

Annex 8

Pollutant Load Analysis



Growth Rate of Population of Former Municipality

No.	Former municipality	Year 1997*	Year 2005	Growth rate	Year 2015	Growth rate	Year 2025	Growth rate
1	Skopje	558,213	609,627	1.09	660,447	1.18	705,608	1.26
2	Gostivar	115,276	118,516	1.03	126,671	1.10	133,918	1.16
3	Tetovo	179,883	189,019	1.05	202,315	1.12	214,130	1.19
4	Kichevo	53,741	56,558	1.05	59,400	1.11	61,924	1.15
5	Makedonski Brod	12,152	10,775	0.89	10,579	0.87	10,406	0.86
6	Kumanovo	131,558	135,737	1.03	141,990	1.08	147,546	1.12
7	Kratovo	10,905	10,358	0.95	9,932	0.91	9,553	0.88
8	Kriva Palanka	25,307	23,904	0.94	22,937	0.91	22,078	0.87
9	Veles	66,829	68,184	1.02	69,953	1.05	71,525	1.07
10	Sveti Nikole	21,616	21,311	0.99	21,207	0.98	21,114	0.98
11	Stip	51,353	54,465	1.06	57,425	1.12	60,055	1.17
12	Probitip	16,766	17,088	1.02	17,433	1.04	17,740	1.06
13	Kochani	48,676	51,285	1.05	53,452	1.10	55,379	1.14
14	Vinica	19,438	20,304	1.04	21,283	1.09	22,154	1.14
15	Delchevo	26,149	26,902	1.03	28,177	1.08	29,310	1.12
16	Berovo	19,913	20,037	1.01	20,201	1.01	20,347	1.02
17	Demir Hisar	10,456	9,388	0.90	8,492	0.81	7,696	0.74
18	Krushevo	12,134	11,909	0.98	11,834	0.98	11,766	0.97
19	Bitola	108,789	110,361	1.01	112,064	1.03	113,578	1.04
20	Prilep	95,310	95,722	1.00	96,937	1.02	98,017	1.03
21	Kavadarci	42,494	44,705	1.05	46,890	1.10	48,831	1.15
22	Negotino	23,542	25,034	1.06	26,516	1.13	27,833	1.18
23	Valandovo	12,271	12,993	1.06	13,704	1.12	14,335	1.17
24	Gevgelija	34,983	37,433	1.07	39,497	1.13	41,331	1.18
25	Ohrid	61,533	64,788	1.05	67,965	1.10	70,788	1.15
26	Struga	65,216	67,691	1.04	71,647	1.10	75,162	1.15
27	Debar	24,995	27,918	1.12	29,864	1.19	31,593	1.26
28	Resen	17,708	17,502	0.99	17,360	0.98	17,235	0.97
29	Radovish	31,237	32,559	1.04	34,164	1.09	35,590	1.14
30	Stumica	92,955	97,635	1.05	102,835	1.11	107,455	1.16
		1,991,398	2,089,708		2,203,171		2,303,997	

Source: *, Statistical Yearbook of the Republic of Macedonia 1997, Statistical Office

Estimation of Population by Sub-basins (1/4)

Name of river	Sub-basin No.	New Municipality code No.	Distribution Ratio	1997		2005		2015		2025	
				All municipality	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin
Vardar	1	22	1.0	47,939	47,939	1.03	49,286	1.10	52,678	1.16	55,692
		26	0.2	1,400	280	1.03	288	1.10	308	1.16	325
		28	1.0	8,061	8,061	1.03	8,288	1.10	8,858	1.16	9,365
		30	1.0	5,708	5,708	1.03	5,868	1.10	6,272	1.16	6,631
		42	0.1	9,587	959	1.05	1,009	1.11	1,060	1.15	1,105
		13	0.1	2,019	202	0.89	179	0.87	176	0.86	173
Sub-total					63,149		64,918		69,351		73,290
Vardar	2	23	1.0	16,002	16,002	1.03	16,452	1.10	17,584	1.16	18,590
		24	1.0	8,731	8,731	1.03	8,976	1.10	9,594	1.16	10,143
		27	0.7	12,369	8,658	1.03	8,902	1.10	9,514	1.16	10,058
		91	1.0	67,673	67,673	1.05	71,110	1.12	76,112	1.19	80,557
		92	1.0	7,650	7,650	1.05	8,039	1.12	8,604	1.19	9,106
		93	0.8	21,596	17,277	1.05	18,154	1.12	19,431	1.19	20,566
		94	0.4	15,492	6,197	1.05	6,512	1.12	6,970	1.19	7,377
		95	1.0	12,918	12,918	1.05	13,574	1.12	14,529	1.19	15,377
		96	1.0	13,684	13,684	1.05	14,379	1.12	15,390	1.19	16,289
		97	1.0	7,293	7,293	1.05	7,663	1.12	8,202	1.19	8,681
		98	0.3	23,027	6,908	1.05	7,259	1.12	7,770	1.19	8,223
99	0.7	7,197	5,038	1.05	5,294	1.12	5,666	1.19	5,997		
Sub-total					178,029		186,313		199,366		210,966
Vardar	3	93	0.2	21,596	4,319	1.05	4,539	1.12	4,858	1.19	5,142
		99	0.3	7,197	2,159	1.05	2,269	1.12	2,428	1.19	2,570
		100	1.0	3,353	3,353	1.05	3,523	1.12	3,771	1.19	3,991
		115	0.9	10,399	9,359	1.09	10,221	1.18	11,073	1.26	11,830
		118	0.8	86,752	69,402	1.09	75,794	1.18	82,112	1.26	87,727
Sub-total					88,592		96,346		104,243		111,260
Treska	4	14	0.3	4,650	1,395	0.89	1,237	0.87	1,214	0.86	1,195
		40	1.0	28,447	28,447	1.05	29,938	1.11	31,443	1.15	32,779
		41	0.6	3,528	2,117	1.05	2,228	1.11	2,340	1.15	2,439
		42	0.9	9,587	8,628	1.05	9,081	1.11	9,537	1.15	9,942
		43	0.9	1,628	1,465	1.05	1,542	1.11	1,619	1.15	1,688
		44	1.0	10,551	10,551	1.05	11,104	1.11	11,662	1.15	12,158
Sub-total					52,603		55,129		57,815		60,200
Treska	5	12	0.7	5,483	3,838	0.89	3,403	0.87	3,341	0.86	3,287
		13	0.8	2,019	1,615	0.89	1,432	0.87	1,406	0.86	1,383
		98	0.7	23,027	16,119	1.05	16,938	1.12	18,129	1.19	19,188
		114	0.8	21,302	17,042	1.09	18,611	1.18	20,163	1.26	21,541
		115	0.1	10,399	1,040	1.09	1,136	1.18	1,230	1.26	1,314
Sub-total					39,654		41,520		44,269		46,713
Lepenec	6	116	0.7	8,262	5,783	1.09	6,316	1.18	6,843	1.26	7,310
		118	0.2	86,752	17,350	1.09	18,948	1.18	20,528	1.26	21,932
		123	1.0	14,817	14,817	1.09	16,182	1.18	17,531	1.26	18,729
Sub-total					37,951		41,446		44,901		47,972
Vardar	7	54	0.1	25,931	2,593	1.03	2,675	1.08	2,799	1.12	2,908
		117	0.8	69,293	55,434	1.03	57,195	1.08	59,830	1.12	62,171
		120	0.1	119,601	11,960	1.03	12,340	1.08	12,908	1.12	13,414
		121	1.0	86,752	86,752	1.03	89,508	1.08	93,631	1.12	97,295
		122	1.0	65,663	65,663	1.03	67,749	1.08	70,870	1.12	73,643
Sub-total					222,403		229,467		240,038		249,431
Vardar	8	13	0.1	2,019	202	0.89	179	0.87	176	0.86	173
		101	0.4	57,568	23,027	1.02	23,494	1.05	24,104	1.07	24,645
		108	0.8	10,670	8,536	1.09	9,322	1.18	10,099	1.26	10,790
		109	1.0	15,572	15,572	1.09	17,006	1.18	18,424	1.26	19,684
		110	1.0	4,378	4,378	1.09	4,781	1.18	5,180	1.26	5,534
		111	0.3	8,368	2,510	1.09	2,742	1.18	2,970	1.26	3,173
		112	0.5	14,937	7,469	1.09	8,156	1.18	8,836	1.26	9,441
		113	1.0	9,843	9,843	1.09	10,750	1.18	11,646	1.26	12,442
		117	0.2	69,293	13,859	1.09	15,135	1.18	16,397	1.26	17,518
		120	0.9	119,601	107,641	1.09	117,555	1.18	127,355	1.26	136,063
		Sub-total					193,037		209,121		225,186

Estimation of Population by Sub-basins (2/4)

Name of river	Sub-basin No.	New Municipality code No.	Distribution Ratio	1997		2005		2015		2025	
				All municipality	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin
Pchinja	9	56	0.1	2,068	207	1.03	213	1.08	223	1.12	232
		57	1.0	4,925	4,925	1.03	5,081	1.08	5,316	1.12	5,524
Sub-total					5,132		5,295		5,539		5,755
Pchinja	10	51	1.0	20,989	20,989	0.94	19,825	0.91	19,023	0.87	18,311
		52	1.0	4,318	4,318	0.94	4,079	0.91	3,914	0.87	3,767
Sub-total					25,307		23,904		22,937		22,078
Pchinja	11	50	0.8	10,905	8,724	0.95	8,286	0.91	7,946	0.88	7,642
		56	0.8	2,068	1,654	1.03	1,707	1.08	1,786	1.12	1,855
Sub-total					10,378		9,993		9,731		9,498
Pchinja	12	53	0.6	97,074	58,244	1.03	60,095	1.08	62,863	1.12	65,323
		54	0.9	25,931	23,338	1.03	24,079	1.08	25,188	1.12	26,174
		116	0.3	8,262	2,479	1.09	2,707	1.18	2,933	1.26	3,133
Sub-total					84,061		86,881		90,984		94,630
Pchinja	13	53	0.4	97,074	38,830	1.03	40,063	1.08	41,909	1.12	43,548
		55	1.0	1,560	1,560	1.03	1,610	1.08	1,684	1.12	1,750
		56	0.1	2,068	207	1.03	213	1.08	223	1.12	232
		101	0.1	57,568	5,757	1.02	5,874	1.05	6,026	1.07	6,161
		108	0.2	10,670	2,134	1.09	2,331	1.18	2,525	1.26	2,697
		111	0.7	8,368	5,858	1.09	6,397	1.18	6,930	1.26	7,404
		112	0.5	14,937	7,469	1.09	8,156	1.18	8,836	1.26	9,441
Sub-total					61,813		64,644		68,133		71,234
Vardar	14	78	0.2	2,939	588	0.99	580	0.98	577	0.98	574
		101	0.5	57,568	28,784	1.02	29,368	1.05	30,130	1.07	30,807
		102	1.0	1,305	1,305	1.02	1,331	1.05	1,366	1.07	1,397
		103	0.8	3,896	3,117	1.02	3,180	1.05	3,262	1.07	3,336
		104	1.0	2,923	2,923	1.02	2,982	1.05	3,060	1.07	3,128
		105	0.9	1,137	1,023	1.02	1,044	1.05	1,071	1.07	1,095
Sub-total					37,740		38,485		39,465		40,337
Bregalnica	15	1	0.7	1,459	1,021	1.01	1,028	1.01	1,036	1.02	1,044
		2	1.0	5,654	5,654	1.01	5,689	1.01	5,736	1.02	5,777
		33	0.5	17,880	8,940	1.03	9,197	1.08	9,633	1.12	10,021
Sub-total					15,615		15,914		16,405		16,841
Bregalnica	16	16	0.1	17,409	1,741	1.04	1,818	1.09	1,906	1.14	1,984
		33	0.5	17,880	8,940	1.03	9,197	1.08	9,633	1.12	10,021
		34	1.0	8,269	8,269	1.03	8,507	1.08	8,910	1.12	9,269
		49	0.5	4,765	2,383	1.05	2,510	1.10	2,616	1.14	2,711
Sub-total					21,332		22,033		23,066		23,984
Bregalnica	17	16	0.9	17,409	15,668	1.04	16,366	1.09	17,155	1.14	17,857
		17	1.0	2,029	2,029	1.04	2,119	1.09	2,222	1.14	2,313
		45	1.0	32,576	32,576	1.05	34,322	1.10	35,772	1.14	37,062
		46	1.0	2,529	2,529	1.05	2,665	1.10	2,777	1.14	2,877
		47	1.0	5,412	5,412	1.05	5,702	1.10	5,943	1.14	6,157
		48	1.0	3,394	3,394	1.05	3,576	1.10	3,727	1.14	3,861
		49	0.5	4,765	2,383	1.05	2,510	1.10	2,616	1.14	2,711
		50	0.2	10,905	2,181	0.95	2,072	0.91	1,986	0.88	1,911
		71	1.0	20,989	20,989	1.02	21,392	1.04	21,824	1.06	22,208
		106	0.3	47,027	14,108	1.06	14,963	1.12	15,776	1.17	16,499
107	1.0	4,326	4,326	1.06	4,588	1.12	4,838	1.17	5,059		
Sub-total					105,595		110,275		114,637		118,515
Bregalnica	18	73	0.2	23,703	4,741	1.04	4,941	1.09	5,185	1.14	5,401
		74	0.6	3,779	2,267	1.04	2,363	1.09	2,480	1.14	2,583
		77	1.0	18,677	18,677	0.99	18,413	0.98	18,324	0.98	18,243
		78	0.8	2,939	2,351	0.99	2,318	0.98	2,307	0.98	2,297
		106	0.4	47,027	18,811	1.06	19,951	1.12	21,035	1.17	21,998
Sub-total					46,847		47,987		49,330		50,523
Crna	19	12	0.2	5,483	1,097	0.89	972	0.87	955	0.86	939
		14	0.7	4,650	3,255	1.05	3,426	1.11	3,598	1.15	3,751
		35	1.0	7,552	7,552	0.90	6,781	0.81	6,133	0.74	5,559
		36	1.0	2,904	2,904	0.90	2,607	0.81	2,359	0.74	2,137
		41	0.3	3,528	1,058	1.05	1,114	1.11	1,170	1.15	1,220

Estimation of Population by Sub-basins (3/4)

