

Modeling Approach For Water-Quality Management to Control Pollution Concentration: A Case Study with Ravi River, Punjab, Pakistan

Supplementary Materials

Table S1. Water-quality measurement collected along the Ravi River (1st Survey).

Site/Parameters		TDS (mg L ⁻¹)	NH ₃ -N (mg L ⁻¹)	NO ₃ -N (mg L ⁻¹)	BOD (mg L ⁻¹)	DO (mg L ