

WQ
WATER QUALITY

THE STUDY
ON
COMPREHENSIVE MANAGEMENT PLAN
FOR
THE WATER RESOURCES OF THE BRANTAS RIVER BASIN
IN
THE REPUBLIC OF INDONESIA

FINAL REPORT

TABLE OF CONTENTS

WQ Water Quality

Table 1	Calculation of Water Quality (BOD) at Bumiayu Bridge (1994).....	WQ-1
Table 2	Calculation of Water Quality (BOD) at Bumiayu Bridge (2020:Without project).....	WQ-11
Table 3	Calculation of Water Quality (BOD) at Bumiayu Bridge (2020:Case-I)	WQ-21
Table 4	Calculation of Water Quality (BOD) at Bumiayu Bridge (2020:Case-II)	WQ-31
Table 5	Calculation of Water Quality (BOD) at Bumiayu Bridge (2020:Case-III) ..	WQ-41

Table-1(1) Calculation of Water Quality (BOD) at Bumayu Bridge (1994)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Aug	Oct	Nov	Dec	Avg	Std
I. Pollution load from upstream													
1) Water quality of Bumayu Bridge (1994)	CO	mg/l											
2) Water flow of Bumayu Bridge	Q	m ³ /s											
3) Pollution load from upstream	$L_0 = CO \times Q$	kg/day											
4) Run-off pollution load from upstream	L_0	kg/day											
II. Pollution load from sub-basin													
A. Domestic waste water													
A1. Pollution load (Sub-basin B00)													
1) Pollution load produced	$a1$	kg/day	635	635	635	635	635	635	635	635	635		
2) Flow-out ratio	$r1-1$	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
3) Flow-down ratio	$r1-2$	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
4) Run-off ratio	$r1 = (r1-1) + (r1-2)$	-	0.03	0.24	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	19	19	19	19	19	19	19	19	19		
A2. Pollution load (Sub-basin B01)													
1) Pollution load produced	$a2$	kg/day	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829		
2) Flow-out ratio	$r2-1$	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
3) Flow-down ratio	$r2-2$	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$r2 = (r2-1) + (r2-2)$	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	366	366	366	366	366	366	366	366	366		
A3. Pollution load (Sub-basin B02)													
1) Pollution load produced	$a3$	kg/day	4,766	4,766	4,766	4,766	4,766	4,766	4,766	4,766	4,766		
2) Flow-out ratio	$r3-1$	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	$r3-2$	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$r3 = (r3-1) + (r3-2)$	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	$D3 = a3 \times r3$	kg/day	998	998	998	998	998	998	998	998	998		
A4. Pollution load (Sub-basin B03)													
1) Pollution load produced	$a4$	kg/day	6,772	6,772	6,772	6,772	6,772	6,772	6,772	6,772	6,772		
2) Flow-out ratio	$r4-1$	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	$r4-2$	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$r4 = (r4-1) + (r4-2)$	-	0.24	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	$D4 = a4 \times r4$	kg/day	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422		
A5. Pollution load (Sub-basin B04)													
1) Pollution load produced	$a5$	kg/day	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244	2,244		
2) Flow-out ratio	$r5-1$	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	$r5-2$	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
4) Run-off ratio	$r5 = (r5-1) + (r5-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	$D5 = a5 \times r5$	kg/day	1,616	1,616	1,616	1,616	1,616	1,616	1,616	1,616	1,616		
A6 Total run-off pollution load from domestic waste water	$D6 = D1 + D2 + D3 + D4 + D5$	kg/day	4,411	4,411	4,411	4,411	4,411	4,411	4,411	4,411	4,411		
B. Industrial waste water													
B1. Pollution load from major producers													
1) Pollution load produced	$b1$	kg/day	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561		
2) Flow-out ratio	$r11-1$	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	$r11-2$	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
4) Run-off ratio	$r11 = (r11-1) + (r11-2)$	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45		
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	703	703	703	703	703	703	703	703	703		
B2. Pollution load from large and medium scale industries													
1) Pollution load produced	$b2$	kg/day	7,406	7,406	7,406	7,406	7,406	7,406	7,406	7,406	7,406		
2) Flow-out ratio	$r12-1$	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	$r12-2$	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$r12 = (r12-1) + (r12-2)$	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28		
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	2,074	2,074	2,074	2,074	2,074	2,074	2,074	2,074	2,074		
B3. Pollution load from small scale industries													
1) Pollution load produced	$b3$	kg/day	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400		
2) Flow-out ratio	$r13-1$	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	$r13-2$	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$r13 = (r13-1) + (r13-2)$	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28		
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	400	400	400	400	400	400	400	400	400		
B4 Total run-off pollution load from the industries	$D4 = D1 + D2 + D3$	kg/day	3,177	3,177	3,177	3,177	3,177	3,177	3,177	3,177	3,177		
C. Agricultural pollution load													
C1. Pollution load from fields													
1) Pollution load produced	$c1$	kg/day											
2) Flow-out ratio	$r21-1$	-											
3) Flow-down ratio	$r21-2$	-											
4) Run-off ratio	$r21 = (r21-1) + (r21-2)$	-											
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day											
C2. Pollution load from livestock													
1) Pollution load produced	$c2$	kg/day	21,276	21,276	21,276	21,276	21,276	21,276	21,276	21,276	21,276		
2) Flow-out ratio	$r22-1$	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	$r22-2$	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$r22 = (r22-1) + (r22-2)$	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	638	638	638	638	638	638	638	638	638		
C3 Total run-off pollution load from agriculture	$A3 = A1 + A2$	kg/day	638	638	638	638	638	638	638	638	638		
D. Other sources													
D1. Pollution load from others													
1) Pollution load produced	$d1$	kg/day	36,620	36,620	36,620	36,620	36,620	36,620	36,620	36,620	36,620		
2) Flow-out ratio	$r31-1$	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	$r31-2$	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$r31 = (r31-1) + (r31-2)$	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	$D5 = d1 \times r31$	kg/day	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099		
III. Water quality at control point													
E. Water quality monitored													
1) 1994		mg/l	8.3	9.4	7.8	8.4	7.8	7.5	8.2	8.4	8.4		
2) Average (1992-1996)													
3) Median (1992-1996)													
F. Result of calculation													
1) Total run-off pollution load	$L = L_0 + D6 + D4 + A3 + D5$	kg/day	9,324	9,324	9,324	9,324	9,324	9,324	9,324	9,324	9,324		
2) Water flow	Q	m ³ /s	19.0	15.0	15.0	14.0	17.0	10.0	14.0	14.0	14.0		
3) Water quality	$C = L/Q$	mg/l	5.7	6.2	7.2	7.7	6.0	10.8	7.9	7.9	7.9		

Table 1(2) Calculation of Water Quality (BOD) at Demangan Bridge (1994)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave (1994)	TS (1994)
I. Pollution load from upstream															
1) Water quality of Lodyo Dam (1992)	mg/l	2.0	2.2	4.3	6.5	4.3	3.8								
2) Water flow of Lodyo Dam	m ³ /s	72.0	6.0	61.0	57.0	107.0	73.0								
3) Pollution load from upstream	kg/day	12,480	1,440	22,663	32,544	39,751	21,067								
4) Pollution load from upstream considered with purification	kg/day	2,480	296	4,533	6,504	7,951	4,213								
II. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B1:42)															
1) Pollution load produced	kg/day	1,144	1,144	1,144	1,144	1,144	1,144								
2) Flow-out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.16	0.16	0.16	0.16	0.16								
5) Run-off pollution load	D1 = r1 x r1	kg/day	183	183	183	183	183								
A2 Pollution load (Sub-basin B1:50)															
1) Pollution load produced	kg/day	1,493	1,493	1,493	1,493	1,493	1,493								
2) Flow-out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r2-2	-	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	D2 = r2 x r2	kg/day	358	358	358	358	358								
A3 Pollution load (Sub-basin B1:53)															
1) Pollution load produced	kg/day	617	617	617	617	617	617								
2) Flow-out ratio	r3-1	-	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4								
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.32	0.32	0.32	0.32	0.32								
5) Run-off pollution load	D3 = r3 x r3	kg/day	197	197	197	197	197								
A4 Total run-off pollution load from domestic waste water	D4 = D1 + D2 + D3	kg/day	739	739	739	739	739								
B. Industrial waste water															
B1 Pollution load from major industries															
1) Pollution load produced	kg/day	230,953	230,953	230,953	230,953	230,953	230,953								
2) Flow-out ratio	r11-1	-	0.3	0.3	0.3	0.3	0.3								
3) Flow-down ratio	r11-2	-	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.06	0.06	0.06	0.06	0.06								
5) Run-off pollution load	D11 = r11 x r11	kg/day	13,857	13,857	13,857	13,857	13,857								
B2 Pollution load from large and medium scale industries															
1) Pollution load produced	kg/day	1,462	1,462	1,462	1,462	1,462	1,462								
2) Flow-out ratio	r12-1	-	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r12-2	-	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	D12 = r12 x r12	kg/day	351	351	351	351	351								
B3 Pollution load from small scale industries															
1) Pollution load produced	kg/day	257	257	257	257	257	257								
2) Flow-out ratio	r13-1	-	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r13-2	-	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	D13 = r13 x r13	kg/day	62	62	62	62	62								
B4 Total run-off pollution load from the industries	D14 = D11 + D12 + D13	kg/day	14,270	14,270	14,270	14,270	14,270								
C. Agricultural pollution load															
C1 Pollution load from fields															
1) Pollution load produced	kg/day	-	-	-	-	-	-								
2) Flow-out ratio	r21-1	-	-	-	-	-	-								
3) Flow-down ratio	r21-2	-	-	-	-	-	-								
4) Run-off ratio	r21 (r21-1+r21-2)	-	-	-	-	-	-								
5) Run-off pollution load	A1 = r21 x r21	kg/day	-	-	-	-	-								
C2 Pollution load from livestock															
1) Pollution load produced	kg/day	11,258	11,258	11,258	11,258	11,258	11,258								
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1								
3) Flow-down ratio	r22-2	-	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	A2 = r22 x r22	kg/day	338	338	338	338	338								
C3 Total run-off pollution load from agriculture	A3 = A1 + A2	kg/day	338	338	338	338	338								
D. Other sources															
D1 Pollution load from others															
1) Pollution load produced	kg/day	10,620	10,620	10,620	10,620	10,620	10,620								
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1								
3) Flow-down ratio	r31-2	-	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	D6 = r31 x r31	kg/day	319	319	319	319	319								
III. Water quality at control point															
E. Water quality monitored															
1) 1994	mg/l	2.8	3.8	4.3	7.5	2.6	3.5							4.1	4.3
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	L = D4 + D14 + D6 + A3 + D6	kg/day	18,153	18,945	20,197	22,196	21,615							20,458	20,089
2) Water flow	Q	m ³ /s	73.5	17.5	62.1	58.3	69.1							70.0	68.5
3) BOD quality	C = L/Q	mg/l	2.5	10.8	3.3	4.8	3.1							3.0	4.6

Table 13.3 Calculation of Water Quality (BOD) at Joeiria Bridge (1994)

Index		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
I. Pollution load from upstream														
1) Water quality of Nigroga River at (D0)	mg/l	6.3	4.8	10.5	3.9	3.8	4.7							
2) Water flow of Nigroga River at (D0)	m ³ /s	140.0	36.9	35.5	65.0	52.4	41.9							
3) Pollution load from upstream	kg/day	76.746	23.558	50.440	21.962	17.204	17.014							
4) Pollution load from point or extended self-purification	kg/day	15.356	4.721	10.083	4.386	3.41	3.403							
II. Pollution load from wastewater														
A. Domestic waste water														
A1. Pollution load (Sub-basin B310)														
1) Pollution load produced	kg/day	2.347	2.347	2.347	2.347	2.347	2.347							
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8							
3) Flow-down ratio	-	0.1	0.1	0.1	0.1	0.1	0.1							
4) Run-off ratio	(r1+r2+3)	0.06	0.06	0.06	0.06	0.06	0.06							
5) Run-off pollution load	kg/day	1.86	1.83	1.88	1.88	1.88	1.88							
A2. Pollution load (Sub-basin B311)														
1) Pollution load produced	kg/day	2.544	2.544	2.544	2.544	2.544	2.544							
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8							
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2							
4) Run-off ratio	(r1+r2+3)	0.16	0.16	0.16	0.16	0.16	0.16							
5) Run-off pollution load	kg/day	4.07	4.07	4.07	4.07	4.07	4.07							
A3. Pollution load (Sub-basin B312)														
1) Pollution load produced	kg/day	2.45	2.45	2.45	2.45	2.45	2.45							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3							
4) Run-off ratio	(r1+r2+3)	0.27	0.27	0.27	0.27	0.27	0.27							
5) Run-off pollution load	kg/day	66	66	66	66	66	66							
A4. Pollution load (Sub-basin B313)														
1) Pollution load produced	kg/day	352	352	352	352	352	352							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3							
4) Run-off ratio	(r1+r2+3)	0.27	0.27	0.27	0.27	0.27	0.27							
5) Run-off pollution load	kg/day	95	95	95	95	95	95							
A5. Pollution load (Sub-basin B314)														
1) Pollution load produced	kg/day	254	254	254	254	254	254							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.45	0.45	0.45	0.45	0.45	0.45							
5) Run-off pollution load	kg/day	114	114	114	114	114	114							
A6. Pollution load (Sub-basin B315)														
1) Pollution load produced	kg/day	1.521	1.521	1.521	1.521	1.521	1.521							
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8							
3) Flow-down ratio	-	0.6	0.6	0.6	0.6	0.6	0.6							
4) Run-off ratio	(r1+r2+3)	0.48	0.48	0.48	0.48	0.48	0.48							
5) Run-off pollution load	kg/day	730	730	730	730	730	730							
A7. Pollution load (Sub-basin B316)														
1) Pollution load produced	kg/day	171	171	171	171	171	171							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8							
4) Run-off ratio	(r1+r2+3)	0.72	0.72	0.72	0.72	0.72	0.72							
5) Run-off pollution load	kg/day	123	123	123	123	123	123							
A8. Pollution load (Sub-basin B317)														
1) Pollution load produced	kg/day	2.287	2.287	2.287	2.287	2.287	2.287							
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7							
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3							
4) Run-off ratio	(r1+r2+3)	0.21	0.21	0.21	0.21	0.21	0.21							
5) Run-off pollution load	kg/day	480	480	480	480	480	480							
A9. Total run-off pollution load from domestic waste water	kg/day	2.804	2.804	2.804	2.804	2.804	2.804							
B. Industrial waste water														
B1. Pollution load from major producers														
1) Pollution load produced	kg/day	788.432	788.432	788.432	788.432	788.432	788.432							
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.025	0.025	0.025	0.025	0.025	0.025							
5) Run-off pollution load	kg/day	19.711	19.711	19.711	19.711	19.711	19.711							
B2. Pollution load from large and medium scale industries														
1) Pollution load produced	kg/day	4.748	4.748	4.748	4.748	4.748	4.748							
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.1	0.1	0.1	0.1	0.1	0.1							
5) Run-off pollution load	kg/day	475	475	475	475	475	475							
B3. Pollution load from small scale industries														
1) Pollution load produced	kg/day	791	791	791	791	791	791							
2) Flow-out ratio	-	0.5	0.2	0.2	0.2	0.2	0.2							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.1	0.1	0.1	0.1	0.1	0.1							
5) Run-off pollution load	kg/day	79	79	79	79	79	79							
B4. Total run-off pollution load from the industries	kg/day	20.265	20.265	20.265	20.265	20.265	20.265							
C. Agricultural pollution load														
C1. Pollution load from fields														
1) Pollution load produced	kg/day													
2) Flow-out ratio	-													
3) Flow-down ratio	-													
4) Run-off ratio	(r1+r2+3)													
5) Run-off pollution load	kg/day													
C2. Pollution load from livestock														
1) Pollution load produced	kg/day	24.838	24.838	24.838	24.838	24.838	24.838							
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.025	0.025	0.025	0.025	0.025	0.025							
5) Run-off pollution load	kg/day	621	621	621	621	621	621							
C3. Total run-off pollution load from agriculture	kg/day	621	621	621	621	621	621							
D. Other sources														
D1. Pollution load from others														
1) Pollution load produced	kg/day	12.240	12.240	12.240	12.240	12.240	12.240							
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	(r1+r2+3)	0.025	0.025	0.025	0.025	0.025	0.025							
5) Run-off pollution load	kg/day	307	307	307	307	307	307							
III. Water quality at control point														
E. Water quality monitored														
1) 1994	mg/l	3.5	3.8	11.9	3.4	7.7	4.5	5.8	7.7					
2) Average (1992-1996)														
3) Average (1992-1996)														
F. Result of calculation														
1) Total run-off pollution load	kg/day	38.746	28.116	31.464	27.777	26.817	26.799	30.293						
2) Water flow	m ³ /s	121.0	47.0	52.0	65.0	47.0	32.0	60.7						
3) Water quality	mg/l	3.3	6.0	7.5	4.9	6.6	9.7	6.9						

Table 114: Calculation of Water Quality (BOD) at Padang Bridge (1994)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave./Yr	1994
I. Pollution load from upstream															
1. Water quality of River Tungkang	mg/l	25	10	48	66	49	23	39							
2. Water flow of River Tungkang	m ³ /s	79.5	37.6	33.3	16.2	11.9	17.4	45.3							
3. Pollution load from upstream	kg/day	17,112	12,736	30,567	9,238	5,036	2,937	11,948							
4. Pollution load from upstream considered self-purification	kg/day	6,929	5,066	12,126	3,695	2,065	1,176	5,179							
II. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B5.1)															
1. Pollution load produced	kg/day	420	420	420	420	420	420	420							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	340	340	340	340	340	340	340							
A2 Pollution load (Sub-basin B5.4)															
1. Pollution load produced	kg/day	1,114	1,114	1,114	1,114	1,114	1,114	1,114							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	960	960	960	960	960	960	960							
A3 Pollution load (Sub-basin B5.5)															
1. Pollution load produced	kg/day	420	420	420	420	420	420	420							
2. Flow out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7							
3. Flow down ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7							
4. Run-off ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7							
5. Run-off pollution load	kg/day	294	294	294	294	294	294	294							
A4 Pollution load (Sub-basin B5.6)															
1. Pollution load produced	kg/day	292	292	292	292	292	292	292							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	164	164	164	164	164	164	164							
A5 Pollution load (Sub-basin B5.7)															
1. Pollution load produced	kg/day	48	48	48	48	48	48	48							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	39	39	39	39	39	39	39							
A6 Pollution load (Sub-basin B5.8)															
1. Pollution load produced	kg/day	847	847	847	847	847	847	847							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	720	720	720	720	720	720	720							
A7 Pollution load (Sub-basin B5.11)															
1. Pollution load produced	kg/day	1,126	1,126	1,126	1,126	1,126	1,126	1,126							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	213	213	213	213	213	213	213							
A8 Pollution load (Sub-basin B5.12)															
1. Pollution load produced	kg/day	3,661	3,661	3,661	3,661	3,661	3,661	3,661							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	366	366	366	366	366	366	366							
A9 Pollution load (Sub-basin B5.13)															
1. Pollution load produced	kg/day	236	236	236	236	236	236	236							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	132	132	132	132	132	132	132							
A10 Pollution load (Sub-basin B5.14)															
1. Pollution load produced	kg/day	3,369	3,369	3,369	3,369	3,369	3,369	3,369							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	337	337	337	337	337	337	337							
A11 Pollution load (Sub-basin B5.15)															
1. Pollution load produced	kg/day	750	750	750	750	750	750	750							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	315	315	315	315	315	315	315							
A12 Total run-off pollution load from domestic waste water															
	kg/day	2,064	2,064	2,064	2,064	2,064	2,064	2,064							
B. Industrial waste water															
B1 Pollution load from major producers															
1. Pollution load produced	kg/day	0	0	0	0	0	0	0							
2. Flow out ratio	-	0	0	0	0	0	0	0							
3. Flow down ratio	-	0	0	0	0	0	0	0							
4. Run-off ratio	-	0	0	0	0	0	0	0							
5. Run-off pollution load	kg/day	0	0	0	0	0	0	0							
B2 Pollution load from large and medium scale industries															
1. Pollution load produced	kg/day	1,794	1,794	1,794	1,794	1,794	1,794	1,794							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	718	718	718	718	718	718	718							
B3 Pollution load from small scale industries															
1. Pollution load produced	kg/day	381	381	381	381	381	381	381							
2. Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
3. Flow down ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
4. Run-off ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9							
5. Run-off pollution load	kg/day	152	152	152	152	152	152	152							
B4 Total run-off pollution load from the industries															
	kg/day	870	870	870	870	870	870	870							
C. Agricultural pollution load															
C1 Pollution load from livestock															
1. Pollution load produced	kg/day	49,114	49,114	49,114	49,114	49,114	49,114	49,114							
2. Flow out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1							
3. Flow down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5							
4. Run-off ratio	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05							
5. Run-off pollution load	kg/day	2,456	2,456	2,456	2,456	2,456	2,456	2,456							
C2 Total run-off pollution load from agriculture															
	kg/day	2,456	2,456	2,456	2,456	2,456	2,456	2,456							
D. Other sources															
D1 Pollution load from others															
1. Pollution load produced	kg/day	36,440	36,440	36,440	36,440										

Table-1.5) Calculation of Water Quality (EQD) at Cengga Tambangan (1994)

Item		Unit	1994	1992	1993	1994	1995	1996	1997	1998
I. Pollution load from upstream										
1) Water quality of Palaran (PQ)	Q1	mg/l	4.6	4.2	4.3	10.5	2.9	7.6		
2) Water flow of Palaran	Q2	m ³ /s	62.4	62.9	47.0	42.4	39.5	34.8		
3) Pollution load from upstream	$L1 = Q1 \times Q2$	kg/day	255.84	262.36	144.81	38.82	9.592	12.551		
4) Pollution load from upstream (considered self-purification)	$L1 - Q1 \times Q2$	kg/day	5.337	3.110	2.229	5.825	1.455	3.426		
II. Pollution load from sub-basin										
A. Domestic waste water										
A1. Pollution load (Sub-basin B1/9)										
1) Pollution load produced	a1	kg/day	144	144	144	144	144	144		
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r1 (r1-1 + r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	52	52	52	52	52	52		
A2. Pollution load (Sub-basin B2/2)										
1) Pollution load produced	a2	kg/day	133	133	133	133	133	133		
2) Flow-out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r2-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r2 (r2-1 + r2-2)	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	48	48	48	48	48	48		
A3 Total run-off pollution load from domestic waste water	$D1 + D2$	kg/day	100	100	100	100	100	100		
B. Industrial waste water										
B1. Pollution load from major industries										
1) Pollution load produced	b1	kg/day	20,279	20,279	20,279	20,279	20,279	20,279		
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r11 (r11-1 + r11-2)	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	7,301	7,301	7,301	7,301	7,301	7,301		
B2. Pollution load from large and medium scale industries										
1) Pollution load produced	b2	kg/day	37	37	37	37	37	37		
2) Flow-out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r12 (r12-1 + r12-2)	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	13	13	13	13	13	13		
B3. Pollution load from small scale industries										
1) Pollution load produced	b3	kg/day	8	8	8	8	8	8		
2) Flow-out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r13 (r13-1 + r13-2)	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	3	3	3	3	3	3		
B4 Total run-off pollution load from the industries	$D1 + D2 + D3$	kg/day	7,339	7,339	7,339	7,339	7,339	7,339		
C. Agricultural pollution load										
C1. Pollution load from fields										
1) Pollution load produced	c1	kg/day								
2) Flow-out ratio	r21-1	-								
3) Flow-down ratio	r21-2	-								
4) Run-off ratio	r21 (r21-1 + r21-2)	-								
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day								
C2. Pollution load from livestock										
1) Pollution load produced	c2	kg/day	1,022	1,022	1,022	1,022	1,022	1,022		
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r22 (r22-1 + r22-2)	-	0.04	0.04	0.04	0.04	0.04	0.04		
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	41	41	41	41	41	41		
C3 Total run-off pollution load from agriculture	$A1 + A2$	kg/day	41	41	41	41	41	41		
D. Other sources										
D1. Pollution load from others										
1) Pollution load produced	d1	kg/day	4,325	4,325	4,325	4,325	4,325	4,325		
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r31 (r31-1 + r31-2)	-	0.04	0.04	0.04	0.04	0.04	0.04		
5) Run-off pollution load	$D4 = d1 \times r31$	kg/day	173	173	173	173	173	173		
II. Water quality at control point										
E. Water quality monitored										
1) 1994		mg/l	3.4	4.0	3.3	10.4	5.2	4.9	5.2	5.2
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load	$L = L1 + D1 + D2 + D3 + D4$	kg/day	12,900	13,703	9,882	13,477	9,137	11,080	11,221	
2) Water flow	Q	m ³ /s	24.6	29.5	21.5	22.2	25.0	21.2	24.0	
3) Water quality	$C = L/Q$	mg/l	5.1	4.2	5.3	7.0	4.2	6.0	5.5	5.1

Table 1(S) Calculation of Water Quality (BOD) at Karangpitang (1994)

Items		Units	Inj.	Pd.	Avg.	Sep.	Ox.	Nw.	Acc/Ops.	TOT
I. Pollution load from upstream										
1) Water quality at Chengpu Pumping station (B00)		C0	m ³ /d	3.4	3.9	3.3	16.8	5.2	4.9	
2) Water flow at Chengpu Pumping station		Q0	m ³ /s	24.6	29.5	27.7	22.7	25.0	21.2	
3) Pollution load from upstream		L0=C0/Q0	kg/d	7.256	73.92	6.130	20.327	11.212	4.893	
4) Pollution load from upstream after control and self-purification		L0-C0x Q0	kg/d	-	4.009	99	3.090	1.685	1.316	
II. Pollution load from sub-basin										
A. Domestic waste water										
A1 Pollution load (Sub-basin B021)										
1) Pollution load produced		a1	kg/day	289	289	289	289	289	289	
2) Flow-out ratio		r(1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio		r(1-(r(1-1)+r(1-2)))	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load		D1=a1*r(1)	kg/day	52	52	52	52	52	52	
A2 Pollution load (Sub-basin B022)										
1) Pollution load produced		a2	kg/day	929	929	929	929	929	929	
2) Flow-out ratio		r(2-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(2-2)	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio		r(2-(r(2-1)+r(2-2)))	-	0.27	0.27	0.27	0.27	0.27	0.27	
5) Run-off pollution load		D2=a2*r(2)	kg/day	251	251	251	251	251	251	
A3 Pollution load (Sub-basin B023)										
1) Pollution load produced		a3	kg/day	374	374	374	374	374	374	
2) Flow-out ratio		r(3-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(3-2)	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio		r(3-(r(3-1)+r(3-2)))	-	0.45	0.45	0.45	0.45	0.45	0.45	
5) Run-off pollution load		D3=a3*r(3)	kg/day	168	168	168	168	168	168	
A4 Pollution load (Sub-basin B024)										
1) Pollution load produced		a4	kg/day	145	145	145	145	145	145	
2) Flow-out ratio		r(4-1)	-	0.6	0.6	0.6	0.6	0.6	0.6	
3) Flow-down ratio		r(4-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio		r(4-(r(4-1)+r(4-2)))	-	0.12	0.12	0.12	0.12	0.12	0.12	
5) Run-off pollution load		D4=a4*r(4)	kg/day	18	18	18	18	18	18	
A5 Pollution load (Sub-basin B025)										
1) Pollution load produced		a5	kg/day	958	958	958	958	958	958	
2) Flow-out ratio		r(5-1)	-	0.5	0.5	0.5	0.5	0.5	0.5	
3) Flow-down ratio		r(5-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio		r(5-(r(5-1)+r(5-2)))	-	0.1	0.1	0.1	0.1	0.1	0.1	
5) Run-off pollution load		D5=a5*r(5)	kg/day	96	96	96	96	96	96	
A6 Pollution load (Sub-basin B031)										
1) Pollution load produced		a6	kg/day	148	148	148	148	148	148	
2) Flow-out ratio		r(6-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(6-2)	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio		r(6-(r(6-1)+r(6-2)))	-	0.21	0.21	0.21	0.21	0.21	0.21	
5) Run-off pollution load		D6=a6*r(6)	kg/day	31	31	31	31	31	31	
A7 Pollution load (Sub-basin B032)										
1) Pollution load produced		a7	kg/day	485	485	485	485	485	485	
2) Flow-out ratio		r(7-1)	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio		r(7-2)	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio		r(7-(r(7-1)+r(7-2)))	-	0.24	0.24	0.24	0.24	0.24	0.24	
5) Run-off pollution load		D7=a7*r(7)	kg/day	116	116	116	116	116	116	
A8 Total run-off pollution load from domestic waste water		D6-D7+a8=D7	kg/day	732	732	732	732	732	732	
B. Industrial waste water										
B1 Pollution load from major producers										
1) Pollution load produced		b1	kg/day	98.054	98.054	98.054	98.054	98.054	98.054	
2) Flow-out ratio		r(1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(1-2)	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio		r(1-(r(1-1)+r(1-2)))	-	0.2	0.2	0.2	0.2	0.2	0.2	
5) Run-off pollution load		D1=b1*r(1)	kg/day	19.611	19.611	19.611	19.611	19.611	19.611	
B2 Pollution load from large and medium scale industries										
1) Pollution load produced		b2	kg/day	9.440	9.440	9.440	9.440	9.440	9.440	
2) Flow-out ratio		r(2-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(2-2)	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio		r(2-(r(2-1)+r(2-2)))	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load		D2=b2*r(2)	kg/day	1.692	1.692	1.692	1.692	1.692	1.692	
B3 Pollution load from small scale industries										
1) Pollution load produced		b3	kg/day	1.104	1.104	1.104	1.104	1.104	1.104	
2) Flow-out ratio		r(3-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio		r(3-2)	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio		r(3-(r(3-1)+r(3-2)))	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load		D3=b3*r(3)	kg/day	193	193	193	193	193	193	
B4 Total run-off pollution load from the industries		D2-D3+a3=D3	kg/day	21.456	21.456	21.456	21.456	21.456	21.456	
C. Agricultural pollution load										
C1 Pollution load from farmland										
1) Pollution load produced		c1	kg/day	-	-	-	-	-	-	
2) Flow-out ratio		r(1-1)	-	-	-	-	-	-	-	
3) Flow-down ratio		r(1-2)	-	-	-	-	-	-	-	
4) Run-off ratio		r(1-(r(1-1)+r(1-2)))	-	-	-	-	-	-	-	
5) Run-off pollution load		A1-C1x Q1	kg/day	-	-	-	-	-	-	
C2 Pollution load from livestock										
1) Pollution load produced		c2	kg/day	6.934	6.934	6.934	6.934	6.934	6.934	
2) Flow-out ratio		r(2-1)	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio		r(2-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio		r(2-(r(2-1)+r(2-2)))	-	0.01	0.01	0.01	0.01	0.01	0.01	
5) Run-off pollution load		A2-C2x Q2	kg/day	69	69	69	69	69	69	
C3 Total run-off pollution load from agriculture		A2-A1+A2	kg/day	69	69	69	69	69	69	
D. Other sources										
D1 Pollution load from others										
1) Pollution load produced		d1	kg/day	10.358	10.358	10.358	10.358	10.358	10.358	
2) Flow-out ratio		r(3-1)	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio		r(3-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio		r(3-(r(3-1)+r(3-2)))	-	0.01	0.01	0.01	0.01	0.01	0.01	
5) Run-off pollution load		D6-D1+A3=D1	kg/day	104	104	104	104	104	104	
III. Water quality at control point										
E. Water quality measured										
1) 1994			mg/l	15.7	11.1	21.2	14.0	7.9	11.3	14.0
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load		L=L0-D1-D2-D3-D4-D5-D6	kg/day	23.445	23.476	23.281	25.411	24.046	23.707	23.893
2) Water flow		Q	m ³ /s	18.3	24.0	21.2	19.8	18.6	28.3	24.9
3) Water quality		C=LO	mg/l	12.8	11.2	12.7	12.9	15.0	9.7	13.7

Table 1.6) Calculation of Water Quality (BOD) at Ngazet (1994)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
I. Pollution load from upstream									
1) Water quality of Karagaling (1994)	CO	mg/l	15.7	11.1	11.2	14.0	7.9	7.0	7.0
2) Water flow of Karagaling	Q ₀	m ³ /s	18.3	24.9	24.2	19.8	18.5	25.3	25.3
3) Pollution load from upstream	(Q ₀ -CO)/Q ₀	kg/day	24.824	23.019	20.515	23.551	11.696	19.376	19.376
4) Pollution load from upstream considered self-purification	L ₀ -CO ₀ /Q ₀	kg/day	3.724	3.455	3.077	3.593	1.964	2.897	2.897
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load (Sub-basin B54C)									
1) Pollution load produced	a1	kg/day	835	835	835	835	835	835	835
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D1=a1 x r1	kg/day	301	301	301	301	301	301	301
A2 Pollution load (Sub-basin B541)									
1) Pollution load produced	a2	kg/day	292	292	292	292	292	292	292
2) Flow out ratio	r2-1	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6
3) Flow down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.12	0.12	0.12	0.12	0.12	0.12	0.12
5) Run-off pollution load	D2=a2 x r2	kg/day	35	35	35	35	35	35	35
A3 Pollution load (Sub-basin B542)									
1) Pollution load produced	a3	kg/day	1029	1029	1029	1029	1029	1029	1029
2) Flow out ratio	r3-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	D3=a3 x r3	kg/day	216	216	216	216	216	216	216
A4 Pollution load (Sub-basin B543)									
1) Pollution load produced	a4	kg/day	4.878	4.878	4.878	4.878	4.878	4.878	4.878
2) Flow out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r4-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D4=a4 x r4	kg/day	1.731	1.731	1.731	1.731	1.731	1.731	1.731
A5 Pollution load (Sub-basin B544)									
1) Pollution load produced	a5	kg/day	2.320	2.320	2.320	2.320	2.320	2.320	2.320
2) Flow out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r5-2	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.63	0.63	0.63	0.63	0.63	0.63	0.63
5) Run-off pollution load	D5=a5 x r5	kg/day	1.462	1.462	1.462	1.462	1.462	1.462	1.462
A6 Total run-off pollution load from domestic waste water	D6=D1+D2+D3+D4+D5	kg/day	3.744	3.744	3.744	3.744	3.744	3.744	3.744
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	a1	kg/day	4.948	4.948	4.948	4.948	4.948	4.948	4.948
2) Flow out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D1=a1 x r11	kg/day	1.781	1.781	1.781	1.781	1.781	1.781	1.781
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	a2	kg/day	5.849	5.849	5.849	5.849	5.849	5.849	5.849
2) Flow out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	D2=a2 x r12	kg/day	1.638	1.638	1.638	1.638	1.638	1.638	1.638
B3 Pollution load from small scale industries									
1) Pollution load produced	a3	kg/day	1.032	1.032	1.032	1.032	1.032	1.032	1.032
2) Flow out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	D3=a3 x r13	kg/day	289	289	289	289	289	289	289
B4 Total run-off pollution load from the industries	D4=D1+D2+D3	kg/day	3.708	3.708	3.708	3.708	3.708	3.708	3.708
C. Agricultural pollution load									
C1 Pollution load from fields									
1) Pollution load produced	a1	kg/day	-	-	-	-	-	-	-
2) Flow out ratio	r21-1	-	-	-	-	-	-	-	-
3) Flow down ratio	r21-2	-	-	-	-	-	-	-	-
4) Run-off ratio	r21 (r21-1+r21-2)	-	-	-	-	-	-	-	-
5) Run-off pollution load	A1=a1 x r21	kg/day	-	-	-	-	-	-	-
C2 Pollution load from livestock									
1) Pollution load produced	a2	kg/day	2.203	2.203	2.203	2.203	2.203	2.203	2.203
2) Flow out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5) Run-off pollution load	A2=a2 x r22	kg/day	44	44	44	44	44	44	44
C3 Total run-off pollution load from agriculture	A3=A1+A2	kg/day	44	44	44	44	44	44	44
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	a1	kg/day	5.425	5.425	5.425	5.425	5.425	5.425	5.425
2) Flow out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5) Run-off pollution load	D1=a1 x r31	kg/day	109	109	109	109	109	109	109
III. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l	6.1	6.0	8.0	9.8	7.3	6.2	7.2	8.0
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	L=L0+D6+D4+A3+D1	kg/day	11.329	11.054	10.642	11.198	9.509	10.502	10.713
2) Water flow	Q	m ³ /s	15.4	20.9	17.8	15.4	13.2	23.1	17.6
3) Water quality	C=L/Q	mg/l	8.5	8.1	6.9	8.4	8.2	5.2	8.4

Table 3.7) Calculation of Water Quality (EQD) at Kayoon (1994)

Items	Unit	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Ave./Day	75% V ₉₅
I. Pollution load from upstream														
1) Water quality of River Bridge (100)	Cu	mg/l	6.1	6.0	8.0	9.5	7.3	6.2						
2) Water flow of River Bridge	Q ₀	m ³ /s	2.5	2.5	2.5	2.5	2.5	2.5						
3) Pollution load from upstream	$10 \times Q_0 \times C_0$	kg/day	1,515	1,200	1,725	2,117	1,577	1,361						
4) Pollution load from upstream (run-off load self-pollution)	$10 \times C_0 \times Q_0$	kg/day	260	219	340	421	315	272						
II. Pollution load from sub-basin														
A. Domestic waste water														
A1 Pollution load (Sub-basin B545)		kg/day	652	652	652	652	652	652						
1) Pollution load produced	r_1	-	0.9	0.9	0.9	0.9	0.9	0.9						
2) Flow-out ratio	r_1-1	-	0.4	0.4	0.4	0.4	0.4	0.4						
3) Flow-down ratio	r_1-2	-	0.56	0.56	0.56	0.56	0.56	0.56						
4) Run-off ratio	$r_1(r_1-1)(r_1-2)$	-	0.25	0.25	0.25	0.25	0.25	0.25						
5) Run-off pollution load	$D_1 = r_1 \times r_1$	kg/day	215	215	215	215	215	215						
A2 Pollution load (Sub-basin B645)		kg/day	973	973	973	973	973	973						
1) Pollution load produced	r_2	-	0.9	0.9	0.9	0.9	0.9	0.9						
2) Flow-out ratio	r_2-1	-	0.6	0.6	0.6	0.6	0.6	0.6						
3) Flow-down ratio	r_2-2	-	0.54	0.54	0.54	0.54	0.54	0.54						
4) Run-off ratio	$r_2(r_2-1)(r_2-2)$	-	0.25	0.25	0.25	0.25	0.25	0.25						
5) Run-off pollution load	$D_2 = r_2 \times r_2$	kg/day	325	325	325	325	325	325						
A3 Total run-off pollution load from domestic waste water	$D_0 = D_1 + D_2$	kg/day	760	760	760	760	760	760						
B. Industrial waste water														
B1 Pollution load from major industries		kg/day	0	0	0	0	0	0						
1) Pollution load produced	r_{11}	-	0	0	0	0	0	0						
2) Flow-out ratio	$r_{11}-1$	-	0	0	0	0	0	0						
3) Flow-down ratio	$r_{11}-2$	-	0	0	0	0	0	0						
4) Run-off ratio	$r_{11}(r_{11}-1)(r_{11}-2)$	-	0	0	0	0	0	0						
5) Run-off pollution load	$D_3 = r_{11} \times r_{11}$	kg/day	0	0	0	0	0	0						
B2 Pollution load from large and medium scale industries		kg/day	654	654	654	654	654	654						
1) Pollution load produced	r_{12}	-	0.9	0.9	0.9	0.9	0.9	0.9						
2) Flow-out ratio	$r_{12}-1$	-	0.5	0.5	0.5	0.5	0.5	0.5						
3) Flow-down ratio	$r_{12}-2$	-	0.45	0.45	0.45	0.45	0.45	0.45						
4) Run-off ratio	$r_{12}(r_{12}-1)(r_{12}-2)$	-	0.24	0.24	0.24	0.24	0.24	0.24						
5) Run-off pollution load	$D_4 = r_{12} \times r_{12}$	kg/day	294	294	294	294	294	294						
B3 Pollution load from small scale industries		kg/day	123	123	123	123	123	123						
1) Pollution load produced	r_{13}	-	0.9	0.9	0.9	0.9	0.9	0.9						
2) Flow-out ratio	$r_{13}-1$	-	0.5	0.5	0.5	0.5	0.5	0.5						
3) Flow-down ratio	$r_{13}-2$	-	0.45	0.45	0.45	0.45	0.45	0.45						
4) Run-off ratio	$r_{13}(r_{13}-1)(r_{13}-2)$	-	0.25	0.25	0.25	0.25	0.25	0.25						
5) Run-off pollution load	$D_5 = r_{13} \times r_{13}$	kg/day	55	55	55	55	55	55						
B4 Total run-off pollution load from the industries	$D_6 = D_3 + D_4 + D_5$	kg/day	350	350	350	350	350	350						
C. Agricultural pollution load														
C1 Pollution load from fields		kg/day												
1) Pollution load produced	r_{21}	-												
2) Flow-out ratio	$r_{21}-1$	-												
3) Flow-down ratio	$r_{21}-2$	-												
4) Run-off ratio	$r_{21}(r_{21}-1)(r_{21}-2)$	-												
5) Run-off pollution load	$D_7 = r_{21} \times r_{21}$	kg/day												
C2 Pollution load from livestock		kg/day	91	91	91	91	91	91						
1) Pollution load produced	r_{22}	-	0.05	0.05	0.05	0.05	0.05	0.05						
2) Flow-out ratio	$r_{22}-1$	-	0.5	0.5	0.5	0.5	0.5	0.5						
3) Flow-down ratio	$r_{22}-2$	-	0.025	0.025	0.025	0.025	0.025	0.025						
4) Run-off ratio	$r_{22}(r_{22}-1)(r_{22}-2)$	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025						
5) Run-off pollution load	$D_8 = r_{22} \times r_{22}$	kg/day	2	2	2	2	2	2						
C3 Total run-off pollution load from agriculture	$D_9 = D_7 + D_8$	kg/day	2	2	2	2	2	2						
D. Other sources														
D1 Pollution load from others		kg/day	580	580	580	580	580	580						
1) Pollution load produced	r_{31}	-	0.05	0.05	0.05	0.05	0.05	0.05						
2) Flow-out ratio	$r_{31}-1$	-	0.5	0.5	0.5	0.5	0.5	0.5						
3) Flow-down ratio	$r_{31}-2$	-	0.025	0.025	0.025	0.025	0.025	0.025						
4) Run-off ratio	$r_{31}(r_{31}-1)(r_{31}-2)$	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025						
5) Run-off pollution load	$D_{10} = r_{31} \times r_{31}$	kg/day	15	15	15	15	15	15						
III. Water quality at control point														
E. Water quality monitored														
1) 1954		mg/l			6.2								6.2	
2) Average (1962-1996)														
3) Median (1952-1996)														
F. Result of calculation														
1) Total run-off pollution load	$L = L_0 + D_0 + D_6 + D_9 + D_{10}$	kg/day	1,360	1,286	1,472	1,550	1,442	1,399					1,440	
2) Water flow	Q	m ³ /s			2.8								2.8	
3) Water quality	$C = L/Q$	mg/l			6.1								6.1	

Table 1.3) Calculation of Water Quality (BOD) at Perong (1994)

Items		Units	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009	3010	3011	3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022	3023	3024	3025	3026	3027	3028	3029	3030	3031	3032	3033	3034	3035	3036	3037	3038	3039	3040	3041	3042	3043	3044	3045	3046	3047	3048	3049	3050	3051	3052	3053	3054	3055	3056	3057	3058	3059	3060	3061	3062	3063	3064	3065	3066	3067	3068	3069	3070	3071	3072	3073	3074	3075	3076	3077	3078	3079	3080	3081	3082	3083	3084	3085	3086	3087	3088	3089	3090	3091	3092	3093	3094	3095	3096	3097	3098	3099	3100	3101	3102	3103	3104	3105	3106	3107	3108	3109	3110	3111	3112	3113	3114	3115	3116	3117	3118	3119	3120	3121	3122	3123	3124	3125	3126	3127	3128	3129	3130	3131	3132	3133	3134	3135	3136	3137	3138	3139	3140	3141	3142	3143	3144	3145	3146	3147	3148	3149	3150	3151	3152	3153	3154	3155	3156	3157	3158	3159	3160	3161	3162	3163	3164	3165	3166	3167	3168	3169	3170	3171	3172	3173	3174	3175	3176	3177	3178	3179	3180	3181	3182	3183	3184	3185	3186	3187	3188	3189	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199	3200	3201	3202	3203	3204	3205	3206	3207	3208	3209	3210	3211	3212	3213	3214	3215	3216	3217	3218	3219	3220	3221	3222	3223	3224	3225	3226	3227	3228	3229	3230	3231	3232	3233	3234	3235	3236	3237	3238	3239	3240	3241	3242	3243	3244	3245	3246	3247	3248	3249	3250	3251	3252	3253	3254	3255	3256	3257	3258	3259	3260	3261	3262	3263	3264	3265	3266	3267	3268	3269	3270	3271	3272	3273	3274	3275	3276	3277	3278	3279	3280	3281	3282	3283	3284	3285	3286	3287	3288	3289	3290	3291	3292	3293	3294	3295	3296	3297	3298	3299	3300	3301	3302	3303	3304	3305	3306	3307	3308	3309	3310	3311	3312	3313	3314	3315	3316	3317	3318	3319	3320	3321	3322	3323	3324	3325	3326	3327	3328	3329	3330	3331	3332	3333	3334	3335	3336	3337	3338	3339	3340	3341	3342	3343	3344	3345	3346	3347	3348	3349	3350	3351	3352	3353	3354	3355	3356	3357	3358	3359	3360	3361	3362	3363
-------	--	-------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Table-1(9) Calculation of Water Quality (BOD) at Bondayu Bridge (1994)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec	Avg (1994)	1995
I. Pollution load from upstream														
1) Water quality of intake of water canal	CO	mg/l												
2) Water flow of intake of water canal	Q0	m ³ /s												
3) Pollution load from upstream	$10^6 \times CO \times Q0$	kg/day												
4) Pollution load from upstream considered self purification	$10^6 \times CO \times \alpha$	kg/day												
II. Pollution load from sub-basin														
A. Domestic waste water														
A1. Pollution load														
1) Pollution load produced	a1	kg/day	20	20	20	20	20	20	20	20	20	20	20	20
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r1-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	18	18	18	18	18	18	18	18	18	18	18	18
A2. Total run-off pollution load from domestic waste water	$D0 = D1$	kg/day	18	18	18	18	18	18	18	18	18	18	18	18
B. Industrial waste water														
B1. Pollution load from major producers														
1) Pollution load produced	b1	kg/day	0	0	0	0	0	0	0	0	0	0	0	0
2) Flow out ratio	r11-1	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Flow down ratio	r11-2	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Run-off ratio	$r11(r11-1)(r11-2)$	-	0	0	0	0	0	0	0	0	0	0	0	0
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	0	0	0	0	0	0	0	0	0	0	0	0
B2. Pollution load from large and medium scale industries														
1) Pollution load produced	b2	kg/day	34	34	34	34	34	34	34	34	34	34	34	34
2) Flow out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r12-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r12(r12-1)(r12-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	24	24	24	24	24	24	24	24	24	24	24	24
B3. Pollution load from small scale industries														
1) Pollution load produced	b3	kg/day	5	5	5	5	5	5	5	5	5	5	5	5
2) Flow out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r13-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r13(r13-1)(r13-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	4	4	4	4	4	4	4	4	4	4	4	4
B4. Total run-off pollution load from the industries	$D3 = D2 + D3$	kg/day	28	28	28	28	28	28	28	28	28	28	28	28
C. Agricultural pollution load														
C1. Pollution load from fields														
1) Pollution load produced	c1	kg/day	-	-	-	-	-	-	-	-	-	-	-	-
2) Flow out ratio	r21-1	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Flow down ratio	r21-2	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Run-off ratio	$r21(r21-1)(r21-2)$	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day	-	-	-	-	-	-	-	-	-	-	-	-
C2. Pollution load from livestock														
1) Pollution load produced	c2	kg/day	10	10	10	10	10	10	10	10	10	10	10	10
2) Flow out ratio	r22-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	r22-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r22(r22-1)(r22-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
C3. Total run-off pollution load from agriculture	$A3 = A1 + A2$	kg/day	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
D. Other sources														
D1. Pollution load from others														
1) Pollution load produced	d1	kg/day	38	38	38	38	38	38	38	38	38	38	38	38
2) Flow out ratio	r31-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	r31-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r31(r31-1)(r31-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	$D4 = d1 \times r31$	kg/day	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08
III. Water quality at control point														
E. Water quality monitored														
1) 1994	mg/l				9.3								9.3	
2) Average (1992-1996)														
3) Median (1992-1996)														
F. Result of calculation														
1) Total run-off pollution load	$L = L0 + D0 + D2 + D3 + D4$	kg/day	52	52	52	52	52	52	52	52	52	52	52	52
2) Water flow	Q	m ³ /s			0.06								0.06	
3) Water quality	$C = L/Q$	mg/l			9.3								9.3	

Table-2(i) Calculation of Water Quality (BOD) at Bumayu Bridge (2020 : Without project)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly	75%ile
I. Pollution load from upstream															
1) Water quality	mg/l	Q6													
2) Water flow	m ³ /s	Q6													
3) Pollution load from upstream	kg/day	$Q6 \times Q6 \times Q6$													
4) Run-off pollution load from upstream	kg/day	1.0													
II. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B000)															
1) Pollution load produced	kg/day	197	197	197	197	197	197	197	197	197	197	197	197		
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
4) Run-off ratio	$(1) \times (1) \times (1)$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
5) Run-off pollution load	kg/day	$D1 = 197 \times 0.01$	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
A2 Pollution load (Sub-basin B001)															
1) Pollution load produced	kg/day	3.745	3.745	3.745	3.745	3.745	3.745	3.745	3.745	3.745	3.745	3.745	3.745		
2) Flow-out ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$(2) \times (3) \times (2)$	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
5) Run-off pollution load	kg/day	$D2 = 3.745 \times 0.1$	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
A3 Pollution load (Sub-basin B020)															
1) Pollution load produced	kg/day	8.562	8.562	8.562	8.562	8.562	8.562	8.562	8.562	8.562	8.562	8.562	8.562		
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$(3) \times (3) \times (3)$	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	kg/day	$D3 = 8.562 \times 0.21$	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
A4 Pollution load (Sub-basin B021)															
1) Pollution load produced	kg/day	14.365	14.365	14.365	14.365	14.365	14.365	14.365	14.365	14.365	14.365	14.365	14.365		
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$(3) \times (3) \times (3)$	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	kg/day	$D4 = 14.365 \times 0.21$	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02		
A5 Pollution load (Sub-basin B022)															
1) Pollution load produced	kg/day	5.185	5.185	5.185	5.185	5.185	5.185	5.185	5.185	5.185	5.185	5.185	5.185		
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$(3) \times (3) \times (3)$	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	kg/day	$D5 = 5.185 \times 0.72$	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73		
A6 Total run-off pollution load from domestic waste water	kg/day	$D6 = D1 + D2 + D3 + D4 + D5$	9.324	9.324	9.324	9.324	9.324	9.324	9.324	9.324	9.324	9.324	9.324		
B. Industrial waste water															
B1 Pollution load from major producers															
1) Pollution load produced	kg/day	1.561	1.561	1.561	1.561	1.561	1.561	1.561	1.561	1.561	1.561	1.561	1.561		
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
4) Run-off ratio	$(1) \times (1) \times (1)$	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45		
5) Run-off pollution load	kg/day	$B1 = 1.561 \times 0.45$	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
B2 Pollution load from large and medium scale industries															
1) Pollution load produced	kg/day	17.775	17.775	17.775	17.775	17.775	17.775	17.775	17.775	17.775	17.775	17.775	17.775		
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$(2) \times (3) \times (2)$	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28		
5) Run-off pollution load	kg/day	$B2 = 17.775 \times 0.28$	4.977	4.977	4.977	4.977	4.977	4.977	4.977	4.977	4.977	4.977	4.977		
B3 Pollution load from small scale industries															
1) Pollution load produced	kg/day	3.432	3.432	3.432	3.432	3.432	3.432	3.432	3.432	3.432	3.432	3.432	3.432		
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$(3) \times (3) \times (3)$	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28		
5) Run-off pollution load	kg/day	$B3 = 3.432 \times 0.28$	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96		
B4 Total run-off pollution load from the industries	kg/day	$B4 = B1 + B2 + B3$	6.540	6.540	6.540	6.540	6.540	6.540	6.540	6.540	6.540	6.540	6.540		
C. Agricultural pollution load															
C1 Pollution load from fields*															
1) Pollution load produced	kg/day	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276		
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$(1) \times (1) \times (1)$	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	kg/day	$C1 = 21.276 \times 0.03$	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64		
C2 Pollution load from Everest															
1) Pollution load produced	kg/day	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276	21.276		
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$(2) \times (3) \times (2)$	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	kg/day	$C2 = 21.276 \times 0.03$	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64		
C3 Total run-off pollution load from agriculture	kg/day	$C3 = C1 + C2$	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28		
D. Other sources															
D1 Pollution load from others															
1) Pollution load produced	kg/day	36.620	36.620	36.620	36.620	36.620	36.620	36.620	36.620	36.620	36.620	36.620	36.620		
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	$(1) \times (1) \times (1)$	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	kg/day	$D1 = 36.620 \times 0.03$	1.099	1.099	1.099	1.099	1.099	1.099	1.099	1.099	1.099	1.099	1.099		
III. Water quality at control point															
E. Water quality monitored															
1) 1994	mg/l	8.3	9.4	7.8	8.4	7.8	7.5	8.2	8.4	7.5	8.2	8.4	8.2		
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	kg/day	$L = D6 + D12 + D13 + D14$	17.761	17.761	17.761	17.761	17.761	17.761	17.761	17.761	17.761	17.761	17.761		
2) Water flow	m ³ /s	Q	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
3) Water quality	mg/l	$C = L/Q$	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5		

Note: *Pollution load from fields is included in other sources

Table-2(2) Calculation of Water Quality (BOD) at Demangan Bridge (2020 : without project)

Items		Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave (Jan-Dec)	TSR (M)
I. Pollution load from upstream																
1) Water quality of Tondya Dam (467)	C6	mg/l	2.0	2.7	4.3	4.6	4.3	3.8								
2) Water flow of Tondya Dam (467)	Q6	m ³ /s	72.0	6.0	61.0	37.0	107.0	71.0								
3) Pollution load from upstream	$10^6 \times C6 \times Q6$	kg/day	12,442	1,470	22,603	32,304	39,753	24,967								
4) Run-off pollution load from upstream	$10^6 \times C6 \times Q6$	kg/day	2,458	280	4,533	6,501	7,951	4,793								
II. Pollution load from sub-basin																
A. Domestic waste water																
A1. Pollution load (Sub-basin B1(2))																
1) Pollution load produced	P1	kg/day	1,520	1,520	1,520	1,520	1,520	1,520								
2) Flow-out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.16	0.16	0.16	0.16	0.16	0.16								
5) Run-off pollution load	$P1 \times r1$	kg/day	241	241	241	241	241	241								
A2. Pollution load (Sub-basin B1(3))																
1) Pollution load produced	P2	kg/day	1,901	1,901	1,901	1,901	1,901	1,901								
2) Flow-out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r2-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	$P2 \times r2$	kg/day	456	456	456	456	456	456								
A3. Pollution load (Sub-basin B1(5))																
1) Pollution load produced	P3	kg/day	732	732	732	732	732	732								
2) Flow-out ratio	r3-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4	0.4								
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.32	0.32	0.32	0.32	0.32	0.32								
5) Run-off pollution load	$P3 \times r3$	kg/day	234	234	234	234	234	234								
A4 Total run-off pollution load from domestic waste water	$D1+D2+D3$	kg/day	932	932	932	932	932	932								
B. Industrial waste water																
B1. Pollution load from major producers																
1) Pollution load produced	P4	kg/day	230,953	230,953	230,953	230,953	230,953	230,953								
2) Flow-out ratio	r4-1	-	0.3	0.3	0.3	0.3	0.3	0.3								
3) Flow-down ratio	r4-2	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.06	0.06	0.06	0.06	0.06	0.06								
5) Run-off pollution load	$P4 \times r4$	kg/day	13,857	13,857	13,857	13,857	13,857	13,857								
B2. Pollution load from large and medium scale industries																
1) Pollution load produced	P5	kg/day	3,510	3,510	3,510	3,510	3,510	3,510								
2) Flow-out ratio	r5-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r5-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	$P5 \times r5$	kg/day	842	842	842	842	842	842								
B3. Pollution load from small scale industries																
1) Pollution load produced	P6	kg/day	617	617	617	617	617	617								
2) Flow-out ratio	r6-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio	r6-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r6 (r6-1+r6-2)	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	$P6 \times r6$	kg/day	148	148	148	148	148	148								
B4 Total run-off pollution load from the industries	$I1+I2+I3$	kg/day	14,848	14,848	14,848	14,848	14,848	14,848								
C. Agricultural pollution load																
C1. Pollution load from fields*																
1) Pollution load produced	P7	kg/day														
2) Flow-out ratio	r7-1	-														
3) Flow-down ratio	r7-2	-														
4) Run-off ratio	r7 (r7-1+r7-2)	-														
5) Run-off pollution load	$P7 \times r7$	kg/day														
C2. Pollution load from livestock																
1) Pollution load produced	P8	kg/day	11,258	11,258	11,258	11,258	11,258	11,258								
2) Flow-out ratio	r8-1	-	0.1	0.1	0.1	0.1	0.1	0.1								
3) Flow-down ratio	r8-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r8 (r8-1+r8-2)	-	0.03	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	$P8 \times r8$	kg/day	338	338	338	338	338	338								
C3 Total run-off pollution load from agriculture	$A5+A1+A2$	kg/day	338	338	338	338	338	338								
D. Other sources																
D1. Pollution load from others																
1) Pollution load produced	P9	kg/day	10,620	10,620	10,620	10,620	10,620	10,620								
2) Flow-out ratio	r9-1	-	0.1	0.1	0.1	0.1	0.1	0.1								
3) Flow-down ratio	r9-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r9 (r9-1+r9-2)	-	0.03	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	$P9 \times r9$	kg/day	319	319	319	319	319	319								
III. Water quality at control point																
E. Water quality monitored																
1) 1954		mg/l	2.0	3.8	4.3	7.5	2.6	3.5								
2) Average (1992-1996)																
3) Maximum (1992-1996)																
F. Result of calculation																
1) Total run-off pollution load	$T=I4+D4+I6+A5+D4$	kg/day	18,924	16,716	20,968	22,937	24,786	21,279								
2) Water flow	Q	m ³ /s	62.6	62.6	62.6	62.6	62.6	62.6								
3) BOD concentration	$C=T/Q$	mg/l	3.0	2.7	3.4	3.7	4.0	3.4								

Note: * Pollution load from fields is included in other sources

Table-2(3) Calculation of Water Quality (BOD) at Jogbrau Bridge (2020 : without project)

Item	Unit	Est.	Est.	Sur.	Sur.	Sur.	Sur.	Sur.
I. Pollution load from upstream								
1) Water quality of Ngeraga Tambora (Q0)	CO	mg/l	6.3	4.8	10.3	3.9	3.8	4.7
2) Water flow of Ngeraga Tambora (Q)	Q	m ³ /s	141.0	56.9	35.6	43.9	32.4	41.9
3) Pollution load from upstream	LO-COxQ0	kg/day	76.749	23.576	50.440	24.902	17.264	17.045
4) Run-off pollution load from upstream	LO-COxQ0	kg/day	15.350	4.736	10.083	4.736	3.441	3.403
II. Pollution load from sub-basin								
A. Domestic waste water								
A1. Pollution load (Sub-basin B110)								
1) Pollution load produced	A1	kg/day	2.897	2.897	2.897	2.897	2.897	2.897
2) Flow out ratio	(1)-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow down ratio	(1)-2	-	0.1	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	(1)-(1)+(1)-2	-	0.09	0.09	0.09	0.09	0.09	0.09
5) Run-off pollution load	D1=A1x(1)	kg/day	232	232	232	232	232	232
A2. Pollution load (Sub-basin B111)								
1) Pollution load produced	A2	kg/day	3.009	3.009	3.009	3.009	3.009	3.009
2) Flow out ratio	(2)-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow down ratio	(2)-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	(2)-(2)-(1)+(2)-2	-	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	D2=A2x(2)	kg/day	481	481	481	481	481	481
A3. Pollution load (Sub-basin B112)								
1) Pollution load produced	A3	kg/day	277	277	277	277	277	277
2) Flow out ratio	(3)-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(3)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(3)-(3)-(1)+(3)-2	-	0.27	0.27	0.27	0.27	0.27	0.27
5) Run-off pollution load	D3=A3x(3)	kg/day	75	75	75	75	75	75
A4. Pollution load (Sub-basin B113)								
1) Pollution load produced	A4	kg/day	396	396	396	396	396	396
2) Flow out ratio	(4)-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(4)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(4)-(4)-(1)+(4)-2	-	0.27	0.27	0.27	0.27	0.27	0.27
5) Run-off pollution load	D4=A4x(4)	kg/day	107	107	107	107	107	107
A5. Pollution load (Sub-basin B114)								
1) Pollution load produced	A5	kg/day	289	289	289	289	289	289
2) Flow out ratio	(5)-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(5)-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	(5)-(5)-(1)+(5)-2	-	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	D5=A5x(5)	kg/day	130	130	130	130	130	130
A6. Pollution load (Sub-basin B115)								
1) Pollution load produced	A6	kg/day	1.796	1.796	1.796	1.796	1.796	1.796
2) Flow out ratio	(6)-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow down ratio	(6)-2	-	0.6	0.6	0.6	0.6	0.6	0.6
4) Run-off ratio	(6)-(6)-(1)+(6)-2	-	0.48	0.48	0.48	0.48	0.48	0.48
5) Run-off pollution load	D6=A6x(6)	kg/day	862	862	862	862	862	862
A7. Pollution load (Sub-basin B116)								
1) Pollution load produced	A7	kg/day	203	203	203	203	203	203
2) Flow out ratio	(7)-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(7)-2	-	0.1	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	(7)-(7)-(1)+(7)-2	-	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	D7=A7x(7)	kg/day	146	146	146	146	146	146
A8. Pollution load (Sub-basin B117)								
1) Pollution load produced	A8	kg/day	2.643	2.643	2.643	2.643	2.643	2.643
2) Flow out ratio	(8)-1	-	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow down ratio	(8)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(8)-(8)-(1)+(8)-2	-	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	D8=A8x(8)	kg/day	618	618	618	618	618	618
A9. Total run-off pollution load from domestic waste water	D8=D1+D2+D3+D4+D5+D6+D7+D8	kg/day	2.651	2.651	2.651	2.651	2.651	2.651
B. Industrial waste water								
B1. Pollution load from major producers								
1) Pollution load produced	B1	kg/day	788.432	788.432	788.432	788.432	788.432	788.432
2) Flow out ratio	(11)-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	(11)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(11)-(11)-(1)+(11)-2	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	B1=B1x(11)	kg/day	19.711	19.711	19.711	19.711	19.711	19.711
B2. Pollution load from large and medium scale industries								
1) Pollution load produced	B2	kg/day	4.748	4.748	4.748	4.748	4.748	4.748
2) Flow out ratio	(12)-1	-	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	(12)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(12)-(12)-(1)+(12)-2	-	0.1	0.1	0.1	0.1	0.1	0.1
5) Run-off pollution load	B2=B2x(12)	kg/day	475	475	475	475	475	475
B3. Pollution load from small scale industries								
1) Pollution load produced	B3	kg/day	791	791	791	791	791	791
2) Flow out ratio	(13)-1	-	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	(13)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(13)-(13)-(1)+(13)-2	-	0.1	0.1	0.1	0.1	0.1	0.1
5) Run-off pollution load	B3=B3x(13)	kg/day	79	79	79	79	79	79
B4. Total run-off pollution load from the industries	B4=B1+B2+B3	kg/day	20.265	20.265	20.265	20.265	20.265	20.265
C. Agricultural pollution load								
C1. Pollution load from fields*								
1) Pollution load produced	C1	kg/day	-	-	-	-	-	-
2) Flow out ratio	(C1)-1	-	-	-	-	-	-	-
3) Flow down ratio	(C1)-2	-	-	-	-	-	-	-
4) Run-off ratio	(C1)-(C1)-(1)+(C1)-2	-	-	-	-	-	-	-
5) Run-off pollution load	A1=C1x(1)	kg/day	-	-	-	-	-	-
C2. Pollution load from livestock								
1) Pollution load produced	C2	kg/day	24.838	24.838	24.838	24.838	24.838	24.838
2) Flow out ratio	(C2)-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	(C2)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(C2)-(C2)-(1)+(C2)-2	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	A2=C2x(2)	kg/day	621	621	621	621	621	621
C3. Total run-off pollution load from agriculture	A2=A1+A2	kg/day	621	621	621	621	621	621
D. Other sources								
D1. Pollution load from others								
1) Pollution load produced	D1	kg/day	12.290	12.290	12.290	12.290	12.290	12.290
2) Flow out ratio	(D1)-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	(D1)-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	(D1)-(D1)-(1)+(D1)-2	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	D4=D1x(1)	kg/day	307	307	307	307	307	307
III. Water quality at control point								
E. Water quality monitored								
1) 1991	mg/l	3.5	3.8	11.9	3.8	7.7	4.5	5.8
2) Average (1991-1996)								
3) Median (1991-1996)								
F. Result of calculation								
1) Total run-off pollution load	C+D4+D5+D6+D7+D8+D9	kg/day	30.193	28.543	33.941	28.224	27.254	30.740
2) Water flow	Q	m³/s	58.2	58.2	58.2	58.2	58.2	58.2
3) Water quality	C+Q	mg/l	7.8	5.7	6.7	5.6	5.4	6.4

Note : * Pollution load from fields is included in other sources

Table 2(4) Calculation of Water Quality (BOD) at Padangean Bridge (2020 : without project)

Area		WQ-1	WQ-2	WQ-3	WQ-4	WQ-5	WQ-6	WQ-7	WQ-8	WQ-9	WQ-10	WQ-11	WQ-12	WQ-13	WQ-14	WQ-15	WQ-16	WQ-17	WQ-18	WQ-19	WQ-20	WQ-21	WQ-22	WQ-23	WQ-24	WQ-25	WQ-26	WQ-27	WQ-28	WQ-29	WQ-30	WQ-31	WQ-32	WQ-33	WQ-34	WQ-35	WQ-36	WQ-37	WQ-38	WQ-39	WQ-40	WQ-41	WQ-42	WQ-43	WQ-44	WQ-45	WQ-46	WQ-47	WQ-48	WQ-49	WQ-50	WQ-51	WQ-52	WQ-53	WQ-54	WQ-55	WQ-56	WQ-57	WQ-58	WQ-59	WQ-60	WQ-61	WQ-62	WQ-63	WQ-64	WQ-65	WQ-66	WQ-67	WQ-68	WQ-69	WQ-70	WQ-71	WQ-72	WQ-73	WQ-74	WQ-75	WQ-76	WQ-77	WQ-78	WQ-79	WQ-80	WQ-81	WQ-82	WQ-83	WQ-84	WQ-85	WQ-86	WQ-87	WQ-88	WQ-89	WQ-90	WQ-91	WQ-92	WQ-93	WQ-94	WQ-95	WQ-96	WQ-97	WQ-98	WQ-99	WQ-100	WQ-101	WQ-102	WQ-103	WQ-104	WQ-105	WQ-106	WQ-107	WQ-108	WQ-109	WQ-110	WQ-111	WQ-112	WQ-113	WQ-114	WQ-115	WQ-116	WQ-117	WQ-118	WQ-119	WQ-120	WQ-121	WQ-122	WQ-123	WQ-124	WQ-125	WQ-126	WQ-127	WQ-128	WQ-129	WQ-130	WQ-131	WQ-132	WQ-133	WQ-134	WQ-135	WQ-136	WQ-137	WQ-138	WQ-139	WQ-140	WQ-141	WQ-142	WQ-143	WQ-144	WQ-145	WQ-146	WQ-147	WQ-148	WQ-149	WQ-150	WQ-151	WQ-152	WQ-153	WQ-154	WQ-155	WQ-156	WQ-157	WQ-158	WQ-159	WQ-160	WQ-161	WQ-162	WQ-163	WQ-164	WQ-165	WQ-166	WQ-167	WQ-168	WQ-169	WQ-170	WQ-171	WQ-172	WQ-173	WQ-174	WQ-175	WQ-176	WQ-177	WQ-178	WQ-179	WQ-180	WQ-181	WQ-182	WQ-183	WQ-184	WQ-185	WQ-186	WQ-187	WQ-188	WQ-189	WQ-190	WQ-191	WQ-192	WQ-193	WQ-194	WQ-195	WQ-196	WQ-197	WQ-198	WQ-199	WQ-200	WQ-201	WQ-202	WQ-203	WQ-204	WQ-205	WQ-206	WQ-207	WQ-208	WQ-209	WQ-210	WQ-211	WQ-212	WQ-213	WQ-214	WQ-215	WQ-216	WQ-217	WQ-218	WQ-219	WQ-220	WQ-221	WQ-222	WQ-223	WQ-224	WQ-225	WQ-226	WQ-227	WQ-228	WQ-229	WQ-230	WQ-231	WQ-232	WQ-233	WQ-234	WQ-235	WQ-236	WQ-237	WQ-238	WQ-239	WQ-240	WQ-241	WQ-242	WQ-243	WQ-244	WQ-245	WQ-246	WQ-247	WQ-248	WQ-249	WQ-250	WQ-251	WQ-252	WQ-253	WQ-254	WQ-255	WQ-256	WQ-257	WQ-258	WQ-259	WQ-260	WQ-261	WQ-262	WQ-263	WQ-264	WQ-265	WQ-266	WQ-267	WQ-268	WQ-269	WQ-270	WQ-271	WQ-272	WQ-273	WQ-274	WQ-275	WQ-276	WQ-277	WQ-278	WQ-279	WQ-280	WQ-281	WQ-282	WQ-283	WQ-284	WQ-285	WQ-286	WQ-287	WQ-288	WQ-289	WQ-290	WQ-291	WQ-292	WQ-293	WQ-294	WQ-295	WQ-296	WQ-297	WQ-298	WQ-299	WQ-300	WQ-301	WQ-302	WQ-303	WQ-304	WQ-305	WQ-306	WQ-307	WQ-308	WQ-309	WQ-310	WQ-311	WQ-312	WQ-313	WQ-314	WQ-315	WQ-316	WQ-317	WQ-318	WQ-319	WQ-320	WQ-321	WQ-322	WQ-323	WQ-324	WQ-325	WQ-326	WQ-327	WQ-328	WQ-329	WQ-330	WQ-331	WQ-332	WQ-333	WQ-334	WQ-335	WQ-336	WQ-337	WQ-338	WQ-339	WQ-340	WQ-341	WQ-342	WQ-343	WQ-344	WQ-345	WQ-346	WQ-347	WQ-348	WQ-349	WQ-350	WQ-351	WQ-352	WQ-353	WQ-354	WQ-355	WQ-356	WQ-357	WQ-358	WQ-359	WQ-360	WQ-361	WQ-362	WQ-363	WQ-364	WQ-365	WQ-366	WQ-367	WQ-368	WQ-369	WQ-370	WQ-371	WQ-372	WQ-373	WQ-374	WQ-375	WQ-376	WQ-377	WQ-378	WQ-379	WQ-380	WQ-381	WQ-382	WQ-383	WQ-384	WQ-385	WQ-386	WQ-387	WQ-388	WQ-389	WQ-390	WQ-391	WQ-392	WQ-393	WQ-394	WQ-395	WQ-396	WQ-397	WQ-398	WQ-399	WQ-400	WQ-401	WQ-402	WQ-403	WQ-404	WQ-405	WQ-406	WQ-407	WQ-408	WQ-409	WQ-410	WQ-411	WQ-412	WQ-413	WQ-414	WQ-415	WQ-416	WQ-417	WQ-418	WQ-419	WQ-420	WQ-421	WQ-422	WQ-423	WQ-424	WQ-425	WQ-426	WQ-427	WQ-428	WQ-429	WQ-430	WQ-431	WQ-432	WQ-433	WQ-434	WQ-435	WQ-436	WQ-437	WQ-438	WQ-439	WQ-440	WQ-441	WQ-442	WQ-443	WQ-444	WQ-445	WQ-446	WQ-447	WQ-448	WQ-449	WQ-450	WQ-451	WQ-452	WQ-453	WQ-454	WQ-455	WQ-456	WQ-457	WQ-458	WQ-459	WQ-460	WQ-461	WQ-462	WQ-463	WQ-464	WQ-465	WQ-466	WQ-467	WQ-468	WQ-469	WQ-470	WQ-471	WQ-472	WQ-473	WQ-474	WQ-475	WQ-476	WQ-477	WQ-478	WQ-479	WQ-480	WQ-481	WQ-482	WQ-483	WQ-484	WQ-485	WQ-486	WQ-487	WQ-488	WQ-489	WQ-490	WQ-491	WQ-492	WQ-493	WQ-494	WQ-495	WQ-496	WQ-497	WQ-498	WQ-499	WQ-500	WQ-501	WQ-502	WQ-503	WQ-504	WQ-505	WQ-506	WQ-507	WQ-508	WQ-509	WQ-510	WQ-511	WQ-512	WQ-513	WQ-514	WQ-515	WQ-516	WQ-517	WQ-518	WQ-519	WQ-520	WQ-521	WQ-522	WQ-523	WQ-524	WQ-525	WQ-526	WQ-527	WQ-528	WQ-529	WQ-530	WQ-531	WQ-532	WQ-533	WQ-534	WQ-535	WQ-536	WQ-537	WQ-538	WQ-539	WQ-540	WQ-541	WQ-542	WQ-543	WQ-544	WQ-545	WQ-546	WQ-547	WQ-548	WQ-549	WQ-550	WQ-551	WQ-552	WQ-553	WQ-554	WQ-555	WQ-556	WQ-557	WQ-558	WQ-559	WQ-560	WQ-561	WQ-562	WQ-563	WQ-564	WQ-565	WQ-566	WQ-567	WQ-568	WQ-569	WQ-570	WQ-571	WQ-572	WQ-573	WQ-574	WQ-575	WQ-576	WQ-577	WQ-578	WQ-579	WQ-580	WQ-581	WQ-582	WQ-583	WQ-584	WQ-585	WQ-586	WQ-587	WQ-588	WQ-589	WQ-590	WQ-591	WQ-592	WQ-593	WQ-594	WQ-595	WQ-596	WQ-597	WQ-598	WQ-599	WQ-600	WQ-601	WQ-602	WQ-603	WQ-604	WQ-605	WQ-606	WQ-607	WQ-608	WQ-609	WQ-610	WQ-611	WQ-612	WQ-613	WQ-614	WQ-615	WQ-616	WQ-617	WQ-618	WQ-619	WQ-620	WQ-621	WQ-622	WQ-623	WQ-624	WQ-625	WQ-626	WQ-627	WQ-628	WQ-629	WQ-630	WQ-631	WQ-632	WQ-633	WQ-634	WQ-635	WQ-636	WQ-637	WQ-638	WQ-639	WQ-640	WQ-641	WQ-642	WQ-643	WQ-644	WQ-645	WQ-646	WQ-647	WQ-648	WQ-649	WQ-650	WQ-651	WQ-652	WQ-653	WQ-654	WQ-655	WQ-656	WQ-657	WQ-658	WQ-659	WQ-660	WQ-661	WQ-662	WQ-663	WQ-664	WQ-665	WQ-666	WQ-667	WQ-668	WQ-669	WQ-670	WQ-671	WQ-672	WQ-673	WQ-674	WQ-675	WQ-676	WQ-677	WQ-678	WQ-679	WQ-680	WQ-681	WQ-682	WQ-683	WQ-684	WQ-685	WQ-686	WQ-687	WQ-688	WQ-689	WQ-690	WQ-691	WQ-692	WQ-693	WQ-694	WQ-695	WQ-696	WQ-697	WQ-698	WQ-699	WQ-700	WQ-701	WQ-702	WQ-703	WQ-704	WQ-705	WQ-706	WQ-707	WQ-708	WQ-709	WQ-710	WQ-711	WQ-712	WQ-713	WQ-714	WQ-715	WQ-716	WQ-717	WQ-718	WQ-719	WQ-720	WQ-721	WQ-722	WQ-723	WQ-724	WQ-725	WQ-726	WQ-727	WQ-728	WQ-729	WQ-730	WQ-731	WQ-732	WQ-733	WQ-734	WQ-735	WQ-736	WQ-737	WQ-738	WQ-739	WQ-740	WQ-741	WQ-742	WQ-743	WQ-744	WQ-745	WQ-746	WQ-747	WQ-748	WQ-749	WQ-750	WQ-751	WQ-752	WQ-753	WQ-754	WQ-755	WQ-756	WQ-757	WQ-758	WQ-759	WQ-760	WQ-761	WQ-762	WQ-763	WQ-764	WQ-765	WQ-766	WQ-767	WQ-768	WQ-769	WQ-770	WQ-771	WQ-772	WQ-773	WQ-774	WQ-775	WQ-776	WQ-777	WQ-778	WQ-779	WQ-780	WQ-781	WQ-782	WQ-783	WQ-784	WQ-785	WQ-786	WQ-787	WQ-788	WQ-789	WQ-790	WQ-791	WQ-792	WQ-793	WQ-794	WQ-795	WQ-796	WQ-797	WQ-798	WQ-799	WQ-800	WQ-801	WQ-802	WQ-803	WQ-804	WQ-805	WQ-806	WQ-807	WQ-808	WQ-809	WQ-810	WQ-811	WQ-812	WQ-813	WQ-814	WQ-815	WQ-816	WQ-817	WQ-818	WQ-819	WQ-820	WQ-821	WQ-822	WQ-823	WQ-824	WQ-825	WQ-826	WQ-827	WQ-828	WQ-829	WQ-830	WQ-831	WQ-832	WQ-833	WQ-834	WQ-835	WQ-836	WQ-837	WQ-838	WQ-839	WQ-840	WQ-841	WQ-842	WQ-843	WQ-844	WQ-845	WQ-846	WQ-847	WQ-848	WQ-849	WQ-850	WQ-851	WQ-852	WQ-853	WQ-854	WQ-855	WQ-856	WQ-857	WQ-858	WQ-859	WQ-860	WQ-861	WQ-862	WQ-863	WQ-864	WQ-865	WQ-866	WQ-867	WQ-868	WQ-869	WQ-870	WQ-871	WQ-872	WQ-873	WQ-874	WQ-875	WQ-876	WQ-877	WQ-878	WQ-879	WQ-880	WQ-881	WQ-882	WQ-883	WQ-884	WQ-885	WQ-886	WQ-887	WQ-888	WQ-889	WQ-890	WQ-891	WQ-892	WQ-893	WQ-894	WQ-895	WQ-896	WQ-897	WQ-898	WQ-899	WQ-900	WQ-901	WQ-902	WQ-903	WQ-904	WQ-905	WQ-906	WQ-907	WQ-908	WQ-909	WQ-910	WQ-911	WQ-912	WQ-913	WQ-914	WQ-915	WQ-916	WQ-917	WQ-918	WQ-919	WQ-920	WQ-921	WQ-922	WQ-923	WQ-924	WQ-925	WQ-926	WQ-927	WQ-928	WQ-929	WQ-930	WQ-931	WQ-932	WQ-933	WQ-934	WQ-935	WQ-936	WQ-937	WQ-938	WQ-939	WQ-940	WQ-941	WQ-942	WQ-943	WQ-944	WQ-945	WQ-946	WQ-947	WQ-948	WQ-949	WQ-950	WQ-951	WQ-952	WQ-953	WQ-954	WQ-955	WQ-956	WQ-957	WQ-958	WQ-959	WQ-960	WQ-961	WQ-962	WQ-963	WQ-964	WQ-965	WQ-966	WQ-967	WQ-968	WQ-969	WQ-970	WQ-971	WQ-972	WQ-973	WQ-974	WQ-975	WQ-976	WQ-977	WQ-978	WQ-979	WQ-980	WQ-981	WQ-982	WQ-983	WQ-984	WQ-985	WQ-986	WQ-987	WQ-988	WQ-989	WQ-990	WQ-991	WQ-992	WQ-993	WQ-994	WQ-995	WQ-996	WQ-997	WQ-998	WQ-999	WQ-1000
------	--	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	---------

Note: "Fertilizer load from fields is evaluated as either none, low, or high."

Table-2(5) Calculation of Water Quality (BOD) at Canggü Tambangan (2020 : without project)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (Avg)	25%ile
I. Pollution load from upstream															
1) Water quality of Patangan (Q0)	Q0	mg/l													
2) Water flow of Patangan	Q	m ³ /s													
3) Pollution load from upstream	$L0 = Q0 \times Q0$	kg/day	16,450	14,877	22,107	13,476	41,796	10,957							
4) Run-off pollution load from upstream	$L0 = Q0 \times Q0$	kg/day	2,897	2,232	3,206	2,021	5,767	1,644							
II. Pollution load from sub-basin															
A. Domestic waste water															
A1. Pollution load (Sub-basin B619)															
1) Pollution load produced	a1	kg/day	219	219	219	219	219	219	219	219	219	219	219	219	219
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r1 = (r1-1 + r1-2)$	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	79	79	79	79	79	79	79	79	79	79	79	79	79
A2. Pollution load (Sub-basin B619)															
1) Pollution load produced	a2	kg/day	202	202	202	202	202	202	202	202	202	202	202	202	202
2) Flow-out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r2-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r2 = (r2-1 + r2-2)$	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	73	73	73	73	73	73	73	73	73	73	73	73	73
A3. Total run-off pollution load from domestic waste water	$D0 = D1 + D2$	kg/day	152	152	152	152	152	152	152	152	152	152	152	152	152
B. Industrial waste water															
B1. Pollution load from major producers															
1) Pollution load produced	b1	kg/day	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279	20,279
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r11 = (r11-1 + r11-2)$	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300	7,300
B2. Pollution load from large and medium scale industries															
1) Pollution load produced	b2	kg/day	100	100	100	100	100	100	100	100	100	100	100	100	100
2) Flow-out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r12 = (r12-1 + r12-2)$	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	36	36	36	36	36	36	36	36	36	36	36	36	36
B3. Pollution load from small scale industries															
1) Pollution load produced	b3	kg/day	21	21	21	21	21	21	21	21	21	21	21	21	21
2) Flow-out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r13 = (r13-1 + r13-2)$	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	8	8	8	8	8	8	8	8	8	8	8	8	8
B4. Total run-off pollution load from the industries	$D0 = D1 + D2 + D3$	kg/day	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373	7,373
C. Agricultural pollution load															
C1. Pollution load from fields *															
1) Pollution load produced	c1	kg/day													
2) Flow-out ratio	r21-1	-													
3) Flow-down ratio	r21-2	-													
4) Run-off ratio	$r21 = (r21-1 + r21-2)$	-													
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day													
C2. Pollution load from livestock															
1) Pollution load produced	c2	kg/day	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r22 = (r22-1 + r22-2)$	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	41	41	41	41	41	41	41	41	41	41	41	41	41
C3. Total run-off pollution load from agriculture	$A0 = A1 + A2$	kg/day	41	41	41	41	41	41	41	41	41	41	41	41	41
D. Other sources															
D1. Pollution load from others															
1) Pollution load produced	d1	kg/day	760	760	760	760	760	760	760	760	760	760	760	760	760
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r31 = (r31-1 + r31-2)$	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	$D0 = d1 \times r31$	kg/day	30	30	30	30	30	30	30	30	30	30	30	30	30
III. Water quality at control point															
E. Water quality monitored															
1) 1994		mg/l	3.4	4.0	3.3	10.6	5.2	4.9	5.2						
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	$L = L0 + D0 + A0 + D0$	kg/day	10,293	10,027	11,097	9,817	9,565	9,439	10,040						
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8						
3) Water quality	$C = L/Q$	mg/l	9.2	9.3	10.0	5.9	8.5	8.5	9.8						

Note : * Pollution load from fields is included in other sources

Table 2(6) Calculation of Water Quality (BOD) at Karangpilang (2020 : without project)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year (Dec)	75% Va
I. Pollution load from upstream															
1) Water quality of Cangkai Tambungan (1990)	mg/l														
2) Water flow of Cangkai Tambungan	m ³ /s														
3) Pollution load from upstream	kg/day	10,293	10,027	11,097	9,812	9,563	9,429								
4) Run-off pollution load from upstream	kg/day	1,544	1,589	1,864	1,479	1,435	1,416								
II. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B621)															
1) Pollution load produced	kg/day	485	485	485	485	485	485								
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18								
5) Run-off pollution load	kg/day	87	87	87	87	87	87								
A2 Pollution load (Sub-basin B622)															
1) Pollution load produced	kg/day	1,557	1,557	1,557	1,557	1,557	1,557								
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	-	0.27	0.27	0.27	0.27	0.27	0.27								
5) Run-off pollution load	kg/day	420	420	420	420	420	420								
A3 Pollution load (Sub-basin B623)															
1) Pollution load produced	kg/day	626	626	626	626	626	626								
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45								
5) Run-off pollution load	kg/day	282	282	282	282	282	282								
A4 Pollution load (Sub-basin B624)															
1) Pollution load produced	kg/day	248	248	248	248	248	248								
2) Flow out ratio	-	0.6	0.6	0.6	0.6	0.6	0.6								
3) Flow down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	-	0.12	0.12	0.12	0.12	0.12	0.12								
5) Run-off pollution load	kg/day	30	30	30	30	30	30								
A5 Pollution load (Sub-basin B630)															
1) Pollution load produced	kg/day	1,605	1,605	1,605	1,605	1,605	1,605								
2) Flow out ratio	-	0.5	0.5	0.5	0.5	0.5	0.5								
3) Flow down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	-	0.1	0.1	0.1	0.1	0.1	0.1								
5) Run-off pollution load	kg/day	161	161	161	161	161	161								
A6 Pollution load (Sub-basin B631)															
1) Pollution load produced	kg/day	248	248	248	248	248	248								
2) Flow out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7								
3) Flow down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	-	0.21	0.21	0.21	0.21	0.21	0.21								
5) Run-off pollution load	kg/day	52	52	52	52	52	52								
A7 Pollution load (Sub-basin B632)															
1) Pollution load produced	kg/day	812	812	812	812	812	812								
2) Flow out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	kg/day	195	195	195	195	195	195								
A8 Total run-off pollution load from domestic waste water	kg/day	1,227	1,227	1,227	1,227	1,227	1,227								
B. Industrial waste water															
B1 Pollution load from major producers															
1) Pollution load produced	kg/day	98,054	98,054	98,054	98,054	98,054	98,054								
2) Flow out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	-	0.25	0.25	0.25	0.25	0.25	0.25								
4) Run-off ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
5) Run-off pollution load	kg/day	19,611	19,611	19,611	19,611	19,611	19,611								
B2 Pollution load from large and medium scale industries															
1) Pollution load produced	kg/day	41,535	41,535	41,535	41,535	41,535	41,535								
2) Flow out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7								
3) Flow down ratio	-	0.25	0.25	0.25	0.25	0.25	0.25								
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18								
5) Run-off pollution load	kg/day	7,269	7,269	7,269	7,269	7,269	7,269								
B3 Pollution load from small scale industries															
1) Pollution load produced	kg/day	6,586	6,586	6,586	6,586	6,586	6,586								
2) Flow out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7								
3) Flow down ratio	-	0.25	0.25	0.25	0.25	0.25	0.25								
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18								
5) Run-off pollution load	kg/day	1,153	1,153	1,153	1,153	1,153	1,153								
B4 Total run-off pollution load from the industries	kg/day	28,032	28,032	28,032	28,032	28,032	28,032								
C. Agricultural pollution load															
C1 Pollution load from fields*															
1) Pollution load produced	kg/day														
2) Flow out ratio	-														
3) Flow down ratio	-														
4) Run-off ratio	-														
5) Run-off pollution load	kg/day														
C2 Pollution load from livestock															
1) Pollution load produced	kg/day	6,934	6,934	6,934	6,934	6,934	6,934								
2) Flow out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05								
3) Flow down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	-	0.01	0.01	0.01	0.01	0.01	0.01								
5) Run-off pollution load	kg/day	69	69	69	69	69	69								
C3 Total run-off pollution load from agriculture	kg/day	69	69	69	69	69	69								
D. Other sources															
D1 Pollution load from others															
1) Pollution load produced	kg/day	10,358	10,358	10,358	10,358	10,358	10,358								
2) Flow out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05								
3) Flow down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	-	0.01	0.01	0.01	0.01	0.01	0.01								
5) Run-off pollution load	kg/day	104	104	104	104	104	104								
III. Water quality at control point															
E. Water quality monitored															
1) 1994	mg/l	15.7	11.1	11.2	14.0	7.9	7.9	11.2	14.0						
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	kg/day	30,975	30,975	31,296	30,964	30,366	30,347	30,937							
2) Water flow	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8							
3) Water quality	mg/l	28.0	28.0	28.1	27.9	27.6	27.9	28.0							

Note: Pollution load from fields is included in other sources

Table 2(7) Calculation of Water Quality (BOD) at Ngagel (2020 : without project)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Average	Range
I. Pollution load from upstream															
1) Water quality of Karangasung (KGS)	CU	mg/l													
2) Water flow of Karangasung	Q _C	m ³ /s													
3) Pollution load from upstream	(C-C ₀)xQ _C	kg/day	36.475	36.936	31.096	30.954	30.954	30.954	30.954	30.954	30.954	30.954	30.954	30.954	30.954
4) Run-off pollution load from upstream	(C-C ₀)xQ _C	kg/day	4.626	4.580	4.580	4.580	4.580	4.580	4.580	4.580	4.580	4.580	4.580	4.580	4.580
II. Pollution load from sub-basin															
A. Domestic waste water															
A1. Pollution load (Sub-basin B640)															
1) Pollution load produced	a1	kg/day	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511	1.511
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D1=a1 x r1	kg/day	544	544	544	544	544	544	544	544	544	544	544	544	544
A2. Pollution load (Sub-basin B641)															
1) Pollution load produced	a2	kg/day	427	427	427	427	427	427	427	427	427	427	427	427	427
2) Flow-out ratio	r2-1	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
3) Flow-down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
5) Run-off pollution load	D2=a2 x r2	kg/day	51	51	51	51	51	51	51	51	51	51	51	51	51
A3. Pollution load (Sub-basin B642)															
1) Pollution load produced	a3	kg/day	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857	1.857
2) Flow-out ratio	r3-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	D3=a3 x r3	kg/day	392	392	392	392	392	392	392	392	392	392	392	392	392
A4. Pollution load (Sub-basin B643)															
1) Pollution load produced	a4	kg/day	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921	8.921
2) Flow-out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r4-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D4=a4 x r4	kg/day	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212	3.212
A5. Pollution load (Sub-basin B644)															
1) Pollution load produced	a5	kg/day	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313	4.313
2) Flow-out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r5-2	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
5) Run-off pollution load	D5=a5 x r5	kg/day	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719	2.719
A6 Total run-off pollution load from domestic waste water	D6=D1+D2+D3+D4+D5	kg/day	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916	6.916
B. Industrial waste water															
B1. Pollution load from major producers															
1) Pollution load produced	b1	kg/day	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948	4.948
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D1=b1 x r11	kg/day	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781	1.781
B2. Pollution load from large and medium scale industries															
1) Pollution load produced	b2	kg/day	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476	27.476
2) Flow-out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	D2=b2 x r12	kg/day	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693	7.693
B3. Pollution load from small scale industries															
1) Pollution load produced	b3	kg/day	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851	4.851
2) Flow-out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	D3=b3 x r13	kg/day	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358	1.358
B4 Total run-off pollution load from the industries	D6=D1+D2+D3	kg/day	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833	10.833
C. Agricultural pollution load															
C1. Pollution load from fields*															
1) Pollution load produced	c1	kg/day													
2) Flow-out ratio	r21-1	-													
3) Flow-down ratio	r21-2	-													
4) Run-off ratio	r21 (r21-1+r21-2)	-													
5) Run-off pollution load	A1=c1 x r21	kg/day													
C2. Pollution load from livestock															
1) Pollution load produced	c2	kg/day	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5) Run-off pollution load	A2=c2 x r22	kg/day	44	44	44	44	44	44	44	44	44	44	44	44	44
C3 Total run-off pollution load from agriculture	A3=A1+A2	kg/day	44	44	44	44	44	44	44	44	44	44	44	44	44
D. Other sources															
D1. Pollution load from others															
1) Pollution load produced	d1	kg/day	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435	5.435
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5) Run-off pollution load	D6=d1 x r31	kg/day	109	109	109	109	109	109	109	109	109	109	109	109	109
III. Water quality at control point															
E. Water quality monitored															
1) 1994		mg/l	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	L=L0+D6+d1+A2+A3	kg/day	22.548	22.542	22.546	22.539	22.532	22.532	22.532	22.532	22.532	22.532	22.532	22.532	22.532
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
3) Water quality	C=L/Q	mg/l	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6

Note : *Pollution load from fields is included in other sources

Table-2(S) Calculation of Water Quality (BOD) at Kayoon (2020 : without project)

Items	Units	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Yearly
I. Pollution load from upstream														
1) Water quality of Jeta Bridge (1100)	mg/l													
2) Water flow of Jeta Bridge	m ³ /s													
3) Pollution load from upstream	kg/day	22,548	22,542	22,546	22,537	22,532	22,529							
4) Run-off pollution load from upstream	kg/day	4,510	4,508	4,513	4,507	4,509	4,506							
II. Pollution load from sub-basin														
A. Domestic waste water														
A1 Pollution load (Sub-basin B545)														
1) Pollution load produced	kg/day	1,213	1,213	1,213	1,213	1,213	1,213							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4							
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36							
5) Run-off pollution load	kg/day	437	437	437	437	437	437							
A2 Pollution load (Sub-basin B545)														
1) Pollution load produced	kg/day	1,829	1,829	1,829	1,829	1,829	1,829							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	-	0.54	0.54	0.54	0.54	0.54	0.54							
5) Run-off pollution load	kg/day	977	977	977	977	977	977							
A3 Total run-off pollution load from domestic waste water	kg/day	1,414	1,414	1,414	1,414	1,414	1,414							
B. Industrial waste water														
B1 Pollution load from small producers														
1) Pollution load produced	kg/day	0	0	0	0	0	0							
2) Flow-out ratio	-	-	-	-	-	-	-							
3) Flow-down ratio	-	-	-	-	-	-	-							
4) Run-off ratio	-	0	0	0	0	0	0							
5) Run-off pollution load	kg/day	0	0	0	0	0	0							
B2 Pollution load from large and medium scale industries														
1) Pollution load produced	kg/day	3,705	3,705	3,705	3,705	3,705	3,705							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45							
5) Run-off pollution load	kg/day	1,667	1,667	1,667	1,667	1,667	1,667							
B3 Pollution load from small scale industries														
1) Pollution load produced	kg/day	580	580	580	580	580	580							
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45							
5) Run-off pollution load	kg/day	261	261	261	261	261	261							
B4 Total run-off pollution load from the industries	kg/day	1,928	1,928	1,928	1,928	1,928	1,928							
C. Agricultural pollution load														
C1 Pollution load from fields*														
1) Pollution load produced	kg/day													
2) Flow-out ratio	-	-	-	-	-	-	-							
3) Flow-down ratio	-	-	-	-	-	-	-							
4) Run-off ratio	-	-	-	-	-	-	-							
5) Run-off pollution load	kg/day													
C2 Pollution load from livestock														
1) Pollution load produced	kg/day	91	91	91	91	91	91							
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	-	0.025	0.025	0.025	0.025	0.025	0.025							
5) Run-off pollution load	kg/day	2	2	2	2	2	2							
C3 Total run-off pollution load from agriculture	kg/day	2	2	2	2	2	2							
D. Other sources														
D1 Pollution load from others														
1) Pollution load produced	kg/day	580	580	580	580	580	580							
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05							
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5							
4) Run-off ratio	-	0.025	0.025	0.025	0.025	0.025	0.025							
5) Run-off pollution load	kg/day	15	15	15	15	15	15							
III. Water quality at control point														
E. Water quality monitored														
1) 1994	mg/l				6.2									6.2
2) Average (1992-1996)														
3) Average (1992-1996)														
F. Result of calculation														
1) Total run-off pollution load	kg/day	7,868	7,867	7,872	7,866	7,865	7,864							7,867
2) Water flow	m ³ /s				8.1									8.1
3) Water quality	mg/l				11.2									11.2

Note: *Pollution load from fields is included in other sources

Table 2.9) Calculation of Water Quality (BOD) at Pelajaran (2019 : without project)

Items		units	Pre	PA	AGE	NG	GA	NGA	AGA	2019
I. Pollution load from upstream										
1) Water quality of intake of source	C0	mg/l			25.9					
2) Water flow of intake of source	Q0	m ³ /s			6.0					
3) Pollution load from upstream	$L0 = C0 \times Q0$	kg/day			12,960					
4) Run-off pollution load from upstream	$L0 \times C0 \times Q0$	kg/day			254					
II. Pollution load from sub basin										
A. Domestic waste water										
A1 Pollution load										
1) Pollution load produced	a1	kg/day	114	114	114	114	114	114	114	
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D1 = a1 x r1	kg/day	21	21	21	21	21	21	21	
A2 Total run-off pollution load from domestic waste water	D0-D1	kg/day	21	21	21	21	21	21	21	
B. Industrial waste water										
B1 Pollution load from major industries										
1) Pollution load produced	b1	kg/day	430,500	430,500	430,500	430,500	430,500	430,500	430,500	
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r11-2	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.018	0.018	0.018	0.018	0.018	0.018	0.018	
5) Run-off pollution load	D1 = b1 x r11	kg/day	7,749	7,749	7,749	7,749	7,749	7,749	7,749	
B2 Pollution load from large and medium scale industries										
1) Pollution load produced	b2	kg/day	265	265	265	265	265	265	265	
2) Flow-out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r12-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D2 = b2 x r12	kg/day	37	37	37	37	37	37	37	
B3 Pollution load from small scale industries										
1) Pollution load produced	b3	kg/day	33	33	33	33	33	33	33	
2) Flow-out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r13-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D3 = b3 x r13	kg/day	6	6	6	6	6	6	6	
B4 Total run-off pollution load from the industries	D0-D1-D2-D3	kg/day	7,792	7,792	7,792	7,792	7,792	7,792	7,792	
C. Agricultural pollution load										
C1 Pollution load from field*										
1) Pollution load produced	c1	kg/day								
2) Flow-out ratio	r21-1	-								
3) Flow-down ratio	r21-2	-								
4) Run-off ratio	r21 (r21-1+r21-2)	-								
5) Run-off pollution load	A1 = c1 x r21	kg/day								
C2 Pollution load from livestock										
1) Pollution load produced	c2	kg/day	56	56	56	56	56	56	56	
2) Flow-out ratio	r22-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow-down ratio	r22-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
5) Run-off pollution load	A2 = c2 x r22	kg/day	2	2	2	2	2	2	2	
C3 Total run-off pollution load from agriculture	A0 = A1 + A2	kg/day	2	2	2	2	2	2	2	
D. Other sources										
D1 Pollution load from other										
1) Pollution load produced	d1	kg/day	113	113	113	113	113	113	113	
2) Flow-out ratio	r31-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow-down ratio	r31-2	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
5) Run-off pollution load	D0 = d1 x r31	kg/day	5	5	5	5	5	5	5	
II. Water quality at control point										
E. Water quality monitored										
1) 1994		mg/l			12.9					12.9
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load	$L = L0 + D0 + D2 + A0 + D0$	kg/day	7,819	7,819	8,076	7,819	7,819	7,819	7,819	7,862
2) Water flow	Q	m ³ /s			3.2					3.2
3) Water quality	C = L/Q	mg/l			25.2					25.2

Note : * Pollution load from field is included in other sources

Table-2(10) Calculation of Water Quality (BOD) at Poreng (2030 : without project)

Items	Unit	Jan.	Feb.	Mar.	Apr.	May	Jun.	Aug (Apr)	95% Val
I. Pollution load from upstream									
1) Water quality at intake of source water	mg/l								
2) Water flow at intake of source water	m ³ /s								
3) Pollution load from upstream	kg/day								
4) Run-off pollution load from upstream	kg/day								
II. Pollution load from substation									
A. Domestic waste water									
A1. Pollution load									
1) Pollution load produced	kg/day	38	38	38	38	38	38		
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	kg/day	27	27	27	27	27	27		
A2. Total run-off pollution load from domestic waste water	kg/day	27	27	27	27	27	27		
B. Industrial waste water									
B1. Pollution load from major industries									
1) Pollution load produced	kg/day	0	0	0	0	0	0		
2) Flow-out ratio	-	-	-	-	-	-	-		
3) Flow-down ratio	-	-	-	-	-	-	-		
4) Run-off ratio	-	0	0	0	0	0	0		
5) Run-off pollution load	kg/day	0	0	0	0	0	0		
B2. Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	68	68	68	68	68	68		
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	kg/day	49	49	49	49	49	49		
B3. Pollution load from small scale industries									
1) Pollution load produced	kg/day	11	11	11	11	11	11		
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	kg/day	8	8	8	8	8	8		
B4. Total run-off pollution load from the industries	kg/day	57	57	57	57	57	57		
C. Agricultural pollution load									
C1. Pollution load from fields*									
1) Pollution load produced	kg/day								
2) Flow-out ratio	-								
3) Flow-down ratio	-								
4) Run-off ratio	-								
5) Run-off pollution load	kg/day								
C2. Pollution load from livestock									
1) Pollution load produced	kg/day	19	19	19	19	19	19		
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	-	0.16	0.16	0.16	0.16	0.16	0.16		
5) Run-off pollution load	kg/day	3.04	3.04	3.04	3.04	3.04	3.04		
C3. Total run-off pollution load from agriculture	kg/day	3.04	3.04	3.04	3.04	3.04	3.04		
D. Other sources									
D1. Pollution load from others									
1) Pollution load produced	kg/day	38	38	38	38	38	38		
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2		
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	-	0.16	0.16	0.16	0.16	0.16	0.16		
5) Run-off pollution load	kg/day	6.20	6.20	6.20	6.20	6.20	6.20		
III. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l			9.3					9.3
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	kg/day	93	93	93	93	93	93		93
2) Water flow	m ³ /s			0.06					0.06
3) BOD concentration	mg/l			15.0					15.0

Note : * Pollution load from fields is included in other sources

Table-3.1) Calculation of Water Quality (BOD) at Benilayu Bridge (2020 : Case-1)

Item	Unit	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈
I. Pollution load from upstream									
1) Water quality	mg/l	Q ₁							
2) Water flow	m ³ /s	Q ₂							
3) Pollution load from upstream	kg/day	$Q_1 \times Q_2$							
4) Run-off pollution load from upstream	kg/day	L ₀							
D. Pollution load from sub-station									
A. Domestic waste water									
A1 Pollution load (Sub-station B001)									
1) Pollution load produced	kg/day	897	197	897	897	897	897	897	897
2) Flow-out ratio	-	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3
3) Flow-down ratio	-	0.1	0.1	0.4	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	-	0.95	0.05	0.05	0.05	0.05	0.05	0.05	0.05
5) Run-off pollution load	kg/day	$D1 = A1 \times r1$	27	27	27	27	27	27	27
A2 Pollution load (Sub-station B002)									
1) Pollution load produced	kg/day	757	757	757	757	757	757	757	757
2) Flow-out ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
5) Run-off pollution load	kg/day	$D2 = A2 \times r2$	151	151	151	151	151	151	151
A3 Pollution load (Sub-station B003)									
1) Pollution load produced	kg/day	6,506	6,506	6,506	6,506	6,506	6,506	6,506	6,506
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5) Run-off pollution load	kg/day	$D3 = A3 \times r3$	1,627	1,627	1,627	1,627	1,627	1,627	1,627
A4 Pollution load (Sub-station B004)									
1) Pollution load produced	kg/day	9,215	9,215	9,215	9,215	9,215	9,215	9,215	9,215
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	kg/day	$D4 = A4 \times r4$	1,935	1,935	1,935	1,935	1,935	1,935	1,935
A5 Pollution load (Sub-station B005)									
1) Pollution load produced	kg/day	3,023	3,023	3,023	3,023	3,023	3,023	3,023	3,023
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	kg/day	$D5 = A5 \times r5$	2,177	2,177	2,177	2,177	2,177	2,177	2,177
A6 Total run-off pollution load from domestic waste water	kg/day	$D6 = D1 + D2 + D3 + D4 + D5$	5,657	5,657	5,657	5,657	5,657	5,657	5,657
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	kg/day	206	206	206	206	206	206	206	206
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	kg/day	$D7 = B1 \times r1$	93	93	93	93	93	93	93
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	14,220	14,220	14,220	14,220	14,220	14,220	14,220	14,220
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	kg/day	$D8 = B2 \times r2$	3,982	3,982	3,982	3,982	3,982	3,982	3,982
B3 Pollution load from small scale industries									
1) Pollution load produced	kg/day	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	kg/day	$D9 = B3 \times r3$	961	961	961	961	961	961	961
B4 Total run-off pollution load from the industries	kg/day	$D9 = D7 + D8 + D9$	5,035	5,035	5,035	5,035	5,035	5,035	5,035
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	kg/day	c1							
2) Flow-out ratio	-	(c1-1)							
3) Flow-down ratio	-	(c1-2)							
4) Run-off ratio	-	(c1) (c1-1) x (c1-2)							
5) Run-off pollution load	kg/day	$A1 = c1 \times r1$							
C2 Pollution load from livestock									
1) Pollution load produced	kg/day	c2	21,276	21,276	21,276	21,276	21,276	21,276	21,276
2) Flow-out ratio	-	(c2-1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	-	(c2-2)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	(c2) (c2-1) x (c2-2)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
5) Run-off pollution load	kg/day	$A2 = c2 \times r2$	638	638	638	638	638	638	638
C3 Total run-off pollution load from agriculture	kg/day	$A3 = A1 + A2$	638	638	638	638	638	638	638
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	kg/day	d1	36,620	36,620	36,620	36,620	36,620	36,620	36,620
2) Flow-out ratio	-	(d1-1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	-	(d1-2)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	(d1) (d1-1) x (d1-2)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
5) Run-off pollution load	kg/day	$Dd = d1 \times r1$	1,099	1,099	1,099	1,099	1,099	1,099	1,099
E. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l	9.3	9.4	9.8	9.4	7.5	7.5	8.2	8.4
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	kg/day	$L = L0 + D6 + D8 + A3 + Dd$	12,429	12,429	12,429	12,429	12,429	12,429	12,429
2) Water flow	m ³ /s	Q	10.0	10.0	10.0	10.0	10.0	10.0	10.0
3) Water quality	mg/l	Cd/Q	14.6	14.6	14.6	14.6	14.6	14.6	14.6

Note : *Pollution load from fields is included in other sources

Table-3(2) Calculation of Water Quality (BOD) at Demangan Bridge (2020 : Case-1)

Items		Unit	Jan	Feb	Mar	Apr	May	Jun	July/Aug	Sept/Oct	Nov/Dec
I. Pollution load from upstream											
1) Water quality of Lodeja Dam (100)	Q0	mg/l	20	22	43	46	43	38			
2) Water flow of Lodeja Dam	Q0	m³/s	720	60	610	570	1070	730			
3) Pollution load from upstream	$Q0 \times C0 \times 86400$	kg/day	12432	1400	22668	32504	39753	23567			
4) Run-off pollution load from upstream	$(10 - C0) \times Q0$	kg/day	2488	20	4533	6501	7951	4763			
II. Pollution load from sub-basin											
A. Domestic waste water											
A1. Pollution load (Sub-basin B142)											
1) Pollution load produced	a1	kg/day	1312	1312	1312	1312	1312	1312			
2) Flow-out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8	0.8			
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2			
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.16	0.16	0.16	0.16	0.16	0.16			
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	210	210	210	210	210	210			
A2. Pollution load (Sub-basin B150)											
1) Pollution load produced	a2	kg/day	1731	1731	1731	1731	1731	1731			
2) Flow-out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8	0.8			
3) Flow-down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2			
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.24	0.24	0.24	0.24	0.24	0.24			
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	415	415	415	415	415	415			
A3. Pollution load (Sub-basin B153)											
1) Pollution load produced	a3	kg/day	732	732	732	732	732	732			
2) Flow-out ratio	r3-1	-	0.8	0.8	0.8	0.8	0.8	0.8			
3) Flow-down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4	0.4			
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.32	0.32	0.32	0.32	0.32	0.32			
5) Run-off pollution load	$D3 = a3 \times r3$	kg/day	234	234	234	234	234	234			
A4. Total run-off pollution load from domestic waste water	$D0 = D1 + D2 + D3$	kg/day	860	860	860	860	860	860			
B. Industrial waste water											
B1. Pollution load from major producers											
1) Pollution load produced	b1	kg/day	6321	6321	6321	6321	6321	6321			
2) Flow-out ratio	r11-1	-	0.3	0.3	0.3	0.3	0.3	0.3			
3) Flow-down ratio	r11-2	-	0.2	0.2	0.2	0.2	0.2	0.2			
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.06	0.06	0.06	0.06	0.06	0.06			
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	373	373	373	373	373	373			
B2. Pollution load from large and medium scale industries											
1) Pollution load produced	b2	kg/day	2806	2806	2806	2806	2806	2806			
2) Flow-out ratio	r12-1	-	0.8	0.8	0.8	0.8	0.8	0.8			
3) Flow-down ratio	r12-2	-	0.3	0.3	0.3	0.3	0.3	0.3			
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.34	0.34	0.34	0.34	0.34	0.34			
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	674	674	674	674	674	674			
B3. Pollution load from small scale industries											
1) Pollution load produced	b3	kg/day	617	617	617	617	617	617			
2) Flow-out ratio	r13-1	-	0.8	0.8	0.8	0.8	0.8	0.8			
3) Flow-down ratio	r13-2	-	0.3	0.3	0.3	0.3	0.3	0.3			
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.34	0.34	0.34	0.34	0.34	0.34			
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	148	148	148	148	148	148			
B4. Total run-off pollution load from the industries	$D0 = D1 + D2 + D3$	kg/day	1195	1195	1195	1195	1195	1195			
C. Agricultural pollution load											
C1. Pollution load from fields*											
1) Pollution load produced	c1	kg/day									
2) Flow-out ratio	r21-1	-									
3) Flow-down ratio	r21-2	-									
4) Run-off ratio	r21 (r21-1+r21-2)	-									
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day									
C2. Pollution load from livestock											
1) Pollution load produced	c2	kg/day	11258	11258	11258	11258	11258	11258			
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1	0.1			
3) Flow-down ratio	r22-2	-	0.3	0.3	0.3	0.3	0.3	0.3			
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.03	0.03	0.03	0.03	0.03	0.03			
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	338	338	338	338	338	338			
C3. Total run-off pollution load from agriculture	$A0 = A1 + A2$	kg/day	338	338	338	338	338	338			
D. Other sources											
D1. Pollution load from others											
1) Pollution load produced	d1	kg/day	10620	10620	10620	10620	10620	10620			
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1			
3) Flow-down ratio	r31-2	-	0.3	0.3	0.3	0.3	0.3	0.3			
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.03	0.03	0.03	0.03	0.03	0.03			
5) Run-off pollution load	$D0 = d1 \times r31$	kg/day	319	319	319	319	319	319			
III. Water quality at control point											
E. Water quality monitored											
1) 1994		mg/l	26	34	43	75	26	35			
2) Average (1992-1996)											
3) Median (1992-1996)											
F. Result of calculation											
1) Total run-off pollution load	$L = D0 + C0 + D1 + A0 + D0$	kg/day	5206	2991	7244	9242	10662	7505	3335		
2) Water flow	Q	m³/s	624	624	624	624	624	624	624		
3) Water quality	$C = L/Q$	mg/l	8.34	4.79	11.60	14.81	17.08	12.03	5.34		

Note: * Pollution load from fields is included in other sources

Table-3(3) Calculation of Water Quality (BOD) at Jogbra Bridge (2020 : Case-I)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul
I. Pollution load from upstream								
1) Water quality of Niganga Tarnangan (CQ)	mg/l	4.3	4.8	10.5	3.9	3.8	4.7	
2) Water flow of Niganga Tarnangan	m ³ /s	141.0	56.9	55.6	65.9	51.4	41.9	
3) Pollution load from upstream	kg/day	76.349	22.538	50.410	21.902	17.265	17.115	
4) Run-off pollution load from upstream	kg/day	15.35%	4.72%	10.08%	4.34%	3.44%	3.40%	
II. Pollution load from sub-basin								
A. Domestic waste water								
A1. Pollution load (Sub-basin B3 (d))								
1) Pollution load produced	kg/day	2.642	2.642	2.642	2.642	2.642	2.642	
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	
4) Run-off ratio	-	0.08	0.08	0.08	0.08	0.08	0.08	
5) Run-off pollution load	kg/day	213	213	213	213	213	213	
A2. Pollution load (Sub-basin B3 (f))								
1) Pollution load produced	kg/day	2.530	2.530	2.530	2.530	2.530	2.530	
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	-	0.16	0.16	0.16	0.16	0.16	0.16	
5) Run-off pollution load	kg/day	405	405	405	405	405	405	
A3. Pollution load (Sub-basin B3 (g))								
1) Pollution load produced	kg/day	2.11	2.11	2.11	2.11	2.11	2.11	
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	-	0.27	0.27	0.27	0.27	0.27	0.27	
5) Run-off pollution load	kg/day	57	57	57	57	57	57	
A4. Pollution load (Sub-basin B3 (h))								
1) Pollution load produced	kg/day	2.97	2.97	2.97	2.97	2.97	2.97	
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	-	0.27	0.27	0.27	0.27	0.27	0.27	
5) Run-off pollution load	kg/day	80	80	80	80	80	80	
A5. Pollution load (Sub-basin B3 (i))								
1) Pollution load produced	kg/day	11	11	11	11	11	11	
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45	
5) Run-off pollution load	kg/day	5	5	5	5	5	5	
A6. Pollution load (Sub-basin B3 (j))								
1) Pollution load produced	kg/day	1.504	1.504	1.504	1.504	1.504	1.504	
2) Flow-out ratio	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio	-	0.6	0.6	0.6	0.6	0.6	0.6	
4) Run-off ratio	-	0.48	0.48	0.48	0.48	0.48	0.48	
5) Run-off pollution load	kg/day	722	722	722	722	722	722	
A7. Pollution load (Sub-basin B3 (k))								
1) Pollution load produced	kg/day	170	170	170	170	170	170	
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72	
5) Run-off pollution load	kg/day	122	122	122	122	122	122	
A8. Pollution load (Sub-basin B3 (l))								
1) Pollution load produced	kg/day	2.916	2.916	2.916	2.916	2.916	2.916	
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	-	0.21	0.21	0.21	0.21	0.21	0.21	
5) Run-off pollution load	kg/day	612	612	612	612	612	612	
A9. Total run-off pollution load from domestic waste water	kg/day	2.217	2.217	2.217	2.217	2.217	2.217	
B. Industrial waste water								
B1. Pollution load from major industries								
1) Pollution load produced	kg/day	55.815	55.815	55.815	55.815	55.815	55.815	
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	-	0.025	0.025	0.025	0.025	0.025	0.025	
5) Run-off pollution load	kg/day	1.395	1.395	1.395	1.395	1.395	1.395	
B2. Pollution load from large and medium scale industries								
1) Pollution load produced	kg/day	3.799	3.799	3.799	3.799	3.799	3.799	
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	
5) Run-off pollution load	kg/day	380	380	380	380	380	380	
B3. Pollution load from small scale industries								
1) Pollution load produced	kg/day	791	791	791	791	791	791	
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	
5) Run-off pollution load	kg/day	79	79	79	79	79	79	
B4. Total run-off pollution load from the industries	kg/day	1.854	1.854	1.854	1.854	1.854	1.854	
C. Agricultural pollution load								
C1. Pollution load from fields*								
1) Pollution load produced	kg/day	-	-	-	-	-	-	
2) Flow-out ratio	-	-	-	-	-	-	-	
3) Flow-down ratio	-	-	-	-	-	-	-	
4) Run-off ratio	-	-	-	-	-	-	-	
5) Run-off pollution load	kg/day	-	-	-	-	-	-	
C2. Pollution load from livestock								
1) Pollution load produced	kg/day	24.838	24.838	24.838	24.838	24.838	24.838	
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	-	0.025	0.025	0.025	0.025	0.025	0.025	
5) Run-off pollution load	kg/day	621	621	621	621	621	621	
C3. Total run-off pollution load from agriculture	kg/day	621	621	621	621	621	621	
D. Other sources								
D1. Pollution load from others								
1) Pollution load produced	kg/day	12.280	12.280	12.280	12.280	12.280	12.280	
2) Flow-out ratio	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	-	0.025	0.025	0.025	0.025	0.025	0.025	
5) Run-off pollution load	kg/day	307	307	307	307	307	307	
III. Water quality at control point								
E. Water quality monitored								
1) 1994	mg/l	3.5	3.8	11.9	3.4	7.7	4.5	7.7
2) Average (1992-1996)								
3) Median (1992-1996)								
F. Result of calculation								
1) Total run-off pollution load	kg/day	30.346	9.718	15.087	9.379	8.440	8.402	11.396
2) Water flow	m ³ /s	58.2	58.2	58.2	58.2	58.2	58.2	58.2
3) Water quality	mg/l	4.0	1.9	2.0	1.9	1.7	1.7	2.4

Note : * Pollution load from fields is included in other sources

Table 3(4) Calculation of Water Quality (BOD) at Fadangan Bridge (2020 : Case 1)

Source	Parameter	Unit	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62	Q63	Q64	Q65	Q66	Q67	Q68	Q69	Q70	Q71	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q102	Q103	Q104	Q105	Q106	Q107	Q108	Q109	Q110	Q111	Q112	Q113	Q114	Q115	Q116	Q117	Q118	Q119	Q120	Q121	Q122	Q123	Q124	Q125	Q126	Q127	Q128	Q129	Q130	Q131	Q132	Q133	Q134	Q135	Q136	Q137	Q138	Q139	Q140	Q141	Q142	Q143	Q144	Q145	Q146	Q147	Q148	Q149	Q150	Q151	Q152	Q153	Q154	Q155	Q156	Q157	Q158	Q159	Q160	Q161	Q162	Q163	Q164	Q165	Q166	Q167	Q168	Q169	Q170	Q171	Q172	Q173	Q174	Q175	Q176	Q177	Q178	Q179	Q180	Q181	Q182	Q183	Q184	Q185	Q186	Q187	Q188	Q189	Q190	Q191	Q192	Q193	Q194	Q195	Q196	Q197	Q198	Q199	Q200	Q201	Q202	Q203	Q204	Q205	Q206	Q207	Q208	Q209	Q210	Q211	Q212	Q213	Q214	Q215	Q216	Q217	Q218	Q219	Q220	Q221	Q222	Q223	Q224	Q225	Q226	Q227	Q228	Q229	Q230	Q231	Q232	Q233	Q234	Q235	Q236	Q237	Q238	Q239	Q240	Q241	Q242	Q243	Q244	Q245	Q246	Q247	Q248	Q249	Q250	Q251	Q252	Q253	Q254	Q255	Q256	Q257	Q258	Q259	Q260	Q261	Q262	Q263	Q264	Q265	Q266	Q267	Q268	Q269	Q270	Q271	Q272	Q273	Q274	Q275	Q276	Q277	Q278	Q279	Q280	Q281	Q282	Q283	Q284	Q285	Q286	Q287	Q288	Q289	Q290	Q291	Q292	Q293	Q294	Q295	Q296	Q297	Q298	Q299	Q300	Q301	Q302	Q303	Q304	Q305	Q306	Q307	Q308	Q309	Q310	Q311	Q312	Q313	Q314	Q315	Q316	Q317	Q318	Q319	Q320	Q321	Q322	Q323	Q324	Q325	Q326	Q327	Q328	Q329	Q330	Q331	Q332	Q333	Q334	Q335	Q336	Q337	Q338	Q339	Q340	Q341	Q342	Q343	Q344	Q345	Q346	Q347	Q348	Q349	Q350	Q351	Q352	Q353	Q354	Q355	Q356	Q357	Q358	Q359	Q360	Q361	Q362	Q363	Q364	Q365	Q366	Q367	Q368	Q369	Q370	Q371	Q372	Q373	Q374	Q375	Q376	Q377	Q378	Q379	Q380	Q381	Q382	Q383	Q384	Q385	Q386	Q387	Q388	Q389	Q390	Q391	Q392	Q393	Q394	Q395	Q396	Q397	Q398	Q399	Q400	Q401	Q402	Q403	Q404	Q405	Q406	Q407	Q408	Q409	Q410	Q411	Q412	Q413	Q414	Q415	Q416	Q417	Q418	Q419	Q420	Q421	Q422	Q423	Q424	Q425	Q426	Q427	Q428	Q429	Q430	Q431	Q432	Q433	Q434	Q435	Q436	Q437	Q438	Q439	Q440	Q441	Q442	Q443	Q444	Q445	Q446	Q447	Q448	Q449	Q450	Q451	Q452	Q453	Q454	Q455	Q456	Q457	Q458	Q459	Q460	Q461	Q462	Q463	Q464	Q465	Q466	Q467	Q468	Q469	Q470	Q471	Q472	Q473	Q474	Q475	Q476	Q477	Q478	Q479	Q480	Q481	Q482	Q483	Q484	Q485	Q486	Q487	Q488	Q489	Q490	Q491	Q492	Q493	Q494	Q495	Q496	Q497	Q498	Q499	Q500	Q501	Q502	Q503	Q504	Q505	Q506	Q507	Q508	Q509	Q510	Q511	Q512	Q513	Q514	Q515	Q516	Q517	Q518	Q519	Q520	Q521	Q522	Q523	Q524	Q525	Q526	Q527	Q528	Q529	Q530	Q531	Q532	Q533	Q534	Q535	Q536	Q537	Q538	Q539	Q540	Q541	Q542	Q543	Q544	Q545	Q546	Q547	Q548	Q549	Q550	Q551	Q552	Q553	Q554	Q555	Q556	Q557	Q558	Q559	Q560	Q561	Q562	Q563	Q564	Q565	Q566	Q567	Q568	Q569	Q570	Q571	Q572	Q573	Q574	Q575	Q576	Q577	Q578	Q579	Q580	Q581	Q582	Q583	Q584	Q585	Q586	Q587	Q588	Q589	Q590	Q591	Q592	Q593	Q594	Q595	Q596	Q597	Q598	Q599	Q600	Q601	Q602	Q603	Q604	Q605	Q606	Q607	Q608	Q609	Q610	Q611	Q612	Q613	Q614	Q615	Q616	Q617	Q618	Q619	Q620	Q621	Q622	Q623	Q624	Q625	Q626	Q627	Q628	Q629	Q630	Q631	Q632	Q633	Q634	Q635	Q636	Q637	Q638	Q639	Q640	Q641	Q642	Q643	Q644	Q645	Q646	Q647	Q648	Q649	Q650	Q651	Q652	Q653	Q654	Q655	Q656	Q657	Q658	Q659	Q660	Q661	Q662	Q663	Q664	Q665	Q666	Q667	Q668	Q669	Q670	Q671	Q672	Q673	Q674	Q675	Q676	Q677	Q678	Q679	Q680	Q681	Q682	Q683	Q684	Q685	Q686	Q687	Q688	Q689	Q690	Q691	Q692	Q693	Q694	Q695	Q696	Q697	Q698	Q699	Q700	Q701	Q702	Q703	Q704	Q705	Q706	Q707	Q708	Q709	Q710	Q711	Q712	Q713	Q714	Q715	Q716	Q717	Q718	Q719	Q720	Q721	Q722	Q723	Q724	Q725	Q726	Q727	Q728	Q729	Q730	Q731	Q732	Q733	Q734	Q735	Q736	Q737	Q738	Q739	Q740	Q741	Q742	Q743	Q744	Q745	Q746	Q747	Q748	Q749	Q750	Q751	Q752	Q753	Q754	Q755	Q756	Q757	Q758	Q759	Q760	Q761	Q762	Q763	Q764	Q765	Q766	Q767	Q768	Q769	Q770	Q771	Q772	Q773	Q774	Q775	Q776	Q777	Q778	Q779	Q780	Q781	Q782	Q783	Q784	Q785	Q786	Q787	Q788	Q789	Q790	Q791	Q792	Q793	Q794	Q795	Q796	Q797	Q798	Q799	Q800	Q801	Q802	Q803	Q804	Q805	Q806	Q807	Q808	Q809	Q810	Q811	Q812	Q813	Q814	Q815	Q816	Q817	Q818	Q819	Q820	Q821	Q822	Q823	Q824	Q825	Q826	Q827	Q828	Q829	Q830	Q831	Q832	Q833	Q834	Q835	Q836	Q837	Q838	Q839	Q840	Q841	Q842	Q843	Q844	Q845	Q846	Q847	Q848	Q849	Q850	Q851	Q852	Q853	Q854	Q855	Q856	Q857	Q858	Q859	Q860	Q861	Q862	Q863	Q864	Q865	Q866	Q867	Q868	Q869	Q870	Q871	Q872	Q873	Q874	Q875	Q876	Q877	Q878	Q879	Q880	Q881	Q882	Q883	Q884	Q885	Q886	Q887	Q888	Q889	Q890	Q891	Q892	Q893	Q894	Q895	Q896	Q897	Q898	Q899	Q900	Q901	Q902	Q903	Q904	Q905	Q906	Q907	Q908	Q909	Q910	Q911	Q912	Q913	Q914	Q915	Q916	Q917	Q918	Q919	Q920	Q921	Q922	Q923	Q924	Q925	Q926	Q927	Q928	Q929	Q930	Q931	Q932	Q933	Q934	Q935	Q936	Q937	Q938	Q939	Q940	Q941	Q942	Q943	Q944	Q945	Q946	Q947	Q948	Q949	Q950	Q951	Q952	Q953	Q954	Q955	Q956	Q957	Q958	Q959	Q960	Q961	Q962	Q963	Q964	Q965	Q966	Q967	Q968	Q969	Q970	Q971	Q972	Q973	Q974	Q975	Q976	Q977	Q978	Q979	Q980	Q981	Q982	Q983	Q984	Q985	Q986	Q987	Q988	Q989	Q990	Q991	Q992	Q993	Q994	Q995	Q996	Q997	Q998	Q999	Q1000	Q1001	Q1002	Q1003	Q1004	Q1005	Q1006	Q1007	Q1008	Q1009	Q1010	Q1011	Q1012	Q1013	Q1014	Q1015	Q1016	Q1017	Q1018	Q1019	Q1020	Q1021	Q1022	Q1023	Q1024	Q1025	Q1026	Q1027	Q1028	Q1029	Q1030	Q1031	Q1032	Q1033	Q1034	Q1035	Q1036	Q1037	Q1038	Q1039	Q1040	Q1041	Q1042	Q1043	Q1044	Q1045	Q1046	Q1047	Q1048	Q1049	Q1050	Q1051	Q1052	Q1053	Q1054	Q1055	Q1056	Q1057	Q1058	Q1059	Q1060	Q1061	Q1062	Q1063	Q1064	Q1065	Q1066	Q1067	Q1068	Q1069	Q1070	Q1071	Q1072	Q1073	Q1074	Q1075	Q1076	Q1077	Q1078	Q1079	Q1080	Q1081	Q1082	Q1083	Q1084	Q1085	Q1086	Q1087	Q1088	Q1089	Q1090	Q1091	Q1092	Q1093	Q1094	Q1095	Q1096	Q1097	Q1098	Q1099	Q1100	Q1101	Q1102	Q1103	Q1104	Q1105	Q1106	Q1107	Q1108	Q1109	Q1110	Q1111	Q1112	Q1113	Q1114	Q1115	Q1116	Q1117	Q1118	Q1119	Q1120	Q1121	Q1122	Q1123	Q1124	Q1125	Q1126	Q1127	Q1128	Q1129	Q1130	Q1131	Q1132	Q1133	Q1134	Q1135	Q1136	Q1137	Q1138	Q1139	Q1140	Q1141	Q1142	Q1143	Q1144	Q1145	Q1146	Q1147	Q1148	Q1149	Q1150	Q1151	Q1152	Q1153	Q1154	Q1155	Q1156	Q1157	Q1158	Q1159	Q1160	Q1161	Q1162	Q1163	Q1164	Q1165	Q1166	Q1167	Q1168	Q1169	Q1170	Q1171	Q1172	Q1173	Q1174	Q1175	Q1176	Q1177	Q1178	Q1179	Q1180	Q1181	Q1182	Q1183	Q1184	Q1185	Q1186	Q1187	Q1188	Q1189	Q1190	Q1191	Q1192	Q1193	Q1194	Q1195	Q1196	Q1197	Q1198	Q1199	Q1200	Q1201	Q1202	Q1203	Q1204	Q1205	Q1206	Q1207	Q1208	Q1209	Q1210	Q1211	Q1212	Q1213	Q1214	Q1215	Q1216	Q1217	Q1218	Q1219	Q1220	Q1221	Q1222	Q1223	Q1224	Q1225	Q1226	Q1227	Q1228	Q1229	Q1230	Q1231	Q1232	Q1233	Q1234	Q1235	Q1236	Q1237	Q1238	Q1239	Q1240	Q1241	Q1242	Q1243	Q1244	Q1245	Q1246	Q1247	Q1248	Q1249	Q1250	Q1251	Q1252	Q1253	Q1254	Q1255	Q1256	Q1257	Q1258	Q1259	Q1260	Q1261	Q1262	Q1263	Q1264	Q1265	Q1266	Q1267	Q1268	Q1269	Q1270	Q1271	Q1272	Q1273	Q1274	Q1275	Q1276	Q1277	Q1278	Q1279	Q1280	Q1281	Q1282	Q1283	Q1284	Q1285	Q1286	Q1287	Q1288	Q1289	Q1290	Q1291	Q1292	Q1293	Q1294	Q1295	Q1296	Q1297	Q1298	Q1299	Q1300	Q1301	Q1302	Q1303	Q1304	Q1305	Q1306	Q1307	Q1308	Q1309	Q1310	Q1311	Q1312	Q1313	Q1314	Q1315	Q1316	Q1317	Q1318	Q1319	Q1320	Q1321	Q1322	Q1323	Q1324	Q1325	Q1326	Q1327	Q1328	Q1329	Q1330	Q1331	Q1332	Q1333	Q1334	Q1335	Q1336	Q1337	Q1338	Q1
--------	-----------	------	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	----

Table 3.5) Calculation of Water Quality (BOD) at Canggü Tambangan (2020 : Case-I)

Point		Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
I. Pollution load from upstream															
1) Water quality of Palarang (1992)	Q0	mg/l													
2) Water flow of Palarang	Q0	m ³ /s													
3) Pollution load from upstream	$L0 = Q0 \times C0$	kg/day	16,247	14,474	21,582	12,075	11,267	11,267	10,554						
4) Run-off pollution load from upstream	$L0 - C0 \times Q0$	kg/day	2,437	2,171	3,241	1,361	1,361	1,361	1,361						
II. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B620)															
1) Pollution load produced	P1	kg/day	219	219	219	219	219	219	219						
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r1 (r1-1 x r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$C1 = P1 \times r1$	kg/day	79	79	79	79	79	79	79						
A2 Pollution load (Sub-basin B620)															
1) Pollution load produced	P2	kg/day	202	202	202	202	202	202	202						
2) Flow out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow down ratio	r2-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r2 (r2-1 x r2-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$C2 = P2 \times r2$	kg/day	73	73	73	73	73	73	73						
A3 Total run-off pollution load from domestic waste water	$D0 = C1 + C2$	kg/day	152	152	152	152	152	152	152						
B. Industrial waste water															
B1 Pollution load from major industries															
1) Pollution load produced	P3	kg/day	8,129	8,129	8,129	8,129	8,129	8,129	8,129						
2) Flow out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r3 (r3-1 x r3-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$C3 = P3 \times r3$	kg/day	2,926	2,926	2,926	2,926	2,926	2,926	2,926						
B2 Pollution load from large and medium scale industries															
1) Pollution load produced	P4	kg/day	80	80	80	80	80	80	80						
2) Flow out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow down ratio	r4-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r4 (r4-1 x r4-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$C4 = P4 \times r4$	kg/day	29	29	29	29	29	29	29						
B3 Pollution load from small scale industries															
1) Pollution load produced	P5	kg/day	21	21	21	21	21	21	21						
2) Flow out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow down ratio	r5-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r5 (r5-1 x r5-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$C5 = P5 \times r5$	kg/day	8	8	8	8	8	8	8						
B4 Total run-off pollution load from the industries	$D1 = C3 + C4 + C5$	kg/day	3,144	3,144	3,144	3,144	3,144	3,144	3,144						
C. Agricultural pollution load															
C1 Pollution load from fields*															
1) Pollution load produced	P6	kg/day													
2) Flow out ratio	r6-1	-													
3) Flow down ratio	r6-2	-													
4) Run-off ratio	r6 (r6-1 x r6-2)	-													
5) Run-off pollution load	$C6 = P6 \times r6$	kg/day													
C2 Pollution load from livestock															
1) Pollution load produced	P7	kg/day	1,022	1,022	1,022	1,022	1,022	1,022	1,022						
2) Flow out ratio	r7-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
3) Flow down ratio	r7-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r7 (r7-1 x r7-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04						
5) Run-off pollution load	$C7 = P7 \times r7$	kg/day	41	41	41	41	41	41	41						
C3 Total run-off pollution load from agriculture	$D2 = C6 + C7$	kg/day	41	41	41	41	41	41	41						
D. Other sources															
D1 Pollution load from others															
1) Pollution load produced	P8	kg/day	760	760	760	760	760	760	760						
2) Flow out ratio	r8-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1						
3) Flow down ratio	r8-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r8 (r8-1 x r8-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04						
5) Run-off pollution load	$C8 = P8 \times r8$	kg/day	30	30	30	30	30	30	30						
II. Water quality at control point															
E. Water quality monitored															
1) 1994		mg/l	3.4	4.0	3.2	10.6	5.2	4.0	5.2						
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	$L = D0 + D1 + D2 + A3 + D4$	kg/day	5,824	5,538	6,568	5,328	5,076	4,900	5,551						
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8						
3) Water quality	$C = L/Q$	mg/l	5.2	5.2	6.0	4.5	4.5	4.5	5.2						

Note: * Pollution load from fields is included in other sources

Table 3(6) Calculation of Water Quality (BOD) at Karangpilang (2020 : Case-I)

Item	Unit	1994	2002	2010	2015	2020	2025	2030
I. Pollution load from upstream								
1) Water quality of Cagar Tambung (1994)	Q	mg/l						
2) Water flow of Cagar Tambung	Q	m ³ /s						
3) Pollution load from upstream	Q ₁ -Q ₂ (Q)	kg/day	5,804	5,539	6,505	5,326	5,076	4,950
4) Run-off pollution load from upstream	Q ₁ -Q ₂ (Q)	kg/day	871	831	991	796	761	743
II. Pollution load from sub-basin								
A. Domestic waste water								
A1. Pollution load (Sub-basin B621)								
1) Pollution load produced	a1	kg/day	342	342	342	342	342	342
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	D1=a1 x r1	kg/day	62	62	62	62	62	62
A2. Pollution load (Sub-basin B622)								
1) Pollution load produced	a2	kg/day	1,067	1,067	1,067	1,067	1,067	1,067
2) Flow-out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r2-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.27	0.27	0.27	0.27	0.27	0.27
5) Run-off pollution load	D2=a2 x r2	kg/day	296	296	296	296	296	296
A3. Pollution load (Sub-basin B623)								
1) Pollution load produced	a3	kg/day	442	442	442	442	442	442
2) Flow-out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r3-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	D3=a3 x r3	kg/day	199	199	199	199	199	199
A4. Pollution load (Sub-basin B624)								
1) Pollution load produced	a4	kg/day	175	175	175	175	175	175
2) Flow-out ratio	r4-1	-	0.6	0.6	0.6	0.6	0.6	0.6
3) Flow-down ratio	r4-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.12	0.12	0.12	0.12	0.12	0.12
5) Run-off pollution load	D4=a4 x r4	kg/day	21	21	21	21	21	21
A5. Pollution load (Sub-basin B625)								
1) Pollution load produced	a5	kg/day	1,132	1,132	1,132	1,132	1,132	1,132
2) Flow-out ratio	r5-1	-	0.5	0.5	0.5	0.5	0.5	0.5
3) Flow-down ratio	r5-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.1	0.1	0.1	0.1	0.1	0.1
5) Run-off pollution load	D5=a5 x r5	kg/day	113	113	113	113	113	113
A6. Pollution load (Sub-basin B631)								
1) Pollution load produced	a6	kg/day	175	175	175	175	175	175
2) Flow-out ratio	r6-1	-	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r6-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r6 (r6-1+r6-2)	-	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	D6=a6 x r6	kg/day	37	37	37	37	37	37
A7. Pollution load (Sub-basin B632)								
1) Pollution load produced	a7	kg/day	573	573	573	573	573	573
2) Flow-out ratio	r7-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow-down ratio	r7-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r7 (r7-1+r7-2)	-	0.24	0.24	0.24	0.24	0.24	0.24
5) Run-off pollution load	D7=a7 x r7	kg/day	138	138	138	138	138	138
A8. Total run-off pollution load from domestic waste water	D8=D1+D2+D3+D4+D5+D6+D7	kg/day	865	865	905	865	865	865
B. Industrial waste water								
B1. Pollution load from major producers								
1) Pollution load produced	b1	kg/day	49,803	49,803	49,803	49,803	49,803	49,803
2) Flow-out ratio	r11-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow-down ratio	r11-2	-	0.25	0.25	0.25	0.25	0.25	0.25
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.2	0.2	0.2	0.2	0.2	0.2
5) Run-off pollution load	B1=b1 x r11	kg/day	9,961	9,961	9,961	9,961	9,961	9,961
B2. Pollution load from large and medium scale industries								
1) Pollution load produced	b2	kg/day	33,228	33,228	33,228	33,228	33,228	33,228
2) Flow-out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r12-2	-	0.25	0.25	0.25	0.25	0.25	0.25
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	B2=b2 x r12	kg/day	5,815	5,815	5,815	5,815	5,815	5,815
B3. Pollution load from small scale industries								
1) Pollution load produced	b3	kg/day	6,586	6,586	6,586	6,586	6,586	6,586
2) Flow-out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r13-2	-	0.25	0.25	0.25	0.25	0.25	0.25
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	B3=b3 x r13	kg/day	1,183	1,183	1,183	1,183	1,183	1,183
B4. Total run-off pollution load from the industries	B4=B1+B2+B3	kg/day	16,928	16,928	16,928	16,928	16,928	16,928
C. Agricultural pollution load								
C1. Pollution load from fields*								
1) Pollution load produced	c1	kg/day						
2) Flow-out ratio	r21-1	-						
3) Flow-down ratio	r21-2	-						
4) Run-off ratio	r21 (r21-1+r21-2)	-						
5) Run-off pollution load	A1=c1 x r21	kg/day						
C2. Pollution load from livestock								
1) Pollution load produced	c2	kg/day	6,934	6,934	6,934	6,934	6,934	6,934
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r22-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.01	0.01	0.01	0.01	0.01	0.01
5) Run-off pollution load	A2=c2 x r22	kg/day	69	69	69	69	69	69
C3. Total run-off pollution load from agriculture	A3=A1+A2	kg/day	69	69	69	69	69	69
D. Other sources								
D1. Pollution load from others								
1) Pollution load produced	d1	kg/day	10,358	10,358	10,358	10,358	10,358	10,358
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r31-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.01	0.01	0.01	0.01	0.01	0.01
5) Run-off pollution load	Dd=d1 x r31	kg/day	104	104	104	104	104	104
III. Water quality at control point								
E. Water quality monitored								
1) 1994		mg/l	153	111	112	140	79	113
2) Average (1992-1996)								
3) Median (1992-1996)								
F. Result of calculation								
1) Total run-off pollution load	L=L1+D8+B4+A3	kg/day	18,837	18,797	18,957	18,765	18,727	18,799
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8
3) Water quality	C=L/Q	mg/l	17.0	17.0	17.1	17.0	16.0	17.0

Note : *Pollution load from fields is included in other sources

Table-3(7) Calculation of Water Quality (BOD) at Ngagel (2020 : Case-I)

Item	Unit	2010	2011	2012	2013	2014	2015	Average	2015-2020
I. Pollution load from upstream									
1) Water quality of Karangpaling (1045)	Q ₀	mg/l							
2) Water flow of Karangpaling	Q ₀	m ³ /s							
3) Pollution load from upstream	$Q_0 \times C_0 \times Q_0$	kg/day	19,837	18,767	18,657	18,765	18,727	18,769	
4) Run-off pollution load from upstream	$Q_0 \times C_0 \times Q_0$	kg/day	2,826	2,826	2,826	2,826	2,826	2,826	
II. Pollution load from sub-basin									
A. Domestic waste water									
A1. Pollution load (Sub-basin B540)									
1) Pollution load produced	a1	kg/day	924	924	924	924	924	924	
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	
5) Run-off pollution load	D1 = a1 x r1	kg/day	333	333	333	333	333	333	
A2. Pollution load (Sub-basin B541)									
1) Pollution load produced	a2	kg/day	271	271	271	271	271	271	
2) Flow out ratio	r2-1	-	0.6	0.6	0.6	0.6	0.6	0.6	
3) Flow down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.12	0.12	0.12	0.12	0.12	0.12	
5) Run-off pollution load	D2 = a2 x r2	kg/day	33	33	33	33	33	33	
A3. Pollution load (Sub-basin B542)									
1) Pollution load produced	a3	kg/day	1,141	1,141	1,141	1,141	1,141	1,141	
2) Flow out ratio	r3-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	
5) Run-off pollution load	D3 = a3 x r3	kg/day	240	240	240	240	240	240	
A4. Pollution load (Sub-basin B543)									
1) Pollution load produced	a4	kg/day	5,430	5,430	5,430	5,430	5,430	5,430	
2) Flow out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r4-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	
5) Run-off pollution load	D4 = a4 x r4	kg/day	1,955	1,955	1,955	1,955	1,955	1,955	
A5. Pollution load (Sub-basin B544)									
1) Pollution load produced	a5	kg/day	2,625	2,625	2,625	2,625	2,625	2,625	
2) Flow out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r5-2	-	0.7	0.7	0.7	0.7	0.7	0.7	
4) Run-off ratio	r5-3 (r5-1+r5-2)	-	0.63	0.63	0.63	0.63	0.63	0.63	
5) Run-off pollution load	D5 = a5 x r5	kg/day	1,654	1,654	1,654	1,654	1,654	1,654	
A6. Total run-off pollution load from domestic waste water	$D1+D2+D3+D4+D5$	kg/day	4,213	4,213	4,213	4,213	4,213	4,213	
B. Industrial waste water									
B1. Pollution load from major producers									
1) Pollution load produced	a1	kg/day	684	684	684	684	684	684	
2) Flow out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	
5) Run-off pollution load	D1 = a1 x r11	kg/day	246	246	246	246	246	246	
B2. Pollution load from large and medium scale industries									
1) Pollution load produced	a2	kg/day	21,981	21,981	21,981	21,981	21,981	21,981	
2) Flow out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	
5) Run-off pollution load	D2 = a2 x r12	kg/day	6,155	6,155	6,155	6,155	6,155	6,155	
B3. Pollution load from small scale industries									
1) Pollution load produced	a3	kg/day	4,851	4,851	4,851	4,851	4,851	4,851	
2) Flow out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.28	0.28	0.28	0.28	0.28	0.28	
5) Run-off pollution load	D3 = a3 x r13	kg/day	1,358	1,358	1,358	1,358	1,358	1,358	
B4. Total run-off pollution load from the industries	$D1+D2+D3$	kg/day	7,759	7,759	7,759	7,759	7,759	7,759	
C. Agricultural pollution load									
C1. Pollution load from fields*									
1) Pollution load produced	a1	kg/day							
2) Flow out ratio	r21-1	-							
3) Flow down ratio	r21-2	-							
4) Run-off ratio	r21 (r21-1+r21-2)	-							
5) Run-off pollution load	A1 = a1 x r21	kg/day							
C2. Pollution load from livestock									
1) Pollution load produced	a2	kg/day	2,203	2,203	2,203	2,203	2,203	2,203	
2) Flow out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	
5) Run-off pollution load	A2 = a2 x r22	kg/day	44	44	44	44	44	44	
C3. Total run-off pollution load from agriculture	$A1+A2$	kg/day	44	44	44	44	44	44	
D. Other sources									
D1. Pollution load from others									
1) Pollution load produced	a1	kg/day	5,435	5,435	5,435	5,435	5,435	5,435	
2) Flow out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	
5) Run-off pollution load	D6 = a1 x r31	kg/day	109	109	109	109	109	109	
III. Water quality at control point									
E. Water quality monitored									
1) 1994		mg/l	6.1	6.0	5.9	5.8	5.7	5.6	
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	$L = L_0 + D_1 + D_2 + D_3 + D_4 + D_5 + D_6$	kg/day	14,951	14,945	14,949	14,940	14,934	14,932	14,945
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8
3) Water quality	$C = L/Q$	mg/l	12.5	12.5	12.5	12.5	12.5	12.5	12.5

Note : *Pollution load from fields is included in other sources

Table-3(8) Calculation of Water Quality (BOD) at Kayoon (2020 : Case-I)

Items	Units	Jan	Feb	Mar	Apr	May	Jun
I. Pollution load from upstream							
1) Water quality of Jeta Bridge (1190)	CO	mg/l					
2) Water flow of Jeta Bridge	Q0	m ³ /s					
3) Pollution load from upstream	$(C0 \times Q0) \times 86400$	kg/day	14,954	14,945	14,969	14,946	14,932
4) Run-off pollution load from upstream	$(C0 - C0) \times Q0$	kg/day	2,460	2,460	2,464	2,458	2,457
II. Pollution load from sub-basin							
A. Domestic waste water							
A1. Pollution load (Sub-basin B545)							
1) Pollution load produced	a1	kg/day	0	0	0	0	0
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r1 = (r1-1 + r1-2)$	-	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	0	0	0	0	0
A2. Pollution load (Sub-basin B546)							
1) Pollution load produced	a2	kg/day	0	0	0	0	0
2) Flow out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r2-2	-	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	$r2 = (r2-1 + r2-2)$	-	0.34	0.34	0.34	0.34	0.34
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	0	0	0	0	0
A3. Total run-off pollution load from domestic waste water	$D0 = D1 + D2$	kg/day	0	0	0	0	0
B. Industrial waste water							
B1. Pollution load from major producers							
1) Pollution load produced	b1	kg/day	0	0	0	0	0
2) Flow out ratio	r11-1	-					
3) Flow down ratio	r11-2	-					
4) Run-off ratio	$r11 = (r11-1 + r11-2)$	-	0	0	0	0	0
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	0	0	0	0	0
B2. Pollution load from large and medium scale industries							
1) Pollution load produced	b2	kg/day	2,460	2,460	2,460	2,460	2,460
2) Flow out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r12-2	-	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	$r12 = (r12-1 + r12-2)$	-	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	1,107	1,107	1,107	1,107	1,107
B3. Pollution load from small scale industries							
1) Pollution load produced	b3	kg/day	540	540	540	540	540
2) Flow out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	r13-2	-	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	$r13 = (r13-1 + r13-2)$	-	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	261	261	261	261	261
B4. Total run-off pollution load from the industries	$D0 = D1 + D2 + D3$	kg/day	1,368	1,368	1,368	1,368	1,368
C. Agricultural pollution load							
C1. Pollution load from fields*							
1) Pollution load produced	c1	kg/day					
2) Flow out ratio	r21-1	-					
3) Flow down ratio	r21-2	-					
4) Run-off ratio	$r21 = (r21-1 + r21-2)$	-					
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day					
C2. Pollution load from livestock							
1) Pollution load produced	c2	kg/day	91	91	91	91	91
2) Flow out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	r22-2	-	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	$r22 = (r22-1 + r22-2)$	-	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	2	2	2	2	2
C3. Total run-off pollution load from agriculture	$A0 = A1 + A2$	kg/day	2	2	2	2	2
D. Other sources							
D1. Pollution load from others							
1) Pollution load produced	d1	kg/day	580	580	580	580	580
2) Flow out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05
3) Flow down ratio	r31-2	-	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	$r31 = (r31-1 + r31-2)$	-	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	$D0 = d1 \times r31$	kg/day	15	15	15	15	15
III. Water quality at control point							
E. Water quality monitored							
1) 1994		mg/l			6.2		6.2
2) Average (1992-1996)							
3) Median (1992-1996)							
F. Result of calculation							
1) Total run-off pollution load	$L = D0 + D0 + D0 + A0 + D0$	kg/day	4,375	4,374	4,379	4,372	4,374
2) Water flow	Q	m ³ /s			8.1		8.1
3) Water quality	$C = L/Q$	mg/l			6.3		6.2

Note : * Pollution load from fields is included in other sources.

Table-3(9) Calculation of Water Quality (BOD) at Pelayaran (2020 : Case-I)

Items	Unit	Loc	Pop	Ind	Ag	City	Nat	Ave Pop	WQ Val
I. Pollution load from upstream									
1) Water quality of intake of water canal	CO	mg/l				25.0			
2) Water flow of intake of water canal	QO	m ³ /s				6.0			
3) Pollution load from upstream	$(CO \times QO) \times 86.4$	kg/day				12960			
4) Run-off pollution load from upstream	$(CO \times QO) \times 86.4$	kg/day				250			
II. Pollution load from sub-basin									
A. Domestic waste water									
A1) Pollution load									
1) Pollution load produced	a1	kg/day	48	48	48	48	48	48	
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	42	42	42	42	42	42	
A2) Total run-off pollution load from domestic waste water	$D1 - D1$	kg/day	12	12	12	12	12	12	
B. Industrial waste water									
B1) Pollution load from major producers									
1) Pollution load produced	b1	kg/day	84,000	84,000	84,000	84,000	84,000	84,000	
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r11-2	-	0.02	0.02	0.02	0.02	0.02	0.02	
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.018	0.018	0.018	0.018	0.018	0.018	
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	1,512	1,512	1,512	1,512	1,512	1,512	
B2) Pollution load from large and medium scale industries									
1) Pollution load produced	b2	kg/day	160	160	160	160	160	160	
2) Flow-out ratio	r12-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r12-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	30	30	30	30	30	30	
B3) Pollution load from small scale industries									
1) Pollution load produced	b3	kg/day	33	33	33	33	33	33	
2) Flow-out ratio	r13-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r13-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	6	6	6	6	6	6	
B4) Total run-off pollution load from the industries	$D1 + D2 + D3$	kg/day	1,547	1,547	1,547	1,547	1,547	1,547	
C. Agricultural pollution load									
C1) Pollution load from fields*									
1) Pollution load produced	c1	kg/day							
2) Flow-out ratio	r21-1	-							
3) Flow-down ratio	r21-2	-							
4) Run-off ratio	r21 (r21-1+r21-2)	-							
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day							
C2) Pollution load from livestock									
1) Pollution load produced	c2	kg/day	56	56	56	56	56	56	
2) Flow-out ratio	r22-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow-down ratio	r22-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	2	2	2	2	2	2	
C3) Total run-off pollution load from agriculture	$A1 + A2$	kg/day	2	2	2	2	2	2	
D. Other sources									
D1) Pollution load from others									
1) Pollution load produced	d1	kg/day	113	113	113	113	113	113	
2) Flow-out ratio	r31-1	-	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow-down ratio	r31-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	
5) Run-off pollution load	$D2 = d1 \times r31$	kg/day	5	5	5	5	5	5	
III. Water quality at control point									
E. Water quality monitored									
1) 1994		mg/l				12.9			12.9
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	$L = I2 + D1 + D2 + A1 + D2$	kg/day	1,566	1,566	1,576	1,556	1,556	1,556	1,610
2) Water flow	Q	m ³ /s				3.2			3.2
3) Water quality	$C = L/Q$	mg/l				6.6			6.6

Note : * Pollution load from fields is included in other sources

Table-3(10) Calculation of Water Quality (BOD) at Porong (2020 : Case-I)

Item	Unit	Por	20	21	22	23	24	25	26
I. Pollution load from upstream									
1) Water quality at intake of sewerage	CO	mg/l							
2) Water flow at intake of sewerage	Q0	m ³ /s							
3) Pollution load from upstream	$10 \times Q0 \times CO$	kg/day							
4) Run-off pollution load from upstream	$(A0 - C0) \times 10$	kg/day							
II. Pollution load from sub-basin									
A. Domestic waste water									
A1. Pollution load									
1) Pollution load produced	a1	kg/day	23	23	23	23	23	23	23
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r1-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r1 = (r1-1 \times r1-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	17	17	17	17	17	17	17
A2 Total run-off pollution load from domestic waste water	$D1 - D1$	kg/day	17	17	17	17	17	17	17
B. Industrial waste water									
B1. Pollution load from major producers									
1) Pollution load produced	a1	kg/day	0	0	0	0	0	0	0
2) Flow-out ratio	r1-1	-	-	-	-	-	-	-	-
3) Flow-down ratio	r1-2	-	-	-	-	-	-	-	-
4) Run-off ratio	$r1 = (r1-1 \times r1-2)$	-	0	0	0	0	0	0	0
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	0	0	0	0	0	0	0
B2. Pollution load from large and medium scale industries									
1) Pollution load produced	a2	kg/day	55	55	55	55	55	55	55
2) Flow-out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r2-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r2 = (r2-1 \times r2-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	40	40	40	40	40	40	40
B3. Pollution load from small scale industries									
1) Pollution load produced	a3	kg/day	11	11	11	11	11	11	11
2) Flow-out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r3-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r3 = (r3-1 \times r3-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	$D3 = a3 \times r3$	kg/day	8	8	8	8	8	8	8
B4 Total run-off pollution load from the industries	$D1 + D2 + D3$	kg/day	48	48	48	48	48	48	48
C. Agricultural pollution load									
C1. Pollution load from fields*									
1) Pollution load produced	a1	kg/day							
2) Flow-out ratio	r1-1	-							
3) Flow-down ratio	r1-2	-							
4) Run-off ratio	$r1 = (r1-1 \times r1-2)$	-							
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day							
C2. Pollution load from livestock									
1) Pollution load produced	a2	kg/day	19	19	19	19	19	19	19
2) Flow-out ratio	r2-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	r2-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r2 = (r2-1 \times r2-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04	3.04
C3 Total run-off pollution load from agriculture	$D1 + D2$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04	3.04
D. Other sources									
D1. Pollution load from others									
1) Pollution load produced	a1	kg/day	38	38	38	38	38	38	38
2) Flow-out ratio	r1-1	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	r1-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	$r1 = (r1-1 \times r1-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	6.08	6.08	6.08	6.08	6.08	6.08	6.08
III. Water quality at control point									
E. Water quality monitored									
1) 1994		mg/l			9.3				9.3
2) Average (1992-1995)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	$L = L0 + D1 + D2 + D3 + D4$	kg/day	73	73	73	73	73	73	73
2) Water flow	Q	m ³ /s			0.06				0.06
3) Water quality	$C = L/Q$	mg/l			14.1				14.1

Note: *Polluting load from fields is included in other sources

Table-4(1) Calculation of Water Quality (BOD) at Bumiayu Bridge (2020 :Case-II)

Item	Unit	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈
I. Pollution load from upstream									
1) Water quality	mg/l								
2) Water flow	m ³ /s								
3) Pollution load from upstream	kg/day								
4) Run-off pollution load from upstream	kg/day								
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load (Sub-basin B10)									
1) Pollution load produced	kg/day	897	897	897	897	897	897	897	897
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
5) Run-off pollution load	kg/day	27	27	27	27	27	27	27	27
A2 Pollution load (Sub-basin B11)									
1) Pollution load produced	kg/day	757	757	757	757	757	757	757	757
2) Flow-out ratio	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
5) Run-off pollution load	kg/day	151	151	151	151	151	151	151	151
A3 Pollution load (Sub-basin B12)									
1) Pollution load produced	kg/day	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	kg/day	1,365	1,365	1,365	1,365	1,365	1,365	1,365	1,365
A4 Pollution load (Sub-basin B13)									
1) Pollution load produced	kg/day	9,215	9,215	9,215	9,215	9,215	9,215	9,215	9,215
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	kg/day	1,935	1,935	1,935	1,935	1,935	1,935	1,935	1,935
A5 Pollution load (Sub-basin B14)									
1) Pollution load produced	kg/day	3,023	3,023	3,023	3,023	3,023	3,023	3,023	3,023
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	kg/day	2,177	2,177	2,177	2,177	2,177	2,177	2,177	2,177
A6 Total run-off pollution load from domestic waste water	kg/day	5,857	5,857	5,857	5,857	5,857	5,857	5,857	5,857
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	kg/day	206	206	206	206	206	206	206	206
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	kg/day	93	93	93	93	93	93	93	93
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	14,220	14,220	14,220	14,220	14,220	14,220	14,220	14,220
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
5) Run-off pollution load	kg/day	3,982	3,982	3,982	3,982	3,982	3,982	3,982	3,982
B3 Pollution load from small scale industries									
1) Pollution load produced	kg/day	3,432	3,432	3,432	3,432	3,432	3,432	3,432	3,432
2) Flow-out ratio	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	-	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
5) Run-off pollution load	kg/day	961	961	961	961	961	961	961	961
B4 Total run-off pollution load from the industries	kg/day	5,035	5,035	5,035	5,035	5,035	5,035	5,035	5,035
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	kg/day								
2) Flow-out ratio	-								
3) Flow-down ratio	-								
4) Run-off ratio	-								
5) Run-off pollution load	kg/day								
C2 Pollution load from livestock									
1) Pollution load produced	kg/day	21,276	21,276	21,276	21,276	21,276	21,276	21,276	21,276
2) Flow-out ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
5) Run-off pollution load	kg/day	638	638	638	638	638	638	638	638
C3 Total run-off pollution load from agriculture	kg/day	638	638	638	638	638	638	638	638
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	kg/day	36,820	36,820	36,820	36,820	36,820	36,820	36,820	36,820
2) Flow-out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3) Flow-down ratio	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
5) Run-off pollution load	kg/day	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099
III. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l	8.5	9.4	7.8	8.4	7.8	7.5	8.2	8.4
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Results of calculation									
1) Total run-off pollution load	kg/day	12,429	12,429	12,429	12,429	12,429	12,429	12,429	12,429
2) Water flow	m ³ /s	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
3) Water quality	mg/l	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4

Note : *Pollution load from fields is included in other sources

Table-4(2) Calculation of Water Quality (BOD) at Demangan Bridge (2020 : Case-11)

Items		Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average	25%ile
I. Pollution load from upstream																
1) Water quality of Lodayo Dam (60)	C0	mg/l	2.0	2.7	4.3	6.6	4.3	3.8								
2) Water flow of Lodayo Dam	Q0	m ³ /s	72.0	8.9	61.0	57.0	167.0	73.0								
3) Pollution load from upstream	L0=C0xQ0	kg/day	12,960	1,400	22,663	32,502	39,753	23,967								
4) Run-off pollution load from upstream	L0-C0xQ0	kg/day	2,400	240	4,530	6,501	7,651	4,790								
II. Pollution load from sub-basin																
A. Domestic waste water																
A1. Pollution load (Sub-basin B142)																
1) Pollution load produced	a1	kg/day	1,312	1,312	1,312	1,312	1,312	1,312								
2) Flow out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r1=(r1-1+r1-2)	-	0.16	0.16	0.16	0.16	0.16	0.16								
5) Run-off pollution load	O1=a1x r1	kg/day	210	210	210	210	210	210								
A2. Pollution load (Sub-basin B150)																
1) Pollution load produced	a2	kg/day	1,731	1,731	1,731	1,731	1,731	1,731								
2) Flow out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	r2-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r2=(r2-1+r2-2)	-	0.34	0.34	0.34	0.34	0.34	0.34								
5) Run-off pollution load	O2=a2x r2	kg/day	415	415	415	415	415	415								
A3. Pollution load (Sub-basin B153)																
1) Pollution load produced	a3	kg/day	732	732	732	732	732	732								
2) Flow out ratio	r3-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4	0.4								
4) Run-off ratio	r3=(r3-1+r3-2)	-	0.32	0.32	0.32	0.32	0.32	0.32								
5) Run-off pollution load	O3=a3x r3	kg/day	234	234	234	234	234	234								
A4. Total run-off pollution load from domestic waste water	O0=O1+O2+O3	kg/day	860	860	860	860	860	860								
B. Industrial waste water																
B1. Pollution load from major producers																
1) Pollution load produced	b1	kg/day	6,221	6,221	6,221	6,221	6,221	6,221								
2) Flow out ratio	r11-1	-	0.3	0.3	0.3	0.3	0.3	0.3								
3) Flow down ratio	r11-2	-	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio	r11=(r11-1+r11-2)	-	0.06	0.06	0.06	0.06	0.06	0.06								
5) Run-off pollution load	O1=b1x r11	kg/day	373	373	373	373	373	373								
B2. Pollution load from large and medium scale industries																
1) Pollution load produced	b2	kg/day	2,808	2,808	2,808	2,808	2,808	2,808								
2) Flow out ratio	r12-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	r12-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r12=(r12-1+r12-2)	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	O2=b2x r12	kg/day	674	674	674	674	674	674								
B3. Pollution load from small scale industries																
1) Pollution load produced	b3	kg/day	617	617	617	617	617	617								
2) Flow out ratio	r13-1	-	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow down ratio	r13-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r13=(r13-1+r13-2)	-	0.24	0.24	0.24	0.24	0.24	0.24								
5) Run-off pollution load	O3=b3x r13	kg/day	148	148	148	148	148	148								
B4. Total run-off pollution load from the industries	O0=O1+O2+O3	kg/day	1,195	1,195	1,195	1,195	1,195	1,195								
C. Agricultural pollution load																
C1. Pollution load from fields*																
1) Pollution load produced	c1	kg/day														
2) Flow out ratio	r21-1	-														
3) Flow down ratio	r21-2	-														
4) Run-off ratio	r21=(r21-1+r21-2)	-														
5) Run-off pollution load	A1=c1x r21	kg/day														
C2. Pollution load from livestock																
1) Pollution load produced	c2	kg/day	11,258	11,258	11,258	11,258	11,258	11,258								
2) Flow out ratio	r22-1	-	0.3	0.3	0.3	0.3	0.3	0.3								
3) Flow down ratio	r22-2	-	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r22=(r22-1+r22-2)	-	0.03	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	A2=c2x r22	kg/day	338	338	338	338	338	338								
C3. Total run-off pollution load from agriculture	A0=A1+A2	kg/day	338	338	338	338	338	338								
D. Other sources																
D1. Pollution load from others																
1) Pollution load produced	d1	kg/day	10,620	10,620	10,620	10,620	10,620	10,620								
2) Flow out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1								
3) Flow down ratio	r31-2	-	0.2	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio	r31=(r31-1+r31-2)	-	0.03	0.03	0.03	0.03	0.03	0.03								
5) Run-off pollution load	O0=d1x r31	kg/day	319	319	319	319	319	319								
II. Water quality at control point																
E. Water quality monitored																
1) 1994		mg/l	2.8	3.8	4.3	7.5	2.6	3.5								
2) Average (1992-1996)																
3) Median (1992-1996)																
F. Result of calculation																
1) Total run-off pollution load	L=L0+D0+L0+A0+O0	kg/day	3,200	2,991	7,244	9,212	10,661	7,505								
2) Water flow	Q	m ³ /s	62.6	62.6	62.6	62.6	62.6	62.6								
3) Water quality	C=L/Q	mg/l	1.0	0.6	1.3	1.5	2.0	1.4								

Note : * Pollution load from fields is included in other sources

Table-4(3) Calculation of Water Quality (BOD) at Joghria Bridge (2020 : Case 1B)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul
I. Pollution load from upstream								
1) Water quality of Nigra gas Tashung in (200)	CO	mg/l	6.3	4.8	10.4	3.9	3.8	4.7
2) Water flow of Nigra gas Tashung in	Q0	m ³ /s	14.0	56.9	55.6	65.9	52.4	41.9
3) Pollution load from upstream	L0-COxQ0	kg/day	76.740	23.543	56.840	21.902	17.264	17.045
4) Run-off pollution load from upstream	L0-COxQ0	kg/day	15.360	4.700	10.688	4.360	3.448	3.409
II. Pollution load from sub-basin								
A. Domestic waste water								
A1 Pollution load (Sub-basin B310)								
1) Pollution load produced	a1	kg/day	2.662	2.662	2.662	2.662	2.662	2.662
2) Flow-out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow-down ratio	r1-2	-	0.1	0.1	0.1	0.1	0.1	0.1
4) Run-off ratio	r1(r1-1+r1-2)	-	0.08	0.08	0.08	0.08	0.08	0.08
5) Run-off pollution load	D1=a1x r1	kg/day	213	213	213	213	213	213
A2 Pollution load (Sub-basin B311)								
1) Pollution load produced	a2	kg/day	2.530	2.530	2.530	2.530	2.530	2.530
2) Flow-out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow-down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r2(r2-1+r2-2)	-	0.16	0.16	0.16	0.16	0.16	0.16
5) Run-off pollution load	D2=a2x r2	kg/day	405	405	405	405	405	405
A3 Pollution load (Sub-basin B312)								
1) Pollution load produced	a3	kg/day	2.11	2.11	2.11	2.11	2.11	2.11
2) Flow-out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r3(r3-1+r3-2)	-	0.27	0.27	0.27	0.27	0.27	0.27
5) Run-off pollution load	D3=a3x r3	kg/day	57	57	57	57	57	57
A4 Pollution load (Sub-basin B313)								
1) Pollution load produced	a4	kg/day	2.97	2.97	2.97	2.97	2.97	2.97
2) Flow-out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r4-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r4(r4-1+r4-2)	-	0.27	0.27	0.27	0.27	0.27	0.27
5) Run-off pollution load	D4=a4x r4	kg/day	80	80	80	80	80	80
A5 Pollution load (Sub-basin B314)								
1) Pollution load produced	a5	kg/day	11	11	11	11	11	11
2) Flow-out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r5-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r5(r5-1+r5-2)	-	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	D5=a5x r5	kg/day	5	5	5	5	5	5
A6 Pollution load (Sub-basin B315)								
1) Pollution load produced	a6	kg/day	1.504	1.504	1.504	1.504	1.504	1.504
2) Flow-out ratio	r6-1	-	0.8	0.8	0.8	0.8	0.8	0.8
3) Flow-down ratio	r6-2	-	0.6	0.6	0.6	0.6	0.6	0.6
4) Run-off ratio	r6(r6-1+r6-2)	-	0.48	0.48	0.48	0.48	0.48	0.48
5) Run-off pollution load	D6=a6x r6	kg/day	722	722	722	722	722	722
A7 Pollution load (Sub-basin B316)								
1) Pollution load produced	a7	kg/day	170	170	170	170	170	170
2) Flow-out ratio	r7-1	-	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r7-2	-	0.8	0.8	0.8	0.8	0.8	0.8
4) Run-off ratio	r7(r7-1+r7-2)	-	0.72	0.72	0.72	0.72	0.72	0.72
5) Run-off pollution load	D7=a7x r7	kg/day	122	122	122	122	122	122
A8 Pollution load (Sub-basin B317)								
1) Pollution load produced	a8	kg/day	2.916	2.916	2.916	2.916	2.916	2.916
2) Flow-out ratio	r8-1	-	0.7	0.7	0.7	0.7	0.7	0.7
3) Flow-down ratio	r8-2	-	0.3	0.3	0.3	0.3	0.3	0.3
4) Run-off ratio	r8(r8-1+r8-2)	-	0.21	0.21	0.21	0.21	0.21	0.21
5) Run-off pollution load	D8=a8x r8	kg/day	612	612	612	612	612	612
A9 Total run-off pollution load from domestic waste water								
	Dd=D1+D2+D3+D4+D5+D6+D7+D8	kg/day	2.217	2.217	2.217	2.217	2.217	2.217
B. Industrial waste water								
B1 Pollution load from major producers								
1) Pollution load produced	b1	kg/day	55.815	55.815	55.815	55.815	55.815	55.815
2) Flow-out ratio	r11-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r11-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r11(r11-1+r11-2)	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	D1=b1x r11	kg/day	1.395	1.395	1.395	1.395	1.395	1.395
B2 Pollution load from large and medium scale industries								
1) Pollution load produced	b2	kg/day	3.799	3.799	3.799	3.799	3.799	3.799
2) Flow-out ratio	r12-1	-	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	r12-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r12(r12-1+r12-2)	-	0.1	0.1	0.1	0.1	0.1	0.1
5) Run-off pollution load	D2=b2x r12	kg/day	380	380	380	380	380	380
B3 Pollution load from small scale industries								
1) Pollution load produced	b3	kg/day	791	791	791	791	791	791
2) Flow-out ratio	r13-1	-	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	r13-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r13(r13-1+r13-2)	-	0.1	0.1	0.1	0.1	0.1	0.1
5) Run-off pollution load	D3=b3x r13	kg/day	79	79	79	79	79	79
B4 Total run-off pollution load from industries								
	Dd=D1+D2+D3	kg/day	1.854	1.854	1.854	1.854	1.854	1.854
C. Agricultural pollution load								
C1 Pollution load from fields*								
1) Pollution load produced	c1	kg/day	-	-	-	-	-	-
2) Flow-out ratio	r21-1	-	-	-	-	-	-	-
3) Flow-down ratio	r21-2	-	-	-	-	-	-	-
4) Run-off ratio	r21(r21-1+r21-2)	-	-	-	-	-	-	-
5) Run-off pollution load	A1=c1x r21	kg/day	-	-	-	-	-	-
C2 Pollution load from livestock								
1) Pollution load produced	c2	kg/day	24.838	24.838	24.838	24.838	24.838	24.838
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r22-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r22(r22-1+r22-2)	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	A2=c2x r22	kg/day	621	621	621	621	621	621
C3 Total run-off pollution load from agriculture								
	A3=A1+A2	kg/day	621	621	621	621	621	621
D. Other sources								
D1 Pollution load from other								
1) Pollution load produced	d1	kg/day	12.280	12.280	12.280	12.280	12.280	12.280
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r31-2	-	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r31(r31-1+r31-2)	-	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	Dd=d1x r31	kg/day	307	307	307	307	307	307
III. Water quality at control point								
E. Water quality monitored								
1) 1994		mg/l	3.5	3.8	11.9	3.4	7.7	4.5
2) Average (1992-1996)								
3) Med (1992-1996)								
F. Result of calculation								
1) Total run-off pollution load	C+L0+Dd+D1+D2+D3+D4	kg/day	20.349	9.715	15.047	9.370	8.440	11.896
2) Water flow	Q	m ³ /s	58.2	58.2	58.2	58.2	58.2	58.2
3) Water quality	C=L/Q	mg/l	4.2	1.9	2.0	1.9	1.7	2.4

Note: *Pollution load from fields is included in other sources

Table 4-1) Calculation of Water Quality (BOD) at Padangan Bridge (2020 : Case-II)

Item	Unit	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈	Q ₉	Q ₁₀	Q ₁₁	Q ₁₂	Q ₁₃	Q ₁₄	Q ₁₅	Q ₁₆	Q ₁₇	Q ₁₈	Q ₁₉	Q ₂₀	Q ₂₁	Q ₂₂	Q ₂₃	Q ₂₄	Q ₂₅	Q ₂₆	Q ₂₇	Q ₂₈	Q ₂₉	Q ₃₀	Q ₃₁	Q ₃₂	Q ₃₃	Q ₃₄	Q ₃₅	Q ₃₆	Q ₃₇	Q ₃₈	Q ₃₉	Q ₄₀	Q ₄₁	Q ₄₂	Q ₄₃	Q ₄₄	Q ₄₅	Q ₄₆	Q ₄₇	Q ₄₈	Q ₄₉	Q ₅₀	Q ₅₁	Q ₅₂	Q ₅₃	Q ₅₄	Q ₅₅	Q ₅₆	Q ₅₇	Q ₅₈	Q ₅₉	Q ₆₀	Q ₆₁	Q ₆₂	Q ₆₃	Q ₆₄	Q ₆₅	Q ₆₆	Q ₆₇	Q ₆₈	Q ₆₉	Q ₇₀	Q ₇₁	Q ₇₂	Q ₇₃	Q ₇₄	Q ₇₅	Q ₇₆	Q ₇₇	Q ₇₈	Q ₇₉	Q ₈₀	Q ₈₁	Q ₈₂	Q ₈₃	Q ₈₄	Q ₈₅	Q ₈₆	Q ₈₇	Q ₈₈	Q ₈₉	Q ₉₀	Q ₉₁	Q ₉₂	Q ₉₃	Q ₉₄	Q ₉₅	Q ₉₆	Q ₉₇	Q ₉₈	Q ₉₉	Q ₁₀₀	Q ₁₀₁	Q ₁₀₂	Q ₁₀₃	Q ₁₀₄	Q ₁₀₅	Q ₁₀₆	Q ₁₀₇	Q ₁₀₈	Q ₁₀₉	Q ₁₁₀	Q ₁₁₁	Q ₁₁₂	Q ₁₁₃	Q ₁₁₄	Q ₁₁₅	Q ₁₁₆	Q ₁₁₇	Q ₁₁₈	Q ₁₁₉	Q ₁₂₀	Q ₁₂₁	Q ₁₂₂	Q ₁₂₃	Q ₁₂₄	Q ₁₂₅	Q ₁₂₆	Q ₁₂₇	Q ₁₂₈	Q ₁₂₉	Q ₁₃₀	Q ₁₃₁	Q ₁₃₂	Q ₁₃₃	Q ₁₃₄	Q ₁₃₅	Q ₁₃₆	Q ₁₃₇	Q ₁₃₈	Q ₁₃₉	Q ₁₄₀	Q ₁₄₁	Q ₁₄₂	Q ₁₄₃	Q ₁₄₄	Q ₁₄₅	Q ₁₄₆	Q ₁₄₇	Q ₁₄₈	Q ₁₄₉	Q ₁₅₀	Q ₁₅₁	Q ₁₅₂	Q ₁₅₃	Q ₁₅₄	Q ₁₅₅	Q ₁₅₆	Q ₁₅₇	Q ₁₅₈	Q ₁₅₉	Q ₁₆₀	Q ₁₆₁	Q ₁₆₂	Q ₁₆₃	Q ₁₆₄	Q ₁₆₅	Q ₁₆₆	Q ₁₆₇	Q ₁₆₈	Q ₁₆₉	Q ₁₇₀	Q ₁₇₁	Q ₁₇₂	Q ₁₇₃	Q ₁₇₄	Q ₁₇₅	Q ₁₇₆	Q ₁₇₇	Q ₁₇₈	Q ₁₇₉	Q ₁₈₀	Q ₁₈₁	Q ₁₈₂	Q ₁₈₃	Q ₁₈₄	Q ₁₈₅	Q ₁₈₆	Q ₁₈₇	Q ₁₈₈	Q ₁₈₉	Q ₁₉₀	Q ₁₉₁	Q ₁₉₂	Q ₁₉₃	Q ₁₉₄	Q ₁₉₅	Q ₁₉₆	Q ₁₉₇	Q ₁₉₈	Q ₁₉₉	Q ₂₀₀	Q ₂₀₁	Q ₂₀₂	Q ₂₀₃	Q ₂₀₄	Q ₂₀₅	Q ₂₀₆	Q ₂₀₇	Q ₂₀₈	Q ₂₀₉	Q ₂₁₀	Q ₂₁₁	Q ₂₁₂	Q ₂₁₃	Q ₂₁₄	Q ₂₁₅	Q ₂₁₆	Q ₂₁₇	Q ₂₁₈	Q ₂₁₉	Q ₂₂₀	Q ₂₂₁	Q ₂₂₂	Q ₂₂₃	Q ₂₂₄	Q ₂₂₅	Q ₂₂₆	Q ₂₂₇	Q ₂₂₈	Q ₂₂₉	Q ₂₃₀	Q ₂₃₁	Q ₂₃₂	Q ₂₃₃	Q ₂₃₄	Q ₂₃₅	Q ₂₃₆	Q ₂₃₇	Q ₂₃₈	Q ₂₃₉	Q ₂₄₀	Q ₂₄₁	Q ₂₄₂	Q ₂₄₃	Q ₂₄₄	Q ₂₄₅	Q ₂₄₆	Q ₂₄₇	Q ₂₄₈	Q ₂₄₉	Q ₂₅₀	Q ₂₅₁	Q ₂₅₂	Q ₂₅₃	Q ₂₅₄	Q ₂₅₅	Q ₂₅₆	Q ₂₅₇	Q ₂₅₈	Q ₂₅₉	Q ₂₆₀	Q ₂₆₁	Q ₂₆₂	Q ₂₆₃	Q ₂₆₄	Q ₂₆₅	Q ₂₆₆	Q ₂₆₇	Q ₂₆₈	Q ₂₆₉	Q ₂₇₀	Q ₂₇₁	Q ₂₇₂	Q ₂₇₃	Q ₂₇₄	Q ₂₇₅	Q ₂₇₆	Q ₂₇₇	Q ₂₇₈	Q ₂₇₉	Q ₂₈₀	Q ₂₈₁	Q ₂₈₂	Q ₂₈₃	Q ₂₈₄	Q ₂₈₅	Q ₂₈₆	Q ₂₈₇	Q ₂₈₈	Q ₂₈₉	Q ₂₉₀	Q ₂₉₁	Q ₂₉₂	Q ₂₉₃	Q ₂₉₄	Q ₂₉₅	Q ₂₉₆	Q ₂₉₇	Q ₂₉₈	Q ₂₉₉	Q ₃₀₀	Q ₃₀₁	Q ₃₀₂	Q ₃₀₃	Q ₃₀₄	Q ₃₀₅	Q ₃₀₆	Q ₃₀₇	Q ₃₀₈	Q ₃₀₉	Q ₃₁₀	Q ₃₁₁	Q ₃₁₂	Q ₃₁₃	Q ₃₁₄	Q ₃₁₅	Q ₃₁₆	Q ₃₁₇	Q ₃₁₈	Q ₃₁₉	Q ₃₂₀	Q ₃₂₁	Q ₃₂₂	Q ₃₂₃	Q ₃₂₄	Q ₃₂₅	Q ₃₂₆	Q ₃₂₇	Q ₃₂₈	Q ₃₂₉	Q ₃₃₀	Q ₃₃₁	Q ₃₃₂	Q ₃₃₃	Q ₃₃₄	Q ₃₃₅	Q ₃₃₆	Q ₃₃₇	Q ₃₃₈	Q ₃₃₉	Q ₃₄₀	Q ₃₄₁	Q ₃₄₂	Q ₃₄₃	Q ₃₄₄	Q ₃₄₅	Q ₃₄₆	Q ₃₄₇	Q ₃₄₈	Q ₃₄₉	Q ₃₅₀	Q ₃₅₁	Q ₃₅₂	Q ₃₅₃	Q ₃₅₄	Q ₃₅₅	Q ₃₅₆	Q ₃₅₇	Q ₃₅₈	Q ₃₅₉	Q ₃₆₀	Q ₃₆₁	Q ₃₆₂	Q ₃₆₃	Q ₃₆₄	Q ₃₆₅	Q ₃₆₆	Q ₃₆₇	Q ₃₆₈	Q ₃₆₉	Q ₃₇₀	Q ₃₇₁	Q ₃₇₂	Q ₃₇₃	Q ₃₇₄	Q ₃₇₅	Q ₃₇₆	Q ₃₇₇	Q ₃₇₈	Q ₃₇₉	Q ₃₈₀	Q ₃₈₁	Q ₃₈₂	Q ₃₈₃	Q ₃₈₄	Q ₃₈₅	Q ₃₈₆	Q ₃₈₇	Q ₃₈₈	Q ₃₈₉	Q ₃₉₀	Q ₃₉₁	Q ₃₉₂	Q ₃₉₃	Q ₃₉₄	Q ₃₉₅	Q ₃₉₆	Q ₃₉₇	Q ₃₉₈	Q ₃₉₉	Q ₄₀₀	Q ₄₀₁	Q ₄₀₂	Q ₄₀₃	Q ₄₀₄	Q ₄₀₅	Q ₄₀₆	Q ₄₀₇	Q ₄₀₈	Q ₄₀₉	Q ₄₁₀	Q ₄₁₁	Q ₄₁₂	Q ₄₁₃	Q ₄₁₄	Q ₄₁₅	Q ₄₁₆	Q ₄₁₇	Q ₄₁₈	Q ₄₁₉	Q ₄₂₀	Q ₄₂₁	Q ₄₂₂	Q ₄₂₃	Q ₄₂₄	Q ₄₂₅	Q ₄₂₆	Q ₄₂₇	Q ₄₂₈	Q ₄₂₉	Q ₄₃₀	Q ₄₃₁	Q ₄₃₂	Q ₄₃₃	Q ₄₃₄	Q ₄₃₅	Q ₄₃₆	Q ₄₃₇	Q ₄₃₈	Q ₄₃₉	Q ₄₄₀	Q ₄₄₁	Q ₄₄₂	Q ₄₄₃	Q ₄₄₄	Q ₄₄₅	Q ₄₄₆	Q ₄₄₇	Q ₄₄₈	Q ₄₄₉	Q ₄₅₀	Q ₄₅₁	Q ₄₅₂	Q ₄₅₃	Q ₄₅₄	Q ₄₅₅	Q ₄₅₆	Q ₄₅₇	Q ₄₅₈	Q ₄₅₉	Q ₄₆₀	Q ₄₆₁	Q ₄₆₂	Q ₄₆₃	Q ₄₆₄	Q ₄₆₅	Q ₄₆₆	Q ₄₆₇	Q ₄₆₈	Q ₄₆₉	Q ₄₇₀	Q ₄₇₁	Q ₄₇₂	Q ₄₇₃	Q ₄₇₄	Q ₄₇₅	Q ₄₇₆	Q ₄₇₇	Q ₄₇₈	Q ₄₇₉	Q ₄₈₀	Q ₄₈₁	Q ₄₈₂	Q ₄₈₃	Q ₄₈₄	Q ₄₈₅	Q ₄₈₆	Q ₄₈₇	Q ₄₈₈	Q ₄₈₉	Q ₄₉₀	Q ₄₉₁	Q ₄₉₂	Q ₄₉₃	Q ₄₉₄	Q ₄₉₅	Q ₄₉₆	Q ₄₉₇	Q ₄₉₈	Q ₄₉₉	Q ₅₀₀	Q ₅₀₁	Q ₅₀₂	Q ₅₀₃	Q ₅₀₄	Q ₅₀₅	Q ₅₀₆	Q ₅₀₇	Q ₅₀₈	Q ₅₀₉	Q ₅₁₀	Q ₅₁₁	Q ₅₁₂	Q ₅₁₃	Q ₅₁₄	Q ₅₁₅	Q ₅₁₆	Q ₅₁₇	Q ₅₁₈	Q ₅₁₉	Q ₅₂₀	Q ₅₂₁	Q ₅₂₂	Q ₅₂₃	Q ₅₂₄	Q ₅₂₅	Q ₅₂₆	Q ₅₂₇	Q ₅₂₈	Q ₅₂₉	Q ₅₃₀	Q ₅₃₁	Q ₅₃₂	Q ₅₃₃	Q ₅₃₄	Q ₅₃₅	Q ₅₃₆	Q ₅₃₇	Q ₅₃₈	Q ₅₃₉	Q ₅₄₀	Q ₅₄₁	Q ₅₄₂	Q ₅₄₃	Q ₅₄₄	Q ₅₄₅	Q ₅₄₆	Q ₅₄₇	Q ₅₄₈	Q ₅₄₉	Q ₅₅₀	Q ₅₅₁	Q ₅₅₂	Q ₅₅₃	Q ₅₅₄	Q ₅₅₅	Q ₅₅₆	Q ₅₅₇	Q ₅₅₈	Q ₅₅₉	Q ₅₆₀	Q ₅₆₁	Q ₅₆₂	Q ₅₆₃	Q ₅₆₄	Q ₅₆₅	Q ₅₆₆	Q ₅₆₇	Q ₅₆₈	Q ₅₆₉	Q ₅₇₀	Q ₅₇₁	Q ₅₇₂	Q ₅₇₃	Q ₅₇₄	Q ₅₇₅	Q ₅₇₆	Q ₅₇₇	Q ₅₇₈	Q ₅₇₉	Q ₅₈₀	Q ₅₈₁	Q ₅₈₂	Q ₅₈₃	Q ₅₈₄	Q ₅₈₅	Q ₅₈₆	Q ₅₈₇	Q ₅₈₈	Q ₅₈₉	Q ₅₉₀	Q ₅₉₁	Q ₅₉₂	Q ₅₉₃	Q ₅₉₄	Q ₅₉₅	Q ₅₉₆	Q ₅₉₇	Q ₅₉₈	Q ₅₉₉	Q ₆₀₀	Q ₆₀₁	Q ₆₀₂	Q ₆₀₃	Q ₆₀₄	Q ₆₀₅	Q ₆₀₆	Q ₆₀₇	Q ₆₀₈	Q ₆₀₉	Q ₆₁₀	Q ₆₁₁	Q ₆₁₂	Q ₆₁₃	Q ₆₁₄	Q ₆₁₅	Q ₆₁₆	Q ₆₁₇	Q ₆₁₈	Q ₆₁₉	Q ₆₂₀	Q ₆₂₁	Q ₆₂₂	Q ₆₂₃	Q ₆₂₄	Q ₆₂₅	Q ₆₂₆	Q ₆₂₇	Q ₆₂₈	Q ₆₂₉	Q ₆₃₀	Q ₆₃₁	Q ₆₃₂	Q ₆₃₃	Q ₆₃₄	Q ₆₃₅	Q ₆₃₆	Q ₆₃₇	Q ₆₃₈	Q ₆₃₉	Q ₆₄₀	Q ₆₄₁	Q ₆₄₂	Q ₆₄₃	Q ₆₄₄	Q ₆₄₅	Q ₆₄₆	Q ₆₄₇	Q ₆₄₈	Q ₆₄₉	Q ₆₅₀	Q ₆₅₁	Q ₆₅₂	Q ₆₅₃	Q ₆₅₄	Q ₆₅₅	Q ₆₅₆	Q ₆₅₇	Q ₆₅₈	Q ₆₅₉	Q ₆₆₀	Q ₆₆₁	Q ₆₆₂	Q ₆₆₃	Q ₆₆₄	Q ₆₆₅	Q ₆₆₆	Q ₆₆₇	Q ₆₆₈	Q ₆₆₉	Q ₆₇₀	Q ₆₇₁	Q ₆₇₂	Q ₆₇₃	Q ₆₇₄	Q ₆₇₅	Q ₆₇₆	Q ₆₇₇	Q ₆₇₈	Q ₆₇₉	Q ₆₈₀	Q ₆₈₁	Q ₆₈₂	Q ₆₈₃	Q ₆₈₄	Q ₆₈₅	Q ₆₈₆	Q ₆₈₇	Q ₆₈₈	Q ₆₈₉	Q ₆₉₀	Q ₆₉₁	Q ₆₉₂	Q ₆₉₃	Q ₆₉₄	Q ₆₉₅	Q ₆₉₆	Q ₆₉₇	Q ₆₉₈	Q ₆₉₉	Q ₇₀₀	Q ₇₀₁	Q ₇₀₂	Q ₇₀₃	Q ₇₀₄	Q ₇₀₅	Q ₇₀₆	Q ₇₀₇	Q ₇₀₈	Q ₇₀₉	Q ₇₁₀	Q ₇₁₁	Q ₇₁₂	Q ₇₁₃	Q ₇₁₄	Q ₇₁₅	Q ₇₁₆	Q ₇₁₇	Q ₇₁₈	Q ₇₁₉	Q ₇₂₀	Q ₇₂₁	Q ₇₂₂	Q ₇₂₃	Q ₇₂₄	Q ₇₂₅	Q ₇₂₆	Q ₇₂₇	Q ₇₂₈	Q ₇₂₉	Q ₇₃₀	Q ₇₃₁	Q ₇₃₂	Q ₇₃₃	Q ₇₃₄	Q ₇₃₅	Q ₇₃₆	Q ₇₃₇	Q ₇₃₈	Q ₇₃₉	Q ₇₄₀	Q ₇₄₁	Q ₇₄₂	Q ₇₄₃	Q ₇₄₄	Q ₇₄₅	Q ₇₄₆	Q ₇₄₇	Q ₇₄₈	Q ₇₄₉	Q ₇₅₀	Q ₇₅₁	Q ₇₅₂	Q ₇₅₃	Q ₇₅₄	Q ₇₅₅	Q ₇₅₆	Q ₇₅₇	Q ₇₅₈	Q ₇₅₉	Q ₇₆₀	Q ₇₆₁	Q ₇₆₂	Q ₇₆₃	Q ₇₆₄	Q ₇₆₅	Q ₇₆₆	Q ₇₆₇	Q ₇₆₈	Q ₇₆₉	Q ₇₇₀	Q ₇₇₁	Q ₇₇₂	Q ₇₇₃	Q ₇₇₄	Q ₇₇₅	Q ₇₇₆	Q ₇₇₇	Q ₇₇₈	Q ₇₇₉	Q ₇₈₀	Q ₇₈₁	Q ₇₈₂	Q ₇₈₃	Q ₇₈₄	Q ₇₈₅	Q ₇₈₆	Q ₇₈₇	Q ₇₈₈	Q ₇₈₉	Q ₇₉₀	Q ₇₉₁	Q ₇₉₂	Q ₇₉₃	Q ₇₉₄	Q ₇₉₅	Q ₇₉₆	Q ₇₉₇	Q ₇₉₈	Q ₇₉₉	Q ₈₀₀	Q ₈₀₁	Q ₈₀₂	Q ₈₀₃	Q ₈₀₄	Q ₈₀₅	Q ₈₀₆	Q ₈₀₇	Q ₈₀₈	Q ₈₀₉	Q ₈₁₀	Q ₈₁₁	Q ₈₁₂	Q ₈₁₃	Q ₈₁₄	Q ₈₁₅	Q ₈₁₆	Q ₈₁₇	Q ₈₁₈	Q ₈₁₉	Q ₈₂₀	Q ₈₂₁	Q ₈₂₂	Q ₈₂₃	Q ₈₂₄	Q ₈₂₅	Q ₈₂₆	Q ₈₂₇	Q ₈₂₈	Q ₈₂₉	Q ₈₃₀	Q ₈₃₁	Q ₈₃₂	Q ₈₃₃	Q ₈₃₄	Q ₈₃₅	Q ₈₃₆	Q ₈₃₇	Q ₈₃₈	Q ₈₃₉	Q ₈₄₀	Q ₈₄₁	Q ₈₄₂	Q ₈₄₃	Q ₈₄₄	Q ₈₄₅	Q ₈₄₆	Q ₈₄₇	Q ₈₄₈	Q ₈₄₉	Q ₈₅₀	Q ₈₅₁	Q ₈₅₂	Q ₈₅₃	Q ₈₅₄	Q ₈₅₅	Q ₈₅₆	Q ₈₅₇	Q ₈₅₈	Q ₈₅₉	Q ₈₆₀	Q ₈₆₁	Q ₈₆₂	Q ₈₆₃	Q ₈₆₄	Q ₈₆₅	Q ₈₆₆	Q ₈₆₇	Q ₈₆₈	Q ₈₆₉	Q ₈₇₀	Q ₈₇₁	Q ₈₇₂	Q ₈₇₃	Q ₈₇₄	Q ₈₇₅	Q ₈₇₆	Q ₈₇₇	Q ₈₇₈	Q ₈₇₉	Q ₈₈₀	Q ₈₈₁	Q ₈₈₂	Q ₈₈₃	Q ₈₈₄	Q ₈₈₅	
------	------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	--

Table-4(5) Calculation of Water Quality (BOD) at Canggü Tambangan (2020 : Case II)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Ass.Dur	Total
I. Pollution load from upstream									
1) Water quality of Pabangas (PQG)	mg/l								
2) Water flow of Pabangas	m ³ /s								
3) Pollution load from upstream	kg/day	16,247	14,474	21,892	13,073	11,293	10,554		
4) Run-off Pollution load from upstream	kg/day	2,407	2,171	3,241	1,961	1,709	1,563		
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load (Sub-basin B509)									
1) Pollution load produced	kg/day	219	219	219	219	219	219		
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	kg/day	79	79	79	79	79	79		
A2 Pollution load (Sub-basin B620)									
1) Pollution load produced	kg/day	202	202	202	202	202	202		
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	kg/day	73	73	73	73	73	73		
A3 Total run-off pollution load from domestic waste water	kg/day	152	152	152	152	152	152		
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	kg/day	8,129	8,129	8,129	8,129	8,129	8,129		
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	kg/day	2,926	2,926	2,926	2,926	2,926	2,926		
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	80	80	80	80	80	80		
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	kg/day	29	29	29	29	29	29		
B3 Pollution load from small scale industries									
1) Pollution load produced	kg/day	21	21	21	21	21	21		
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36		
5) Run-off pollution load	kg/day	8	8	8	8	8	8		
B4 Total run-off pollution load from the industries	kg/day	3,144	3,144	3,144	3,144	3,144	3,144		
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	kg/day								
2) Flow out ratio	-								
3) Flow down ratio	-								
4) Run-off ratio	-								
5) Run-off pollution load	kg/day								
C2 Pollution load from live stock									
1) Pollution load produced	kg/day	1,022	1,022	1,022	1,022	1,022	1,022		
2) Flow out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04		
5) Run-off pollution load	kg/day	41	41	41	41	41	41		
C3 Total run-off pollution load from agriculture	kg/day	41	41	41	41	41	41		
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	kg/day	760	760	760	760	760	760		
2) Flow out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04		
5) Run-off pollution load	kg/day	30	30	30	30	30	30		
III. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l	3.4	4.0	3.2	10.6	5.2	4.9	5.2	5.2
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	kg/day	5,804	5,538	6,808	5,228	5,076	4,950	5,551	
2) Water flow	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8	12.8	
3) Water quality	mg/l	8.2	5.2	6.0	4.8	4.6	4.6	5.8	5.2

Note : *Pollution load from fields is included in other sources

Table-4(6) Calculation of Water Quality (BOD) at Karangpaling (2020 : Case-II)

Items	Unit	Q ₁₀	Q ₁₅	Q ₂₀	Q ₂₅	Q ₃₀	Q ₃₅	Q ₄₀	Q ₄₅	Q ₅₀
I. Pollution load from upstream										
1) Water quality at Cagar Tambaga (1996)	mg/l	Q6								
2) Water flow at Cagar Tambaga	m ³ /s	Q6								
3) Pollution load from upstream	kg/day	10-CO-CO	5425	5530	6608	5326	5076	4650		
4) Run-off pollution load from upstream	kg/day	10-CO-CO	571	851	991	796	761	743		
II. Pollution load from sub-basin										
A. Domestic waste water										
A1 Pollution load (Sub-basin B621)										
1) Pollution load produced	kg/day	a1	342	342	342	342	342	342		
2) Flow out ratio	-	r1-1	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	r1-2	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	-	r1 (r1-1+r1-2)	0.18	0.18	0.18	0.18	0.18	0.18		
5) Run-off pollution load	kg/day	D1=a1 x r1	62	62	62	62	62	62		
A2 Pollution load (Sub-basin B622)										
1) Pollution load produced	kg/day	a2	1097	1097	1097	1097	1097	1097		
2) Flow out ratio	-	r2-1	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	r2-2	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	-	r2 (r2-1+r2-2)	0.27	0.27	0.27	0.27	0.27	0.27		
5) Run-off pollution load	kg/day	D2=a2 x r2	296	296	296	296	296	296		
A3 Pollution load (Sub-basin B623)										
1) Pollution load produced	kg/day	a3	442	442	442	442	442	442		
2) Flow out ratio	-	r3-1	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	-	r3-2	0.5	0.5	0.5	0.5	0.5	0.5		
4) Run-off ratio	-	r3 (r3-1+r3-2)	0.45	0.45	0.45	0.45	0.45	0.45		
5) Run-off pollution load	kg/day	D3=a3 x r3	199	199	199	199	199	199		
A4 Pollution load (Sub-basin B624)										
1) Pollution load produced	kg/day	a4	175	175	175	175	175	175		
2) Flow out ratio	-	r4-1	0.6	0.6	0.6	0.6	0.6	0.6		
3) Flow down ratio	-	r4-2	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	-	r4 (r4-1+r4-2)	0.12	0.12	0.12	0.12	0.12	0.12		
5) Run-off pollution load	kg/day	D4=a4 x r4	21	21	21	21	21	21		
A5 Pollution load (Sub-basin B630)										
1) Pollution load produced	kg/day	a5	1132	1132	1132	1132	1132	1132		
2) Flow out ratio	-	r5-1	0.5	0.5	0.5	0.5	0.5	0.5		
3) Flow down ratio	-	r5-2	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	-	r5 (r5-1+r5-2)	0.1	0.1	0.1	0.1	0.1	0.1		
5) Run-off pollution load	kg/day	D5=a5 x r5	113	113	113	113	113	113		
A6 Pollution load (Sub-basin B631)										
1) Pollution load produced	kg/day	a6	0	0	0	0	0	0		
2) Flow out ratio	-	r6-1	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow down ratio	-	r6-2	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	-	r6 (r6-1+r6-2)	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	kg/day	D6=a6 x r6	0	0	0	0	0	0		
A7 Pollution load (Sub-basin B632)										
1) Pollution load produced	kg/day	a7	0	0	0	0	0	0		
2) Flow out ratio	-	r7-1	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow down ratio	-	r7-2	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	-	r7 (r7-1+r7-2)	0.24	0.24	0.24	0.24	0.24	0.24		
5) Run-off pollution load	kg/day	D7=a7 x r7	0	0	0	0	0	0		
A8 Total run-off pollution load from domestic waste water	kg/day	D8=D1+D2+D3+D4+D5+D6+D7	691	691	691	691	691	691		
B. Industrial waste water										
B1 Pollution load from major producers										
1) Pollution load produced	kg/day	b1	0	0	0	0	0	0		
2) Flow out ratio	-	r11-1	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow down ratio	-	r11-2	0.25	0.25	0.25	0.25	0.25	0.25		
4) Run-off ratio	-	r11 (r11-1+r11-2)	0.2	0.2	0.2	0.2	0.2	0.2		
5) Run-off pollution load	kg/day	D11=b1 x r11	0	0	0	0	0	0		
B2 Pollution load from large and medium scale industries										
1) Pollution load produced	kg/day	b2	33,228	33,228	33,228	33,228	33,228	33,228		
2) Flow out ratio	-	r12-1	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow down ratio	-	r12-2	0.25	0.25	0.25	0.25	0.25	0.25		
4) Run-off ratio	-	r12 (r12-1+r12-2)	0.18	0.18	0.18	0.18	0.18	0.18		
5) Run-off pollution load	kg/day	D12=b2 x r12	5,815	5,815	5,815	5,815	5,815	5,815		
B3 Pollution load from small scale industries										
1) Pollution load produced	kg/day	b3	6,586	6,586	6,586	6,586	6,586	6,586		
2) Flow out ratio	-	r13-1	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow down ratio	-	r13-2	0.25	0.25	0.25	0.25	0.25	0.25		
4) Run-off ratio	-	r13 (r13-1+r13-2)	0.18	0.18	0.18	0.18	0.18	0.18		
5) Run-off pollution load	kg/day	D13=b3 x r13	1,153	1,153	1,153	1,153	1,153	1,153		
B4 Total run-off pollution load from the industries	kg/day	D13+D12+D11	6,967	6,967	6,967	6,967	6,967	6,967		
C. Agricultural pollution load										
C1 Pollution load from fields*										
1) Pollution load produced	kg/day	c1								
2) Flow out ratio	-	r21-1								
3) Flow down ratio	-	r21-2								
4) Run-off ratio	-	r21 (r21-1+r21-2)								
5) Run-off pollution load	kg/day	A1=c1 x r21								
C2 Pollution load from forest										
1) Pollution load produced	kg/day	c2	6,934	6,934	6,934	6,934	6,934	6,934		
2) Flow out ratio	-	r22-1	0.05	0.05	0.05	0.05	0.05	0.05		
3) Flow down ratio	-	r22-2	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	-	r22 (r22-1+r22-2)	0.01	0.01	0.01	0.01	0.01	0.01		
5) Run-off pollution load	kg/day	A2=c2 x r22	69	69	69	69	69	69		
C3 Total run-off pollution load from agriculture	kg/day	A2+A1+A2	69	69	69	69	69	69		
D. Other sources										
D1 Pollution load from others										
1) Pollution load produced	kg/day	d1	10,358	10,358	10,358	10,358	10,358	10,358		
2) Flow out ratio	-	r31-1	0.05	0.05	0.05	0.05	0.05	0.05		
3) Flow down ratio	-	r31-2	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	-	r31 (r31-1+r31-2)	0.01	0.01	0.01	0.01	0.01	0.01		
5) Run-off pollution load	kg/day	D11=d1 x r31	104	104	104	104	104	104		
III. Water quality at control point										
E. Water quality monitored										
1) 1994	mg/l		15.7	11.1	11.2	14.0	7.9	7.9	11.3	14.0
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load	kg/day	L=D8+D9+D10+A1+A2+D11	8,702	8,662	8,822	8,630	8,543	8,574	8,644	
2) Water flow	m ³ /s	Q	12.8	12.8	12.8	12.8	12.8	12.8	12.8	
3) Water quality	mg/l	C=LOQ	7.9	7.8	8.0	7.8	7.8	7.8	7.8	7.9

Note : *Pollution load from fields is included in other sources

Table-4(7) Calculation of Water Quality (BOD) at Ngagel (2020 : Case-II)

Item	Unit	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈	Q ₉	Q ₁₀	Q ₁₁	Q ₁₂	Q ₁₃	Q ₁₄	Q ₁₅	Q ₁₆	Q ₁₇	Q ₁₈	Q ₁₉	Q ₂₀	Q ₂₁	Q ₂₂	Q ₂₃	Q ₂₄	Q ₂₅	Q ₂₆	Q ₂₇	Q ₂₈	Q ₂₉	Q ₃₀	Q ₃₁	Q ₃₂	Q ₃₃	Q ₃₄	Q ₃₅	Q ₃₆	Q ₃₇	Q ₃₈	Q ₃₉	Q ₄₀	Q ₄₁	Q ₄₂	Q ₄₃	Q ₄₄	Q ₄₅	Q ₄₆	Q ₄₇	Q ₄₈	Q ₄₉	Q ₅₀	Q ₅₁	Q ₅₂	Q ₅₃	Q ₅₄	Q ₅₅	Q ₅₆	Q ₅₇	Q ₅₈	Q ₅₉	Q ₆₀	Q ₆₁	Q ₆₂	Q ₆₃	Q ₆₄	Q ₆₅	Q ₆₆	Q ₆₇	Q ₆₈	Q ₆₉	Q ₇₀	Q ₇₁	Q ₇₂	Q ₇₃	Q ₇₄	Q ₇₅	Q ₇₆	Q ₇₇	Q ₇₈	Q ₇₉	Q ₈₀	Q ₈₁	Q ₈₂	Q ₈₃	Q ₈₄	Q ₈₅	Q ₈₆	Q ₈₇	Q ₈₈	Q ₈₉	Q ₉₀	Q ₉₁	Q ₉₂	Q ₉₃	Q ₉₄	Q ₉₅	Q ₉₆	Q ₉₇	Q ₉₈	Q ₉₉	Q ₁₀₀	Q ₁₀₁	Q ₁₀₂	Q ₁₀₃	Q ₁₀₄	Q ₁₀₅	Q ₁₀₆	Q ₁₀₇	Q ₁₀₈	Q ₁₀₉	Q ₁₁₀	Q ₁₁₁	Q ₁₁₂	Q ₁₁₃	Q ₁₁₄	Q ₁₁₅	Q ₁₁₆	Q ₁₁₇	Q ₁₁₈	Q ₁₁₉	Q ₁₂₀	Q ₁₂₁	Q ₁₂₂	Q ₁₂₃	Q ₁₂₄	Q ₁₂₅	Q ₁₂₆	Q ₁₂₇	Q ₁₂₈	Q ₁₂₉	Q ₁₃₀	Q ₁₃₁	Q ₁₃₂	Q ₁₃₃	Q ₁₃₄	Q ₁₃₅	Q ₁₃₆	Q ₁₃₇	Q ₁₃₈	Q ₁₃₉	Q ₁₄₀	Q ₁₄₁	Q ₁₄₂	Q ₁₄₃	Q ₁₄₄	Q ₁₄₅	Q ₁₄₆	Q ₁₄₇	Q ₁₄₈	Q ₁₄₉	Q ₁₅₀	Q ₁₅₁	Q ₁₅₂	Q ₁₅₃	Q ₁₅₄	Q ₁₅₅	Q ₁₅₆	Q ₁₅₇	Q ₁₅₈	Q ₁₅₉	Q ₁₆₀	Q ₁₆₁	Q ₁₆₂	Q ₁₆₃	Q ₁₆₄	Q ₁₆₅	Q ₁₆₆	Q ₁₆₇	Q ₁₆₈	Q ₁₆₉	Q ₁₇₀	Q ₁₇₁	Q ₁₇₂	Q ₁₇₃	Q ₁₇₄	Q ₁₇₅	Q ₁₇₆	Q ₁₇₇	Q ₁₇₈	Q ₁₇₉	Q ₁₈₀	Q ₁₈₁	Q ₁₈₂	Q ₁₈₃	Q ₁₈₄	Q ₁₈₅	Q ₁₈₆	Q ₁₈₇	Q ₁₈₈	Q ₁₈₉	Q ₁₉₀	Q ₁₉₁	Q ₁₉₂	Q ₁₉₃	Q ₁₉₄	Q ₁₉₅	Q ₁₉₆	Q ₁₉₇	Q ₁₉₈	Q ₁₉₉	Q ₂₀₀	Q ₂₀₁	Q ₂₀₂	Q ₂₀₃	Q ₂₀₄	Q ₂₀₅	Q ₂₀₆	Q ₂₀₇	Q ₂₀₈	Q ₂₀₉	Q ₂₁₀	Q ₂₁₁	Q ₂₁₂	Q ₂₁₃	Q ₂₁₄	Q ₂₁₅	Q ₂₁₆	Q ₂₁₇	Q ₂₁₈	Q ₂₁₉	Q ₂₂₀	Q ₂₂₁	Q ₂₂₂	Q ₂₂₃	Q ₂₂₄	Q ₂₂₅	Q ₂₂₆	Q ₂₂₇	Q ₂₂₈	Q ₂₂₉	Q ₂₃₀	Q ₂₃₁	Q ₂₃₂	Q ₂₃₃	Q ₂₃₄	Q ₂₃₅	Q ₂₃₆	Q ₂₃₇	Q ₂₃₈	Q ₂₃₉	Q ₂₄₀	Q ₂₄₁	Q ₂₄₂	Q ₂₄₃	Q ₂₄₄	Q ₂₄₅	Q ₂₄₆	Q ₂₄₇	Q ₂₄₈	Q ₂₄₉	Q ₂₅₀	Q ₂₅₁	Q ₂₅₂	Q ₂₅₃	Q ₂₅₄	Q ₂₅₅	Q ₂₅₆	Q ₂₅₇	Q ₂₅₈	Q ₂₅₉	Q ₂₆₀	Q ₂₆₁	Q ₂₆₂	Q ₂₆₃	Q ₂₆₄	Q ₂₆₅	Q ₂₆₆	Q ₂₆₇	Q ₂₆₈	Q ₂₆₉	Q ₂₇₀	Q ₂₇₁	Q ₂₇₂	Q ₂₇₃	Q ₂₇₄	Q ₂₇₅	Q ₂₇₆	Q ₂₇₇	Q ₂₇₈	Q ₂₇₉	Q ₂₈₀	Q ₂₈₁	Q ₂₈₂	Q ₂₈₃	Q ₂₈₄	Q ₂₈₅	Q ₂₈₆	Q ₂₈₇	Q ₂₈₈	Q ₂₈₉	Q ₂₉₀	Q ₂₉₁	Q ₂₉₂	Q ₂₉₃	Q ₂₉₄	Q ₂₉₅	Q ₂₉₆	Q ₂₉₇	Q ₂₉₈	Q ₂₉₉	Q ₃₀₀	Q ₃₀₁	Q ₃₀₂	Q ₃₀₃	Q ₃₀₄	Q ₃₀₅	Q ₃₀₆	Q ₃₀₇	Q ₃₀₈	Q ₃₀₉	Q ₃₁₀	Q ₃₁₁	Q ₃₁₂	Q ₃₁₃	Q ₃₁₄	Q ₃₁₅	Q ₃₁₆	Q ₃₁₇	Q ₃₁₈	Q ₃₁₉	Q ₃₂₀	Q ₃₂₁	Q ₃₂₂	Q ₃₂₃	Q ₃₂₄	Q ₃₂₅	Q ₃₂₆	Q ₃₂₇	Q ₃₂₈	Q ₃₂₉	Q ₃₃₀	Q ₃₃₁	Q ₃₃₂	Q ₃₃₃	Q ₃₃₄	Q ₃₃₅	Q ₃₃₆	Q ₃₃₇	Q ₃₃₈	Q ₃₃₉	Q ₃₄₀	Q ₃₄₁	Q ₃₄₂	Q ₃₄₃	Q ₃₄₄	Q ₃₄₅	Q ₃₄₆	Q ₃₄₇	Q ₃₄₈	Q ₃₄₉	Q ₃₅₀	Q ₃₅₁	Q ₃₅₂	Q ₃₅₃	Q ₃₅₄	Q ₃₅₅	Q ₃₅₆	Q ₃₅₇	Q ₃₅₈	Q ₃₅₉	Q ₃₆₀	Q ₃₆₁	Q ₃₆₂	Q ₃₆₃	Q ₃₆₄	Q ₃₆₅	Q ₃₆₆	Q ₃₆₇	Q ₃₆₈	Q ₃₆₉	Q ₃₇₀	Q ₃₇₁	Q ₃₇₂	Q ₃₇₃	Q ₃₇₄	Q ₃₇₅	Q ₃₇₆	Q ₃₇₇	Q ₃₇₈	Q ₃₇₉	Q ₃₈₀	Q ₃₈₁	Q ₃₈₂	Q ₃₈₃	Q ₃₈₄	Q ₃₈₅	Q ₃₈₆	Q ₃₈₇	Q ₃₈₈	Q ₃₈₉	Q ₃₉₀	Q ₃₉₁	Q ₃₉₂	Q ₃₉₃	Q ₃₉₄	Q ₃₉₅	Q ₃₉₆	Q ₃₉₇	Q ₃₉₈	Q ₃₉₉	Q ₄₀₀	Q ₄₀₁	Q ₄₀₂	Q ₄₀₃	Q ₄₀₄	Q ₄₀₅	Q ₄₀₆	Q ₄₀₇	Q ₄₀₈	Q ₄₀₉	Q ₄₁₀	Q ₄₁₁	Q ₄₁₂	Q ₄₁₃	Q ₄₁₄	Q ₄₁₅	Q ₄₁₆	Q ₄₁₇	Q ₄₁₈	Q ₄₁₉	Q ₄₂₀	Q ₄₂₁	Q ₄₂₂	Q ₄₂₃	Q ₄₂₄	Q ₄₂₅	Q ₄₂₆	Q ₄₂₇	Q ₄₂₈	Q ₄₂₉	Q ₄₃₀	Q ₄₃₁	Q ₄₃₂	Q ₄₃₃	Q ₄₃₄	Q ₄₃₅	Q ₄₃₆	Q ₄₃₇	Q ₄₃₈	Q ₄₃₉	Q ₄₄₀	Q ₄₄₁	Q ₄₄₂	Q ₄₄₃	Q ₄₄₄	Q ₄₄₅	Q ₄₄₆	Q ₄₄₇	Q ₄₄₈	Q ₄₄₉	Q ₄₅₀	Q ₄₅₁	Q ₄₅₂	Q ₄₅₃	Q ₄₅₄	Q ₄₅₅	Q ₄₅₆	Q ₄₅₇	Q ₄₅₈	Q ₄₅₉	Q ₄₆₀	Q ₄₆₁	Q ₄₆₂	Q ₄₆₃	Q ₄₆₄	Q ₄₆₅	Q ₄₆₆	Q ₄₆₇	Q ₄₆₈	Q ₄₆₉	Q ₄₇₀	Q ₄₇₁	Q ₄₇₂	Q ₄₇₃	Q ₄₇₄	Q ₄₇₅	Q ₄₇₆	Q ₄₇₇	Q ₄₇₈	Q ₄₇₉	Q ₄₈₀	Q ₄₈₁	Q ₄₈₂	Q ₄₈₃	Q ₄₈₄	Q ₄₈₅	Q ₄₈₆	Q ₄₈₇	Q ₄₈₈	Q ₄₈₉	Q ₄₉₀	Q ₄₉₁	Q ₄₉₂	Q ₄₉₃	Q ₄₉₄	Q ₄₉₅	Q ₄₉₆	Q ₄₉₇	Q ₄₉₈	Q ₄₉₉	Q ₅₀₀	Q ₅₀₁	Q ₅₀₂	Q ₅₀₃	Q ₅₀₄	Q ₅₀₅	Q ₅₀₆	Q ₅₀₇	Q ₅₀₈	Q ₅₀₉	Q ₅₁₀	Q ₅₁₁	Q ₅₁₂	Q ₅₁₃	Q ₅₁₄	Q ₅₁₅	Q ₅₁₆	Q ₅₁₇	Q ₅₁₈	Q ₅₁₉	Q ₅₂₀	Q ₅₂₁	Q ₅₂₂	Q ₅₂₃	Q ₅₂₄	Q ₅₂₅	Q ₅₂₆	Q ₅₂₇	Q ₅₂₈	Q ₅₂₉	Q ₅₃₀	Q ₅₃₁	Q ₅₃₂	Q ₅₃₃	Q ₅₃₄	Q ₅₃₅	Q ₅₃₆	Q ₅₃₇	Q ₅₃₈	Q ₅₃₉	Q ₅₄₀	Q ₅₄₁	Q ₅₄₂	Q ₅₄₃	Q ₅₄₄	Q ₅₄₅	Q ₅₄₆	Q ₅₄₇	Q ₅₄₈	Q ₅₄₉	Q ₅₅₀	Q ₅₅₁	Q ₅₅₂	Q ₅₅₃	Q ₅₅₄	Q ₅₅₅	Q ₅₅₆	Q ₅₅₇	Q ₅₅₈	Q ₅₅₉	Q ₅₆₀	Q ₅₆₁	Q ₅₆₂	Q ₅₆₃	Q ₅₆₄	Q ₅₆₅	Q ₅₆₆	Q ₅₆₇	Q ₅₆₈	Q ₅₆₉	Q ₅₇₀	Q ₅₇₁	Q ₅₇₂	Q ₅₇₃	Q ₅₇₄	Q ₅₇₅	Q ₅₇₆	Q ₅₇₇	Q ₅₇₈	Q ₅₇₉	Q ₅₈₀	Q ₅₈₁	Q ₅₈₂	Q ₅₈₃	Q ₅₈₄	Q ₅₈₅	Q ₅₈₆	Q ₅₈₇	Q ₅₈₈	Q ₅₈₉	Q ₅₉₀	Q ₅₉₁	Q ₅₉₂	Q ₅₉₃	Q ₅₉₄	Q ₅₉₅	Q ₅₉₆	Q ₅₉₇	Q ₅₉₈	Q ₅₉₉	Q ₆₀₀	Q ₆₀₁	Q ₆₀₂	Q ₆₀₃	Q ₆₀₄	Q ₆₀₅	Q ₆₀₆	Q ₆₀₇	Q ₆₀₈	Q ₆₀₉	Q ₆₁₀	Q ₆₁₁	Q ₆₁₂	Q ₆₁₃	Q ₆₁₄	Q ₆₁₅	Q ₆₁₆	Q ₆₁₇	Q ₆₁₈	Q ₆₁₉	Q ₆₂₀	Q ₆₂₁	Q ₆₂₂	Q ₆₂₃	Q ₆₂₄	Q ₆₂₅	Q ₆₂₆	Q ₆₂₇	Q ₆₂₈	Q ₆₂₉	Q ₆₃₀	Q ₆₃₁	Q ₆₃₂	Q ₆₃₃	Q ₆₃₄	Q ₆₃₅	Q ₆₃₆	Q ₆₃₇	Q ₆₃₈	Q ₆₃₉	Q ₆₄₀	Q ₆₄₁	Q ₆₄₂	Q ₆₄₃	Q ₆₄₄	Q ₆₄₅	Q ₆₄₆	Q ₆₄₇	Q ₆₄₈	Q ₆₄₉	Q ₆₅₀	Q ₆₅₁	Q ₆₅₂	Q ₆₅₃	Q ₆₅₄	Q ₆₅₅	Q ₆₅₆	Q ₆₅₇	Q ₆₅₈	Q ₆₅₉	Q ₆₆₀	Q ₆₆₁	Q ₆₆₂	Q ₆₆₃	Q ₆₆₄	Q ₆₆₅	Q ₆₆₆	Q ₆₆₇	Q ₆₆₈	Q ₆₆₉	Q ₆₇₀	Q ₆₇₁	Q ₆₇₂	Q ₆₇₃	Q ₆₇₄	Q ₆₇₅	Q ₆₇₆	Q ₆₇₇	Q ₆₇₈	Q ₆₇₉	Q ₆₈₀	Q ₆₈₁	Q ₆₈₂	Q ₆₈₃	Q ₆₈₄	Q ₆₈₅	Q ₆₈₆	Q ₆₈₇	Q ₆₈₈	Q ₆₈₉	Q ₆₉₀	Q ₆₉₁	Q ₆₉₂	Q ₆₉₃	Q ₆₉₄	Q ₆₉₅	Q ₆₉₆	Q ₆₉₇	Q ₆₉₈	Q ₆₉₉	Q ₇₀₀	Q ₇₀₁	Q ₇₀₂	Q ₇₀₃	Q ₇₀₄	Q ₇₀₅	Q ₇₀₆	Q ₇₀₇	Q ₇₀₈	Q ₇₀₉	Q ₇₁₀	Q ₇₁₁	Q ₇₁₂	Q ₇₁₃	Q ₇₁₄	Q ₇₁₅	Q ₇₁₆	Q ₇₁₇	Q ₇₁₈	Q ₇₁₉	Q ₇₂₀	Q ₇₂₁	Q ₇₂₂	Q ₇₂₃	Q ₇₂₄	Q ₇₂₅	Q ₇₂₆	Q ₇₂₇	Q ₇₂₈	Q ₇₂₉	Q ₇₃₀	Q ₇₃₁	Q ₇₃₂	Q ₇₃₃	Q ₇₃₄	Q ₇₃₅	Q ₇₃₆	Q ₇₃₇	Q ₇₃₈	Q ₇₃₉	Q ₇₄₀	Q ₇₄₁	Q ₇₄₂	Q ₇₄₃	Q ₇₄₄	Q ₇₄₅	Q ₇₄₆	Q ₇₄₇	Q ₇₄₈	Q ₇₄₉	Q ₇₅₀	Q ₇₅₁	Q ₇₅₂	Q ₇₅₃	Q ₇₅₄	Q ₇₅₅	Q ₇₅₆	Q ₇₅₇	Q ₇₅₈	Q ₇₅₉	Q ₇₆₀	Q ₇₆₁	Q ₇₆₂	Q ₇₆₃	Q ₇₆₄	Q ₇₆₅	Q ₇₆₆	Q ₇₆₇	Q ₇₆₈	Q ₇₆₉	Q ₇₇₀	Q ₇₇₁	Q ₇₇₂	Q ₇₇₃	Q ₇₇₄	Q ₇₇₅	Q ₇₇₆	Q ₇₇₇	Q ₇₇₈	Q ₇₇₉	Q ₇₈₀	Q ₇₈₁	Q ₇₈₂	Q ₇₈₃	Q ₇₈₄	Q ₇₈₅	Q ₇₈₆	Q ₇₈₇	Q ₇₈₈	Q ₇₈₉	Q ₇₉₀	Q ₇₉₁	Q ₇₉₂	Q ₇₉₃	Q ₇₉₄	Q ₇₉₅	Q ₇₉₆	Q ₇₉₇	Q ₇₉₈	Q ₇₉₉	Q ₈₀₀	Q ₈₀₁	Q ₈₀₂	Q ₈₀₃	Q ₈₀₄	Q ₈₀₅	Q ₈₀₆	Q ₈₀₇	Q ₈₀₈	Q ₈₀₉	Q ₈₁₀	Q ₈₁₁	Q ₈₁₂	Q ₈₁₃	Q ₈₁₄	Q ₈₁₅	Q ₈₁₆	Q ₈₁₇	Q ₈₁₈	Q ₈₁₉	Q ₈₂₀	Q ₈₂₁	Q ₈₂₂	Q ₈₂₃	Q ₈₂₄	Q ₈₂₅	Q ₈₂₆	Q ₈₂₇	Q ₈₂₈	Q ₈₂₉	Q ₈₃₀	Q ₈₃₁	Q ₈₃₂	Q ₈₃₃	Q ₈₃₄	Q ₈₃₅	Q ₈₃₆	Q ₈₃₇	Q ₈₃₈	Q ₈₃₉	Q ₈₄₀	Q ₈₄₁	Q ₈₄₂	Q ₈₄₃	Q ₈₄₄	Q ₈₄₅	Q ₈₄₆	Q ₈₄₇	Q ₈₄₈	Q ₈₄₉	Q ₈₅₀	Q ₈₅₁	Q ₈₅₂	Q ₈₅₃	Q ₈₅₄	Q ₈₅₅	Q ₈₅₆	Q ₈₅₇	Q ₈₅₈	Q ₈₅₉	Q ₈₆₀	Q ₈₆₁	Q ₈₆₂	Q ₈₆₃	Q ₈₆₄	Q ₈₆₅	Q ₈₆₆	Q ₈₆₇	Q ₈₆₈	Q ₈₆₉	Q ₈₇₀	Q ₈₇₁	Q ₈₇₂	Q ₈₇₃	Q ₈₇₄	Q ₈₇₅	Q ₈₇₆	Q ₈₇₇	Q ₈₇₈	Q ₈₇₉	Q ₈₈₀	Q ₈₈₁	Q ₈₈₂	Q ₈₈₃	Q ₈₈₄	Q ₈₈₅	
------	------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	--

Table-4(S) Calculation of Water Quality (BOD) at Kayoon (2020 : Case-II)

Items	Unit	2000	2010	2020	2025	2030	2035	2040	2045
I. Pollution load from upstream									
1) Water quality of Jels Bridge (100)	mg/l								
2) Water flow of Jels Bridge	m ³ /s								
3) Pollution load from upstream	kg/day	14931	14925	14920	14920	14914	14911	14911	14911
4) Run-off pollution load from upstream	kg/day	2956	2955	2950	2954	2953	2952	2952	2952
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load (Sub-basin B645)									
1) Pollution load produced	kg/day	0	0	0	0	0	0	0	0
2) Flow-out ratio	r1:1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r1:2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4) Run-off ratio	r1 (r1+r1:2)	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36
5) Run-off pollution load	D1=at x r1	kg/day	0	0	0	0	0	0	0
A2 Pollution load (Sub-basin B646)									
1) Pollution load produced	kg/day	0	0	0	0	0	0	0	0
2) Flow-out ratio	r2:1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r2:2	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6
4) Run-off ratio	r2 (r2+r2:2)	-	0.54	0.54	0.54	0.54	0.54	0.54	0.54
5) Run-off pollution load	D2=a2 x r2	kg/day	0	0	0	0	0	0	0
A3 Total run-off pollution load from domestic waste water	D1+D2	kg/day	0	0	0	0	0	0	0
B. Industrial waste water									
B1 Pollution load from major producers									
1) Pollution load produced	kg/day	0	0	0	0	0	0	0	0
2) Flow-out ratio	r11:1	-	-	-	-	-	-	-	-
3) Flow-down ratio	r11:2	-	-	-	-	-	-	-	-
4) Run-off ratio	r11 (r11:1+r11:2)	-	-	-	-	-	-	-	-
5) Run-off pollution load	D1=B1 x r11	kg/day	0	0	0	0	0	0	0
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	2460	2460	2460	2460	2460	2460	2460	2460
2) Flow-out ratio	r12:1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r12:2	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r12 (r12:1+r12:2)	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	D2=B2 x r12	kg/day	1107	1107	1107	1107	1107	1107	1107
B3 Pollution load from small scale industries									
1) Pollution load produced	kg/day	580	580	580	580	580	580	580	580
2) Flow-out ratio	r13:1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	r13:2	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r13 (r13:1+r13:2)	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45
5) Run-off pollution load	D3=B3 x r13	kg/day	261	261	261	261	261	261	261
B4 Total run-off pollution load from the industries	D1+D2+D3	kg/day	1368	1368	1368	1368	1368	1368	1368
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	kg/day								
2) Flow-out ratio	r21:1	-	-	-	-	-	-	-	-
3) Flow-down ratio	r21:2	-	-	-	-	-	-	-	-
4) Run-off ratio	r21 (r21:1+r21:2)	-	-	-	-	-	-	-	-
5) Run-off pollution load	A1=C1 x r21	kg/day							
C2 Pollution load from livestock									
1) Pollution load produced	kg/day	91	91	91	91	91	91	91	91
2) Flow-out ratio	r22:1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r22:2	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r22 (r22:1+r22:2)	-	0.025	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	A2=C2 x r22	kg/day	2	2	2	2	2	2	2
C3 Total run-off pollution load from agriculture	A1+A2	kg/day	2	2	2	2	2	2	2
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	kg/day	580	580	580	580	580	580	580	580
2) Flow-out ratio	r31:1	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05
3) Flow-down ratio	r31:2	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4) Run-off ratio	r31 (r31:1+r31:2)	-	0.025	0.025	0.025	0.025	0.025	0.025	0.025
5) Run-off pollution load	D2=D1 x r31	kg/day	15	15	15	15	15	15	15
III. Water quality at control point									
E. Water quality monitored									
1) 1992	mg/l				6.2				6.2
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	L=L0+D1+D2+D3+D4	kg/day	4371	4370	4375	4364	4369	4367	4370
2) Water flow	Q	m ³ /s			8.1				8.1
3) Water quality	C=L/Q	mg/l			6.2				6.2

Note : *Pollution load from fields is included in other sources

Table-4.9) Calculation of Water Quality (BOD) at Pelajaran (2019 : Case-II)

Item	Unit	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈
I. Pollution load from upstream									
1) Water quality of intake of source	mg/l				15.0				
2) Water flow of intake of source	m ³ /s				6.0				
3) Pollution load from upstream	kg/day				12.960				
4) Run-off pollution load from upstream	kg/day				25.9				
II. Pollution load from sub-basin									
A. Domestic waste water									
A1. Pollution load									
1) Pollution load produced	kg/day	68	68	68	68	68	68	68	68
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	kg/day	12	12	12	12	12	12	12	12
A2 Total run-off pollution load from domestic waste water	kg/day	12	12	12	12	12	12	12	12
B. Industrial waste water									
B1. Pollution load from major industries									
1) Pollution load produced	kg/day	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4) Run-off ratio	-	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
5) Run-off pollution load	kg/day	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512
B2. Pollution load from large and medium scale industries									
1) Pollution load produced	kg/day	164	164	164	164	164	164	164	164
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	kg/day	30	30	30	30	30	30	30	30
B3. Pollution load from small scale industries									
1) Pollution load produced	kg/day	33	33	33	33	33	33	33	33
2) Flow-out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	kg/day	6	6	6	6	6	6	6	6
B4 Total run-off pollution load from the industries	kg/day	1,547	1,547	1,547	1,547	1,547	1,547	1,547	1,547
C. Agricultural pollution load									
C1. Pollution load from fields*									
1) Pollution load produced	kg/day								
2) Flow-out ratio	-								
3) Flow-down ratio	-								
4) Run-off ratio	-								
5) Run-off pollution load	kg/day								
C2. Pollution load from livestock									
1) Pollution load produced	kg/day	56	56	56	56	56	56	56	56
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	kg/day	2	2	2	2	2	2	2	2
C3 Total run-off pollution load from agriculture	kg/day	2	2	2	2	2	2	2	2
D. Other sources									
D1. Pollution load from others									
1) Pollution load produced	kg/day	113	113	113	113	113	113	113	113
2) Flow-out ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow-down ratio	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	kg/day	5	5	5	5	5	5	5	5
III. Water quality at control point									
E. Water quality monitored									
1) 1994	mg/l				12.9				12.9
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	kg/day	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566
2) Water flow	m ³ /s				3.2				3.2
3) Water quality	mg/l				6.6				6.6

Note : * Pollution load from fields is included in other sources

Table-4(10) Calculation of Water Quality (BOD) at Porong (2020 : Case-11)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Ave (Per)	10% Val
I. Pollution load from upstream									
1) Water quality of intake of water canal	QC								
2) Water flow of intake of water canal	QC								
3) Pollution load from upstream	$(Q-CQ) \times Q0$								
4) Run-off pollution load from upstream	$(Q-CQ) \times Q0$								
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load									
1) Pollution load produced	p1	kg/day	23	23	23	23	23	23	
2) Flow out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r1-2	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	$r1(r1-1) \times r1-2$	-	0.72	0.72	0.72	0.72	0.72	0.72	
5) Run-off pollution load	$D1 = p1 \times r1$	kg/day	17	17	17	17	17	17	
A2 Total run-off pollution load from domestic waste water	$D1-D2$	kg/day	17	17	17	17	17	17	
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	p1	kg/day	0	0	0	0	0	0	
2) Flow out ratio	r1-1	-	-	-	-	-	-	-	
3) Flow down ratio	r1-2	-	-	-	-	-	-	-	
4) Run-off ratio	$r1(r1-1) \times r1-2$	-	0	0	0	0	0	0	
5) Run-off pollution load	$D1 = p1 \times r1$	kg/day	0	0	0	0	0	0	
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	p2	kg/day	55	55	55	55	55	55	
2) Flow out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r2-2	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	$r2(r2-1) \times r2-2$	-	0.72	0.72	0.72	0.72	0.72	0.72	
5) Run-off pollution load	$D2 = p2 \times r2$	kg/day	40	40	40	40	40	40	
B3 Pollution load from small scale industries									
1) Pollution load produced	p3	kg/day	11	11	11	11	11	11	
2) Flow out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow down ratio	r3-2	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	$r3(r3-1) \times r3-2$	-	0.72	0.72	0.72	0.72	0.72	0.72	
5) Run-off pollution load	$D3 = p3 \times r3$	kg/day	8	8	8	8	8	8	
B4 Total run-off pollution load from the industries	$D2+D3+D4$	kg/day	48	48	48	48	48	48	
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	p4	kg/day	-	-	-	-	-	-	
2) Flow out ratio	r4-1	-	-	-	-	-	-	-	
3) Flow down ratio	r4-2	-	-	-	-	-	-	-	
4) Run-off ratio	$r4(r4-1) \times r4-2$	-	-	-	-	-	-	-	
5) Run-off pollution load	$D4 = p4 \times r4$	kg/day	-	-	-	-	-	-	
C2 Pollution load from livestock									
1) Pollution load produced	p5	kg/day	19	19	19	19	19	19	
2) Flow out ratio	r5-1	-	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow down ratio	r5-2	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	$r5(r5-1) \times r5-2$	-	0.16	0.16	0.16	0.16	0.16	0.16	
5) Run-off pollution load	$D5 = p5 \times r5$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04	
C3 Total run-off pollution load from agriculture	$D4+D5+D6$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04	
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	p6	kg/day	38	38	38	38	38	38	
2) Flow out ratio	r6-1	-	0.2	0.2	0.2	0.2	0.2	0.2	
3) Flow down ratio	r6-2	-	0.8	0.8	0.8	0.8	0.8	0.8	
4) Run-off ratio	$r6(r6-1) \times r6-2$	-	0.16	0.16	0.16	0.16	0.16	0.16	
5) Run-off pollution load	$D6 = p6 \times r6$	kg/day	6.08	6.08	6.08	6.08	6.08	6.08	
III. Water quality at control point									
E. Water quality monitored									
1) 1994					9.3				9.3
2) Average (1992-1996)									
3) Maximum (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	$L = (D1+D2+D3+D4+D5+D6)$	kg/day	73	73	73	73	73	73	73
2) Water flow	Q	m ³ /s			0.06				0.06
3) Water quality	$C = L/Q$	mg/l			14.15				14.15

Note : * Pollution load from fields is included in other sources

Table-S(1) Calculation of Water Quality (BOD) at Bomlayu Bridge (2020 : Case-III)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Avg	25°C
I. Pollution load from upstream															
1) Water quality	CO	mg/l													
2) Water flow	Q ₀	m ³ /s													
3) Pollution load from upstream	CO × Q ₀	kg/day													
4) Run-off pollution load from upstream	D	kg/day													
B. Pollution load from sub-basin															
A. Domestic waste water															
A1 Pollution load (Sub-basin B001)															
1) Pollution load produced	a1	kg/day	897	897	897	897	897	897	897	897	897	897	897		
2) Flow-out ratio	r1-1	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
3) Flow-down ratio	r1-2	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	D1 = a1 × r1	kg/day	27	27	27	27	27	27	27	27	27	27	27		
A2 Pollution load (Sub-basin B002)															
1) Pollution load produced	a2	kg/day	757	757	757	757	757	757	757	757	757	757	757		
2) Flow-out ratio	r2-1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
3) Flow-down ratio	r2-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
5) Run-off pollution load	D2 = a2 × r2	kg/day	151	151	151	151	151	151	151	151	151	151	151		
A3 Pollution load (Sub-basin B003)															
1) Pollution load produced	a3	kg/day	4364	4364	4364	4364	4364	4364	4364	4364	4364	4364	4364		
2) Flow-out ratio	r3-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	D3 = a3 × r3	kg/day	1021	1021	1021	1021	1021	1021	1021	1021	1021	1021	1021		
A4 Pollution load (Sub-basin B004)															
1) Pollution load produced	a4	kg/day	5090	5090	5090	5090	5090	5090	5090	5090	5090	5090	5090		
2) Flow-out ratio	r4-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	r4-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21		
5) Run-off pollution load	D4 = a4 × r4	kg/day	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069		
A5 Pollution load (Sub-basin B005)															
1) Pollution load produced	a5	kg/day	3023	3023	3023	3023	3023	3023	3023	3023	3023	3023	3023		
2) Flow-out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r5-2	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	D5 = a5 × r5	kg/day	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177	2177		
A6 Total run-off pollution load from domestic waste water	D6 = D1 + D2 + D3 + D4 + D5	kg/day	4345	4345	4345	4345	4345	4345	4345	4345	4345	4345	4345		
B. Industrial waste water															
B1 Pollution load from major producers															
1) Pollution load produced	b1	kg/day	165	165	165	165	165	165	165	165	165	165	165		
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow-down ratio	r11-2	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45		
5) Run-off pollution load	D1 = b1 × r11	kg/day	74	74	74	74	74	74	74	74	74	74	74		
B2 Pollution load from large and medium scale industries															
1) Pollution load produced	b2	kg/day	14220	14220	14220	14220	14220	14220	14220	14220	14220	14220	14220		
2) Flow-out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26		
5) Run-off pollution load	D2 = b2 × r12	kg/day	3682	3682	3682	3682	3682	3682	3682	3682	3682	3682	3682		
B3 Pollution load from small scale industries															
1) Pollution load produced	b3	kg/day	2745	2745	2745	2745	2745	2745	2745	2745	2745	2745	2745		
2) Flow-out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
3) Flow-down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26		
5) Run-off pollution load	D3 = b3 × r13	kg/day	769	769	769	769	769	769	769	769	769	769	769		
B4 Total run-off pollution load from the industries	D4 = D1 + D2 + D3	kg/day	4824	4824	4824	4824	4824	4824	4824	4824	4824	4824	4824		
C. Agricultural pollution load															
C1 Pollution load from fields*															
1) Pollution load produced	c1	kg/day													
2) Flow-out ratio	r21-1	-													
3) Flow-down ratio	r21-2	-													
4) Run-off ratio	r21 (r21-1+r21-2)	-													
5) Run-off pollution load	A1 = c1 × r21	kg/day													
C2 Pollution load from livestock															
1) Pollution load produced	c2	kg/day	21276	21276	21276	21276	21276	21276	21276	21276	21276	21276	21276		
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r22-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	A2 = c2 × r22	kg/day	638	638	638	638	638	638	638	638	638	638	638		
C3 Total run-off pollution load from agriculture	A3 = A1 + A2	kg/day	638	638	638	638	638	638	638	638	638	638	638		
D. Other sources															
D1 Pollution load from others															
1) Pollution load produced	d1	kg/day	36620	36620	36620	36620	36620	36620	36620	36620	36620	36620	36620		
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r31-2	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	D6 = d1 × r31	kg/day	1099	1099	1099	1099	1099	1099	1099	1099	1099	1099	1099		
III. Water quality at control point															
E. Water quality monitored															
1) 1994		mg/l	8.3	9.4	7.6	8.4	1.8	7.5	8.2	8.4					
2) Average (1992-1996)															
3) Median (1992-1996)															
F. Result of calculation															
1) Total run-off pollution load	L = D6 + D4 + D5 + A3 + D6	kg/day	11067	11067	11067	11067	11067	11067	11067	11067	11067	11067	11067		
2) Water flow	Q	m ³ /s	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
3) Water quality	C = L/Q	mg/l	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7		

Note : * Pollution load from fields is included in other sources

Table-5(2) Calculation of Water Quality (BOD) at Demangan Bridge (2020 : Case-III)

Items		water	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
I. Pollution load from upstream										
1) Water quality of Lady's Dam (200)	Q0	mg/l	2.0	2.0	4.3	6.6	4.3	3.8		
2) Water flow of Lady's Dam	Q0	m ³ /s	72.0	8.0	61.0	57.0	107.0	73.0		
3) Pollution load from upstream	$1.0 \times Q0 \times Q0$	kg/day	12.42	1.60	22.66	32.54	39.33	23.66		
4) Run-off pollution load from upstream	$1.0 \times Q0 \times Q0$	kg/day	2.485	2.80	4.53	6.50	7.95	4.79		
II. Pollution load from sub-basin										
A. Domestic waste water										
A1. Pollution load (Sub-basin B142)										
1) Pollution load produced	a1	kg/day	1.229	1.229	1.229	1.229	1.229	1.229		
2) Flow-out ratio	r1-1	-	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r1 = (r1-1 + r1-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16		
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	197	197	197	197	197	197		
A2. Pollution load (Sub-basin B150)										
1) Pollution load produced	a2	kg/day	1.661	1.661	1.661	1.661	1.661	1.661		
2) Flow-out ratio	r2-1	-	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow-down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r2 = (r2-1 + r2-2)$	-	0.24	0.24	0.24	0.24	0.24	0.24		
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	399	399	399	399	399	399		
A3. Pollution load (Sub-basin B153)										
1) Pollution load produced	a3	kg/day	732	732	732	732	732	732		
2) Flow-out ratio	r3-1	-	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow-down ratio	r3-2	-	0.4	0.4	0.4	0.4	0.4	0.4		
4) Run-off ratio	$r3 = (r3-1 + r3-2)$	-	0.32	0.32	0.32	0.32	0.32	0.32		
5) Run-off pollution load	$D3 = a3 \times r3$	kg/day	234	234	234	234	234	234		
A4. Total run-off pollution load from domestic waste water	$D0 = D1 + D2 + D3$	kg/day	830	830	830	830	830	830		
B. Industrial waste water										
B1. Pollution load from large producers										
1) Pollution load produced	b1	kg/day	6.221	6.221	6.221	6.221	6.221	6.221		
2) Flow-out ratio	r11-1	-	0.2	0.2	0.2	0.2	0.2	0.2		
3) Flow-down ratio	r11-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r11 = (r11-1 + r11-2)$	-	0.76	0.76	0.76	0.76	0.76	0.76		
5) Run-off pollution load	$D1 = b1 \times r11$	kg/day	373	373	373	373	373	373		
B2. Pollution load from large and medium scale industries										
1) Pollution load produced	b2	kg/day	2.808	2.808	2.808	2.808	2.808	2.808		
2) Flow-out ratio	r12-1	-	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow-down ratio	r12-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r12 = (r12-1 + r12-2)$	-	0.24	0.24	0.24	0.24	0.24	0.24		
5) Run-off pollution load	$D2 = b2 \times r12$	kg/day	674	674	674	674	674	674		
B3. Pollution load from small scale industries										
1) Pollution load produced	b3	kg/day	493	493	493	493	493	493		
2) Flow-out ratio	r13-1	-	0.8	0.8	0.8	0.8	0.8	0.8		
3) Flow-down ratio	r13-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r13 = (r13-1 + r13-2)$	-	0.24	0.24	0.24	0.24	0.24	0.24		
5) Run-off pollution load	$D3 = b3 \times r13$	kg/day	118	118	118	118	118	118		
B4. Total run-off pollution load from the industries	$D0 = D1 + D2 + D3$	kg/day	1.166	1.166	1.166	1.166	1.166	1.166		
C. Agricultural pollution load										
C1. Pollution load from fields*										
1) Pollution load produced	c1	kg/day								
2) Flow-out ratio	r21-1	-								
3) Flow-down ratio	r21-2	-								
4) Run-off ratio	$r21 = (r21-1 + r21-2)$	-								
5) Run-off pollution load	$D1 = c1 \times r21$	kg/day								
C2. Pollution load from livestock										
1) Pollution load produced	c2	kg/day	11.258	11.258	11.258	11.258	11.258	11.258		
2) Flow-out ratio	r22-1	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r22-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r22 = (r22-1 + r22-2)$	-	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	$D2 = c2 \times r22$	kg/day	338	338	338	338	338	338		
C3. Total run-off pollution load from agriculture	$D0 = D1 + D2$	kg/day	338	338	338	338	338	338		
D. Other sources										
D1. Pollution load from others										
1) Pollution load produced	d1	kg/day	10.630	10.630	10.630	10.630	10.630	10.630		
2) Flow-out ratio	r31-1	-	0.1	0.1	0.1	0.1	0.1	0.1		
3) Flow-down ratio	r31-2	-	0.2	0.2	0.2	0.2	0.2	0.2		
4) Run-off ratio	$r31 = (r31-1 + r31-2)$	-	0.03	0.03	0.03	0.03	0.03	0.03		
5) Run-off pollution load	$D0 = d1 \times r31$	kg/day	319	319	319	319	319	319		
III. Water quality at control point										
E. Water quality monitored										
1) 1994	mg/l		2.8	3.8	4.3	7.3	2.6	3.5	4.1	4.3
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load	$L = L0 + D0 + D0 + D0 + D0$	kg/day	5.140	2.531	7.184	9.152	10.602	7.445	7.076	
2) Water flow	Q	m ³ /s	62.6	62.6	62.6	62.6	62.6	62.6	62.6	
3) Water quality	$C = L/Q$	mg/l	1.6	0.5	1.2	1.2	2.0	1.6	2.2	3.2

Note: *Pollution load from fields is included in other sources

Table-S(3) Calculation of Water Quality (BOD) at Jogbra Bridge (2020 : case-III)

Items		Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.	Std. Dev.	75% V
I. Pollution load from upstream																	
1) Water quality of Nongga Tumbungu (Q1)		CO	mg/l	6.3	4.8	10.5	3.9	3.8	4.7								
2) Water flow of Nongga Tumbungu		Q2	m ³ /s	141.0	54.9	55.0	65.0	52.4	41.9								
3) Pollution load from upstream		Q1 x Q2 x Q3	kg/day	75.740	23.568	50.440	21.402	17.264	17.015								
4) Run-off pollution load from upstream		Q1 x Q2 x Q4	kg/day	15350	4720	10680	4350	3441	3401								
II. Pollution load from sub-basin																	
A. Domestic waste water																	
A1. Pollution load (Sub-basin B310)																	
1) Pollution load produced		a1	kg/day	2.51	2.51	2.51	2.51	2.51	2.51								
2) Flow-out ratio		r1-1	%	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio		r1-2	%	0.1	0.1	0.1	0.1	0.1	0.1								
4) Run-off ratio		r1 (r1-1+r1-2)	%	0.26	0.08	0.08	0.08	0.08	0.08								
5) Run-off pollution load		D1 = a1 x r1	kg/day	201	201	201	201	201	201								
A2. Pollution load (Sub-basin B311)																	
1) Pollution load produced		a2	kg/day	2.22	2.22	2.22	2.22	2.22	2.22								
2) Flow-out ratio		r2-1	%	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio		r2-2	%	0.2	0.2	0.2	0.2	0.2	0.2								
4) Run-off ratio		r2 (r2-1+r2-2)	%	0.16	0.16	0.16	0.16	0.16	0.16								
5) Run-off pollution load		D2 = a2 x r2	kg/day	356	356	356	356	356	356								
A3. Pollution load (Sub-basin B312)																	
1) Pollution load produced		a3	kg/day	158	158	158	158	158	158								
2) Flow-out ratio		r3-1	%	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow-down ratio		r3-2	%	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio		r3 (r3-1+r3-2)	%	0.27	0.27	0.27	0.27	0.27	0.27								
5) Run-off pollution load		D3 = a3 x r3	kg/day	45	45	45	45	45	45								
A4. Pollution load (Sub-basin B313)																	
1) Pollution load produced		a4	kg/day	234	234	234	234	234	234								
2) Flow-out ratio		r4-1	%	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow-down ratio		r4-2	%	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio		r4 (r4-1+r4-2)	%	0.27	0.27	0.27	0.27	0.27	0.27								
5) Run-off pollution load		D4 = a4 x r4	kg/day	63	63	63	63	63	63								
A5. Pollution load (Sub-basin B314)																	
1) Pollution load produced		a5	kg/day	11	11	11	11	11	11								
2) Flow-out ratio		r5-1	%	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow-down ratio		r5-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r5 (r5-1+r5-2)	%	0.45	0.45	0.45	0.45	0.45	0.45								
5) Run-off pollution load		D5 = a5 x r5	kg/day	5	5	5	5	5	5								
A6. Pollution load (Sub-basin B315)																	
1) Pollution load produced		a6	kg/day	1317	1317	1317	1317	1317	1317								
2) Flow-out ratio		r6-1	%	0.8	0.8	0.8	0.8	0.8	0.8								
3) Flow-down ratio		r6-2	%	0.6	0.6	0.6	0.6	0.6	0.6								
4) Run-off ratio		r6 (r6-1+r6-2)	%	0.45	0.45	0.45	0.45	0.45	0.45								
5) Run-off pollution load		D6 = a6 x r6	kg/day	632	632	632	632	632	632								
A7. Pollution load (Sub-basin B316)																	
1) Pollution load produced		a7	kg/day	150	150	150	150	150	150								
2) Flow-out ratio		r7-1	%	0.9	0.9	0.9	0.9	0.9	0.9								
3) Flow-down ratio		r7-2	%	0.8	0.8	0.8	0.8	0.8	0.8								
4) Run-off ratio		r7 (r7-1+r7-2)	%	0.72	0.72	0.72	0.72	0.72	0.72								
5) Run-off pollution load		D7 = a7 x r7	kg/day	108	108	108	108	108	108								
A8. Pollution load (Sub-basin B317)																	
1) Pollution load produced		a8	kg/day	2899	2899	2899	2899	2899	2899								
2) Flow-out ratio		r8-1	%	0.7	0.7	0.7	0.7	0.7	0.7								
3) Flow-down ratio		r8-2	%	0.3	0.3	0.3	0.3	0.3	0.3								
4) Run-off ratio		r8 (r8-1+r8-2)	%	0.21	0.21	0.21	0.21	0.21	0.21								
5) Run-off pollution load		D8 = a8 x r8	kg/day	609	609	609	609	609	609								
A9. Total run-off pollution load from domestic waste water		(D1-D4)-(D5-D8)	kg/day	2019	2019	2019	2019	2019	2019								
B. Industrial waste water																	
B1. Pollution load from major producers																	
1) Pollution load produced		b1	kg/day	55.815	55.815	55.815	55.815	55.815	55.815								
2) Flow-out ratio		r11-1	%	0.05	0.05	0.05	0.05	0.05	0.05								
3) Flow-down ratio		r11-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r11 (r11-1+r11-2)	%	0.025	0.025	0.025	0.025	0.025	0.025								
5) Run-off pollution load		D1 = b1 x r11	kg/day	1.395	1.395	1.395	1.395	1.395	1.395								
B2. Pollution load from large and medium scale industries																	
1) Pollution load produced		b2	kg/day	3799	3799	3799	3799	3799	3799								
2) Flow-out ratio		r12-1	%	0.2	0.2	0.2	0.2	0.2	0.2								
3) Flow-down ratio		r12-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r12 (r12-1+r12-2)	%	0.1	0.1	0.1	0.1	0.1	0.1								
5) Run-off pollution load		D2 = b2 x r12	kg/day	380	380	380	380	380	380								
B3. Pollution load from small scale industries																	
1) Pollution load produced		b3	kg/day	633	633	633	633	633	633								
2) Flow-out ratio		r13-1	%	0.2	0.2	0.2	0.2	0.2	0.2								
3) Flow-down ratio		r13-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r13 (r13-1+r13-2)	%	0.1	0.1	0.1	0.1	0.1	0.1								
5) Run-off pollution load		D3 = b3 x r13	kg/day	63	63	63	63	63	63								
B4. Total run-off pollution load from the industries		(D1-D3)-(D4-D8)	kg/day	1.829	1.829	1.829	1.829	1.829	1.829								
C. Agricultural pollution load																	
C1. Pollution load from fields*																	
1) Pollution load produced		c1	kg/day														
2) Flow-out ratio		r21-1	%														
3) Flow-down ratio		r21-2	%														
4) Run-off ratio		r21 (r21-1+r21-2)	%														
5) Run-off pollution load		A1 = c1 x r21	kg/day														
C2. Pollution load from livestock																	
1) Pollution load produced		c2	kg/day	24.838	24.838	24.838	24.838	24.838	24.838								
2) Flow-out ratio		r22-1	%	0.05	0.05	0.05	0.05	0.05	0.05								
3) Flow-down ratio		r22-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r22 (r22-1+r22-2)	%	0.025	0.025	0.025	0.025	0.025	0.025								
5) Run-off pollution load		A2 = c2 x r22	kg/day	621	621	621	621	621	621								
C3. Total run-off pollution load from agriculture		A3 = A1 + A2	kg/day	621	621	621	621	621	621								
D. Other sources																	
D1. Pollution load from others																	
1) Pollution load produced		d1	kg/day	12.280	12.280	12.280	12.280	12.280	12.280								
2) Flow-out ratio		r31-1	%	0.05	0.05	0.05	0.05	0.05	0.05								
3) Flow-down ratio		r31-2	%	0.5	0.5	0.5	0.5	0.5	0.5								
4) Run-off ratio		r31 (r31-1+r31-2)	%	0.025	0.025	0.025	0.025	0.025	0.025								
5) Run-off pollution load		D4 = d1 x r31	kg/day	307	307	307	307	307	307								
II. Water quality at control point																	
E. Water quality monitored																	
1) 1994			mg/l	3.5	3.6	11.9	3.4	3.7	4.5								
2) Average (1992-1996)																	
3) Median (1992-1996)																	
F. Result of calculation																	
1) Total run-off pollution load		L = L0 + D4 + D5 + A3 + D4	kg/day	20135	9305	14874	9159	8128	8180								
2) Water flow		Q	m ³ /s	58.2	58.2	58.2	58.2	58.2	58.2								
3) Water quality		C = L/Q	mg/l	4.3	1.9	3.0	1.8	1.6	1.6								

Table 5-4: Calculation of Water Quality (BOD) at Padangas Bridge (2020 : Case file)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
I. Pollution load from agriculture														
1. Water quality at farm boundary (kg/d)	kg	2.5	7.0	4.8	6.4	4.9	2.7							
2. Water flow at farm boundary (m³/s)	m³/s	79.5	17.0	13.7	16.1	11.9	12.6							
3. Pollution load from agriculture (kg/d)	kg/d	17.17	13.70	10.56	10.29	5.01	1.76							
4. Runoff pollution load from agriculture (kg/d)	kg/d	6.359	5.296	12.76	3.651	2.041	1.176							
II. Pollution load from industry														
A. Domestic waste water														
A1 Pollution load (Sub-town B501)	kg/d	641	641	641	641	641	641							
1) Pollution load produced	kg/d	641	641	641	641	641	641							
2) Flow out rate	kg/d	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow down rate	kg/d	0.9	0.9	0.9	0.9	0.9	0.9							
4) Run off rate	kg/d	0.81	0.81	0.81	0.81	0.81	0.81							
5) Run off pollution load	kg/d	520	520	520	520	520	520							
A2 Pollution load (Sub-town B504)	kg/d	1,760	1,760	1,760	1,760	1,760	1,760							
1) Pollution load produced	kg/d	1,760	1,760	1,760	1,760	1,760	1,760							
2) Flow out rate	kg/d	0.5	0.5	0.5	0.5	0.5	0.5							
3) Flow down rate	kg/d	0.1	0.1	0.1	0.1	0.1	0.1							
4) Run off rate	kg/d	0.05	0.05	0.05	0.05	0.05	0.05							
5) Run off pollution load	kg/d	85	85	85	85	85	85							
A3 Pollution load (Sub-town B505)	kg/d	685	685	685	685	685	685							
1) Pollution load produced	kg/d	685	685	685	685	685	685							
2) Flow out rate	kg/d	0.3	0.3	0.3	0.3	0.3	0.3							
3) Flow down rate	kg/d	0.21	0.21	0.21	0.21	0.21	0.21							
4) Run off rate	kg/d	0.21	0.21	0.21	0.21	0.21	0.21							
5) Run off pollution load	kg/d	138	138	138	138	138	138							
A4 Pollution load (Sub-town B506)	kg/d	446	446	446	446	446	446							
1) Pollution load produced	kg/d	446	446	446	446	446	446							
2) Flow out rate	kg/d	0.8	0.8	0.8	0.8	0.8	0.8							
3) Flow down rate	kg/d	0.7	0.7	0.7	0.7	0.7	0.7							
4) Run off rate	kg/d	0.56	0.56	0.56	0.56	0.56	0.56							
5) Run off pollution load	kg/d	250	250	250	250	250	250							
A5 Pollution load (Sub-town B507)	kg/d	73	73	73	73	73	73							
1) Pollution load produced	kg/d	73	73	73	73	73	73							
2) Flow out rate	kg/d	0.9	0.9	0.9	0.9	0.9	0.9							
3) Flow down rate	kg/d	0.9	0.9	0.9	0.9	0.9	0.9							
4) Run off rate	kg/d	0.81	0.81	0.81	0.81	0.81	0.81							
5) Run off pollution load	kg/d	59	59	59	59	59	59							
A6 Pollution load (Sub-town B508)	kg/d	1,293	1,293	1,293	1,293	1,293	1,293							
1) Pollution load produced	kg/d	1,293	1,293	1,293	1,293	1,293	1,293							
2) Flow out rate	kg/d	0.3	0.3	0.3	0.3	0.3	0.3							
3) Flow down rate	kg/d	0.05	0.05	0.05	0.05	0.05	0.05							

Note: "P" designates land from which is excluded in other entries.

Table-5(5) Calculation of Water Quality (BOD) at Cengga Tambangan (2020 : Case-III)

Items	Unit	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly	30 Day
I. Pollution load from upstream																
1) Water quality of Polangan (Q0)	mg/l															
2) Water flow of Polangan (Q0)	m ³ /s															
3) Pollution load from upstream	kg/day	16.154	14.391	21.522	12.993	11.211	10.471									
4) Run-off pollution load from upstream	kg/day	2.425	2.159	3.228	1.939	1.647	1.571									
B. Pollution load from sub basin																
A. Domestic waste water																
A1 Pollution load (Sub basin B6 (9))																
1) Pollution load produced	kg/day	219	219	219	219	219	219									
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36									
5) Run-off pollution load	kg/day	79	79	79	79	79	79									
A2 Pollution load (Sub basin B6 (1))																
1) Pollution load produced	kg/day	202	202	202	202	202	202									
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36									
5) Run-off pollution load	kg/day	73	73	73	73	73	73									
A3 Total run-off pollution load from domestic waste water	kg/day	152	152	152	152	152	152									
B. Industrial waste water																
B1 Pollution load from major producers																
1) Pollution load produced	kg/day	8.129	8.129	8.129	8.129	8.129	8.129									
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36									
5) Run-off pollution load	kg/day	2.926	2.926	2.926	2.926	2.926	2.926									
B2 Pollution load from large and medium scale industries																
1) Pollution load produced	kg/day	80	80	80	80	80	80									
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36									
5) Run-off pollution load	kg/day	29	29	29	29	29	29									
B3 Pollution load from small scale industries																
1) Pollution load produced	kg/day	17	17	17	17	17	17									
2) Flow out ratio	-	0.9	0.9	0.9	0.9	0.9	0.9									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.36	0.36	0.36	0.36	0.36	0.36									
5) Run-off pollution load	kg/day	6	6	6	6	6	6									
B4 Total run-off pollution load from the industries	kg/day	3.103	3.103	3.103	3.103	3.103	3.103									
C. Agricultural pollution load																
C1 Pollution load from fields*																
1) Pollution load produced	kg/day															
2) Flow out ratio	-															
3) Flow down ratio	-															
4) Run-off ratio	-															
5) Run-off pollution load	kg/day															
C2 Pollution load from livestock																
1) Pollution load produced	kg/day	1.022	1.022	1.022	1.022	1.022	1.022									
2) Flow out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04									
5) Run-off pollution load	kg/day	41	41	41	41	41	41									
C3 Total run-off pollution load from agriculture	kg/day	41	41	41	41	41	41									
D. Other sources																
D1 Pollution load from others																
1) Pollution load produced	kg/day	760	760	760	760	760	760									
2) Flow out ratio	-	0.1	0.1	0.1	0.1	0.1	0.1									
3) Flow down ratio	-	0.4	0.4	0.4	0.4	0.4	0.4									
4) Run-off ratio	-	0.04	0.04	0.04	0.04	0.04	0.04									
5) Run-off pollution load	kg/day	30	30	30	30	30	30									
II. Water quality at control point																
E. Water quality monitored																
1) 1994	mg/l	3.4	4.0	3.3	10.6	5.2	6.9									
2) Average (1993-1995)																
3) Median (1992-1996)																
F. Result of calculation																
1) Total run-off pollution load	kg/day	5.750	5.464	6.554	5.274	5.022	4.996									
2) Water flow	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8									
3) Water quality	mg/l	5.2	5.0	5.9	4.8	4.5	4.5									

Note : *Pollution load from fields is included in other sources

Table 5(6) Calculation of Water Quality (BOD) at Karangpilang (2020 : Case-III)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Aug (D)	2020 V.A
I. Pollution load from upstream									
1) Water quality of Cagar Tambungan (1964)	CO	mg/l							
2) Water flow of Cagar Tambungan	Q	m ³ /s							
3) Pollution load from upstream	LO-COxQ	kg/day	5,750	5,484	6,554	5,274	5,022	4,196	
4) Run-off pollution load from upstream	LO-COxQ	kg/day	561	621	983	761	753	734	
II. Pollution load from sub-basin									
A. Domestic waste water									
A1 Pollution load (Sub-basin B621)									
1) Pollution load produced	a1	kg/day	249	249	249	249	249	249	
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r1-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r1-(r1-1+r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D1=a1 x r1	kg/day	45	45	45	45	45	45	
A2 Pollution load (Sub-basin B622)									
1) Pollution load produced	a2	kg/day	300	300	300	300	300	300	
2) Flow-out ratio	r2-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r2-2	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	r2-(r2-1+r2-2)	-	0.27	0.27	0.27	0.27	0.27	0.27	
5) Run-off pollution load	D2=a2 x r2	kg/day	116	116	116	116	116	116	
A3 Pollution load (Sub-basin B623)									
1) Pollution load produced	a3	kg/day	322	322	322	322	322	322	
2) Flow-out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9	
3) Flow-down ratio	r3-2	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	r3-(r3-1+r3-2)	-	0.45	0.45	0.45	0.45	0.45	0.45	
5) Run-off pollution load	D3=a3 x r3	kg/day	145	145	145	145	145	145	
A4 Pollution load (Sub-basin B624)									
1) Pollution load produced	a4	kg/day	126	126	126	126	126	126	
2) Flow-out ratio	r4-1	-	0.6	0.6	0.6	0.6	0.6	0.6	
3) Flow-down ratio	r4-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r4-(r4-1+r4-2)	-	0.12	0.12	0.12	0.12	0.12	0.12	
5) Run-off pollution load	D4=a4 x r4	kg/day	15	15	15	15	15	15	
A5 Pollution load (Sub-basin B625)									
1) Pollution load produced	a5	kg/day	825	825	825	825	825	825	
2) Flow-out ratio	r5-1	-	0.5	0.5	0.5	0.5	0.5	0.5	
3) Flow-down ratio	r5-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r5-(r5-1+r5-2)	-	0.1	0.1	0.1	0.1	0.1	0.1	
5) Run-off pollution load	D5=a5 x r5	kg/day	83	83	83	83	83	83	
A6 Pollution load (Sub-basin B626)									
1) Pollution load produced	a6	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r6-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow-down ratio	r6-2	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	r6-(r6-1+r6-2)	-	0.21	0.21	0.21	0.21	0.21	0.21	
5) Run-off pollution load	D6=a6 x r6	kg/day	0	0	0	0	0	0	
A7 Pollution load (Sub-basin B627)									
1) Pollution load produced	a7	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r7-1	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio	r7-2	-	0.3	0.3	0.3	0.3	0.3	0.3	
4) Run-off ratio	r7-(r7-1+r7-2)	-	0.24	0.24	0.24	0.24	0.24	0.24	
5) Run-off pollution load	D7=a7 x r7	kg/day	0	0	0	0	0	0	
A8 Total run-off pollution load from domestic waste water	D8=D1+...+D7	kg/day	504	504	504	504	504	504	
B. Industrial waste water									
B1 Pollution load from major producers									
1) Pollution load produced	b1	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r11-1	-	0.8	0.8	0.8	0.8	0.8	0.8	
3) Flow-down ratio	r11-2	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio	r11-(r11-1+r11-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	
5) Run-off pollution load	D11=b1 x r11	kg/day	0	0	0	0	0	0	
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	b2	kg/day	26,582	26,582	26,582	26,582	26,582	26,582	
2) Flow-out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow-down ratio	r12-2	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio	r12-(r12-1+r12-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D12=b2 x r12	kg/day	4,852	4,852	4,852	4,852	4,852	4,852	
B3 Pollution load from small scale industries									
1) Pollution load produced	b3	kg/day	5,269	5,269	5,269	5,269	5,269	5,269	
2) Flow-out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7	
3) Flow-down ratio	r13-2	-	0.25	0.25	0.25	0.25	0.25	0.25	
4) Run-off ratio	r13-(r13-1+r13-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	
5) Run-off pollution load	D13=b3 x r13	kg/day	922	922	922	922	922	922	
B4 Total run-off pollution load from the industries	D14=D12+D13	kg/day	5,774	5,774	5,774	5,774	5,774	5,774	
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	c1	kg/day							
2) Flow-out ratio	r21-1	-							
3) Flow-down ratio	r21-2	-							
4) Run-off ratio	r21-(r21-1+r21-2)	-							
5) Run-off pollution load	A1=c1 x r21	kg/day							
C2 Pollution load from livestock									
1) Pollution load produced	c2	kg/day	6,934	6,934	6,934	6,934	6,934	6,934	
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	r22-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r22-(r22-1+r22-2)	-	0.01	0.01	0.01	0.01	0.01	0.01	
5) Run-off pollution load	A2=c2 x r22	kg/day	69	69	69	69	69	69	
C3 Total run-off pollution load from agriculture	A3=A1+A2	kg/day	69	69	69	69	69	69	
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	d1	kg/day	10,358	10,358	10,358	10,358	10,358	10,358	
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	r31-2	-	0.2	0.2	0.2	0.2	0.2	0.2	
4) Run-off ratio	r31-(r31-1+r31-2)	-	0.01	0.01	0.01	0.01	0.01	0.01	
5) Run-off pollution load	D11=d1 x r31	kg/day	104	104	104	104	104	104	
II. Water quality at control point									
E. Water quality monitored									
1) 1964		mg/l	15.7	11.1	11.2	14.0	7.9	7.9	11.2
2) Average (1962-1966)									
3) Me-flux (1962-1966)									
F. Result of calculation									
1) Total run-off pollution load	L=L8+D8+D14+A3+D1	kg/day	7,113	7,073	7,233	7,642	7,004	6,955	7,075
2) Water flow	Q	m ³ /s	11.8	12.8	12.8	12.8	12.8	12.8	12.8
3) Water quality	C=L/Q	mg/l	5.4	5.4	5.5	5.9	5.3	5.3	5.4

Note : *Pollution load from fields is included in other sources

Table-5(7) Calculation of Water Quality (BOD) at Ngagul (2020 : Case-III)

Items	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
I. Pollution load from upstream														
1) Water quality of Karangpung (1045)	CO	mg/l												
2) Water flow of Karangpung	Q0	m ³ /s												
3) Pollution load from upstream	$LO = CO \times Q0$	kg/day	17.113	17.073	17.133	17.042	17.004	16.965						
4) Run-off pollution load from upstream	$LO = CO \times Q0$	kg/day	2567	2561	2568	2556	2551	2548						
II. Pollution load from sub-basin														
A. Domestic waste water														
A1. Pollution load (Sub-basin B540)														
1) Pollution load produced	a1	kg/day	747	747	747	747	747	747						
2) Flow-out ratio	r1-1	-	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow-down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	258	258	258	258	258	258						
A2. Pollution load (Sub-basin B541)														
1) Pollution load produced	a2	kg/day	170	170	170	170	170	170						
2) Flow-out ratio	r2-1	-	0.6	0.6	0.6	0.6	0.6	0.6						
3) Flow-down ratio	r2-2	-	0.2	0.2	0.2	0.2	0.2	0.2						
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.12	0.12	0.12	0.12	0.12	0.12						
5) Run-off pollution load	$D2 = a2 \times r2$	kg/day	20	20	20	20	20	20						
A3. Pollution load (Sub-basin B542)														
1) Pollution load produced	a3	kg/day	837	837	837	837	837	837						
2) Flow-out ratio	r3-1	-	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow-down ratio	r3-2	-	0.3	0.3	0.3	0.3	0.3	0.3						
4) Run-off ratio	r3 (r3-1+r3-2)	-	0.21	0.21	0.21	0.21	0.21	0.21						
5) Run-off pollution load	$D3 = a3 \times r3$	kg/day	156	156	156	156	156	156						
A4. Pollution load (Sub-basin B543)														
1) Pollution load produced	a4	kg/day	4302	4302	4302	4302	4302	4302						
2) Flow-out ratio	r4-1	-	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow-down ratio	r4-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r4 (r4-1+r4-2)	-	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$D4 = a4 \times r4$	kg/day	1549	1549	1549	1549	1549	1549						
A5. Pollution load (Sub-basin B544)														
1) Pollution load produced	a5	kg/day	2082	2082	2082	2082	2082	2082						
2) Flow-out ratio	r5-1	-	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow-down ratio	r5-2	-	0.7	0.7	0.7	0.7	0.7	0.7						
4) Run-off ratio	r5 (r5-1+r5-2)	-	0.63	0.63	0.63	0.63	0.63	0.63						
5) Run-off pollution load	$D5 = a5 \times r5$	kg/day	1312	1312	1312	1312	1312	1312						
A6. Total run-off pollution load from domestic waste water	$D6 = D1 + D2 + D3 + D4 + D5$	kg/day	3325	3325	3325	3325	3325	3325						
B. Industrial waste water														
B1. Pollution load from major producers														
1) Pollution load produced	b1	kg/day	547	547	547	547	547	547						
2) Flow-out ratio	r11-1	-	0.9	0.9	0.9	0.9	0.9	0.9						
3) Flow-down ratio	r11-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r11 (r11-1+r11-2)	-	0.36	0.36	0.36	0.36	0.36	0.36						
5) Run-off pollution load	$D11 = b1 \times r11$	kg/day	197	197	197	197	197	197						
B2. Pollution load from large and medium scale industries														
1) Pollution load produced	b2	kg/day	17385	17385	17385	17385	17385	17385						
2) Flow-out ratio	r12-1	-	0.7	0.7	0.7	0.7	0.7	0.7						
3) Flow-down ratio	r12-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.38	0.38	0.38	0.38	0.38	0.38						
5) Run-off pollution load	$D12 = b2 \times r12$	kg/day	4924	4924	4924	4924	4924	4924						
B3. Pollution load from small scale industries														
1) Pollution load produced	b3	kg/day	3881	3881	3881	3881	3881	3881						
2) Flow-out ratio	r13-1	-	0.7	0.7	0.7	0.7	0.7	0.7						
3) Flow-down ratio	r13-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.28	0.28	0.28	0.28	0.28	0.28						
5) Run-off pollution load	$D13 = b3 \times r13$	kg/day	1087	1087	1087	1087	1087	1087						
B4. Total run-off pollution load from the industries	$D14 = D12 + D13$	kg/day	6207	6207	6207	6207	6207	6207						
C. Agricultural pollution load														
C1. Pollution load from fields*														
1) Pollution load produced	c1	kg/day												
2) Flow-out ratio	r21-1	-												
3) Flow-down ratio	r21-2	-												
4) Run-off ratio	r21 (r21-1+r21-2)	-												
5) Run-off pollution load	$A1 = c1 \times r21$	kg/day												
C2. Pollution load from livestock														
1) Pollution load produced	c2	kg/day	2203	2203	2203	2203	2203	2203						
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05						
3) Flow-down ratio	r22-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.02	0.02	0.02	0.02	0.02	0.02						
5) Run-off pollution load	$A2 = c2 \times r22$	kg/day	44	44	44	44	44	44						
C3. Total run-off pollution load from agriculture	$A3 = A1 + A2$	kg/day	44	44	44	44	44	44						
D. Other sources														
D1. Pollution load from others														
1) Pollution load produced	d1	kg/day	5435	5435	5435	5435	5435	5435						
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05						
3) Flow-down ratio	r31-2	-	0.4	0.4	0.4	0.4	0.4	0.4						
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.02	0.02	0.02	0.02	0.02	0.02						
5) Run-off pollution load	$D6 = d1 \times r31$	kg/day	109	109	109	109	109	109						
II. Water quality at control point														
E. Water quality monitored														
1) 1994		mg/l	6.1	6.0	6.0	5.8	5.7	6.3						
2) Average (1992-1996)														
3) Median (1992-1996)														
F. Result of calculation														
1) Total run-off pollution load	$L = LO + D6 + A3 + D6$	kg/day	12252	12246	12270	12242	12236	12233						
2) Water flow	Q	m ³ /s	12.8	12.8	12.8	12.8	12.8	12.8						
3) Water quality	$C = L/Q$	mg/l	11.1	11.1	11.1	11.1	11.1	11.1						

Note: * Pollution load from fields is included in other sources

Table-S(8) Calculation of Water Quality (BOD) at Kayoon (2020 : case-III)

Items	Symbol	Unit	1994	1995	1996	1997	1998	1999	2000
I. Pollution load from upstream									
1) Water quality at Jeta Bridge (1990)	Q0	mg/l							
2) Water flow at Jeta Bridge	Q0-Q0xQ0	kg/day	12,232	12,236	12,270	12,247	12,236	12,233	
3) Pollution load from upstream	Q0-Q0xQ0	kg/day	2,460	2,465	2,464	2,448	2,447	2,447	
4) Run-off pollution load from upstream	Q0-Q0xQ0	kg/day							
II. Pollution load from sub-basin									
A. Domestic waste water									
A1. Pollution load (Sub-basin B6-55)									
1) Pollution load produced	a1	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r1-1	-	0.0	0.0	0.0	0.0	0.0	0.0	
3) Flow-down ratio	r1-2	-	0.4	0.4	0.4	0.4	0.4	0.4	
4) Run-off ratio	r1 (r1-1+r1-2)	-	0.36	0.36	0.36	0.36	0.36	0.36	
5) Run-off pollution load	D1=a1 x r1	kg/day	0	0	0	0	0	0	
A2. Pollution load (Sub-basin B6-56)									
1) Pollution load produced	a2	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r2-1	-	0.0	0.0	0.0	0.0	0.0	0.0	
3) Flow-down ratio	r2-2	-	0.6	0.6	0.6	0.6	0.6	0.6	
4) Run-off ratio	r2 (r2-1+r2-2)	-	0.54	0.54	0.54	0.54	0.54	0.54	
5) Run-off pollution load	D2=a2 x r2	kg/day	0	0	0	0	0	0	
A3 Total run-off pollution load from domestic waste water	D0=D1+D2	kg/day	0	0	0	0	0	0	
B. Industrial waste water									
B1. Pollution load from major producers									
1) Pollution load produced	b1	kg/day	0	0	0	0	0	0	
2) Flow-out ratio	r11-1	-	0	0	0	0	0	0	
3) Flow-down ratio	r11-2	-	0	0	0	0	0	0	
4) Run-off ratio	r11 (r11-1+r11-2)	-	0	0	0	0	0	0	
5) Run-off pollution load	D1=b1 x r11	kg/day	0	0	0	0	0	0	
B2. Pollution load from large and medium scale industries									
1) Pollution load produced	b2	kg/day	2,460	2,460	2,460	2,460	2,460	2,460	
2) Flow-out ratio	r12-1	-	0.0	0.0	0.0	0.0	0.0	0.0	
3) Flow-down ratio	r12-2	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	r12 (r12-1+r12-2)	-	0.45	0.45	0.45	0.45	0.45	0.45	
5) Run-off pollution load	D2=b2 x r12	kg/day	1,107	1,107	1,107	1,107	1,107	1,107	
B3. Pollution load from small scale industries									
1) Pollution load produced	b3	kg/day	580	580	580	580	580	580	
2) Flow-out ratio	r13-1	-	0.0	0.0	0.0	0.0	0.0	0.0	
3) Flow-down ratio	r13-2	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	r13 (r13-1+r13-2)	-	0.45	0.45	0.45	0.45	0.45	0.45	
5) Run-off pollution load	D3=b3 x r13	kg/day	261	261	261	261	261	261	
B4 Total run-off pollution load from the industries	D0=D1+D2+D3	kg/day	1,368	1,368	1,368	1,368	1,368	1,368	
C. Agricultural pollution load									
C1. Pollution load from fields*									
1) Pollution load produced	c1	kg/day							
2) Flow-out ratio	r21-1	-							
3) Flow-down ratio	r21-2	-							
4) Run-off ratio	r21 (r21-1+r21-2)	-							
5) Run-off pollution load	A1=c1 x r21	kg/day							
C2. Pollution load from livestock									
1) Pollution load produced	c2	kg/day	91	91	91	91	91	91	
2) Flow-out ratio	r22-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	r22-2	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	r22 (r22-1+r22-2)	-	0.025	0.025	0.025	0.025	0.025	0.025	
5) Run-off pollution load	A2=c2 x r22	kg/day	2	2	2	2	2	2	
C3 Total run-off pollution load from agriculture	A0=A1+A2	kg/day	2	2	2	2	2	2	
D. Other sources									
D1. Pollution load from others									
1) Pollution load produced	d1	kg/day	580	580	580	580	580	580	
2) Flow-out ratio	r31-1	-	0.05	0.05	0.05	0.05	0.05	0.05	
3) Flow-down ratio	r31-2	-	0.5	0.5	0.5	0.5	0.5	0.5	
4) Run-off ratio	r31 (r31-1+r31-2)	-	0.025	0.025	0.025	0.025	0.025	0.025	
5) Run-off pollution load	D4=d1 x r31	kg/day	15	15	15	15	15	15	
III. Water quality at control point									
E. Water quality monitored									
1) 1994		mg/l				6.2			6.2
2) Average (1992-1996)									
3) Average (1997-1998)									
F. Result of calculation									
1) Total run-off pollution load	L=L0+D0+D4+A0+D4	kg/day	3,835	3,834	3,839	3,833	3,832	3,831	3,834
2) Water flow	Q	m ³ /s				8.1			8.1
3) Water quality	C=L/Q	mg/l				5.5			5.5

Note: *Pollution load from fields is included in other sources.

Table-5(3) Calculation of Water Quality (BOD) at Pelayara (2020 : Case-III)

BOD ₅		mg/l	1994	2000	2005	2010	2015	2020	2025
I. Pollution load from upstream									
1) Water quality of intake of sewer canal	Q ₀	mg/l			25.0				
2) Water flow of intake of sewer canal	Q ₀	m ³ /s			6.0				
3) Pollution load from upstream	L ₀ = Q ₀ × Q ₀	kg/day			1500				
4) Run-off pollution load from upstream	L ₀ = Q ₀ × Q ₀	kg/day			250				
II. Pollution load from sub basin									
A. Domestic waste water									
A1 Pollution load									
1) Pollution load produced	a1	kg/day	36	36	36	36	36	36	36
2) Flow out ratio	(r1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(r1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	D1 = a1 × r1	kg/day	6	6	6	6	6	6	6
A2 Total run-off pollution load from domestic waste water	D1 = D1	kg/day	6	6	6	6	6	6	6
B. Industrial waste water									
B1 Pollution load from major industries									
1) Pollution load produced	b1	kg/day	67200	67200	67200	67200	67200	67200	67200
2) Flow out ratio	(r1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(r1-2)	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.018	0.018	0.018	0.018	0.018	0.018	0.018
5) Run-off pollution load	D1 = b1 × r1	kg/day	1210	1210	1210	1210	1210	1210	1210
B2 Pollution load from large and medium scale industries									
1) Pollution load produced	b2	kg/day	164	164	164	164	164	164	164
2) Flow out ratio	(r1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(r1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	D2 = b2 × r1	kg/day	30	30	30	30	30	30	30
B3 Pollution load from small scale industries									
1) Pollution load produced	b3	kg/day	33	33	33	33	33	33	33
2) Flow out ratio	(r1-1)	-	0.9	0.9	0.9	0.9	0.9	0.9	0.9
3) Flow down ratio	(r1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18
5) Run-off pollution load	D3 = b3 × r1	kg/day	6	6	6	6	6	6	6
B4 Total run-off pollution load from the industries	D3-1 = D2 + D3	kg/day	1245	1245	1245	1245	1245	1245	1245
C. Agricultural pollution load									
C1 Pollution load from fields*									
1) Pollution load produced	c1	kg/day							
2) Flow out ratio	(r1-1)	-							
3) Flow down ratio	(r1-2)	-							
4) Run-off ratio	r1 (r1-1) × (r1-2)	-							
5) Run-off pollution load	A1 = c1 × r1	kg/day							
C2 Pollution load from livestock									
1) Pollution load produced	c2	kg/day	50	50	50	50	50	50	50
2) Flow out ratio	(r1-1)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	(r1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	A2 = c2 × r1	kg/day	2	2	2	2	2	2	2
C3 Total run-off pollution load from agriculture	A2 = A1 + A2	kg/day	2	2	2	2	2	2	2
D. Other sources									
D1 Pollution load from others									
1) Pollution load produced	d1	kg/day	113	113	113	113	113	113	113
2) Flow out ratio	(r1-1)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
3) Flow down ratio	(r1-2)	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4) Run-off ratio	r1 (r1-1) × (r1-2)	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04
5) Run-off pollution load	Dd = d1 × r1	kg/day	5	5	5	5	5	5	5
III. Water quality at control point									
E. Water quality monitored									
1) 1994		mg/l			12.9				12.9
2) Average (1992-1996)									
3) Median (1992-1996)									
F. Result of calculation									
1) Total run-off pollution load	L = L ₀ + D1 + D2 + D3 + D4	kg/day	1258	1258	1258	1258	1258	1258	1261
2) Water flow	Q	m ³ /s			3.2				3.2
3) Water quality	C = L/Q	mg/l			5.8				5.8

Note: * Pollution load from fields is included in other sources

Table-S(10) Calculation of Water Quality (BOD) at Porong (2020 : Case-III)

Items		Units	I_{avg}	I_{2T}	A_{avg}	N_{2T}	C_{avg}	K_{avg}	Ave. Dis	3.05 Vg
I. Pollution load from upstream										
1) Water quality of intake of sewer canal	C_0	mg/l								
2) Water flow of intake of sewer canal	Q_0	m ³ /s								
3) Pollution load from upstream	$LP = C_0 \times Q_0$	kg/day								
4) Run-off pollution load from upstream	$LO = C_0 \times Q_0$	kg/day								
II. Pollution load from substation										
A. Domestic waste water										
A1. Pollution load										
1) Pollution load produced	$a1$	kg/day	12	12	12	12	12	12		
2) Flow out ratio	$r1-1$	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	$r1-2$	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	$D1 = a1 \times r1$	kg/day	9	9	9	9	9	9		
A2 Total run-off pollution load from domestic waste water	$D1-D1$	kg/day	9	9	9	9	9	9		
B. Industrial waste water										
B1. Pollution load from major industries										
1) Pollution load produced	$b1$	kg/day	0	0	0	0	0	0		
2) Flow out ratio	$r1-1$	-								
3) Flow down ratio	$r1-2$	-								
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0	0	0	0	0	0		
5) Run-off pollution load	$D1 = b1 \times r1$	kg/day	0	0	0	0	0	0		
B2. Pollution load from large and medium scale industries										
1) Pollution load produced	$b2$	kg/day	55	55	55	55	55	55		
2) Flow out ratio	$r1-1$	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	$r1-2$	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	$D2 = b2 \times r1$	kg/day	40	40	40	40	40	40		
B3. Pollution load from small scale industries										
1) Pollution load produced	$b3$	kg/day	11	11	11	11	11	11		
2) Flow out ratio	$r1-1$	-	0.9	0.9	0.9	0.9	0.9	0.9		
3) Flow down ratio	$r1-2$	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.72	0.72	0.72	0.72	0.72	0.72		
5) Run-off pollution load	$D3 = b3 \times r1$	kg/day	8	8	8	8	8	8		
E4 Total run-off pollution load from the industries	$D2-D3 + D1-D3$	kg/day	48	48	48	48	48	48		
C. Agricultural pollution load										
C1. Pollution load from fields										
1) Pollution load produced	$c1$	kg/day								
2) Flow out ratio	$r1-1$	-								
3) Flow down ratio	$r1-2$	-								
4) Run-off ratio	$r1(r1-1)(r1-2)$	-								
5) Run-off pollution load	$D1 = c1 \times r1$	kg/day								
C2. Pollution load from livestock										
1) Pollution load produced	$c2$	kg/day	19	19	19	19	19	19		
2) Flow out ratio	$r1-1$	-	0.2	0.2	0.2	0.2	0.2	0.2		
3) Flow down ratio	$r1-2$	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16		
5) Run-off pollution load	$D2 = c1 \times r1$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04		
C3 Total run-off pollution load from agriculture	$D2-D1 + D2$	kg/day	3.04	3.04	3.04	3.04	3.04	3.04		
D. Other sources										
D1. Pollution load from others										
1) Pollution load produced	$d1$	kg/day	38	38	38	38	38	38		
2) Flow out ratio	$r1-1$	-	0.2	0.2	0.2	0.2	0.2	0.2		
3) Flow down ratio	$r1-2$	-	0.8	0.8	0.8	0.8	0.8	0.8		
4) Run-off ratio	$r1(r1-1)(r1-2)$	-	0.16	0.16	0.16	0.16	0.16	0.16		
5) Run-off pollution load	$D1 = d1 \times r1$	kg/day	6.08	6.08	6.08	6.08	6.08	6.08		
III. Water quality at control point										
E. Water quality monitored										
1) 954		mg/l			9.3				9.3	
2) Average (1992-1996)										
3) Median (1992-1996)										
F. Result of calculation										
1) Total run-off pollution load	$L = LO + D2 + D3 + A2 + D4$	kg/day	65	65	65	65	65	65	65	
2) Water flow	Q	m ³ /s			0.06				0.06	
3) Water quality	$C = L/Q$	mg/l			12.8				12.8	

Note : Pollution load from fields is included in other sources