Name of river	Sub-basin No.	New Municipality code No.	Distribution Ratio	1997		2005		2015		2025	
				All municipality	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin
		43	0.1	1,628	163	1.05	171	1.11	180	1.15	188
		58	1.0	9,916	9,916	0.98	9,732	0.98	9,671	0.97	9,615
		59	1.0	2,218	2,218	1.00	2,228	1.02	2,256	1.03	2,281
		66	0.4	72,797	29,119	1.00	29,245	1.02	29,616	1.03	29,946
		67	1.0	11,980	11,980	1.00	12,032	1.02	12,185	1.03	12,320
		68	0.1	3,372	337	1.00	339	1.02	343	1.03	347
		69	1.0	6,329	6,329	1.00	6,356	1.02	6,437	1.03	6,509
Sub-total					75,928		75,002		74,901		74,811
Crna	20	3	0.3	86,780	26,034	1.01	26,410	1.03	26,818	1.04	27,180
		8	0.8	4,960	3,968	1.01	4,025	1.03	4,087	1.04	4,143
		9	1.0	2,843	2,843	1.01	2,884	1.03	2,929	1.04	2,968
		10	1.0	1,768	1,768	1.01	1,794	1.03	1,821	1.04	1,846
		11	0.8	2,395	1,916	1.01	1,944	1.03	1,974	1.04	2,000
		66	0.2	72,797	14,559	1.00	14,622	1.02	14,808	1.03	14,973
		68	0.8	3,372	2,698	1.00	2,709	1.02	2,744	1.03	2,774
Sub-total					53,786		54,388		55,180		55,884
Crna	21	3	0.7	86,780	60,746	1.01	61,624	1.03	62,575	1.04	63,420
		4	1.0	5,818	5,818	1.01	5,902	1.03	5,993	1.04	6,074
		5	1.0	2,844	2,844	1.01	2,885	1.03	2,930	1.04	2,969
		6	0.9	928	835	1.01	847	1.03	860	1.04	872
Sub-total					70,243		71,258		72,358		73,335
Crna	22	6	0.1	928	93	1.01	94	1.03	96	1.04	97
		7	1.0	453	453	1.01	460	1.03	467	1.04	473
		11	0.1	2,395	240	1.01	243	1.03	247	1.04	250
		37	0.5	37,744	18,872	1.05	19,854	1.10	20,824	1.15	21,686
		38	0.4	484	194	1.05	204	1.10	214	1.15	222
		68	0.1	3,372	337	1.00	339	1.02	343	1.03	347
		70	1.0	832	832	1.00	836	1.02	846	1.03	856
Sub-total					21,020		22,029		23,036		23,931
Crna	23	37	0.2	37,744	7,549	1.05	7,942	1.10	8,330	1.15	8,675
		39	1.0	4,266	4,266	1.05	4,488	1.10	4,707	1.15	4,902
		66	0.4	72,797	29,119	1.00	29,245	1.02	29,616	1.03	29,946
		103	0.2	3,896	779	1.02	795	1.05	816	1.07	834
		105	0.1	1,137	114	1.02	116	1.05	119	1.07	122
Sub-total					41,827		42,585		43,588		44,478
Vardar	24	37	0.3	37,744	11,323	1.05	11,912	1.10	12,495	1.15	13,012
		60	1.0	18,721	18,721	1.06	19,907	1.13	21,086	1.18	22,133
		61	0.2	4,821	964	1.06	1,025	1.13	1,086	1.18	1,140
		74	0.1	3,779	378	1.04	394	1.09	413	1.14	431
		103	0.2	3,896	779	1.02	795	1.05	816	1.07	834
		106	0.3	47,027	14,108	1.06	14,963	1.12	15,776	1.17	16,499
Sub-total					46,274		48,997		51,672		54,048
Vardar	25	15	1.0	12,271	12,271	1.06	12,993	1.12	13,704	1.17	14,335
		18	0.9	19,593	17,634	1.07	18,869	1.13	19,909	1.18	20,834
		19	1.0	2,766	2,766	1.07	2,960	1.13	3,123	1.18	3,268
		20	1.0	8,950	8,950	1.07	9,577	1.13	10,105	1.18	10,574
		21	0.6	3,674	2,204	1.07	2,359	1.13	2,489	1.18	2,604
		38	0.6	484	290	1.05	306	1.10	320	1.15	334
		61	0.8	4,821	3,857	1.06	4,101	1.13	4,344	1.18	4,560
		74	0.3	3,779	1,134	1.04	1,182	1.09	1,240	1.14	1,292
Sub-total					49,106		52,345		55,234		57,800
Strumica	26	73	0.2	23,703	4,741	1.04	4,941	1.09	5,185	1.14	5,401
Sub-total					4,741		4,941		5,185		5,401
Strumica	27	73	0.6	23,703	14,222	1.04	14,824	1.09	15,554	1.14	16,204
		75	1.0	3,755	3,755	1.04	3,914	1.09	4,107	1.14	4,278
		81	0.1	11,726	1,173	1.05	1,232	1.11	1,297	1.16	1,356
Sub-total					19,149		19,969		20,959		21,837
Strumica	28	1	0.3	14,259	4,278	1.01	4,304	1.01	4,340	1.02	4,371
		79	1.0	44,683	44,683	1.05	46,933	1.11	49,432	1.16	51,653
		80	1.0	12,621	12,621	1.05	13,256	1.11	13,962	1.16	14,590

Estimation of Population by Sub-basins (4/4)

Name of river	Sub-basin No.	New Municipality code No.	Distribution Ratio	1997		2005		2015		2025	
				All municipality	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin	Growth rate	Population In basin
		81	0.9	11,726	10,553	1.05	11,085	1.11	11,675	1.16	12,200
		82	1.0	12,744	12,744	1.05	13,386	1.11	14,099	1.16	14,732
		83	1.0	4,783	4,783	1.05	5,024	1.11	5,291	1.16	5,529
		84	1.0	6,398	6,398	1.05	6,720	1.11	7,078	1.16	7,396
Sub-total					96,060		100,708		105,877		110,470
Crn Drim	29	62	1.0	53,720	53,720	1.05	56,562	1.10	59,335	1.15	61,800
		63	0.1	3,212	321	1.05	338	1.10	355	1.15	370
		64	1.0	1,716	1,716	1.05	1,807	1.10	1,895	1.15	1,974
		65	0.8	2,885	2,308	1.05	2,430	1.10	2,549	1.15	2,655
		76	1.0	17,708	17,708	0.99	17,502	0.98	17,360	0.97	17,235
		85	0.6	36,760	22,056	1.04	22,893	1.10	24,231	1.15	25,420
Sub-total					97,829		101,532		105,726		109,453
Crn Drim	30	31	1.0	18,422	18,422	1.12	20,576	1.19	22,011	1.26	23,285
		32	1.0	6,573	6,573	1.12	7,342	1.19	7,853	1.26	8,308
		41	0.1	3,528	353	1.05	371	1.11	390	1.15	407
		63	0.9	3,212	2,891	1.05	3,044	1.10	3,193	1.15	3,326
		65	0.2	2,885	577	1.05	608	1.10	637	1.15	664
		85	0.4	36,760	14,704	1.04	15,262	1.10	16,154	1.15	16,946
		86	1.0	1,950	1,950	1.04	2,024	1.10	2,142	1.15	2,247
		87	1.0	6,956	6,956	1.04	7,220	1.10	7,642	1.15	8,017
		88	1.0	9,745	9,745	1.04	10,115	1.10	10,706	1.15	11,231
		89	1.0	7,341	7,341	1.04	7,620	1.10	8,065	1.15	8,461
		90	1.0	2,464	2,464	1.04	2,558	1.10	2,707	1.15	2,840
Sub-total					71,976		76,738		81,500		85,731
Crn Drim	31	25	0.8	10,853	8,682	1.03	8,926	1.10	9,541	1.16	10,086
		26	0.8	1,400	1,120	1.03	1,151	1.10	1,231	1.16	1,301
		41	0.1	3,528	353	1.05	371	1.11	390	1.15	407
Sub-total					10,155		10,449		11,161		11,794
Grand total					1,947,330		2,030,614		2,131,774		2,221,666

BOD₅ Load from Domestic Wastewater

Vardar river

Block No.	Population 1997	BOD ₅ load (kg/day)	Population 2005	BOD ₅ load (kg/day)	Population 2015	BOD ₅ load (kg/day)	Population 2025	BOD ₅ load (kg/day)
1	63,149	3,410	64,918	3,506	69,351	3,745	73,290	3,958
2	178,029	9,614	186,313	10,061	199,366	10,766	210,966	11,392
3	88,592	4,784	96,346	5,203	104,243	5,629	111,260	6,008
4	52,603	2,841	55,129	2,977	57,815	3,122	60,200	3,251
5	39,654	2,141	41,520	2,242	44,269	2,391	46,713	2,523
6	37,951	2,049	41,446	2,238	44,901	2,425	47,972	2,590
7	222,403	12,010	229,467	12,391	240,038	12,962	249,431	13,469
8	193,037	10,424	209,121	11,293	225,186	12,160	239,463	12,931
9	5,132	277	5,295	286	5,539	299	5,755	311
10	25,307	1,367	23,904	1,291	22,937	1,239	22,078	1,192
11	10,378	560	9,993	540	9,731	525	9,498	513
12	84,061	4,539	86,881	4,692	90,984	4,913	94,630	5,110
13	61,813	3,338	64,644	3,491	68,133	3,679	71,234	3,847
14	37,740	2,038	38,485	2,078	39,465	2,131	40,337	2,178
15	15,615	843	15,914	859	16,405	886	16,841	909
16	21,332	1,152	22,033	1,190	23,066	1,246	23,984	1,295
17	105,595	5,702	110,275	5,955	114,637	6,190	118,515	6,400
18	46,847	2,530	47,987	2,591	49,330	2,664	50,523	2,728
19	75,928	4,100	75,002	4,050	74,901	4,045	74,811	4,040
20	53,786	2,904	54,388	2,937	55,180	2,980	55,884	3,018
21	70,243	3,793	71,258	3,848	72,358	3,907	73,335	3,960
22	21,020	1,135	22,029	1,190	23,036	1,244	23,931	1,292
23	41,827	2,259	42,585	2,300	43,588	2,354	44,478	2,402
24	46,274	2,499	48,997	2,646	51,672	2,790	54,048	2,919
25	49,106	2,652	52,345	2,827	55,234	2,983	57,800	3,121
Sub-total	1,647,420	88,961	1,716,277	92,679	1,801,366	97,274	1,876,978	101,357

Strumica river

Block No.	Population 1997	BOD load (kg/day)	Population 2005	BOD load (kg/day)	Population 2015	BOD load (kg/day)	Population 2025	BOD load (kg/day)
26	4,741	256	4,941	267	5,185	280	5,401	292
27	19,149	1,034	19,969	1,078	20,959	1,132	21,837	1,179
28	96,060	5,187	100,708	5,438	105,877	5,717	110,470	5,965
Sub-total	119,950	6,477	125,618	6,783	132,021	7,129	137,709	7,436

Crn Drim river

Block No.	Population 1997	BOD load (kg/day)	Population 2005	BOD load (kg/day)	Population 2015	BOD load (kg/day)	Population 2025	BOD load (kg/day)
29	97,829	5,283	101,532	5,483	105,726	5,709	109,453	5,910
30	71,976	3,887	76,738	4,144	81,500	4,401	85,731	4,629
31	10,155	548	10,449	564	11,161	603	11,794	637
Sub-total	179,960	9,718	188,719	10,191	198,387	10,713	206,979	11,177

Total	1,947,330	105,156	2,030,614	109,653	2,131,774	115,116	2,221,666	119,970
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Note: Per capita BOD₅ load = 54.0 g/day (constant)

Calculation of BOD₅ Load of Industrial Wastewater (Year 1997) (1/5)

No.	Type of industry	Unit BOD ₅ (mg/lit)	Skejpe (10 ³ m ³) (Share) (kg/day)	Gostivar (10 ³ m ³) (Share) (kg/day)	Tetovo (10 ³ m ³) (Share) (kg/day)	Kichevo (10 ³ m ³) (Share) (kg/day)	Makendonski Brod (10 ³ m ³) (Share) (kg/day)
1	Thermal power station cooling	-	504 0.0292	-	-	1,421 0.9941	-
2	Extraction of coal	-	-	-	-	-	-
3	Petroleum products industry	100	551 0.0320 151	-	86 0.0101 24	-	-
4	Extraction of iron ore	-	-	-	-	-	-
5	Iron and steel industry	70	3,053 0.1772 585	-	-	-	-
6	Non-ferrous ore mining	-	-	-	-	-	-
7	Non-ferrous metal production	-	-	-	-	-	-
8	Non-ferrous metal processing	-	3,325 0.1930	-	6,035 0.7073	-	-
9	Extraction of non-metal minerals	-	-	-	-	-	-
10	Processing of non-metal minerals	-	-	-	-	-	-
11	Manufacture of metal products	70	90 0.0053 17	-	-	-	38 1.0090 7
12	Machine industry	-	-	-	-	-	-
13	Manufacture of transport equipment	70	156 0.0091 30	-	-	-	-
14	Manufacture of electrical equipment	-	-	-	-	8 0.0059	-
15	Basic chemical industry	500	-	-	-	-	-
16	Chemical products industry	1,000	5,368 0.3115 14,707	-	153 0.0180 420	-	-
17	Stone, gravel and sand quarrying	-	-	37 0.0200	-	-	-
18	Construction materials industry	-	429 0.0249	1,332 0.7244	-	-	-
19	Lumber industry	130	-	-	-	-	-
20	Finished wood products industry	130	10 0.0006 4	-	-	-	-
21	Paper and paper products	500	1,113 0.0646 1,524	-	-	-	-
22	Textile fiber and fabric industry	300	-	159 0.0866 131	2,108 0.2471 1,733	-	-
23	Finished textile products industry	-	67 0.0039	88 0.0480	-	-	-
24	Leather and fur industry	1,200	590 0.0343 1,941	-	-	-	-
25	Leather footwear and accessories	-	187 0.0108	-	91 0.0107	-	-
26	Food products industry	1,500	411 0.0238 1,688	100 0.0544 411	24 0.0028 98	-	-
27	Beverages industry	300	1,377 0.0799 1,132	-	-	-	-
28	Fodder industry	1,000	-	-	-	-	-
29	Tobacco industry	150	-	-	34 0.0039 14	-	-
30	Printing industry	3,000	-	-	-	-	-
31	Recycling of industrial waste	-	-	-	-	-	-
32	Miscellaneous manufacturing	-	-	123 0.0667	1 0.0001	-	-
	TOTAL		17,232 1.0000 21,781	1,839 1.0000 542	8,532 1.0000 2,288	1,429 1.0000	38 1.0000 7

Calculation of BOD Load of Industrial Wastewater (Year 1997) (2/5)

Kumonovo		Kratovo		Kriva Palnaka		Veles		Sveti Nikole		Ship		Probshtip	
(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)	(10 ³ m ³)	(Share)
(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)
-	-	-	-	-	-	-	-	-	-	-	-	-	-
86	0.0983	24	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	0.0208	-	-	4,177	0.4599	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
103	0.1170	20	-	62	0.0069	12	-	-	-	42	0.0210	8	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	49	0.0054	9	-	-	-	-	-	-	-
-	-	-	-	2,670	0.2939	3,657	-	-	-	-	-	571	1.0000
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	0.0044	-	-	7,48	0.0824	-	-	-	-	-	-	-	-
3	0.0029	1	-	-	-	-	-	-	-	-	-	-	-
271	0.3090	97	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	1,558	0.7814	1,281	-
-	-	-	-	20	0.0955	-	-	-	-	70	0.0353	-	-
338	0.3856	1,112	-	-	-	239	0.0263	786	-	-	-	-	-
34	0.0382	-	-	-	-	-	-	-	-	-	-	-	-
21	0.0239	86	-	188	0.9045	771	789	0.0869	3,242	174	1.0000	715	1,251
-	-	-	-	-	-	-	48	0.0053	40	-	-	19	0.0097
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	22	0.0025	9	-	-	-	-
-	-	-	-	-	-	-	4	0.0005	35	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	350	1.0000	-	-	-	-	-	-	-	-
877	1.0000	1,338	-	208	1.0000	771	9,083	1.0000	8,016	174	1.0000	715	1,995
-	-	-	-	-	-	-	-	-	-	1,995	1.0000	2,556	571
-	-	-	-	-	-	-	-	-	-	-	-	-	1.0000

Calculation of BOD₅ Load of Industrial Wastewater (Year 2005) (1/5)

