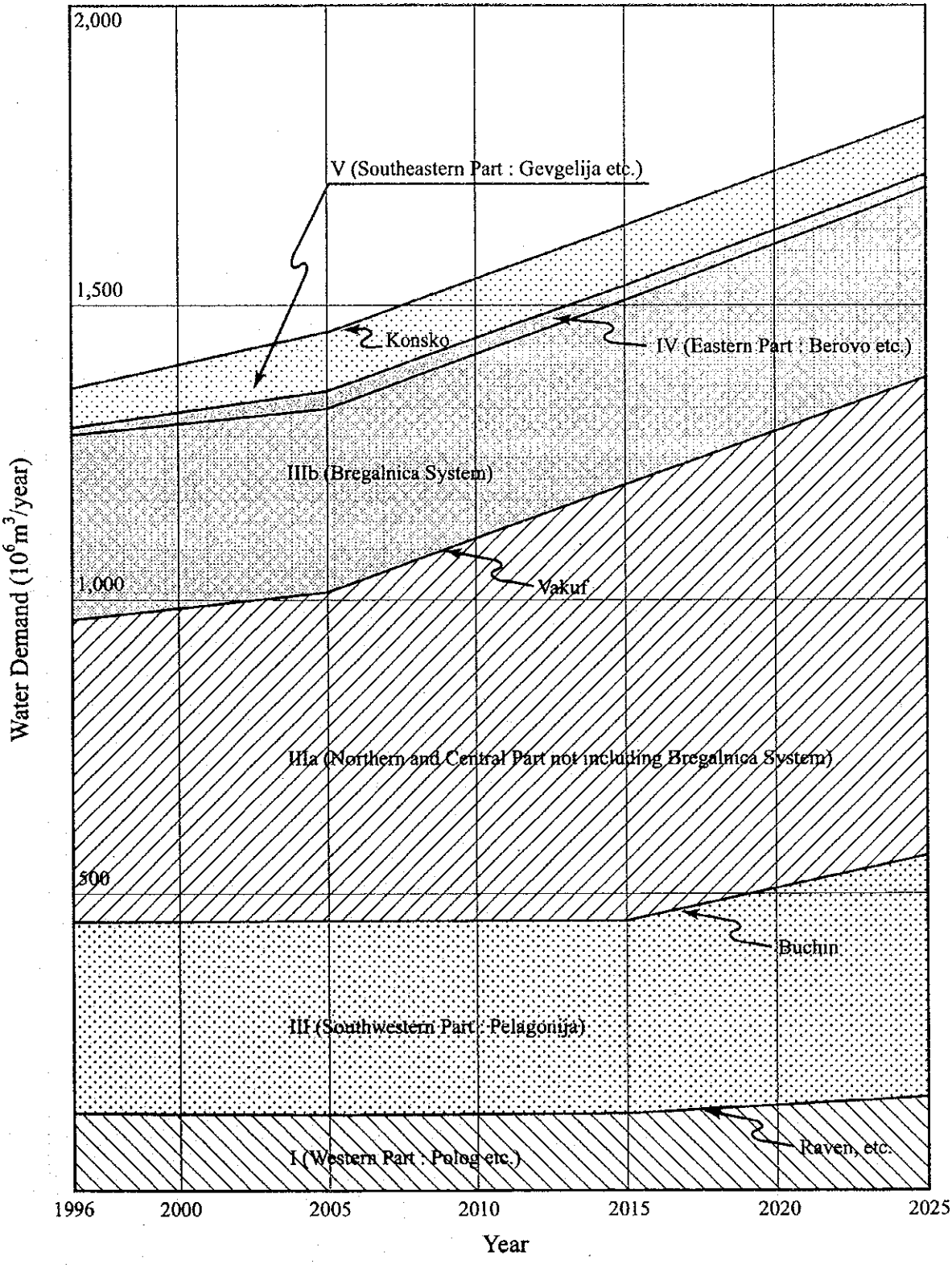


Figure 3 Development Curve of Agricultural Water

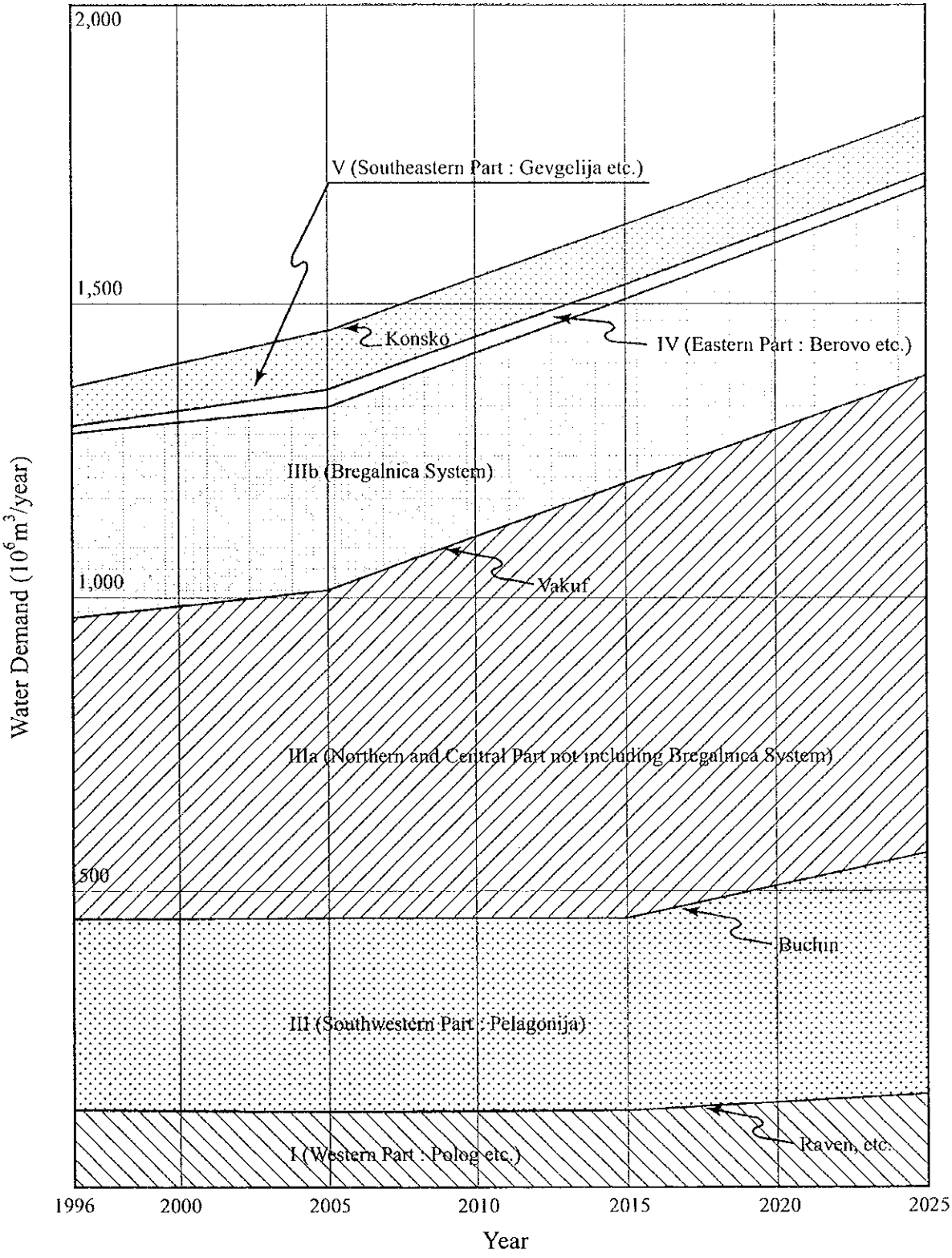


Figure 3 Development Curve of Agricultural Water

THE STUDY ON THE INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
JAPAN INTERNATIONAL COOPERATION AGENCY

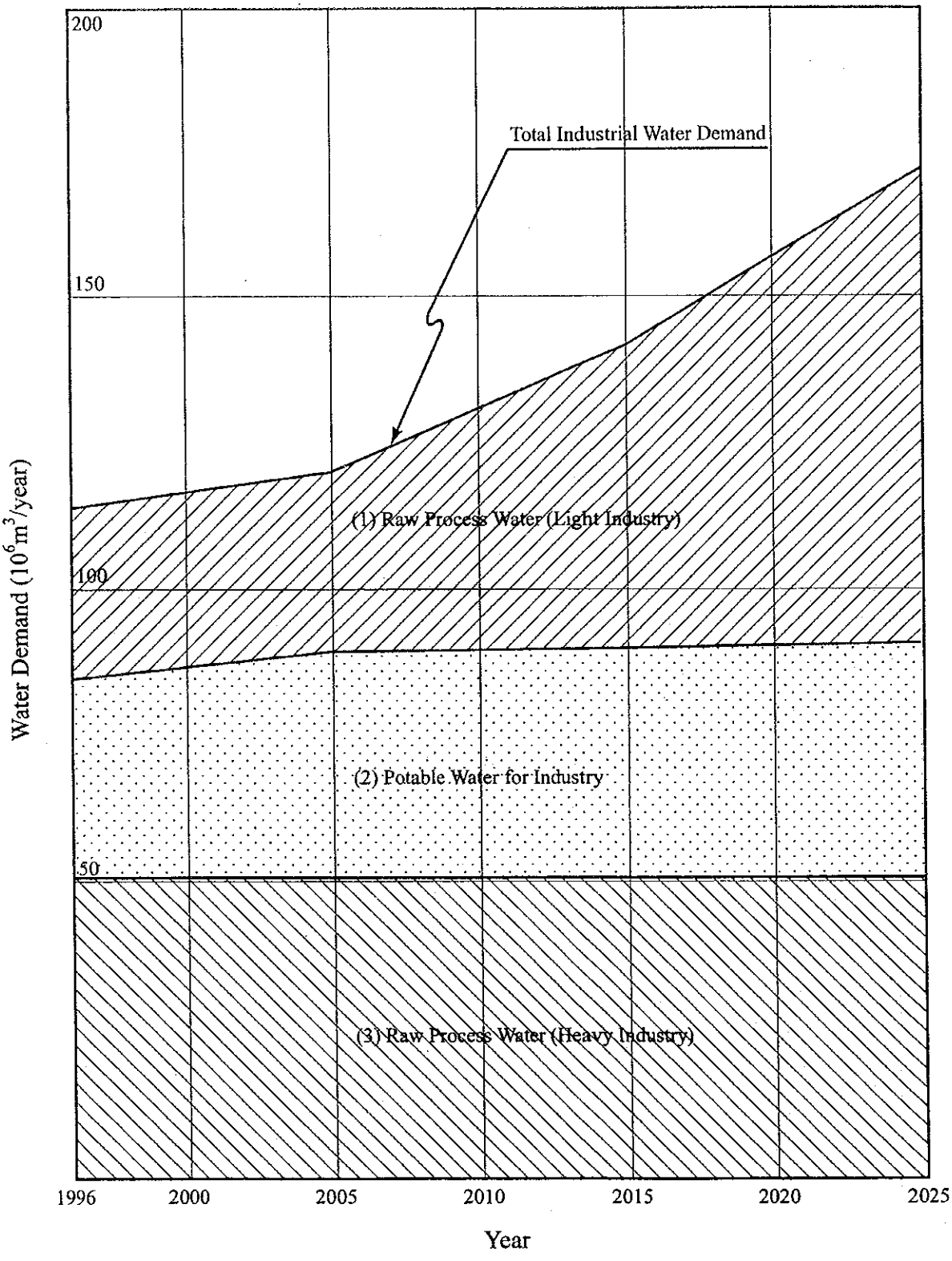


Figure 4 Development Curve of Industrial Water

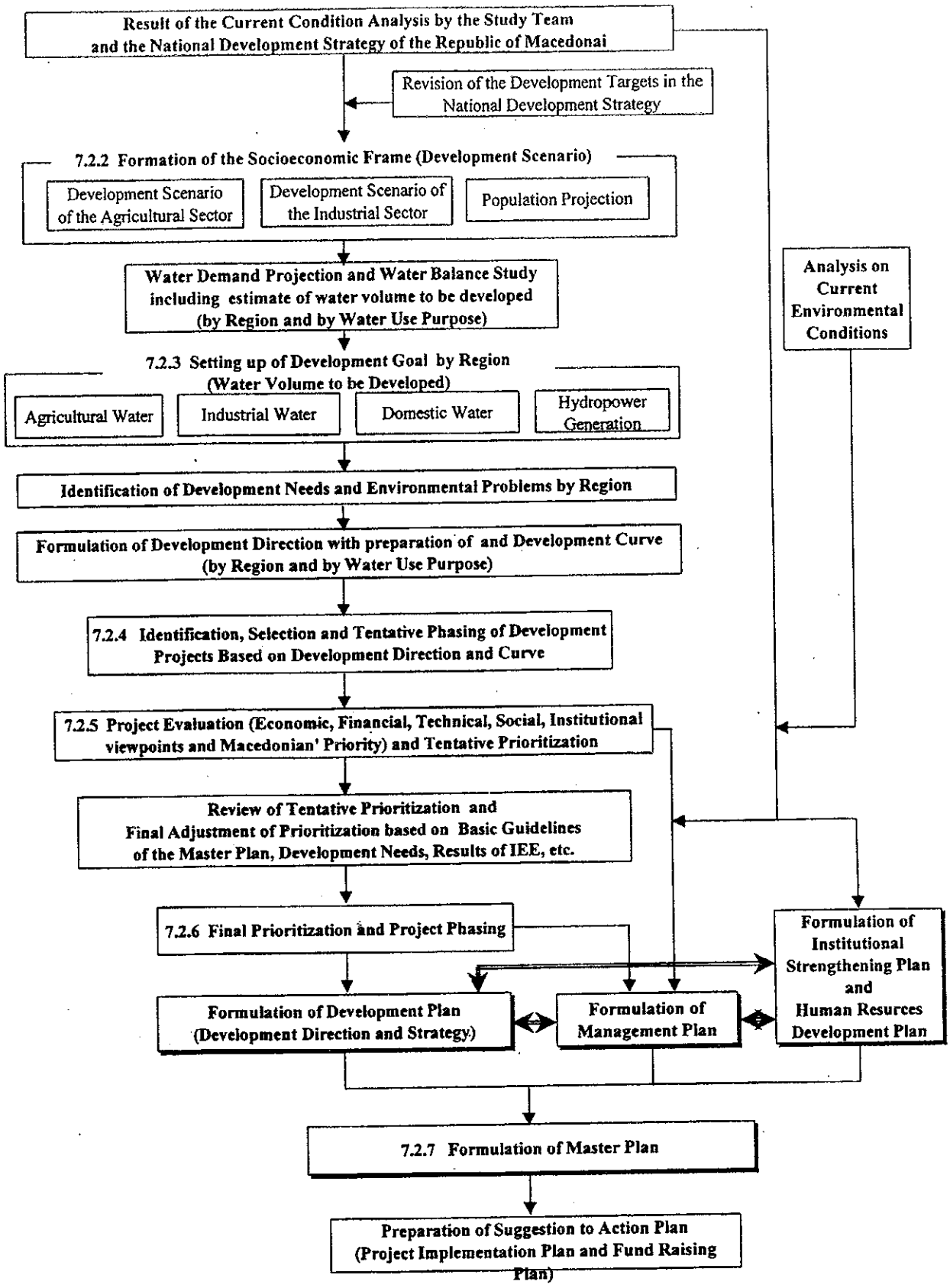


Figure 5 Flowchart for Process of Master Plan Formulation

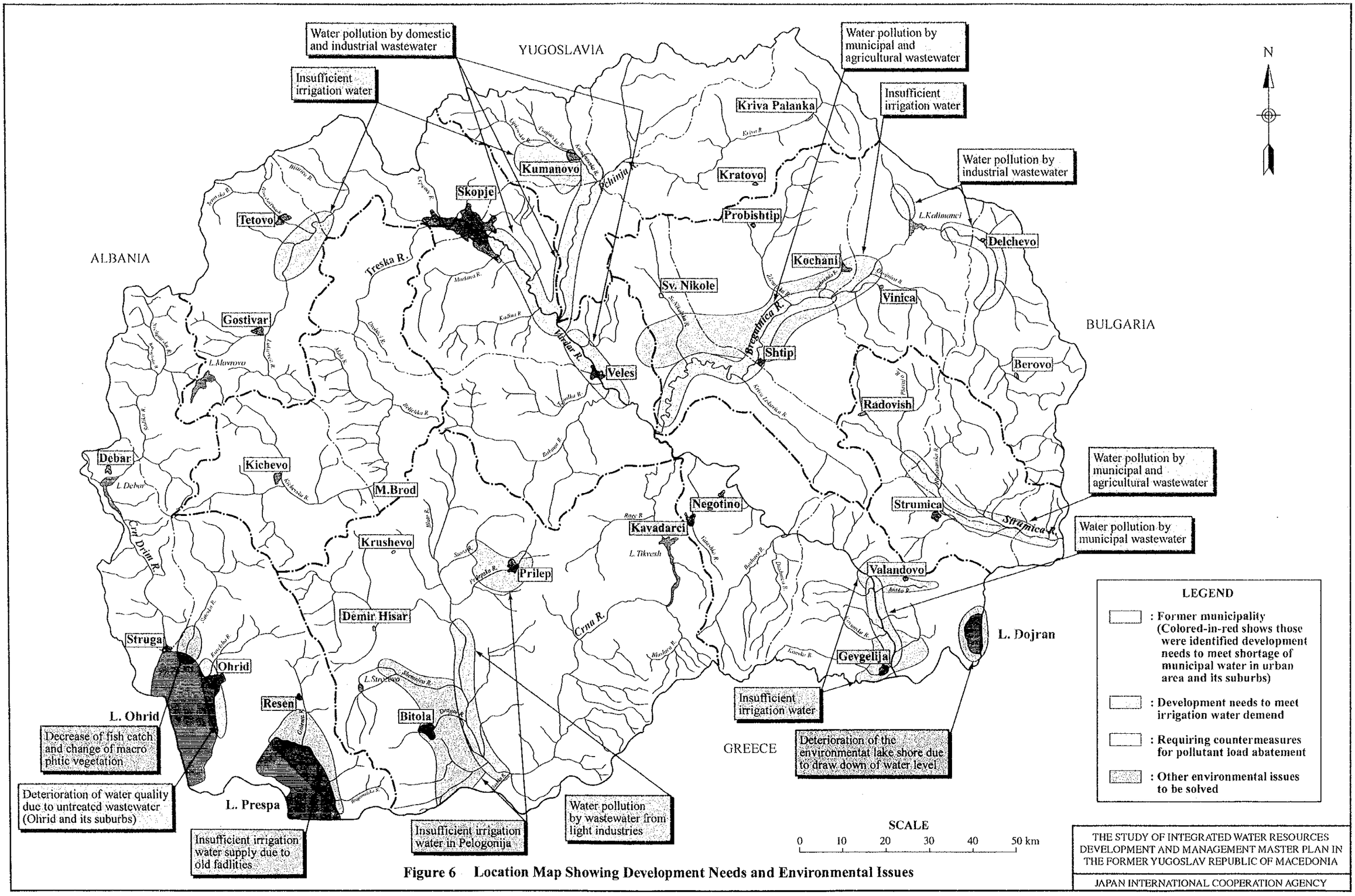


Figure 6 Location Map Showing Development Needs and Environmental Issues

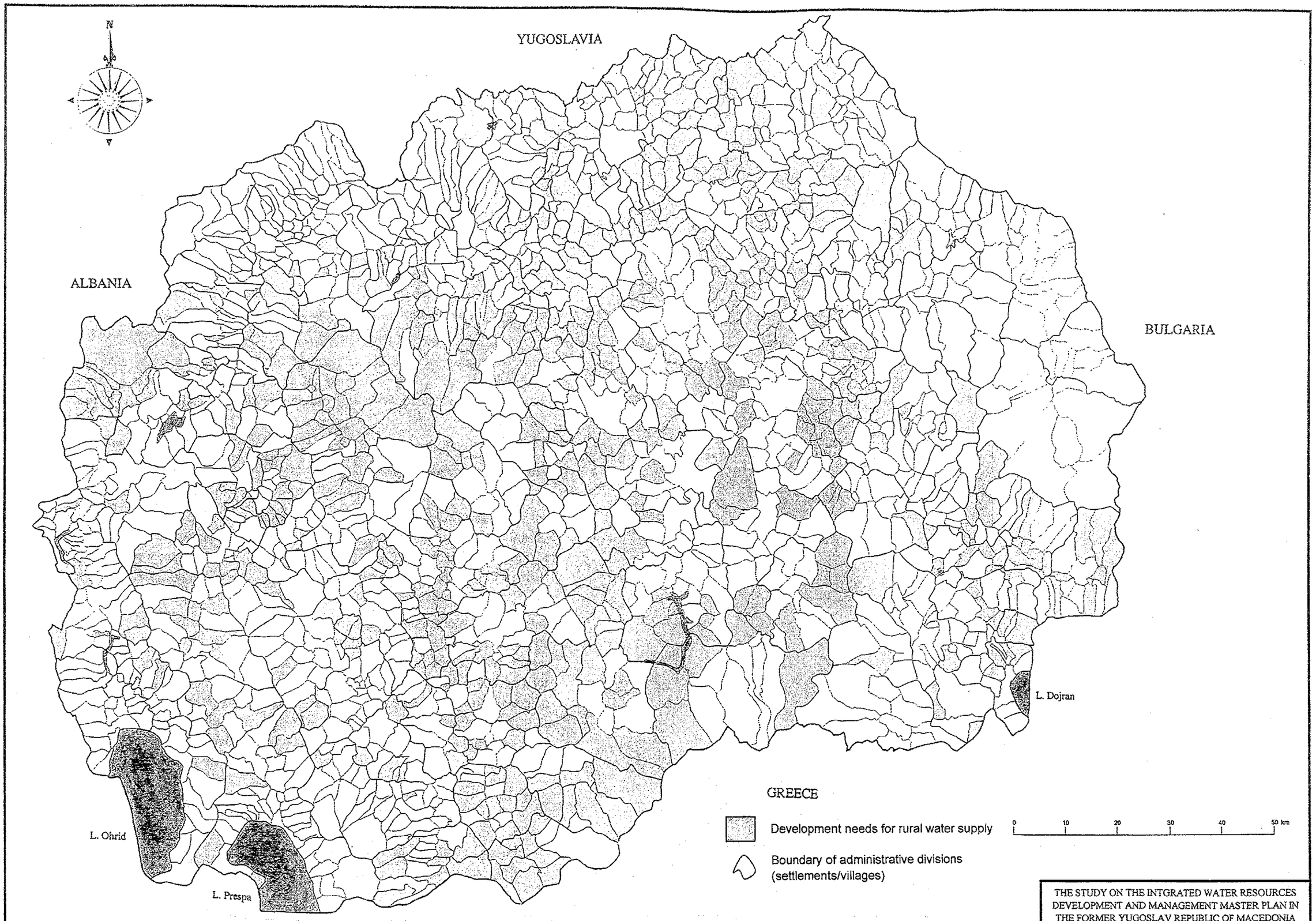
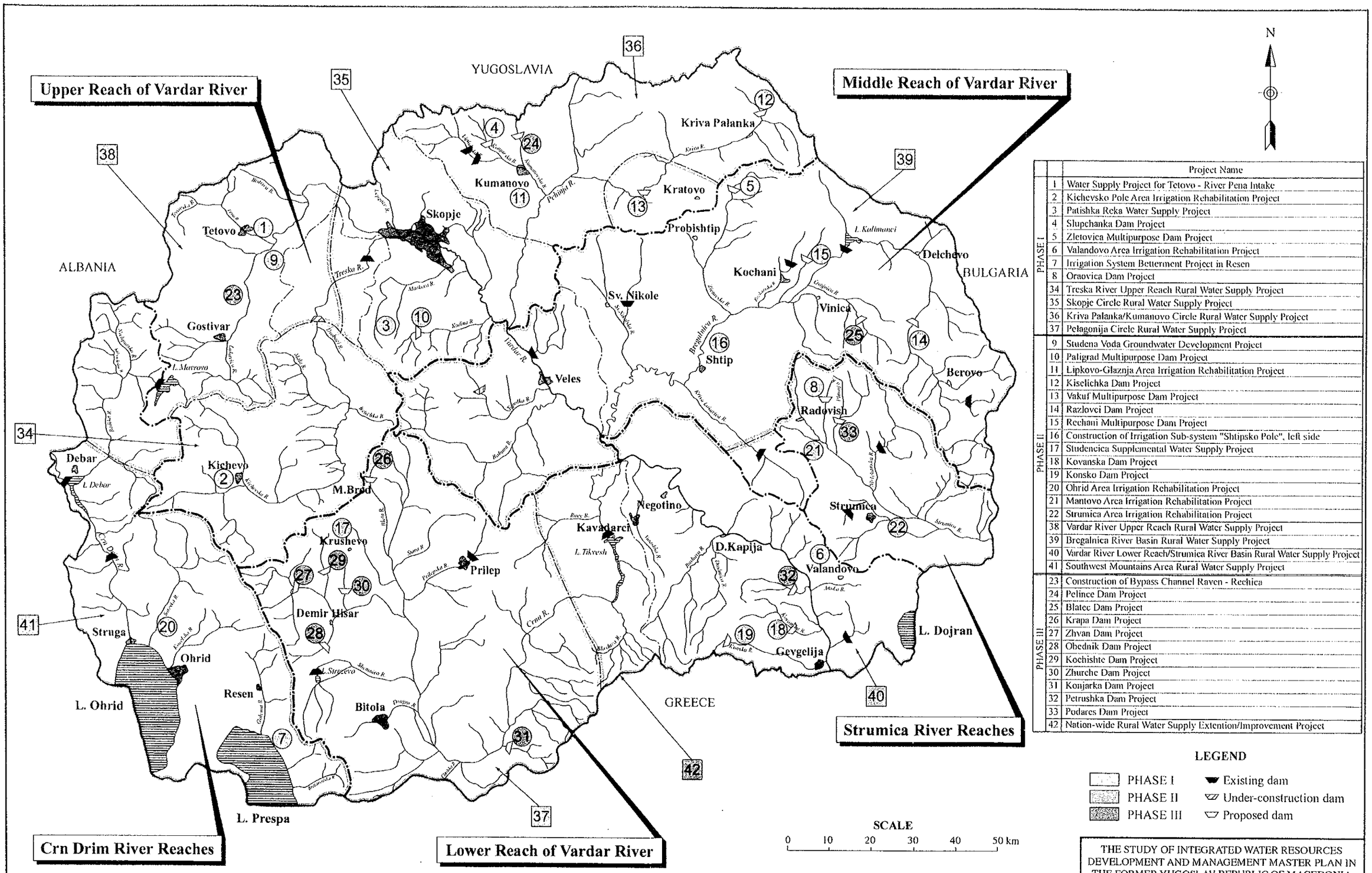


Figure 7 Location Map Showing Development Needs of Rural Water Supply

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



		Project Name
PHASE I	1	Water Supply Project for Tetovo - River Pena Intake
	2	Kichevsko Pole Area Irrigation Rehabilitation Project
	3	Patishka Reka Water Supply Project
	4	Slupchanka Dam Project
	5	Zletovica Multipurpose Dam Project
	6	Valandovo Area Irrigation Rehabilitation Project
	7	Irrigation System Betterment Project in Resen
	8	Oraovica Dam Project
	34	Treska River Upper Reach Rural Water Supply Project
	35	Skopje Circle Rural Water Supply Project
	36	Kriva Palanka/Kumanovo Circle Rural Water Supply Project
	37	Pelagonija Circle Rural Water Supply Project
PHASE II	9	Studena Voda Groundwater Development Project
	10	Paligrad Multipurpose Dam Project
	11	Lipkovo-Glaznja Area Irrigation Rehabilitation Project
	12	Kiselichka Dam Project
	13	Vakuf Multipurpose Dam Project
	14	Razlovci Dam Project
	15	Rechani Multipurpose Dam Project
	16	Construction of Irrigation Sub-system "Shtipsko Pole", left side
	17	Studencica Supplemental Water Supply Project
	18	Kovanska Dam Project
	19	Konsko Dam Project
	20	Ohrid Area Irrigation Rehabilitation Project
	21	Mantovo Area Irrigation Rehabilitation Project
	22	Strumica Area Irrigation Rehabilitation Project
	38	Vardar River Upper Reach Rural Water Supply Project
	39	Bregalnica River Basin Rural Water Supply Project
	40	Vardar River Lower Reach/Strumica River Basin Rural Water Supply Project
	41	Southwest Mountains Area Rural Water Supply Project
PHASE III	23	Construction of Bypass Channel Raven - Rechica
	24	Pelince Dam Project
	25	Blatec Dam Project
	26	Krapa Dam Project
	27	Zhvan Dam Project
	28	Obednik Dam Project
	29	Kochishte Dam Project
	30	Zhurche Dam Project
	31	Konjarka Dam Project
	32	Petrushka Dam Project
	33	Podares Dam Project
	42	Nation-wide Rural Water Supply Extention/Improvement Project

LEGEND

PHASE I
PHASE II
PHASE III
Existing dam
Under-construction dam
Proposed dam

THE STUDY OF INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 8 Location Map of Water Resources Development Plan

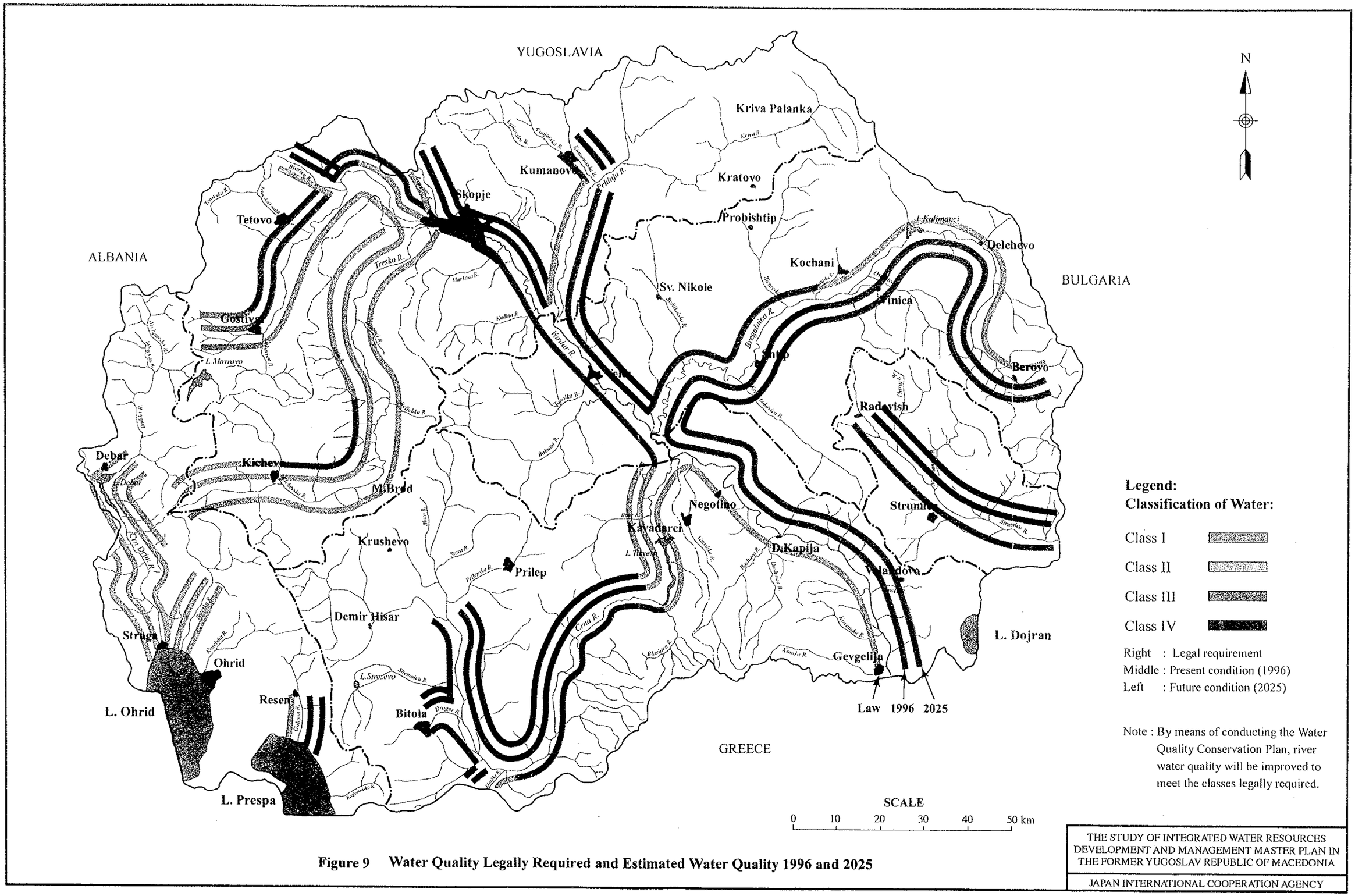
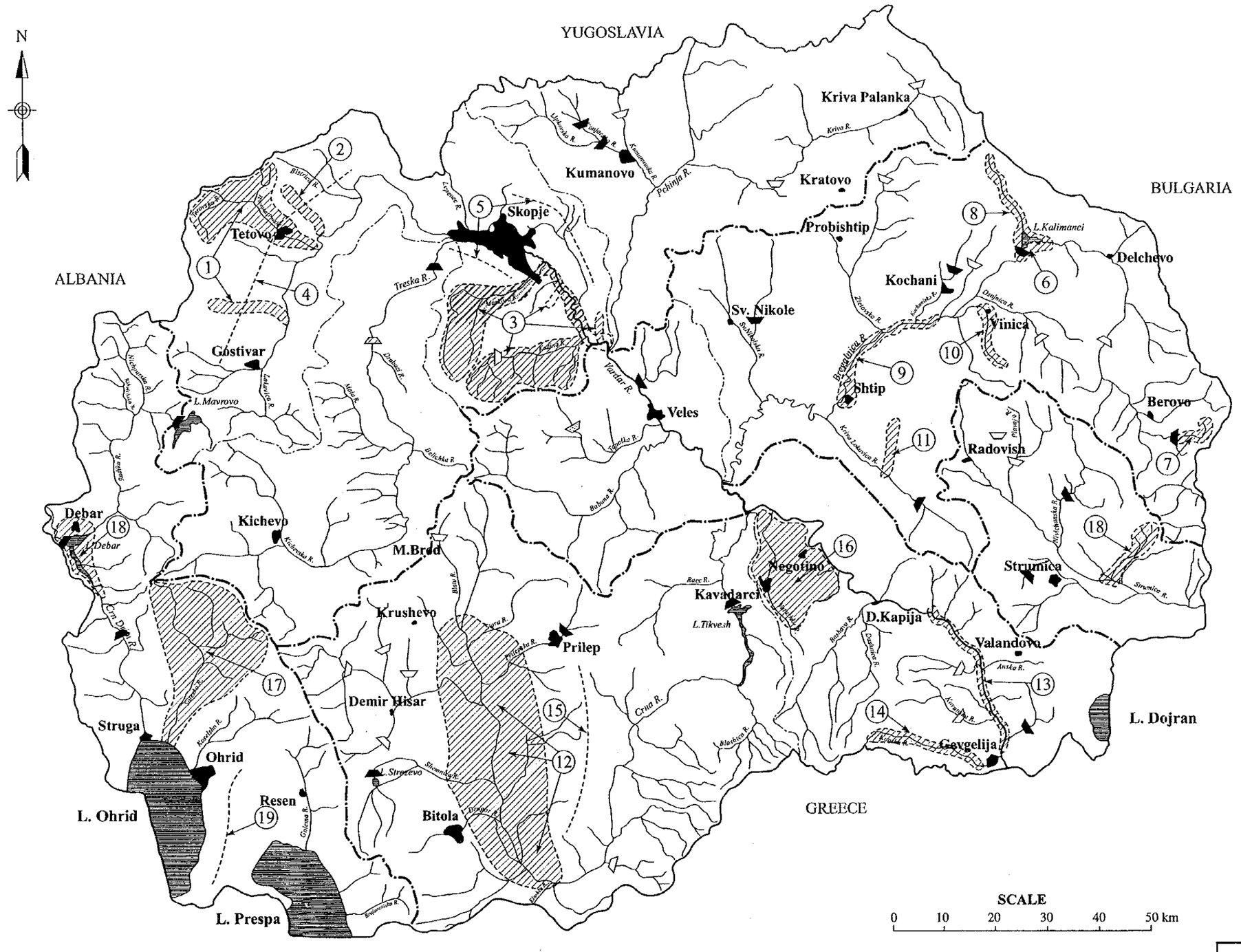


Figure 9 Water Quality Legally Required and Estimated Water Quality 1996 and 2025

THE STUDY OF INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



Project List

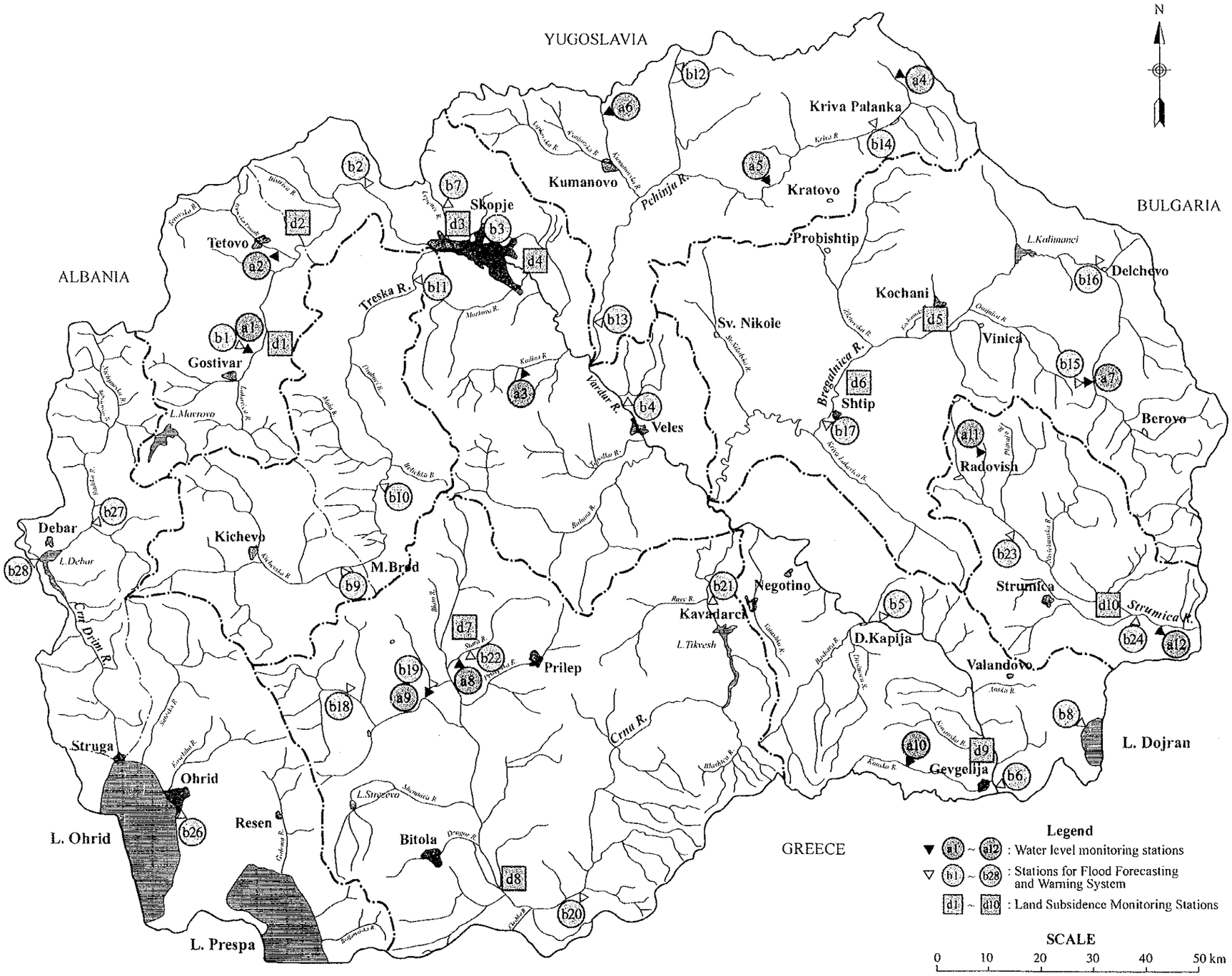
No.	Project Name (Project No.)
1	Pena River Erosion Control Project
2	Dzhepishte River Erosion Control Project
3	Markova and Kadina River Basins Erosion Control Projects
4	Shara Mountains Erosion Control Project
5	Skopsko Crna Gora Mountaions Erosion Control Project
6	Kalimanci Reservoir Erosion Control Project
7	Ratevska Reservoir Erosion Control Project
8	Kamenicika River Erosion Control Project
9	Bregalnica Middle Reach River Improvement Project
10	Vinicika River Erosion Control Project
11	Mantovo Reservoir Debris Flow Control Project
12	Pelagonija Field Drainage Improvement Project
13	Vardar River Lower Reach Improvement Project
14	Konsko River Improvement Project
15	Selechka Mountain Erosion Control Project
16	Kavadarci Area Erosion Control Project
17	Sateska River Basin Consrevation Project
18	Debar Reservoir Erosion Control Project
19	Galichica and Pelister Mountains Erosion Control Project

Legend : Existing dam; Proposed dam; Under-construction dam

THE STUDY OF INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 10 Location Map of Watershed Conservation Plan



(a) Water Level Monitoring Network Improvement and Expansion Plan

- Renewal of instruments and new installation of limunigraph

No.	Name of Gauging Station	River Name
1	Batin Dol (existing)	Vardar River mainstream
2	Pena	Pena River
3	Paligrad	Kadina River
4	Kiselichka	Kriva River
5	Vakuf	Kriva River
6	Slupchanka	Slupchanska River
7	Berovo (existing)	Bregalnica River
8	Bolotino (existing)	Bolotinska River (Crna River)
9	Bucin (existing)	Crna River
10	Konsko	Konska River
11	Oraovica	Oraovica River
12	Smolarski Most	Strumica River

(b) Flood Forecasting and Warning System Enhancement

- Introducing telemetering system including development of software for prediction of flood discharge

No.	Name of Gauging Station	River Name
1	Batin Dol	Vardar River mainstream
2	Radusha	Vardar River mainstream
3	Skopje	Vardar River mainstream
4	Veles	Vardar River mainstream
5	Demir Kapija	Vardar River mainstream
6	Gevgelija	Vardar River mainstream
7	Vliv	Lepenec River
8	Nov Dojran	Lake Dojran
9	Makedonski Brod	Treska River
10	Modrishte	Treska River
11	Sveti Bogorodica	Treska River
12	Pelince	Pchinja River
13	Katlanovska Banja	Pchinja River
14	Kriva Palanka	Pchinja River
15	Berovo	Bregalnica River
16	Ochi Pale	Bregalnica River
17	Shtip	Bregalnica River
18	Dolenci	Crna River
19	Buchin	Crna River
20	Skochivir	Crna River
21	Vozarci	Crna River
22	Borotino	Borotinska River
23	Sushevo	Strumica River
24	Novo Selo	Strumica River
25	Stenje	Lake Prespa
26	Ohrid	Lake Ohrid
27	Boshkov Most	Radika River
28	Shpilje	Crn Drim River

(d) Land Subsidence Monitoring Network Enhancement Plan

- Installation of land subsidence monitoring stations

No.	Name of Station
1	Polog (Gostivar)
2	Polog (Tetovo)
3	Skopje (West)
4	Skopje (East)
5	Kochani
6	Shtip
7	Pelagonija (North)
8	Pelagonija (South)
9	Gevgelija
10	Strumica

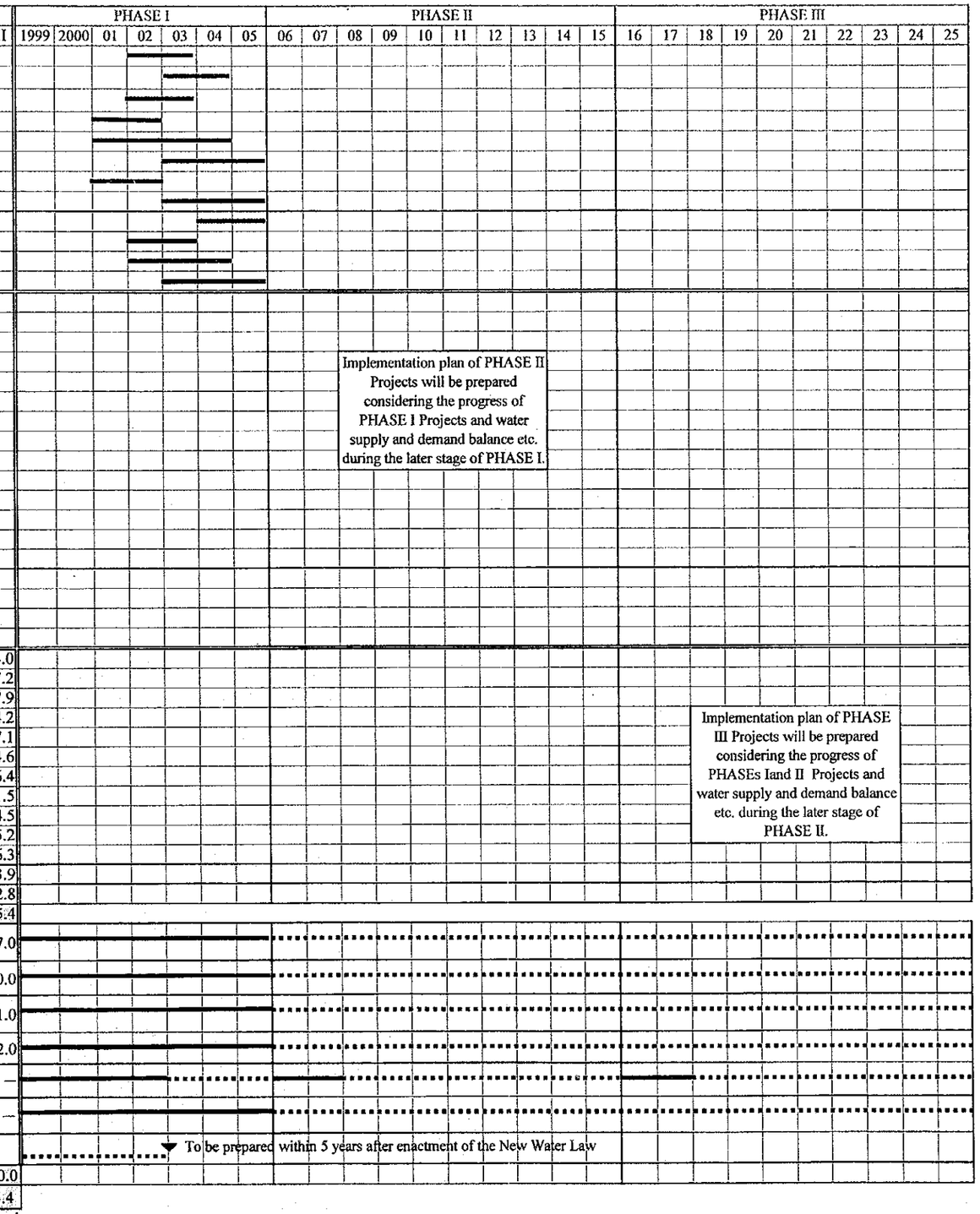
Note : Surface water quality monitoring stations and groundwater monitoring stations are excluded from this map.(Ref. Table 8.2)

Figure 11 Location Map of Surface Water and Groundwater Monitoring System Improvement Plan

THE STUDY OF INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

	Project Name	Purpose	Project Cost (US$mil.) PHASE I	PHASE II	PHASE III
Water Resources Development Plan	1. Water Supply Project for Tetovo - River Pena Intake	M & I	3.2		
	2. Kichevsko Pole Area Irrigation Rehabilitation Project	RI	2.9		
	3. Patishka Reka Water Supply Project	M	3.2		
	4. Slupchanka Dam Project	M	7.3		
	5. Zletovica Multipurpose Dam Project (Phase I)	M & I	68.2		
	6. Valandovo Area Irrigation Rehabilitation Project	RI	7.3		
	7. Irrigtion System Betterment Project in Resen	RI	7.0		
	8. Oraovica Dam Project	M & E	21.7		
	34. Treska River Upper Reach Rural Water Supply Project	RS	19.3		
	35. Skopje Circle Rural Water Supply Project	RS	21.3		
	36. Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS	29.3		
	37. Pelagonija Circle Rural Water Supply Project	RS	35.4		
	9. Studena Voda Groundwater Development Project	M		1.0	
	10. Paligrad Multipurpose Dam Project	M & I, A, P		48.1	
	11. Lipkovo-Glaznja Area Irrigation Rehabilitation Project	RI		21.6	
	12. Kiselichka Dam Project	M & I, A		46.4	
	13. Vakuf Multipurpose Dam Project	M & I, A, P		164.3	
	14. Razlovci Dam Project	M & I, A		42.3	
	15. Rechani Multipurpose Dam Project	M & I, P		50.3	
	16. Construction of Irrigation Sub-system "Shtipsko Pole", left side	A		13.9	
	17. Studencica Supplemental Water Supply Project	M & I		2.5	
	18. Kovanska Dam Project	A		31.9	
	19. Konsko Dam Project	M & I, A		66.1	
	20. Ohrid Area Irrigation Rehabilitation Project	RI		8.2	
	21. Mantovo Area Irrigation Rehabilitation Project	RI		11.2	
	22. Strumica Area Irrigation Rehabilitation Project	RI		24.4	
	38. Vardar River Upper Reach Rural Water Supply Project	RS		15.6	
	39. Bregalnica River Basin Rural Water Supply Project	RS		29.8	
	40. Vardar River Lower Reach/Strumica River Basin Rural Water Supply Project	RS		21.4	
	41. Southwest Mountains Area Rural Water Supply Project	RS		7.5	
	23. Construction of Bypass Channel Raven- Rechica	A			44.0
	24. Pelince Dam Project	A			57.2
	25. Blatec Dam Project	M & I, A			37.9
	26. Krapa Dam Project	M & I, A			54.2
	27. Zhvan Dam Project	A			127.1
	28 Obednik Dam Project	A			44.6
	29. Kochishte Dam Project	A			66.4
	30. Zhurche Dam Project	A			21.5
	31. Konjarka Dam Project	A			24.5
	32. Petrushka Dam Project	A			65.2
	33. Podares Dam Project	M & I, A			66.3
	42. Nationwide Rural Water Supply Extention/Improvement Project	RS			53.9
	Subtotal by PHASE		226.1	606.5	662.8
	Subtotal of Water Resources Development Plan				1,495.4
Water Resources Management Plan	Water Quality Conservation Plan by River Basin	PHASE I to III			217.0
	Watershed Conservation Plan by River Basin				190.0
	Surface Water and Groundwater Monitoring System Improvement Plan				61.0
	Water-related Facilities Operation and Maintenance Improvement Plan				2.0
	Institutions and Legal System Strengthening Plan				—
	Human Resources Development Plan				—
	New Water Economy Base Plan to be prepared by GOM				
	Subtotal of Water Resources Management Plan				470.0
		Grand total			1,965.4



Remarks, M: Municipal, I: Industrial, A: Agricultural, P:Power, E: Environmental, RI: Irrigation Rehabilitation, RS: Rural Water Supply

Figure 12 Overall Implementation Plan

No.	Project Name	Purpose	Project cost (US$ mil.)	PHASE I						
				1999	2000	2001	2002	2003	2004	2005
1	Water Supply Project for Tetovo - River Pena Intake	M & I	3.2			RE				
							1.6	1.6		
2	Kichevsko Pole Area Irrigation Rehabilitation Project	RI	2.9				NP			
								1.4	1.5	
3	Patishka Reka Water Supply Project	M	3.2			RE				
							1.6	1.6		
4	Slupchanka Dam Project	M	7.3		RE					
						3.7	3.6			
5	Zletovica Multipurpose Dam Project	M & I	68.2		RE					
						13.6	20.5	20.5	13.6	
6	Valandovo Area Irrigation Rehabilitation Project	RI	7.3				NP			
								2.3	2.7	2.3
7	Irrigation System Betterment Project in Resen	RI	7.0		RE					
						3.5	3.5			
8	Oraovica Dam Project	M & E	21.7				NP			
								6.5	8.7	6.5
		Subtotal	120.8	0.0	0.0	20.8	30.8	33.9	26.5	8.8
34	Treska River Upper Reach Rural Water Supply Project	RS	19.3					NP		
									9.6	9.7
35	Skopje Circle Rural Water Supply Project	RS	21.3			NP				
							10.6	10.7		
36	Kriva Palanka/Kumanovo Circle Rural Water Supply Project	RS	29.3			NP				
							8.8	11.7	8.8	
37	Pelagonija Circle Rural Water Supply Project	RS	35.4				NP			
								11.7	12.7	11.0
		Subtotal	105.3	0.0	0.0	0.0	19.4	34.1	31.1	20.7
		Total	226.1	0.0	0.0	20.8	50.2	68.0	57.6	29.5

Remarks: · For purpose of project; M: Municipal, I: Industrial, E: Environmental, RI: Irrigation Rehabilitation, RS: Rural Water Supply
· For works before implementation of Projects; RE: Review of existing plan/design, NP: New planning, study and survey

Figure 13 Implementation Program of PHASE I Projects