No.	Type of industry	Unit BOD ₅ (mg/lit)	Skopje (10 ³ m ³) (Share) (kg/day)	Gostivar (10 ³ m ³) (Share) (kg/day)	Tetovo (10 ³ m ³) (Share) (kg/day)	Kichevo (10 ³ m ³) (Share) (kg/day)	Makendonski Brod (10 ³ m ³) (Share) (kg/day)
1	Thermal power station cooling	-	616 0.0292	-	-	1,798 0.9941	-
2	Extraction of coal	-	-	-	-	-	-
3	Petroleum products industry	100	674 0.0320 185	-	88 0.0101 24	-	-
4	Extraction of iron ore	-	-	-	-	-	-
5	Iron and steel industry	70	3,737 0.1772 717	-	-	-	-
6	Non-ferrous ore mining	-	-	-	-	-	-
7	Non-ferrous metal production	-	-	-	6,133 0.7073	-	-
8	Non-ferrous metal processing	-	4,069 0.1930	-	-	-	-
9	Extraction of non-metal minerals	-	-	-	-	-	-
10	Processing of non-metal minerals	-	-	-	-	-	-
11	Manufacture of metal products	70	111 0.0053 21	-	-	-	46 1.0000 9
12	Machine industry	-	-	-	-	-	-
13	Manufacture of transport equipment	70	191 0.0091 37	-	-	11 0.0059	-
14	Manufacture of electrical equipment	-	-	-	-	-	-
15	Basic chemical industry	500	-	-	156 0.0180 427	-	-
16	Chemical products industry	1,000	6,570 0.3115 18,001	39 0.0200	-	-	-
17	Stone, gravel and sand quarrying	-	525 0.0249	1,421 0.7244	-	-	-
18	Construction materials industry	-	-	-	-	-	-
19	Lumber industry	130	-	-	-	-	-
20	Finished wood products industry	130	12 0.0006 4	-	-	-	-
21	Paper and paper products	500	1,362 0.0646 1,866	-	-	-	-
22	Textile fiber and fabric industry	300	-	170 0.0866 140	2,142 0.2471 1,761	-	-
23	Finished textile products industry	-	82 0.0039	94 0.0480	-	-	-
24	Leather and fur industry	1,200	723 0.0343 2,376	-	93 0.0107	-	-
25	Leather footwear and accessories	-	229 0.0108	-	-	-	-
26	Food products industry	1,500	503 0.0238 2,067	107 0.0544 438	24 0.0028 99	-	-
27	Beverages industry	300	1,685 0.0799 1,385	-	-	-	-
28	Feeder industry	1,000	-	-	-	-	-
29	Tobacco industry	150	-	-	34 0.0039 14	-	-
30	Printing industry	3,000	-	-	-	-	-
31	Recycling of industrial waste	-	-	-	-	-	-
32	Miscellaneous manufacturing	-	-	131 0.0667	1 0.0001	-	-
TOTAL			21,091 1.0000 26,658	1,962 1.0000 578	8,671 1.0000 2,325	1,809 1.0000	46 1.0000 9

2005(2/5)

Calculation of BOD Load of Industrial Wastewater (Year 2005) (2/5)

Kumondovo (10 ³ m ³) (Share) (kg/day)	Kratovo (10 ³ m ³) (Share) (kg/day)	Kriva Palnaka (10 ³ m ³) (Share) (kg/day)	Veles (10 ³ m ³) (Share) (kg/day)	Sveti Nikole (10 ³ m ³) (Share) (kg/day)	Ship (10 ³ m ³) (Share) (kg/day)	Probishup (10 ³ m ³) (Share) (kg/day)
-	-	-	-	-	-	-
100 0.0983	27	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
21 0.0208	-	-	4,369 0.4599	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
119 0.1170	23	-	65 0.0069	-	46 0.0210	9
-	-	-	-	-	-	-
-	-	-	51 0.0054	-	-	-
-	-	-	-	-	-	677 1.0000
-	-	-	2,792 0.2939	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
5 0.0044	-	-	783 0.0824	-	-	-
3 0.0029	1	-	-	-	-	-
315 0.3090	112	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	287 0.0302	-	1,729 0.7814	1,421
-	-	22 0.0955	-	-	78 0.0353	-
393 0.3856	1,293	-	250 0.0263	-	-	-
39 0.0382	-	-	-	-	-	-
24 0.0239	100	210 0.9045	825 0.0869	212 1.0000	338 0.1526	1,389
-	-	-	51 0.0053	-	21 0.0097	17
-	-	-	-	-	-	-
-	-	-	24 0.0025	-	-	-
-	-	-	4 0.0005	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	385 1.0000	-	-	-	-	-
1,020 1.0000	1,557	232 1.0000	9,501 1.0000	212 1.0000	2,212 1.0000	2,836
-	-	862	8,383	869	677	1,0000
-	385 1.0000	-	-	-	-	-

Calculation of BOD₅ Load of Industrial Wastewater (Year 2015) (1/5)

No.	Type of industry	Unit BOD ₅ (mg/lit)	Skopje (10 ³ m ³) (Share) (kg/day)	Gostivar (10 ³ m ³) (Share) (kg/day)	Tetovo (10 ³ m ³) (Share) (kg/day)	Kichevo (10 ³ m ³) (Share) (kg/day)	Makedonski Brod (10 ³ m ³) (Share) (kg/day)
1	Thermal power station cooling	-	504 0.0292	-	-	2,442 0.9941	-
2	Extraction of coal	-	-	-	-	-	-
3	Petroleum products industry	100	551 0.0320	-	89 0.0101	-	-
4	Extraction of iron ore	-	-	-	-	-	-
5	Iron and steel industry	70	3,053 0.1772	-	-	-	-
6	Non-ferrous ore mining	-	-	-	-	-	-
7	Non-ferrous metal production	-	-	-	-	-	-
8	Non-ferrous metal processing	-	3,325 0.1930	-	6,236 0.7073	-	-
9	Extraction of non-metal minerals	-	-	-	-	-	-
10	Processing of non-metal minerals	-	-	-	-	-	-
11	Manufacture of metal products	70	90 0.0053	-	-	-	57 1.0000
12	Machine industry	-	-	-	-	-	-
13	Manufacture of transport equipment	70	156 0.0091	-	-	14 0.0059	-
14	Manufacture of electrical equipment	-	-	-	-	-	-
15	Basic chemical industry	500	-	-	-	-	-
16	Chemical products industry	1,000	5,368 0.3115	-	158 0.0180	-	-
17	Stone, gravel and sand quarrying	-	-	42 0.0200	-	-	-
18	Construction materials industry	-	429 0.0249	1,520 0.7244	-	-	-
19	Lumber industry	130	-	-	-	-	-
20	Finished wood products industry	130	10 0.0006	-	-	-	-
21	Paper and paper products	500	1,113 0.0646	-	-	-	-
22	Textile fiber and fabric industry	300	-	182 0.0866	2,178 0.2471	-	-
23	Finished textile products industry	-	67 0.0039	101 0.0480	-	-	-
24	Leather and fur industry	1,200	596 0.0343	-	-	-	-
25	Leather footwear and accessories	-	187 0.0108	-	94 0.0107	-	-
26	Food products industry	1,500	411 0.0238	114 0.0544	25 0.0028	-	-
27	Beverages industry	300	1,377 0.0799	-	-	-	-
28	Fodder industry	1,000	-	-	-	-	-
29	Tobacco industry	150	-	-	35 0.0039	-	-
30	Printing industry	3,000	-	-	-	-	-
31	Recycling of industrial waste	-	-	-	-	-	-
32	Miscellaneous manufacturing	-	-	140 0.0667	1 0.0001	-	-
	TOTAL		17,232 1.0000	2,099 1.0000	8,316 1.0000	2,456 1.0000	57 1.0000
			21,781	618	2,364		11

Calculation of BOD₅ Load of Industrial Wastewater (Year 2025) (1/5)

No.	Type of industry	Unit BOD ₅ (mg/ltr)	Skopje (10 ³ m ³) (Share) (kg/day)	Gostivar (10 ³ m ³) (Share) (kg/day)	Tetovo (10 ³ m ³) (Share) (kg/day)	Kichevo (10 ³ m ³) (Share) (kg/day)	Makendonski Brod (10 ³ m ³) (Share) (kg/day)
1	Thermal power station cooling	-	1,130 0.0292	-	-	3,639 0.9941	-
2	Extraction of coal	-	-	-	-	-	-
3	Petroleum products industry	100	1,236 0.0520 339	-	91 0.0101 25	-	-
4	Extraction of iron ore	-	-	-	-	-	-
5	Iron and steel industry	70	6,852 0.1772 1,314	-	-	-	-
6	Non-ferrous ore mining	-	-	-	-	-	-
7	Non-ferrous metal production	-	-	-	6,345 0.7073	-	-
8	Non-ferrous metal processing	-	7,463 0.1930	-	-	-	-
9	Extraction of non-metal minerals	-	-	-	-	-	-
10	Processing of non-metal minerals	-	-	-	-	-	-
11	Manufacture of metal products	70	203 0.0053 39	-	-	-	78 1.0000 15
12	Machine industry	-	-	-	-	-	-
13	Manufacture of transport equipment	70	351 0.0091 67	-	-	22 0.0059	-
14	Manufacture of electrical equipment	-	-	-	-	-	-
15	Basic chemical industry	500	-	-	-	-	-
16	Chemical products industry	1,000	12,049 0.3115 33,011	-	161 0.0180 442	-	-
17	Stone, gravel and sand quarrying	-	-	45 0.0200	-	-	-
18	Construction materials industry	-	963 0.0249	1,639 0.7244	-	-	-
19	Lumber industry	130	-	-	-	-	-
20	Finished wood products industry	130	23 0.0006 8	-	-	-	-
21	Paper and paper products	500	2,498 0.0646 3,422	-	-	-	-
22	Textile fiber and fabric industry	300	-	196 0.0866 161	2,216 0.2471 1,822	-	-
23	Finished textile products industry	-	151 0.0039	109 0.0480	-	-	-
24	Leather and fur industry	1,200	1,325 0.0343 4,357	-	-	-	-
25	Leather footwear and accessories	-	420 0.0108	-	96 0.0107	-	-
26	Food products industry	1,500	922 0.0238 3,790	123 0.0544 505	25 0.0028 103	-	-
27	Beverages industry	300	3,094 0.0799 2,540	-	-	-	-
28	Fodder industry	1,000	-	-	-	-	-
29	Tobacco industry	150	-	-	35 0.0039 15	-	-
30	Printing industry	3,000	-	-	-	-	-
31	Recycling of industrial waste	-	-	-	-	-	-
32	Miscellaneous manufacturing	-	-	151 0.0667	1 0.0001	-	-
	TOTAL		38,677 1.0000 48,887	2,263 1.0000 667	8,970 1.0000 2,405	3,661 1.0000	78 1.0000 15

Numbers of Livestock (1997) (1/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
1	02	0.30	24,600	7,380	4,300	1,290	900	270
	04	0.05	15,800	790	2,000	100	2,000	100
	05	0.05	5,100	255	600	30	1,700	85
Sub-total			45,500	8,425	6,900	1,420	4,600	455
2	02	0.15	24,600	3,690	4,300	645	900	135
	03	0.60	47,800	28,680	7,800	4,680	11,900	7,140
Sub-total			72,400	32,370	12,100	5,325	12,800	7,275
3	03	0.15	47,800	7,170	7,800	1,170	11,900	1,785
	01	0.10	22,100	2,210	5,800	580	15,200	1,520
Sub-total			69,900	9,380	13,600	1,750	27,100	3,305
4	02	0.05	24,600	1,230	4,300	215	900	45
	04	0.80	15,800	12,640	2,000	1,600	2,000	1,600
	05	0.05	5,100	255	600	30	1,700	85
Sub-total			45,500	14,125	6,900	1,845	4,600	1,730
5	01	0.10	22,100	2,210	5,800	580	15,200	1,520
	02	0.25	24,600	6,150	4,300	1,075	900	225
	05	0.80	5,100	4,080	600	480	1,700	1,360
Sub-total			51,800	12,440	10,700	2,135	17,800	3,105
6	01	0.10	22,100	2,210	5,800	580	15,200	1,520
Sub-total			22,100	2,210	5,800	580	15,200	1,520
7	01	0.10	22,100	2,210	5,800	580	15,200	1,520
Sub-total			22,100	2,210	5,800	580	15,200	1,520
8	01	0.40	22,100	8,840	5,800	2,320	15,200	6,080
	09	0.15	7,000	1,050	1,300	195	2,100	315
Sub-total			29,100	9,890	7,100	2,515	17,300	6,395
9	06	0.35	15,900	5,565	3,100	1,085	21,900	7,665
Sub-total			15,900	5,565	3,100	1,085	21,900	7,665
10	08	0.95	9,600	9,120	1,500	1,425	8,600	8,170
			9,600	9,120	1,500	1,425	8,600	8,170
11	06	0.15	15,900	2,385	3,100	465	21,900	3,285
	07	0.85	3,300	2,805	500	425	3,900	3,315
Sub-total			19,200	5,190	3,600	890	25,800	6,600
12	06	0.25	15,900	3,975	3,100	775	21,900	5,475
Sub-total			15,900	3,975	3,100	775	21,900	5,475
13	01	0.15	22,100	3,315	5,800	870	15,200	2,280
	06	0.25	15,900	3,975	3,100	775	21,900	5,475
	09	0.05	7,000	350	1,300	65	2,100	105
Sub-total			45,000	7,640	10,200	1,710	39,200	7,860
14	09	0.60	7,000	4,200	1,300	780	2,100	1,260
	10	0.10	1,900	190	500	50	4,200	420
Sub-total			8,900	4,390	1,800	830	6,300	1,680
15	15	0.30	8,000	2,400	700	210	11,100	3,330
	16	0.80	5,700	4,560	2,000	1,600	5,400	4,320
Sub-total			13,700	6,960	2,700	1,810	16,500	7,650
16	13	0.10	6,500	650	1,500	150	15,200	1,520
	14	0.05	2,000	100	300	15	4,200	210
	15	0.70	8,000	5,600	700	490	11,100	7,770
Sub-total			16,500	6,350	2,500	655	30,500	9,500
17	07	0.15	3,300	495	500	75	3,900	585
	08	0.05	9,600	480	1,500	75	8,600	430
	11	0.50	2,900	1,450	400	200	3,100	1,550
	12	1.00	2,400	2,400	200	200	4,500	4,500
	13	0.90	6,500	5,850	1,500	1,350	15,200	13,680
	14	0.95	2,000	1,900	300	285	4,200	3,990
Sub-total			26,700	12,575	4,400	2,185	39,500	24,735
18	10	0.90	1,900	1,710	500	450	4,200	3,780
	11	0.30	2,900	870	400	120	3,100	930
	29	0.25	4,400	1,100	3,000	750	5,300	1,325
Sub-total			9,200	3,680	3,900	1,320	12,600	6,035

Numbers of Livestock (1997) (2/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
19	04	0.20	15,800	3,160	2,000	400	2,000	400
	05	0.10	5,100	510	600	60	1,700	170
	17	1.00	4,200	4,200	1,400	1,400	2,800	2,800
	18	1.00	4,100	4,100	1,200	1,200	800	800
	19	0.05	16,600	830	1,900	95	8,100	405
	20	0.40	16,100	6,440	3,800	1,520	7,000	2,800
Sub-total			61,900	19,240	10,900	4,675	22,400	7,375
20	19	0.35	16,600	5,810	1,900	665	8,100	2,835
	20	0.15	16,100	2,415	3,800	570	7,000	1,050
Sub-total			32,700	8,225	5,700	1,235	15,100	3,885
21	19	0.35	16,600	5,810	1,900	665	8,100	2,835
Sub-total			16,600	5,810	1,900	665	8,100	2,835
22	19	0.25	16,600	4,150	1,900	475	8,100	2,025
	20	0.25	16,100	4,025	3,800	950	7,000	1,750
	21	0.40	1,000	400	1,100	440	3,100	1,240
Sub-total			33,700	8,575	6,800	1,865	18,200	5,015
23	09	0.10	7,000	700	1,300	130	2,100	210
	20	0.20	16,100	3,220	3,800	760	7,000	1,400
	21	0.20	1,000	200	1,100	220	3,100	620
Sub-total			24,100	4,120	6,200	1,110	12,200	2,230
24	09	0.10	7,000	700	1,300	130	2,100	210
	11	0.20	2,900	580	400	80	3,100	620
	21	0.15	1,000	150	1,100	165	3,100	465
	22	0.70	1,500	1,050	700	490	3,000	2,100
	29	0.05	4,400	220	3,000	150	5,300	265
Sub-total			16,800	2,700	6,500	1,015	16,600	3,660
25	21	0.25	1,000	250	1,100	275	3,100	775
	22	0.30	1,500	450	700	210	3,000	900
	23	1.00	2,700	2,700	500	500	2,600	2,600
	24	1.00	5,200	5,200	1,500	1,500	3,300	3,300
	29	0.15	4,400	660	3,000	450	5,300	795
	30	0.05	14,600	730	11,300	565	16,700	835
Sub-total			29,400	9,990	18,100	3,500	34,000	9,205
26	29	0.10	4,400	440	3,000	300	5,300	530
Sub-total			4,400	440	3,000	300	5,300	530
27	29	0.45	4,400	1,980	3,000	1,350	5,300	2,385
Sub-total			4,400	1,980	3,000	1,350	5,300	2,385
28	16	0.20	5,700	1,140	2,000	400	5,400	1,080
	30	0.95	14,600	13,870	11,300	10,735	16,700	15,865
Sub-total			20,300	15,010	13,300	11,135	22,100	16,945
29	25	0.60	7,400	4,440	700	420	9,000	5,400
	26	0.20	14,600	2,920	11,300	2,260	16,700	3,340
	28	1.00	6,500	6,500	100	100	1,800	1,800
Sub-total			28,500	13,860	12,100	2,780	27,500	10,540
30	25	0.40	7,400	2,960	700	280	9,000	3,600
	26	0.80	14,600	11,680	11,300	9,040	16,700	13,360
	27	1.00	2,900	2,900	1,100	1,100	0	0
Sub-total			24,900	17,540	13,100	10,420	25,700	16,960
31	02	0.45	24,600	11,070	4,300	1,935	900	405
Sub-total			24,600	11,070	4,300	1,935	900	405

Numbers of Livestock (2005) (1/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
1	02	0.30	25,100	7,530	4,500	1,350	1,200	360
	04	0.05	16,200	810	2,000	100	2,700	135
	05	0.05	5,200	260	600	30	2,200	110
Sub-total			46,500	8,600	7,100	1,480	6,100	605
2	02	0.15	25,100	3,765	4,500	675	1,200	180
	03	0.60	48,800	29,280	8,200	4,920	15,900	9,540
Sub-total			73,900	33,045	12,700	5,595	17,100	9,720
3	03	0.15	48,800	7,320	8,200	1,230	15,900	2,385
	01	0.10	22,600	2,260	6,000	600	20,200	2,020
Sub-total			71,400	9,580	14,200	1,830	36,100	4,405
4	02	0.05	25,100	1,255	4,500	225	1,200	60
	04	0.80	16,200	12,960	2,000	1,600	2,700	2,160
	05	0.05	5,200	260	600	30	2,200	110
Sub-total			46,500	14,475	7,100	1,855	6,100	2,330
5	01	0.10	22,600	2,260	6,000	600	20,200	2,020
	02	0.25	25,100	6,275	4,500	1,125	1,200	300
	05	0.80	5,200	4,160	600	480	2,200	1,760
Sub-total			52,900	12,695	11,100	2,205	23,600	4,080
6	01	0.10	22,600	2,260	6,000	600	20,200	2,020
Sub-total			22,600	2,260	6,000	600	20,200	2,020
7	01	0.10	22,600	2,260	6,000	600	20,200	2,020
Sub-total			22,600	2,260	6,000	600	20,200	2,020
8	01	0.40	22,600	9,040	6,000	2,400	20,200	8,080
	09	0.15	7,100	1,065	1,400	210	2,800	420
Sub-total			29,700	10,105	7,400	2,610	23,000	8,500
9	06	0.35	16,300	5,705	3,200	1,120	29,300	10,255
Sub-total			16,300	5,705	3,200	1,120	29,300	10,255
10	08	0.95	9,800	9,310	1,600	1,520	11,500	10,925
Sub-total			9,800	9,310	1,600	1,520	11,500	10,925
11	06	0.15	16,300	2,445	3,200	480	29,300	4,395
	07	0.85	3,400	2,890	500	425	5,200	4,420
Sub-total			19,700	5,335	3,700	905	34,500	8,815
12	06	0.25	16,300	4,075	3,200	800	29,300	7,325
Sub-total			16,300	4,075	3,200	800	29,300	7,325
13	01	0.15	22,600	3,390	6,000	900	20,200	3,030
	06	0.25	16,300	4,075	3,200	800	29,300	7,325
	09	0.05	7,100	355	1,400	70	2,800	140
Sub-total			46,000	7,820	10,600	1,770	52,300	10,495
14	09	0.60	7,100	4,260	1,400	840	2,800	1,680
	10	0.10	2,000	200	500	50	5,600	560
Sub-total			9,100	4,460	1,900	890	8,400	2,240
15	15	0.30	8,200	2,460	700	210	14,900	4,470
	16	0.80	5,800	4,640	2,100	1,680	7,200	5,760
Sub-total			14,000	7,100	2,800	1,890	22,100	10,230
16	13	0.10	6,600	660	1,500	150	20,200	2,020
	14	0.05	2,100	105	300	15	5,600	280
	15	0.70	8,200	5,740	700	490	14,900	10,430
Sub-total			16,900	6,505	2,500	655	40,700	12,730
17	07	0.15	3,400	510	500	75	5,200	780
	08	0.05	9,800	490	1,600	80	11,500	575
	11	0.50	3,000	1,500	400	200	4,100	2,050
	12	1.00	2,500	2,500	200	200	6,000	6,000
	13	0.90	6,600	5,940	1,500	1,350	20,200	18,180
14	0.95	2,100	1,995	300	285	5,600	5,320	
Sub-total			27,400	12,935	4,500	2,190	52,600	32,905
18	10	0.90	2,000	1,800	500	450	5,600	5,040
	11	0.30	3,000	900	400	120	4,100	1,230
	29	0.25	4,500	1,125	3,200	800	7,000	1,750
Sub-total				3,825		1,370		8,020

Numbers of Livestock (2005) (2/2)

Unit: head

Sub-basin No.	Former Municipality No.		Ratio	Cattle		Horse		Pig	
				Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
19	04		0.20	16,200	3,240	2,000	400	2,700	540
	05		0.10	5,200	520	600	60	2,200	220
	17		1.00	4,300	4,300	1,500	1,500	3,800	3,800
	18		1.00	4,200	4,200	1,300	1,300	1,000	1,000
	19		0.05	16,900	845	2,000	100	10,800	540
	20		0.40	16,500	6,600	4,000	1,600	9,400	3,760
Sub-total				63,300	19,705	11,400	4,960	29,900	9,860
20	19		0.35	16,900	5,915	2,000	700	10,800	3,780
	20		0.15	16,500	2,475	4,000	600	9,400	1,410
Sub-total				33,400	8,390	6,000	1,300	20,200	5,190
21	19		0.35	16,900	5,915	2,000	700	10,800	3,780
Sub-total				16,900	5,915	2,000	700	10,800	3,780
22	19		0.25	16,900	4,225	2,000	500	10,800	2,700
	20		0.25	16,500	4,125	4,000	1,000	9,400	2,350
	21		0.40	1,000	400	1,200	480	4,200	1,680
Sub-total				34,400	8,750	7,200	1,980	24,400	6,730
23	09		0.10	7,100	710	1,400	140	2,800	280
	20		0.20	16,500	3,300	4,000	800	9,400	1,880
	21		0.20	1,000	200	1,200	240	4,200	840
Sub-total				24,600	4,210	6,600	1,180	16,400	3,000
24	09		0.10	7,100	710	1,400	140	2,800	280
	11		0.20	3,000	600	400	80	4,100	820
	21		0.15	1,000	150	1,200	180	4,200	630
	22		0.70	1,500	1,050	700	490	4,000	2,800
	29		0.05	4,500	225	3,200	160	7,000	350
Sub-total				17,100	2,735	6,900	1,050	22,100	4,880
25	21		0.25	1,000	250	1,200	300	4,200	1,050
	22		0.30	1,500	450	700	210	4,000	1,200
	23		1.00	2,700	2,700	500	500	3,500	3,500
	24		1.00	5,300	5,300	1,500	1,500	4,500	4,500
	29		0.15	4,500	675	3,200	480	7,000	1,050
	30		0.05	14,900	745	11,800	590	22,200	1,110
Sub-total				29,900	10,120	18,900	3,580	45,400	12,410
26	29		0.10	4,500	450	3,200	320	7,000	700
Sub-total				4,500	450	3,200	320	7,000	700
27	29		0.45	4,500	2,025	3,200	1,440	7,000	3,150
Sub-total				4,500	2,025	3,200	1,440	7,000	3,150
28	16		0.20	5,800	1,160	2,100	420	7,200	1,440
	30		0.95	14,900	14,155	11,800	11,210	22,200	21,090
Sub-total				20,700	15,315	13,900	11,630	29,400	22,530
29	25		0.60	7,500	4,500	800	480	12,100	7,260
	26		0.20	15,400	3,080	1,300	260	7,400	1,480
	28		1.00	6,700	6,700	100	100	2,400	2,400
Sub-total				29,600	14,280	2,200	840	21,900	11,140
30	25		0.40	7,500	3,000	800	320	12,100	4,840
	26		0.80	15,400	12,320	1,300	1,040	7,400	5,920
	27		1.00	2,900	2,900	1,100	1,100	0	0
Sub-total				25,800	18,220	3,200	2,460	19,500	10,760
31	02		0.45	25,100	11,295	4,500	2,025	1,200	540
Sub-total				25,100	11,295	4,500	2,025	1,200	540

Numbers of Livestock (2015) (1/2)

Unit: head									
Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig		
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	
1	02	0.30	25,700	7,710	4,700	1,410	1,600	480	
	04	0.05	16,500	825	2,100	105	3,500	175	
	05	0.05	5,400	270	600	30	2,900	145	
Sub-total			47,600	8,805	7,400	1,545	8,000	800	
2	02	0.15	25,700	3,855	4,700	705	1,600	240	
	03	0.60	50,000	30,000	8,600	5,160	20,300	12,180	
Sub-total			75,700	33,855	13,300	5,865	21,900	12,420	
3	03	0.15	50,000	7,500	8,600	1,290	20,300	3,045	
	01	0.10	23,100	2,310	6,300	630	25,900	2,590	
Sub-total			73,100	9,810	14,900	1,920	46,200	5,635	
4	02	0.05	25,700	1,285	4,700	235	1,600	80	
	04	0.80	16,500	13,200	2,100	1,680	3,500	2,800	
	05	0.05	5,400	270	600	30	2,900	145	
Sub-total			47,600	14,755	7,400	1,945	8,000	3,025	
5	01	0.10	23,100	2,310	6,300	630	25,900	2,590	
	02	0.25	25,700	6,425	4,700	1,175	1,600	400	
	05	0.80	5,400	4,320	600	480	2,900	2,320	
Sub-total			54,200	13,055	11,600	2,285	30,400	5,310	
6	01	0.10	23,100	2,310	6,300	630	25,900	2,590	
Sub-total			23,100	2,310	6,300	630	25,900	2,590	
7	01	0.10	23,100	2,310	6,300	630	25,900	2,590	
Sub-total			23,100	2,310	6,300	630	25,900	2,590	
8	01	0.40	23,100	9,240	6,300	2,520	25,900	10,360	
	09	0.15	7,300	1,095	1,500	225	3,600	540	
Sub-total			30,400	10,335	7,800	2,745	29,500	10,900	
9	06	0.35	16,700	5,845	3,400	1,190	37,400	13,090	
			16,700	5,845	3,400	1,190	37,400	13,090	
Sub-total			16,700	5,845	3,400	1,190	37,400	13,090	
10	08	0.95	10,100	9,595	1,600	1,520	14,600	13,870	
			10,100	9,595	1,600	1,520	14,600	13,870	
Sub-total			10,100	9,595	1,600	1,520	14,600	13,870	
11	06	0.15	16,700	2,505	3,400	510	37,400	5,610	
	07	0.85	3,400	2,890	500	425	6,600	5,610	
Sub-total			20,100	5,395	3,900	935	44,000	11,220	
12	06	0.25	16,700	4,175	3,400	850	37,400	9,350	
			16,700	4,175	3,400	850	37,400	9,350	
Sub-total			16,700	4,175	3,400	850	37,400	9,350	
13	01	0.15	23,100	3,465	6,300	945	25,900	3,885	
	06	0.25	16,700	4,175	3,400	850	37,400	9,350	
	09	0.05	7,300	365	1,500	75	3,600	180	
Sub-total			47,100	8,005	11,200	1,870	66,900	13,415	
14	09	0.60	7,300	4,380	1,500	900	3,600	2,160	
	10	0.10	2,000	200	500	50	7,200	720	
Sub-total			9,300	4,580	2,000	950	10,800	2,880	
15	15	0.30	8,400	2,520	800	240	19,000	5,700	
	16	0.80	6,000	4,800	2,200	1,760	9,200	7,360	
Sub-total			14,400	7,320	3,000	2,000	28,200	13,060	
16	13	0.10	6,800	680	1,600	160	25,900	2,590	
	14	0.05	2,100	105	400	20	7,200	360	
	15	0.70	8,400	5,880	800	560	19,000	13,300	
Sub-total			17,300	6,665	2,800	740	52,100	16,250	
17	07	0.15	3,400	510	500	75	6,600	990	
	08	0.05	10,100	505	1,600	80	14,600	730	
	11	0.50	3,100	1,550	500	250	5,200	2,600	
	12	1.00	2,500	2,500	200	200	7,700	7,700	
	13	0.90	6,800	6,120	1,600	1,440	25,900	23,310	
14	0.95	2,100	1,995	400	380	7,200	6,840		
Sub-total			28,000	13,180	4,800	2,425	67,200	42,170	
18	10	0.90	2,000	1,800	500	450	7,200	6,480	
	11	0.30	3,100	930	500	150	5,200	1,560	
	29	0.25	4,600	1,150	3,300	825	9,000	2,250	
Sub-total			9,700	3,880	4,300	1,425	21,400	10,290	

Numbers of Livestock (2015) (2/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
19	04	0.20	16,500	3,300	2,100	420	3,500	700
	05	0.10	5,400	540	600	60	2,900	290
	17	1.00	4,400	4,400	1,600	1,600	4,900	4,900
	18	1.00	4,300	4,300	1,400	1,400	1,300	1,300
	19	0.05	17,300	865	2,100	105	13,800	690
	20	0.40	16,900	6,760	4,200	1,680	12,000	4,800
Sub-total			64,800	20,165	12,000	5,265	38,400	12,680
20	19	0.35	17,300	6,055	2,100	735	13,800	4,830
	20	0.15	16,900	2,535	4,200	630	12,000	1,800
Sub-total			34,200	8,590	6,300	1,365	25,800	6,630
21	19	0.35	17,300	6,055	2,100	735	13,800	4,830
Sub-total			17,300	6,055	2,100	735	13,800	4,830
22	19	0.25	17,300	4,325	2,100	525	13,800	3,450
	20	0.25	16,900	4,225	4,200	1,050	12,000	3,000
	21	0.40	1,000	400	1,200	480	5,300	2,120
Sub-total			35,200	8,950	7,500	2,055	31,100	8,570
23	09	0.10	7,300	730	1,500	150	3,600	360
	20	0.20	16,900	3,380	4,200	840	12,000	2,400
	21	0.20	1,000	200	1,200	240	5,300	1,060
Sub-total			25,200	4,310	6,900	1,230	20,900	3,820
24	09	0.10	7,300	730	1,500	150	3,600	360
	11	0.20	3,100	620	500	100	5,200	1,040
	21	0.15	1,000	150	1,200	180	5,300	795
	22	0.70	1,600	1,120	800	560	5,200	3,640
	29	0.05	4,600	230	3,300	165	9,000	450
Sub-total			17,600	2,850	7,300	1,155	28,300	6,285
25	21	0.25	1,000	250	1,200	300	5,300	1,325
	22	0.30	1,600	480	800	240	5,200	1,560
	23	1.00	2,800	2,800	500	500	4,500	4,500
	24	1.00	5,400	5,400	1,600	1,600	5,700	5,700
	29	0.15	4,600	690	3,300	495	9,000	1,350
	30	0.05	15,200	760	12,400	620	28,500	1,425
Sub-total			30,600	10,380	19,800	3,755	58,200	15,860
26	29	0.10	4,600	460	3,300	330	9,000	900
Sub-total			4,600	460	3,300	330	9,000	900
27	29	0.45	4,600	2,070	3,300	1,485	9,000	4,050
Sub-total			4,600	2,070	3,300	1,485	9,000	4,050
28	16	0.20	6,000	1,200	2,200	440	9,200	1,840
	30	0.95	15,200	14,440	12,400	11,780	28,500	27,075
Sub-total			21,200	15,640	14,600	12,220	37,700	28,915
29	25	0.60	7,700	4,620	800	480	15,500	9,300
	26	0.20	15,800	3,160	1,400	280	9,400	1,880
	28	1.00	6,800	6,800	100	100	3,100	3,100
Sub-total			30,300	14,580	2,300	860	28,000	14,280
30	25	0.40	7,700	3,080	800	320	15,500	6,200
	26	0.80	15,800	12,640	1,400	1,120	9,400	7,520
	27	1.00	3,000	3,000	1,200	1,200	0	0
Sub-total			26,500	18,720	3,400	2,640	24,900	13,720
31	02	0.45	25,700	11,565	4,700	2,115	1,600	720
Sub-total			25,700	11,565	4,700	2,115	1,600	720

Numbers of Livestock (2025) (1/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
1	02	0.30	26,400	7,920	5,000	1,500	1,900	570
	04	0.05	17,000	850	2,300	115	4,200	210
	05	0.05	5,500	275	600	30	3,500	175
Sub-total			48,900	9,045	7,900	1,645	9,600	955
2	02	0.15	26,400	3,960	5,000	750	1,900	285
	03	0.60	51,300	30,780	9,100	5,460	24,700	14,820
Sub-total			77,700	34,740	14,100	6,210	26,600	15,105
3	03	0.15	51,300	7,695	9,100	1,365	24,700	3,705
	01	0.10	23,700	2,370	6,700	670	31,500	3,150
Sub-total			75,000	10,065	15,800	2,035	56,200	6,855
4	02	0.05	26,400	1,320	5,000	250	1,900	95
	04	0.80	17,000	13,600	2,300	1,840	4,200	3,360
	05	0.05	5,500	275	600	30	3,500	175
Sub-total			48,900	15,195	7,900	2,120	9,600	3,630
5	01	0.10	23,700	2,370	6,700	670	31,500	3,150
	02	0.25	26,400	6,600	5,000	1,250	1,900	475
	05	0.80	5,500	4,400	600	480	3,500	2,800
Sub-total			55,600	13,370	12,300	2,400	36,900	6,425
6	01	0.10	23,700	2,370	6,700	670	31,500	3,150
Sub-total			23,700	2,370	6,700	670	31,500	3,150
7	01	0.10	23,700	2,370	6,700	670	31,500	3,150
Sub-total			23,700	2,370	6,700	670	31,500	3,150
8	01	0.40	23,700	9,480	6,700	2,680	31,500	12,600
	09	0.15	7,500	1,125	1,600	240	4,400	660
Sub-total			31,200	10,605	8,300	2,920	35,900	13,260
9	06	0.35	17,100	5,985	3,600	1,260	45,500	15,925
Sub-total			17,100	5,985	3,600	1,260	45,500	15,925
10	08	0.95	10,400	9,880	1,700	1,615	17,800	16,910
Sub-total			10,400	9,880	1,700	1,615	17,800	16,910
11	06	0.15	17,100	2,565	3,600	540	45,500	6,825
	07	0.85	3,500	2,975	600	510	8,100	6,885
Sub-total			20,600	5,540	4,200	1,050	53,600	13,710
12	06	0.25	17,100	4,275	3,600	900	45,500	11,375
			17,100	4,275	3,600	900	45,500	11,375
13	01	0.15	23,700	3,555	6,700	1,005	31,500	4,725
	06	0.25	17,100	4,275	3,600	900	45,500	11,375
	09	0.05	7,500	375	1,600	80	4,400	220
Sub-total			48,300	8,205	11,900	1,985	81,400	16,320
14	09	0.60	17,100	10,260	3,600	2,160	45,500	27,300
	10	0.10	2,100	210	600	60	8,700	870
Sub-total			19,200	10,470	4,200	2,220	54,200	28,170
15	15	0.30	8,600	2,580	800	240	23,100	6,930
	16	0.80	6,100	4,880	2,400	1,920	11,200	8,960
Sub-total			14,700	7,460	3,200	2,160	34,300	15,890
16	13	0.10	7,000	700	1,700	170	31,500	3,150
	14	0.05	2,200	110	400	20	8,700	435
	15	0.70	8,600	6,020	800	560	23,100	16,170
Sub-total			17,800	6,830	2,900	750	63,300	19,755
17	07	0.15	3,500	525	600	90	8,100	1,215
	08	0.05	10,400	520	1,700	85	17,800	890
	11	0.50	3,100	1,550	500	250	6,400	3,200
	12	1.00	3,500	3,500	600	600	8,100	8,100
	13	0.90	7,000	6,300	1,700	1,530	31,500	28,350
Sub-total			29,700	14,485	5,500	2,935	80,600	50,020
18	10	0.90	2,100	1,890	600	540	8,700	7,830
	11	0.30	3,100	930	500	150	6,400	1,920
	29	0.25	4,700	1,175	3,500	875	11,000	2,750
Sub-total			9,900	3,995	4,600	1,565	26,100	12,500

Numbers of Livestock (2025) (2/2)

Unit: head

Sub-basin No.	Former Municipality No.	Ratio	Cattle		Horse		Pig	
			Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block	Numbers in municipality	Numbers in block
19	04	0.20	17,000	3,400	2,300	460	4,200	840
	05	0.10	5,500	550	600	60	3,500	350
	17	1.00	4,500	4,500	1,700	1,700	5,900	5,900
	18	1.00	4,400	4,400	1,400	1,400	1,600	1,600
	19	0.05	17,800	890	2,300	115	16,800	840
	20	0.40	17,300	6,920	4,500	1,800	14,600	5,840
Sub-total			66,500	20,660	12,800	5,535	46,600	15,370
20	19	0.35	17,800	6,230	2,300	805	16,800	5,880
	20	0.15	17,300	2,595	4,500	675	14,600	2,190
Sub-total			35,100	8,825	6,800	1,480	31,400	8,070
21	19	0.35	17,800	6,230	2,300	805	16,800	5,880
Sub-total			17,800	6,230	2,300	805	16,800	5,880
22	19	0.25	17,800	4,450	2,300	575	16,800	4,200
	20	0.25	17,300	4,325	4,500	1,125	14,600	3,650
	21	0.40	1,100	440	1,300	520	6,500	2,600
Sub-total			36,200	9,215	8,100	2,220	37,900	10,450
23	09	0.10	7,500	750	1,600	160	4,400	440
	20	0.20	17,300	3,460	4,500	900	14,600	2,920
	21	0.20	1,100	220	1,300	260	6,500	1,300
Sub-total			25,900	4,430	7,400	1,320	25,500	4,660
24	09	0.10	7,500	750	1,600	160	4,400	440
	11	0.20	3,100	620	500	100	6,400	1,280
	21	0.15	1,100	165	1,300	195	6,500	975
	22	0.70	1,600	1,120	800	560	6,300	4,410
	29	0.05	4,700	235	3,500	175	11,000	550
	Sub-total			18,000	2,890	7,700	1,190	34,600
25	21	0.25	1,100	275	1,300	325	6,500	1,625
	22	0.30	1,600	480	800	240	6,300	1,890
	23	1.00	2,900	2,900	600	600	5,400	5,400
	24	1.00	5,600	5,600	1,700	1,700	6,900	6,900
	29	0.15	4,700	705	3,500	525	11,000	1,650
	30	0.05	15,600	780	13,100	655	34,600	1,730
Sub-total			31,500	10,740	21,000	4,045	70,700	19,195
26	29	0.10	4,700	470	3,500	350	11,000	1,100
Sub-total			4,700	470	3,500	350	11,000	1,100
27	29	0.45	4,700	2,115	3,500	1,575	11,000	4,950
Sub-total			4,700	2,115	3,500	1,575	11,000	4,950
28	16	0.20	6,100	1,220	2,400	480	11,200	2,240
	30	0.95	15,600	14,820	13,100	12,445	34,600	32,870
Sub-total			21,700	16,040	15,500	12,925	45,800	35,110
29	25	0.60	7,900	4,740	800	480	18,800	11,280
	26	0.20	16,200	3,240	1,500	300	11,500	2,300
	28	1.00	7,000	7,000	100	100	3,700	3,700
Sub-total			31,100	14,980	2,400	880	34,000	17,280
30	25	0.40	7,900	3,160	800	320	18,800	7,520
	26	0.80	16,200	12,960	1,500	1,200	11,500	9,200
	27	1.00	3,100	3,100	1,200	1,200	0	0
Sub-total			27,200	19,220	3,500	2,720	30,300	16,720
31	02	0.45	26,400	11,880	5,000	2,250	1,900	855
Sub-total			26,400	11,880	5,000	2,250	1,900	855

BOD₅ LOAD FROM LIVESTOCK

Vardar river

Sub-basin No.	Numbers (1997)			BOD ₅ Total (kg/day)	Numbers (2005)			BOD ₅ Total (kg/day)	Numbers (2015)			BOD ₅ Total (kg/day)	Numbers (2025)			BOD ₅ Total (kg/day)
	Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig	
1	8,425	1,420	455	5,795	8,600	1,480	605	5,951	8,805	1,545	800	6,135	9,045	1,645	955	6,342
2	32,370	5,325	7,275	23,343	33,045	5,595	9,720	24,324	33,855	5,865	12,420	25,442	34,740	6,210	15,105	26,621
3	9,380	1,750	3,305	7,049	9,580	1,830	4,405	7,415	9,810	1,920	5,635	7,828	10,065	2,035	6,855	8,260
4	14,125	1,845	1,730	9,792	14,475	1,855	2,330	10,138	14,755	1,945	3,025	10,476	15,195	2,120	3,630	10,917
5	12,440	2,135	3,105	9,052	12,695	2,205	4,080	9,426	13,055	2,285	5,310	9,920	13,370	2,400	6,425	10,370
6	2,210	580	1,520	1,846	2,260	600	2,020	1,982	2,310	630	2,590	2,135	2,370	670	3,150	2,294
7	2,210	580	1,520	1,846	2,260	600	2,020	1,982	2,310	630	2,590	2,135	2,370	670	3,150	2,294
8	9,890	2,515	6,395	8,162	10,105	2,610	8,500	8,741	10,335	2,745	10,900	9,398	10,605	2,920	13,260	10,082
9	5,565	1,085	7,665	5,333	5,705	1,120	10,255	5,949	5,845	1,190	13,090	6,621	5,985	1,260	15,925	7,293
10	9,120	1,425	8,170	7,784	9,310	1,520	10,925	8,478	9,595	1,520	13,870	9,249	9,880	1,615	16,910	10,661
11	5,190	890	6,600	4,837	5,335	905	8,815	5,377	5,395	935	11,220	5,903	5,540	1,050	13,710	6,519
12	3,975	775	5,475	3,810	4,075	800	7,325	4,249	4,175	850	9,350	4,729	4,275	900	11,375	5,209
13	7,640	1,710	7,860	6,838	7,820	1,770	10,495	7,493	8,005	1,870	13,415	8,218	8,205	1,985	16,320	8,952
14	4,390	830	1,680	3,328	4,460	890	2,240	3,498	4,580	950	2,880	3,716	10,470	2,220	28,170	12,823
15	6,960	1,810	7,650	6,383	7,100	1,890	10,230	7,006	7,320	2,000	13,060	7,737	7,460	2,160	15,890	8,428
16	6,350	655	9,500	6,108	6,505	655	12,730	6,853	6,665	740	16,250	7,678	6,830	750	19,755	8,487
17	12,575	2,185	24,735	13,476	12,935	2,190	32,905	15,341	13,180	2,425	42,170	17,403	14,485	2,935	50,020	19,920
18	3,680	1,320	6,035	3,853	3,825	1,370	8,020	4,353	3,880	1,425	10,290	4,855	3,995	1,565	12,500	5,401
19	19,240	4,675	7,375	14,817	19,705	4,960	9,860	15,674	20,165	5,265	12,680	16,600	20,660	5,535	15,370	17,514
20	8,225	1,235	3,885	6,313	8,390	1,300	5,190	6,694	8,590	1,365	6,630	7,124	8,825	1,480	8,070	7,588
21	5,810	665	2,835	4,432	5,915	700	3,780	4,696	6,055	735	4,830	5,003	6,230	805	5,880	5,340
22	8,575	1,865	5,015	6,901	8,750	1,980	6,730	7,382	8,950	2,055	8,570	7,894	9,215	2,220	10,450	8,476
23	4,120	1,110	2,230	3,327	4,210	1,180	3,000	3,554	4,310	1,230	3,820	3,793	4,430	1,320	4,660	4,058
24	2,700	1,015	3,660	2,683	2,735	1,050	4,880	2,957	2,850	1,155	6,285	3,335	2,890	1,190	7,655	3,642
25	9,990	3,500	9,205	9,005	10,120	3,580	12,410	9,746	10,380	3,755	15,860	10,641	10,740	4,045	19,195	11,603
Total	215,155	42,900	144,880	176,113	219,915	44,635	193,470	189,259	225,175	47,030	247,540	203,967	237,875	51,705	324,385	228,492

Strumica river

Sub-basin No.	Numbers (1997)			BOD Total (kg/day)	Numbers (2005)			BOD Total (kg/day)	Numbers (2015)			BOD Total (kg/day)	Numbers (2025)			BOD Total (kg/day)
	Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig	
26	440	300	530	454	450	320	700	498	460	330	900	547	470	350	1,100	598
27	1,980	1,350	2,385	2,041	2,025	1,440	3,150	2,243	2,070	1,485	4,050	2,462	2,115	1,575	4,950	2,690
28	15,010	11,135	16,945	15,445	15,315	11,630	22,530	16,866	15,640	12,220	28,915	18,481	16,040	12,925	35,110	20,131
Total	17,430	12,785	19,860	17,940	17,790	13,390	26,380	19,607	18,170	14,035	33,865	21,490	18,625	14,830	41,160	23,419

Crn Drim river

Sub-basin No.	Heads (1997)			BOD Total (kg/day)	Heads (2005)			BOD Total (kg/day)	Heads (2015)			BOD Total (kg/day)	Heads (2025)			BOD Total (kg/day)
	Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig		Cattle	Horse	Pig	
29	13,860	2,780	10,540	11,590	14,280	840	11,140	11,552	14,580	860	14,280	12,376	14,980	880	17,280	13,237
30	17,540	10,420	16,960	16,910	18,220	2,460	10,760	14,354	18,720	2,640	13,720	15,306	19,220	2,720	16,720	16,243
31	11,070	1,935	405	7,592	11,295	2,025	540	7,782	11,565	2,115	720	8,011	11,880	2,250	855	8,269
Total	42,470	15,135	27,905	36,092	43,795	5,325	22,440	33,688	44,865	5,615	28,720	35,693	46,080	5,850	34,855	37,749

Note: Unit BOD concentrations per head of animal are as follow:

Cattle 640 gr/day
Horse 220 gr/day
Pig 200 gr/day

LOW FLOW DISCHARGE FOR CALCULATION
OF BOD₅ CONCENTRATION

Vardar river

Sub-basin No.	Base point	Name of river	Catchment area (km ²)	Applied ST No.	Catchment area at ST (km ²)	75% discharge at ST (m ³ /s)	Specific discharge (m ³ /s/100km ²)	75% discharge at base point (m ³ /s)
1		Vardar	343	ST4	1,083	12.69	1.17	4.02
	ST3	Vardar	343	ST4	1,083	12.69	1.17	4.02
2		Vardar	928	ST4	1,083	12.69	1.17	10.87
	ST5	Vardar	1,242	ST4	1,083	12.69	1.17	14.55
3		Vardar	342	ST4	1,083	12.69	1.17	4.01
4		Treska	886	ST23	886	3.70	0.42	3.70
	ST23	Treska	886	ST23	886	3.70	0.42	3.70
5		Treska	1,722	ST23	886	3.70	0.42	7.19
	ST27	Treska	2,068	ST23	886	3.70	0.42	8.64
6		Lepenec	828	ST8	4,650	31.36	0.67	5.58
	ST30	Lepenec	828	ST8	4,650	31.36	0.67	5.58
7		Vardar	170	ST8	4,650	31.36	0.67	1.15
	ST8	Vardar	4,650	ST8	4,650	31.36	0.67	31.36
8		Vardar	1,797	ST10	8,820	37.31	0.42	7.60
9		Pchinja	871	ST38	626	1.52	0.24	2.11
10		Pchinja	626	ST38	626	1.52	0.24	1.52
	ST38	Pchinja	626	ST38	626	1.52	0.24	1.52
11		Pchinja	377	ST38	626	1.52	0.24	0.92
12		Pchinja	460	ST35	2,794	3.47	0.12	0.57
	ST42	Pchinja	460	ST35	2,794	3.47	0.12	0.57
13		Pchinja	460	ST35	2,794	3.47	0.12	0.57
	ST35	Pchinja	2,794	ST35	2,794	3.47	0.12	3.47
14		Vardar	1,114	ST14	21,350	37.31	0.17	1.95
	ST10	Vardar	8,820	ST14	21,350	37.31	0.17	15.41
15		Bregalnica	846	ST50	846	1.38	0.16	1.38
	ST50	Bregalnica	846	ST50	846	1.38	0.16	1.38
16		Bregalnica	351	ST50	846	1.38	0.16	0.57
	ST51	Bregalnica	1,289	ST50	846	1.38	0.16	2.10
17		Bregalnica	1,608	ST52	2,897	3.90	0.13	2.16
	ST52	Bregalnica	2,897	ST52	2,897	3.90	0.13	3.90
18		Bregalnica	1,410	ST52	2,897	3.90	0.13	1.90
	ST53	Bregalnica	4,286	ST52	2,897	3.90	0.13	5.77
	ST12	Vardar	14,241	ST14	21,350	59.47	0.28	39.67
19		Crna	1,441	ST64	3,975	4.28	0.11	1.55
	ST62	Crna	1,441	ST64	3,975	4.28	0.11	1.55
20		Crna	1,104	ST64	3,975	4.28	0.11	1.19
	ST63	Crna	2,545	ST64	3,975	4.28	0.11	2.74
21		Crna	1,487	ST64	3,975	4.28	0.11	1.60
	ST64	Crna	3,975	ST64	3,975	4.28	0.11	4.28
22		Crna	1,399	ST64	3,975	4.28	0.11	1.51
	ST66	Crna	5,374	ST64	3,975	4.28	0.11	5.79
23		Crna	516	ST64	3,975	4.28	0.11	0.56
24		Vardar	7,109	ST14	21,350	59.47	0.28	19.80
	ST14	Vardar	21,350	ST14	21,350	59.47	0.28	59.47
25		Vardar	951	ST16	22,301	62.11	0.28	2.65
	ST16	Vardar	22,301	ST16	22,301	62.11	0.28	62.11

Strumica river

26		ST102	60	ST103	520	0.45	0.09	0.05
27		ST103	460	ST103	520	0.45	0.09	0.40
28		ST104	881	ST104	1,401	0.87	0.06	0.55

Crn Drim river

29		ST87	953	ST98	751	6.82	0.91	8.65
30		ST89	1651	ST98	751	6.82	0.91	14.99
31		ST98	751	ST98	751	6.82	0.91	6.82

Estimate of BOD₅ Concentration (1997) (1/2)

Base point No.	Sub-basin No.	Domestic wastewater		Industrial wastewater		Agricultural wastewater		Non-point source		Total quantity at outlet of river (kg/day)	RP-ratio	Total BOD ₅ at base point (kg/day)	Discharge (m ³ /s)	BOD ₅ concentration (mg/lit)
		Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio					
Vardar mainstream														
1		3,410	0.25	853	0.25	542	0.25	136	0.05	290	0.05	343	0.05	1,295
2		9,614	0.25	2,403	0.25	2,288	0.25	572	0.05	290	0.05	1,167	0.05	1,295
3		4,784	0.25	1,196	0.25	0	0.25	708	0.05	1,457	0.05	928	0.05	4,189
4		2,841	0.25	710	0.25	0	0.25	0	0.05	352	0.05	342	0.05	1,566
5		2,141	0.25	535	0.25	2	0.25	2	0.05	490	0.05	886	0.05	1,244
6		2,049	0.25	512	0.25	21,781	0.25	5,445	0.05	92	0.05	828	0.05	1,076
7		12,010	0.25	3,002	0.25	0	0.25	0	0.05	92	0.05	170	0.05	6,091
8		10,424	0.25	2,606	0.25	8,016	0.25	6,155	0.05	2,936	0.05	1,114	0.05	3,103
9		277	0.25	69	0.25	0	0.25	2,004	0.05	408	0.05	1,797	0.05	5,108
10		1,367	0.25	342	0.25	771	0.25	193	0.05	267	0.05	871	0.05	379
11		560	0.25	140	0.25	0	0.25	0	0.05	389	0.05	626	0.05	955
12		4,539	0.25	1,135	0.25	1,338	0.25	355	0.05	1,900	0.05	377	0.05	401
13		3,338	0.25	834	0.25	0	0.25	0	0.05	342	0.05	460	0.05	1,683
14		2,038	0.25	509	0.25	0	0.25	0	0.05	166	0.05	1,114	0.05	1,199
15		843	0.25	211	0.25	441	0.25	8,686	0.05	4,941	0.05	846	0.05	732
16		1,152	0.25	288	0.25	0	0.25	110	0.05	319	0.05	305	0.05	29,021
17		5,702	0.25	1,426	0.25	2,734	0.25	684	0.05	674	0.05	1,608	0.05	682
18		2,530	0.25	632	0.25	715	0.25	1,790	0.05	0	0.05	1,410	0.05	611
19		4,100	0.25	1,025	0.25	1,965	0.25	491	0.05	6,239	0.05	1,441	0.05	2,863
20		2,904	0.25	726	0.25	1,936	0.25	484	0.05	741	0.05	1,104	0.05	882
21		3,793	0.25	948	0.25	0	0.25	0	0.05	316	0.05	1,487	0.05	34,059
22		1,135	0.25	284	0.25	0	0.25	0	0.05	222	0.05	1,399	0.05	72
23		2,259	0.25	565	0.25	0	0.25	0	0.05	345	0.05	516	0.05	1,581
24		2,499	0.25	625	0.25	2,130	0.25	533	0.05	134	0.05	1,162	0.05	1,244
25		2,632	0.25	663	0.25	1,249	0.25	312	0.05	8,103	0.05	951	0.05	699
Lepevec river														
6		2,049	0.25	512	0.25	21,781	0.25	5,445	0.05	92	0.05	828	0.05	42,018
Treska river														
4		2,841	0.25	710	0.25	0	0.25	0	0.05	490	0.05	886	0.05	1,473
5		2,141	0.25	535	0.25	0	0.25	0	0.05	490	0.05	1,722	0.05	43,491
6		1,245	0.25	312	0.25	0	0.25	0	0.05	92	0.05	828	0.05	30,444
Pchinja river														
9		277	0.25	69	0.25	0	0.25	0	0.05	267	0.05	871	0.05	6,091
10		1,367	0.25	342	0.25	771	0.25	193	0.05	389	0.05	626	0.05	6,091
11		560	0.25	140	0.25	0	0.25	0	0.05	490	0.05	1,244	0.05	4,264
12		4,539	0.25	1,135	0.25	1,338	0.25	355	0.05	190	0.05	460	0.05	871
13		3,338	0.25	834	0.25	0	0.25	0	0.05	130	0.05	1,623	0.05	1,074
14		2,520	0.25	632	0.25	527	0.25	1,430	0.05	44	0.05	1,244	0.05	2,318
15		843	0.25	211	0.25	441	0.25	868	0.05	44	0.05	871	0.05	864
16		1,152	0.25	288	0.25	0	0.25	110	0.05	44	0.05	1,244	0.05	1,623
17		5,702	0.25	1,426	0.25	2,734	0.25	684	0.05	389	0.05	626	0.05	871
18		2,530	0.25	632	0.25	715	0.25	1,790	0.05	190	0.05	460	0.05	1,683
19		4,100	0.25	1,025	0.25	1,965	0.25	491	0.05	342	0.05	460	0.05	1,199
20		2,904	0.25	726	0.25	1,936	0.25	484	0.05	166	0.05	1,114	0.05	732
21		3,793	0.25	948	0.25	0	0.25	0	0.05	408	0.05	1,797	0.05	29,021
22		1,135	0.25	284	0.25	0	0.25	0	0.05	267	0.05	871	0.05	682
23		2,259	0.25	565	0.25	0	0.25	0	0.05	319	0.05	305	0.05	611
24		2,499	0.25	625	0.25	2,130	0.25	533	0.05	674	0.05	1,608	0.05	2,863
25		2,632	0.25	663	0.25	1,249	0.25	312	0.05	0	0.05	1,410	0.05	882
ST13														
ST15														
ST18														
ST19														
ST20														
ST21														
ST22														
ST23														
ST24														
ST25														
ST26														
ST27														
ST28														
ST29														
ST30														
ST31														
ST32														
ST33														
ST34														
ST35														

Estimate of BOD₅ Concentration (1997) (2/2)

Sub-basin No.	Base point No.	Sub-basin No.	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Total BOD ₅ at base point (kg/day)	RP-ratio	Total quantity at outlet of river (kg/day)	Discharge (m ³ /s)	BOD ₅ concentration (mg/lit)
		Bregalnica river	843	0.25	211	441	0.25	110	6,383	0.05	319	846	0.05	42	478	0.7	682	1.38	4.0
		ST50			211			110			319			42			682		
		16	1,152	0.25	288	0	0.25	0	6,108	0.05	305	351	0.05	18	611	0.7	611	2.10	5.0
		ST51			499			110			621			60			1,293		
		17	5,702	0.25	1,426	2,734	0.25	684	13,476	0.05	674	1,608	0.05	83	2,863	0.7	4,157	3.90	8.6
		ST52			1,924			794			1,298			140			4,157		
		18	2,530	0.25	632	715	0.25	179	3,853	0.05	1,491	1,410	0.05	71	1,074	0.7	5,231	5.77	7.3
		ST53			2,557			975			1,491			211			5,231		
		Crna river	4,100	0.25	1,025	1,965	0.25	491	14,817	0.05	741	1,441	0.05	72	2,329	0.7	2,329	1.55	12.2
		ST62			1,025			491			741			72			2,329		
		20	2,904	0.25	726	1,936	0.25	484	6,313	0.05	316	1,104	0.05	55	1,581	0.7	3,910	2.74	11.6
		ST63			1,751			975			1,056			127			3,910		
		21	3,793	0.25	948	0	0.25	0	4,432	0.05	222	1,487	0.05	74	1,244	0.7	5,154	4.28	9.8
		ST64			2,699			975			1,278			202			5,154		
		22	1,135	0.25	284	0	0.25	0	6,901	0.05	345	1,399	0.05	70	699	0.7	4,097	5.79	8.2
		ST66			2,983			975			1,623			272			5,853		
		Strumica river	256	0.25	64	98	0.25	25	454	0.05	23	60	0.05	3	114	0.7	114	0.05	18.5
		ST102			64			25			23			3			114		
		27	1,034	0.25	259	1,925	0.25	481	2,041	0.05	102	460	0.05	23	865	0.7	2,737	0.45	17.6
		ST103			323			506			125			26			979		
		28	5,187	0.25	1,297	0	0.25	0	15,445	0.05	772	881	0.05	44	2,113	0.7	3,092	1.00	25.1
		ST104			1,619			506			897			70			3,092		
		Crni Drina river	5,283	0.25	1,321	740	0.25	185	11,590	0.05	580	953	0.05	48	2,133	0.7	1,493	8.65	2.0
		ST87			1,321			185			580			48			2,133		
		31	3,887	0.25	972	0	0.25	0	16,910	0.05	846	1,651	0.05	83	1,900	0.7	4,033	6.82	4.8
		ST98			2,293			185			1,425			130			4,033		
		30	548	0.25	137	0	0.25	0	7,592	0.05	380	751	0.05	38	554	0.7	3,211	14.99	2.5
		ST89			2,430			185			1,805			168			4,587		
		Grand total	105,156		26,289	48,676		12,169	230,145		11,315	27,955		1,398	51,170				

Note: "Discharge" is 70% dependable discharge (average of 36 years from 1961 to 1996).

D-ratio, Discharge ratio
PR-ratio, Residual purification ratio

Estimate of BOD₅ Concentration (2005) (1/2)

Sub- basin No.	Domestic wastewater		Industrial wastewater		Agricultural wastewater		Non-point source		Total quantity at outlet of river (kg/day)	RP-ratio	Total BOD ₅ at base point (kg/day)	BOD ₅ concentration (mg/lit)
	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio				
Vardar mainstream												
1	3,506	0.25	877	578	0.25	145	298	343	0.05	17	1,336	4.02
ST3			877			145	298			17	1,336	
2	10,061	0.25	2,515	2,323	0.25	581	1,216	928	0.05	46	4,359	
ST5			2,515			581	1,216			46	4,359	
3	5,203	0.25	1,301	0	0.25	0	371	342	0.05	17	1,689	
4	2,977	0.25	744	0	0.25	0	507	886	0.05	44	1,295	
5	2,242	0.25	561	9	0.25	2	471	1,722	0.05	86	1,120	
6	2,238	0.25	560	26,658	0.25	6,665	99	828	0.05	41	7,365	
7	12,391	0.25	3,098	0	0.25	0	99	170	0.05	9	3,205	
ST8			3,098			7,393	3,061			261	20,369	31.36
8	11,293	0.25	2,823	8,383	0.25	2,096	437	1,797	0.05	50	5,446	
9	286	0.25	72	0	0.25	0	297	871	0.05	44	413	
10	1,291	0.25	323	862	0.25	216	424	626	0.05	31	993	
11	540	0.25	135	0	0.25	0	269	377	0.05	19	423	
12	4,692	0.25	1,173	1,557	0.25	389	212	460	0.05	23	1,798	
13	3,491	0.25	873	0	0.25	0	375	460	0.05	23	1,270	
14	2,078	0.25	520	0	0.25	0	175	1,114	0.05	56	750	
ST10			15,572			10,093	3,250			346	31,462	37.31
15	859	0.25	215	488	0.25	122	350	846	0.05	42	729	
16	1,190	0.25	298	0	0.25	0	343	351	0.05	18	658	
17	5,955	0.25	1,489	3,032	0.25	758	767	1,608	0.05	80	3,094	
18	2,591	0.25	648	869	0.25	217	0	1,410	0.05	71	936	
ST12			18,221			11,190	6,710			757	36,878	39.36
19	4,050	0.25	1,013	2,190	0.25	548	784	1,441	0.05	72	2,416	
20	2,937	0.25	734	1,957	0.25	489	335	1,104	0.05	55	1,613	
21	3,848	0.25	962	0	0.25	0	235	1,487	0.05	74	1,271	
22	1,190	0.25	298	0	0.25	0	369	1,999	0.05	70	737	
23	2,300	0.25	575	0	0.25	0	178	516	0.05	26	779	
24	2,646	0.25	662	2,199	0.25	550	148	1,162	0.05	58	1,417	
ST14			22,464			12,777	8,758			1,112	45,111	59.47
25	2,827	0.25	707	1,406	0.25	352	487	951	0.05	48	1,593	
ST16			23,171			13,128	9,245			1,160	46,704	62.11
Lepencec river												
6	2,238	0.25	560	26,658	0.25	6,665	99	828	0.05	41	7,365	
ST20			560			6,665	99			41	7,365	
Treska river												
4	2,977	0.25	744	0	0.25	0	507	886	0.05	44	1,295	
ST23			744			0	507			44	1,295	
5	2,242	0.25	561	0	0.25	0	453	1,722	0.05	86	1,099	
ST27			561			0	453			86	1,099	
Pcinja river												
9	286	0.25	72	0	0.25	0	297	871	0.05	44	413	
10	1,291	0.25	323	862	0.25	216	424	626	0.05	31	993	
ST38			392			216	424			75	1,406	1.32
11	540	0.25	135	0	0.25	0	269	377	0.05	19	423	
12	4,692	0.25	1,173	1,557	0.25	389	212	460	0.05	23	1,798	
ST42			1,173			389	212			23	1,798	
13	3,491	0.25	873	0	0.25	0	375	460	0.05	23	1,270	
ST35			2,575			605	1,577			140	4,897	5.47

Estimate of BOD₅ Concentration (2005) (2/2)

Base point No.	Sub-basin No.	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Total quantity at outlet of river (kg/day)	RP-ratio	Total BOD ₅ at base point (kg/day)	Discharge (m ³ /s)	BOD ₅ concentration (mg/lit)
Bregalnica river																		
15		859	0.25	215	488	0.25	122	7,006	0.05	350	846	0.05	42	729	0.7	511	1.38	4.3
ST150				215			122			350			42					
16		1,190	0.25	298	0	0.25	0	6,853	0.05	343	351	0.05	18	688	0.7	971	2.10	5.4
ST151				298			0			343			18					
17		5,955	0.25	1,489	3,032	0.25	758	15,341	0.05	1,608	1,608	0.05	80	3,094	0.7	3,137	3.90	9.3
ST152				1,489			758			1,608			80					
18		2,591	0.25	648	869	0.25	217	4,353	0.05	218	1,410	0.05	71	1,153	0.7	3,944	5.77	7.9
ST153				648			217			218			71					
Crna river																		
19		4,050	0.25	1,013	2,190	0.25	548	15,674	0.05	784	1,441	0.05	72	2,416	0.7	1,691	1.55	12.6
ST162				1,013			548			784			72					
20		2,937	0.25	734	1,957	0.25	489	6,694	0.05	335	1,104	0.05	55	1,613	0.7	2,820	2.74	11.9
ST163				734			489			335			55					
21		3,848	0.25	962	0	0.25	0	4,696	0.05	235	1,487	0.05	74	1,271	0.7	3,710	4.28	10.0
ST164				962			0			235			74					
22		1,190	0.25	298	0	0.25	0	7,382	0.05	369	1,399	0.05	70	737	0.7	4,226	5.79	8.4
ST166				298			0			369			70					
Strumica river																		
26		267	0.25	67	108	0.25	27	498	0.05	25	60	0.05	3	122	0.7	85	0.05	19.7
ST102				67			27			25			3					
27		1,078	0.25	270	2,131	0.25	533	2,243	0.05	112	460	0.05	23	937	0.7	741	0.45	19.1
ST103				270			533			112			23					
28		5,433	0.25	1,360	0	0.25	0	16,866	0.05	843	881	0.05	44	2,247	0.7	2,314	1.00	26.8
ST104				1,360			0			843			44					
Crna Drina river																		
29		5,483	0.25	1,371	814	0.25	204	11,582	0.05	578	953	0.05	48	2,200	0.7	1,540	8.65	2.1
ST187				1,371			204			578			48					
31		4,144	0.25	1,036	0	0.25	0	14,354	0.05	718	1,651	0.05	83	1,836	0.7	2,825	6.82	4.8
ST198				1,036			0			718			83					
30		564	0.25	141	0	0.25	0	7,782	0.05	389	751	0.05	38	568	0.7	3,222	14.99	2.5
ST189				141			0			389			38					
Grand total		109,656		27,414	55,566		13,892	242,554		11,910	27,955		1,398	54,613				

Note: "Discharge" is 70% dependable discharge (average of 36 years from 1961 to 1996).

D-ratio, Discharge ratio

PR-ratio, Residual purification ratio

Estimate of BOD₅ Concentration (2015) (1/2)

Base point No.	Sub-basin No.	Domestic wastewater			Industrial wastewater			Agricultural wastewater			Non-point source			Total BOD ₅ at base point (kg/day)	RP-ratio	Total quantity at outlet of river (kg/day)	Discharge concentration (mg/lit)
		Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)				
Vardar mainstream																	
ST3	1	3,745	0.25	936	618	0.25	155	6,135	0.05	307	343	0.05	17	1,415	0.7	990	4.02
		10,766	0.25	2,692	2,364	0.25	591	25,442	0.05	1,272	928	0.05	46	4,601			2.9
ST5	2			3,628			746			1,579			64	6,016	0.7	4,211	14.55
		5,629	0.25	1,407	0	0.25	0	7,828	0.05	391	342	0.05	17	1,816			
		3,122	0.25	781	0	0.25	0	10,476	0.05	524	886	0.05	44	1,349			
		2,391	0.25	598	3	0.25	3	9,920	0.05	496	1,722	0.05	86	1,183			
		2,425	0.25	606	34,592	0.25	8,648	2,135	0.05	107	828	0.05	41	9,402			
		12,962	0.25	3,241	0	0.25	0	2,135	0.05	107	170	0.05	9	3,356			
ST8	7			10,260			3,396			3,204			261	25,121	0.7	16,185	31.36
		12,160	0.25	3,040	10,183	0.25	2,546	9,398	0.05	470	1,797	0.05	90	6,146			6.0
		299	0.25	75	0	0.25	0	6,621	0.05	331	871	0.05	44	449			
		1,239	0.25	310	972	0.25	243	9,249	0.05	462	626	0.05	31	1,047			
		525	0.25	131	0	0.25	0	5,903	0.05	295	377	0.05	19	445			
		4,913	0.25	1,228	1,870	0.25	468	4,729	0.05	236	460	0.05	23	1,955			
		3,679	0.25	920	0	0.25	0	8,218	0.05	411	460	0.05	23	1,354			
		2,131	0.25	533	0	0.25	0	3,716	0.05	186	1,114	0.05	56	774			
ST10	14			16,497			5,595			5,595			546	35,290	0.7	24,703	37.31
		886	0.25	222	534	0.25	134	7,737	0.05	387	846	0.05	42	784			
		1,246	0.25	312	0	0.25	0	7,678	0.05	384	351	0.05	18	713			
		6,190	0.25	1,548	3,714	0.25	929	17,403	0.05	870	1,608	0.05	80	3,427			
		2,664	0.25	666	1,027	0.25	257	4,855	0.05	0	1,410	0.05	71	993			
ST12	18			19,243			13,971			7,236			757	41,207	0.7	28,845	39.36
		4,045	0.25	1,011	2,455	0.25	614	16,600	0.05	830	1,441	0.05	72	2,527			
		2,980	0.25	745	1,978	0.25	495	7,124	0.05	356	1,104	0.05	55	1,651			
		5,907	0.25	977	0	0.25	0	5,003	0.05	250	1,487	0.05	74	1,301			
		1,244	0.25	311	0	0.25	0	7,894	0.05	395	1,399	0.05	70	776			
		2,354	0.25	589	0	0.25	0	3,793	0.05	190	516	0.05	26	804			
		2,790	0.25	698	2,273	0.25	568	3,355	0.05	168	1,162	0.05	58	1,492			
ST14	24			23,573			9,425			9,425			1,112	49,758	0.7	34,830	59.47
		2,983	0.25	746	1,598	0.25	400	10,641	0.05	532	931	0.05	48	1,725			
ST16	25			24,319			16,047			9,557			1,160	51,483	0.7	36,038	62.11
Lepenee river	6			606			8,648			107			41	9,402			
ST130	6			606			8,648			107			41	9,402	0.7	6,582	5.58
Treska river	4			3,122			0			524			44	1,349			
ST123	5			781			0			524			44	1,349			
		2,391	0.25	598	11	0.25	3	9,920	0.05	496	1,722	0.05	86	1,183			
ST127	5			1,378			3			1,920			130	2,531	0.7	1,772	8.64
Pehinja river	9			299			0			331			44	449			
ST138	10			1,239			243	9,249	0.05	462	626	0.05	31	1,047			
		525	0.25	131	0	0.25	0	5,903	0.05	295	377	0.05	19	445			
		4,913	0.25	1,228	1,870	0.25	468	4,729	0.05	236	460	0.05	23	1,955			
ST142	12			1,228			468			236			23	1,955	0.7	1,369	0.57
		3,679	0.25	920	0	0.25	0	8,218	0.05	411	460	0.05	23	1,354			
ST135	13			2,664			711			1,736			140	5,230	0.7	3,675	3.47

Estimate of BOD₅ Concentration (2015) (2/2)

Sub-basin No.	Base point No.	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Total BOD ₅ at base point (kg/day)	RP-ratio	Total quantity at outlet of river (kg/day)	Discharge (m ³ /s)	BOD ₅ concentration (mg/lit)
Bregalnica river	15	886	0.25	222	534	0.25	134	7,737	0.05	387	846	0.05	42	784	0.7	549	1.38	0.7	784	1.38	4.6
	ST50			222			134			387			42	784		549			784		4.6
	16	1,246	0.25	312	0	0.25	0	7,678	0.05	351	351	0.05	18	713	0.7	1,048	2.10	0.7	713	2.10	5.8
	ST51			312			0			351			18	713		1,048			713		5.8
	17	6,190	0.25	1,548	3,714	0.25	929	17,403	0.05	870	1,608	0.05	80	3,427	0.7	3,447	3.90	0.7	3,427	3.90	10.2
ST52			1,548	3,714		929	17,403		870	1,608		80	3,427		3,447			3,427		10.2	
Crna river	18	2,664	0.25	666	1,027	0.25	257	4,855	0.05	243	1,410	0.05	71	1,236	0.7	4,312	5.77	0.7	1,236	5.77	8.6
	ST53			666	1,027		257	4,855		243	1,410		71	1,236		4,312			1,236		8.6
	19	4,045	0.25	1,011	2,455	0.25	614	16,600	0.05	830	1,441	0.05	72	2,527	0.7	1,769	1.55	0.7	2,527	1.55	13.2
ST62			1,011	2,455		614	16,600		830	1,441		72	2,527		1,769			2,527		13.2	
Strumica river	20	2,980	0.25	745	1,978	0.25	495	7,124	0.05	356	1,104	0.05	55	1,651	0.7	2,925	2.74	0.7	1,651	2.74	12.4
	ST63			745	1,978		495	7,124		356	1,104		55	1,651		2,925			1,651		12.4
	21	3,907	0.25	977	0	0.25	0	5,003	0.05	250	1,487	0.05	74	1,301	0.7	3,835	4.28	0.7	1,301	4.28	10.4
	ST64			977	0		0	5,003		250	1,487		74	1,301		3,835			1,301		10.4
	22	1,244	0.25	311	0	0.25	0	7,894	0.05	395	1,399	0.05	70	776	0.7	4,378	5.79	0.7	776	5.79	8.8
ST66			311	0		0	7,894		395	1,399		70	776		4,378			776		8.8	
Crna Drina river	26	280	0.25	70	118	0.25	30	547	0.05	27	60	0.05	3	130	0.7	91	0.05	0.7	130	0.05	21.0
	ST102			70	118		30	547		27	60		3	130		91			130		21.0
	27	1,132	0.25	283	2,357	0.25	589	2,462	0.05	123	460	0.05	23	1,018	0.7	804	0.45	0.7	1,018	0.45	20.7
	ST103			283	2,357		589	2,462		123	460		23	1,018		804			1,018		20.7
	28	5,717	0.25	1,429	0	0.25	0	18,481	0.05	924	881	0.05	44	2,397	0.7	2,482	1.00	0.7	2,397	1.00	28.7
ST104			1,429	0		0	18,481		924	881		44	2,397		2,482			2,397		28.7	
Grand total	29	5,709	0.25	1,427	886	0.25	222	12,376	0.05	619	953	0.05	48	2,315	0.7	1,621	8.65	0.7	2,315	8.65	2.2
	ST187			1,427	886		222	12,376		619	953		48	2,315		1,621			2,315		2.2
	31	4,401	0.25	1,100	0	0.25	0	15,306	0.05	765	1,651	0.05	83	1,948	0.7	2,984	6.82	0.7	1,948	6.82	5.1
	ST198			1,100	0		0	15,306		765	1,651		83	1,948		2,984			1,948		5.1
	30	603	0.25	151	0	0.25	0	8,011	0.05	401	751	0.05	38	589	0.7	3,397	14.99	0.7	589	14.99	2.6
ST189			151	0		0	8,011		401	751		38	589		3,397			589		2.6	
Grand total		115,117		28,779	67,550		16,888	261,171		12,816	27,955		1,398	59,880					59,880		

Note: "Discharge" is 70% dependable discharge (average of 36 years from 1961 to 1996).

D-ratio, Discharge ratio

RP-ratio, Residual purification ratio

Estimate of BOD₅ Concentration (2025) (1/2)

Base point No.	Sub-basin No.	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Total quantity at outlet of river (kg/day)	RP-ratio	Total BOD ₅ at base point (kg/day)	Discharge concentration (mg/lit)
Vardar mainstream	1	3,958	0.25	990	667	0.25	167	6,342	0.05	317	343	0.05	17	1,491	0.7	1,043	4.02
	ST3			990			167			317			17	1,491			3.0
	2	11,392	0.25	2,848	2,405	0.25	601	26,621	0.05	1,331	928	0.05	46	6,317	0.7	4,422	14.55
	ST5			2,848			601			1,331			46	6,317			3.5
	3	6,008	0.25	1,502	0	0.25	0	8,260	0.05	413	342	0.05	17	1,932			
	4	3,251	0.25	813	0	0.25	0	10,917	0.05	546	886	0.05	44	1,403			
	5	2,523	0.25	631	15	0.25	4	10,370	0.05	519	1,722	0.05	86	1,239			
6	2,590	0.25	648	48,888	0.25	12,222	2,294	0.05	115	828	0.05	41	13,026				
7	13,469	0.25	3,367	0	0.25	0	2,294	0.05	115	170	0.05	9	3,490				
ST8			10,798			12,994			3,355			261	27,407	0.7	19,185	31.36	7.1
8	12,931	0.25	3,233	12,441	0.25	3,110	10,082	0.05	504	1,797	0.05	90	6,937				
9	311	0.25	78	0	0.25	0	7,293	0.05	365	846	0.05	44	486				
10	1,192	0.25	298	1,115	0.25	279	10,061	0.05	503	626	0.05	31	1,111				
11	513	0.25	128	0	0.25	0	6,519	0.05	326	377	0.05	19	473				
12	5,110	0.25	1,278	2,383	0.25	596	5,209	0.05	260	460	0.05	23	2,157				
13	3,847	0.25	962	0	0.25	0	8,952	0.05	448	460	0.05	23	1,432				
14	2,178	0.25	545	0	0.25	0	12,823	0.05	641	1,114	0.05	56	1,241				
ST10			17,378			16,979			6,402			346	41,245	0.7	28,871	37.51	9.0
15	909	0.25	227	585	0.25	146	8,428	0.05	421	846	0.05	42	837				
16	1,295	0.25	324	0	0.25	0	8,487	0.05	424	351	0.05	18	766				
17	6,400	0.25	1,600	4,137	0.25	1,034	19,920	0.05	996	1,608	0.05	80	3,711				
18	2,728	0.25	682	1,274	0.25	319	5,401		0	1,410	0.05	71	1,071				
ST12			20,151			18,478			8,244			757	47,629	0.7	33,341	39.36	9.8
19	4,040	0.25	1,010	2,792	0.25	698	17,514	0.05	876	1,441	0.05	72	2,636				
20	3,018	0.25	755	1,999	0.25	500	7,588	0.05	379	1,104	0.05	55	1,689				
21	3,960	0.25	990	0	0.25	0	5,340	0.05	267	1,487	0.05	74	1,331				
22	1,292	0.25	323	0	0.25	0	8,476	0.05	424	1,399	0.05	70	817				
23	2,402	0.25	601	0	0.25	0	4,058	0.05	203	516	0.05	26	829				
24	2,919	0.25	730	2,354	0.25	589	3,642	0.05	182	1,162	0.05	58	1,558				
ST14			24,559			20,264			10,575			112	56,510	0.7	39,557	59.47	7.7
25	3,121	0.25	780	1,866	0.25	467	11,603	0.05	580	951	0.05	48	1,874				
ST16			25,339			20,730			11,155			1160	58,384	0.7	40,869	62.11	7.6
Lepencec river	6	2,590	0.25	648	48,888	0.25	12,222	2,294	0.05	115	828	0.05	41	13,026			
ST30			648			12,222			115			41	13,026	0.7	9,118	3.58	18.9
Treska river	4	3,251	0.25	813	0	0.25	0	10,917	0.05	546	886	0.05	44	1,403			
ST23			813			0				546		44	1,403				
ST27			631	0	0.25	0	9,052	0.05	453	1,722	0.05	86	1,169				
ST27			1,444			0				998		130	2,572	0.7	1,801	3.64	2.4
Pchunja river	9	311	0.25	78	0	0.25	0	7,293	0.05	365	871	0.05	44	486			
10	1,192	0.25	298	1,115	0.25	279	10,061	0.05	503	626	0.05	31	1,111				
ST38			376			279			868			75	1,597	0.7	1,118	1.52	8.5
11	513	0.25	128	0	0.25	0	6,519	0.05	326	377	0.05	19	473				
12	5,110	0.25	1,278	2,383	0.25	596	5,209	0.05	260	460	0.05	23	2,157				
ST42			1,278			596			260			23	2,157	0.7	1,510	0.57	30.7
13	3,847	0.25	962	0	0.25	0	8,952	0.05	448	460	0.05	23	1,432				
ST35			2,743			875			1,902			140	5,659	0.7	3,961	3.47	15.2

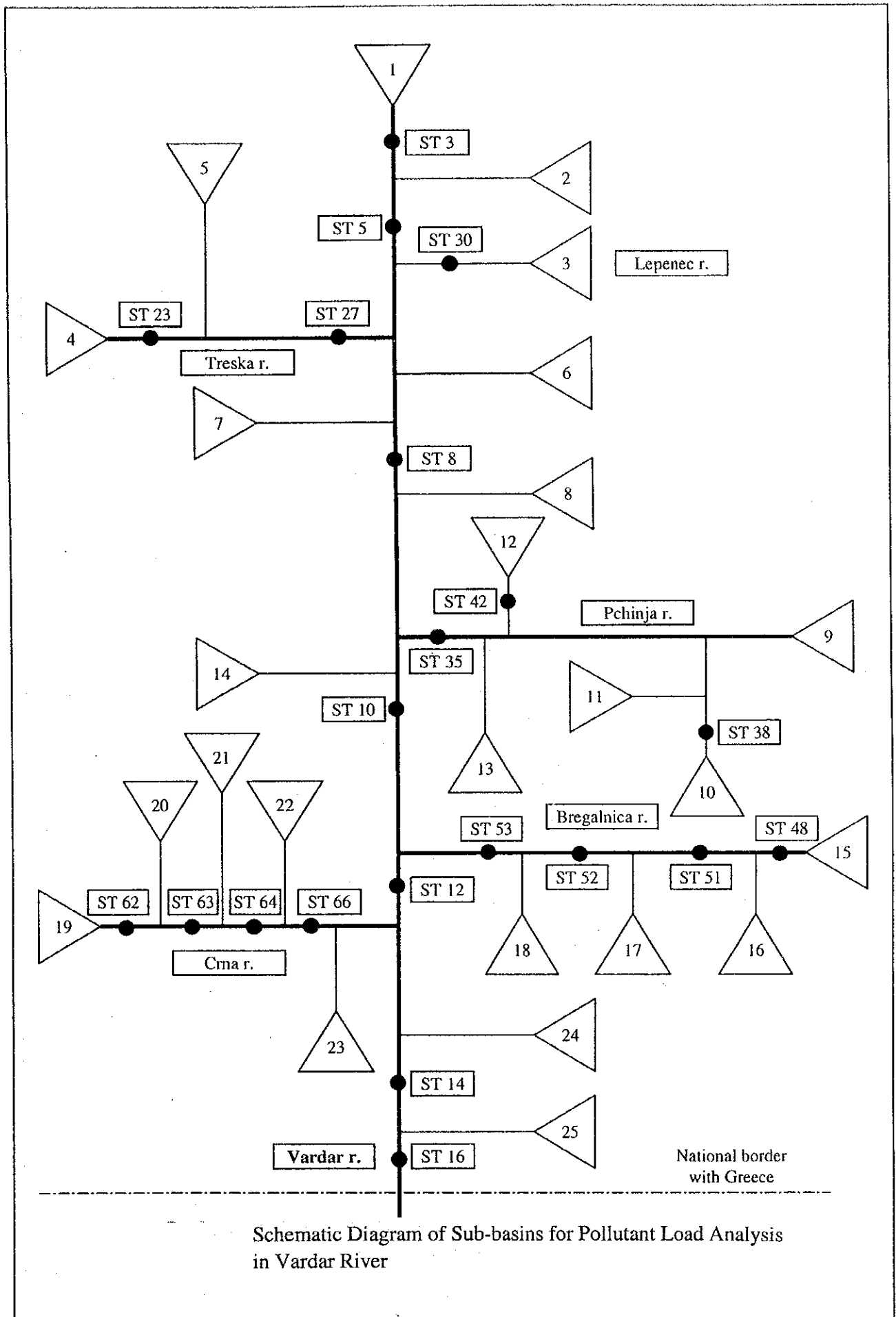
Estimate of BOD₅ Concentration (2025) (2/2)

Sub- basin Base point No.	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Load (kg/day)	D-ratio	Quantity at outlet of river (kg/day)	Total quantity at outlet of river (kg/day)	XP-ratio	Total BOD ₅ at base point (kg/day)	Discharge (m ³ /s)	BOD ₅ concentration (mg/lit)
Bregalnica river																	
S150	909	0.25	227	585	0.25	146	8,428	0.05	421	846	0.05	42	837	0.7	586	1.38	4.9
S151	1,295	0.25	324	0	0.25	146	8,487	0.05	424	351	0.05	18	766	0.7	1,122	2.10	6.2
S152	6,400	0.25	1,600	4,137	0.25	1,034	19,920	0.05	996	1,608	0.05	80	3,711	0.7	3,719	3.90	11.0
S153	2,728	0.25	682	1,274	0.25	319	5,401	0.05	270	1,410	0.05	71	1,341	0.7	4,658	5.77	9.3
Crna river																	
S162	4,040	0.25	1,010	2,792	0.25	698	17,514	0.05	876	1,441	0.05	72	2,656	0.7	1,859	1.55	13.9
S163	3,018	0.25	755	1,999	0.25	500	7,588	0.05	379	1,104	0.05	55	1,689	0.7	3,041	2.74	12.8
S164	3,960	0.25	990	0	0.25	1,198	5,340	0.05	267	1,487	0.05	74	1,331	0.7	3,973	4.28	10.7
S166	1,292	0.25	323	0	0.25	1,198	8,476	0.05	424	1,399	0.05	70	817	0.7	4,545	5.79	9.1
Stranica river																	
ST102	292	0.25	73	128	0.25	32	598	0.05	30	60	0.05	3	138	0.7	97	0.05	22.3
ST103	1,179	0.25	295	2,617	0.25	654	2,690	0.05	135	460	0.05	23	1,107	0.7	871	0.45	22.4
ST104	5,965	0.25	1,491	0	0.25	686	20,331	0.05	1,017	881	0.05	44	2,582	0.7	2,657	1.00	30.8
Crn Drin river																	
S187	5,910	0.25	1,478	958	0.25	240	13,237	0.05	662	953	0.05	48	2,427	0.7	1,699	3.65	2.3
S198	4,629	0.25	1,157	0	0.25	240	16,243	0.05	812	1,651	0.05	83	2,052	0.7	3,135	6.82	5.3
S189	637	0.25	159	0	0.25	240	8,269	0.05	413	751	0.05	38	610	0.7	3,562	14.99	2.8
Grand total	119,969		29,992	86,624		21,656	289,862		14,223	27,955		1,398	67,269				

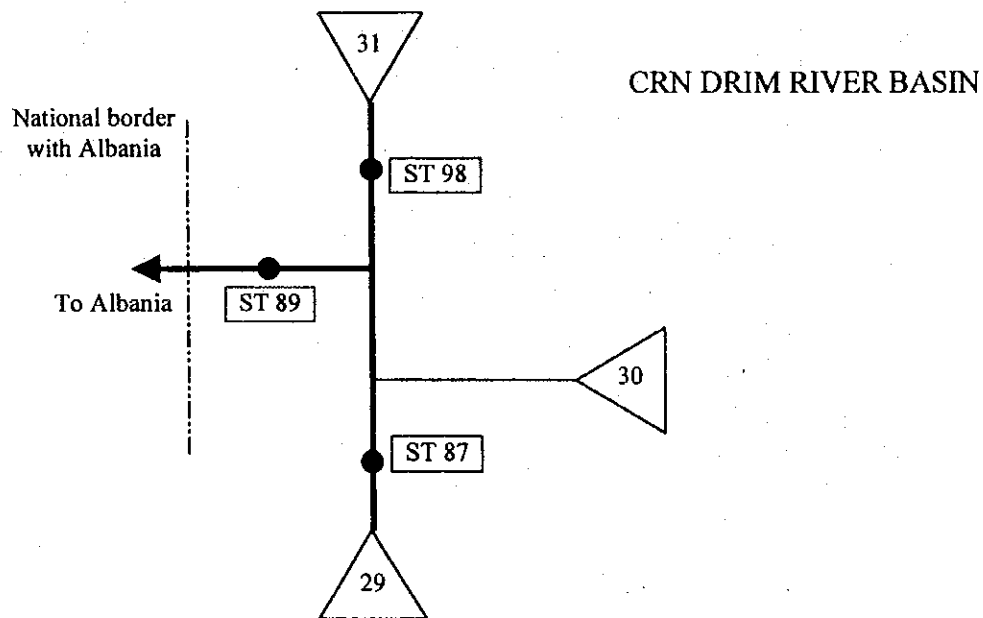
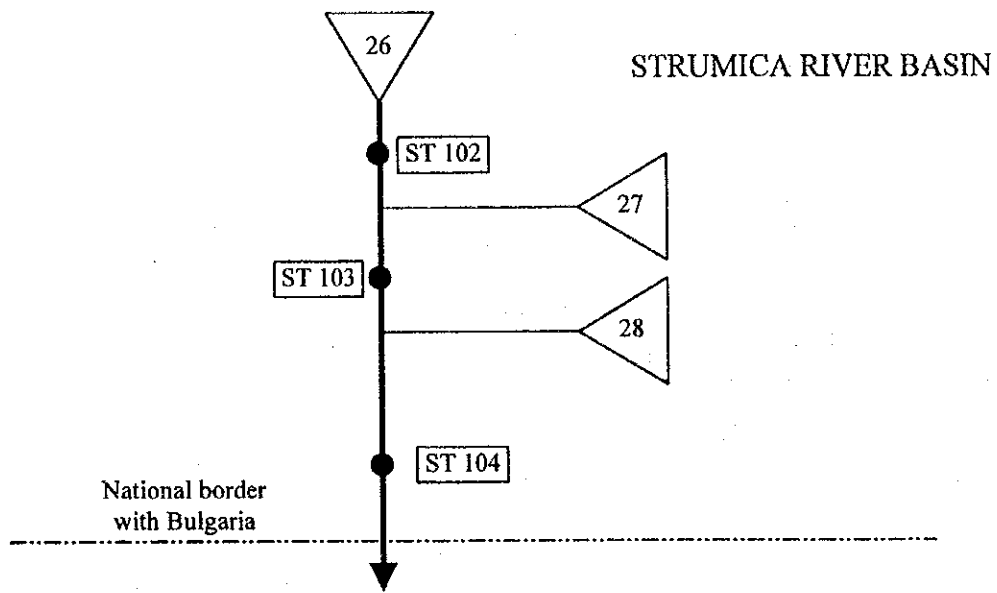
Note: "Discharge" is 70% dependable discharge (average of 36 years from 1961 to 1996).

D-ratio, Discharge ratio

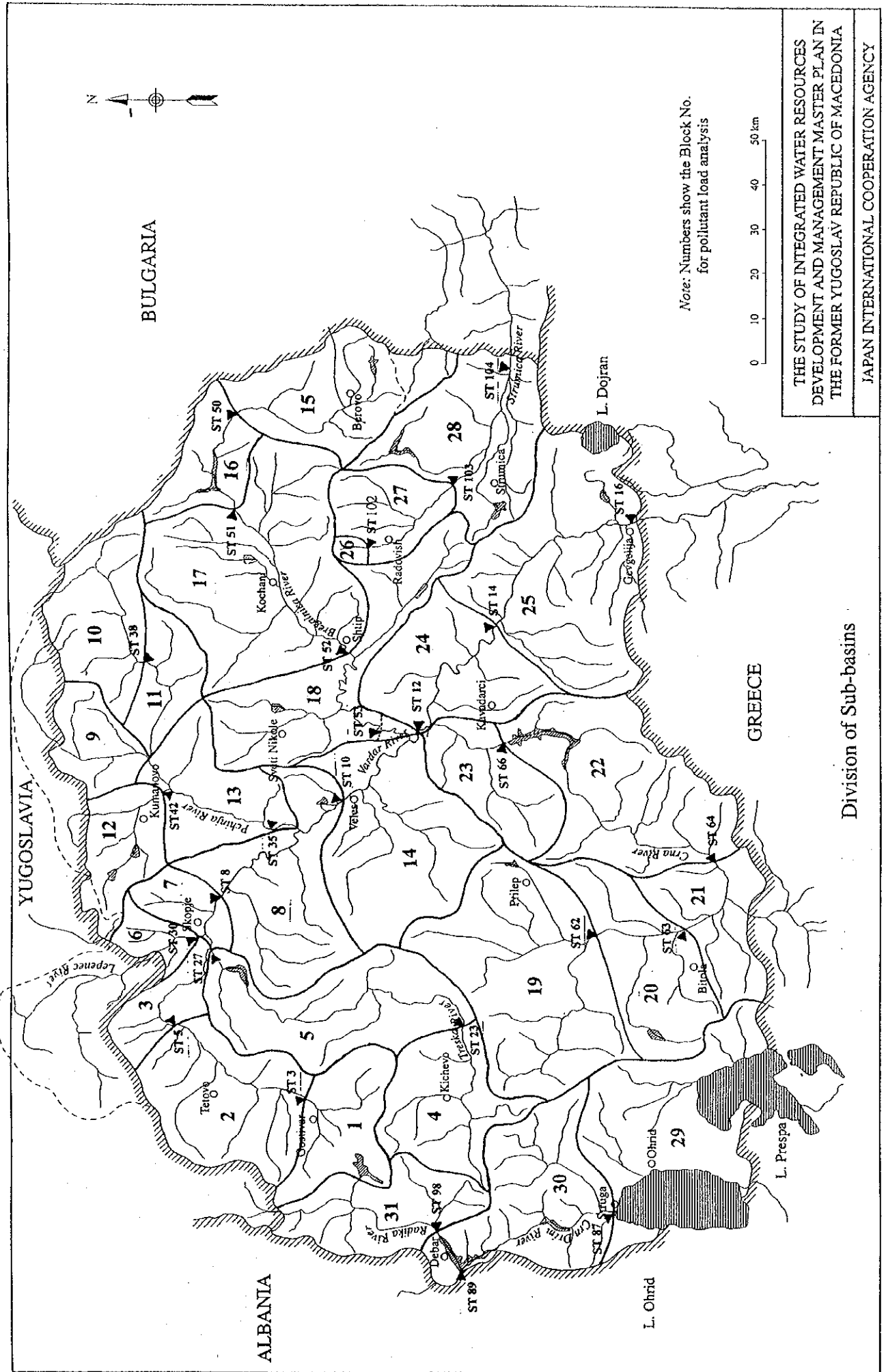
PR-ratio, Residual purification ratio



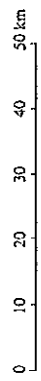
Schematic Diagram of Sub-basins for Pollutant Load Analysis in Vardar River



Schematic Diagram of Sub-basins for Pollutant Load Analysis in Strumica and Crn Drim Rivers



Note: Numbers show the Block No. for pollutant load analysis



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 JAPAN INTERNATIONAL COOPERATION AGENCY

Division of Sub-basins

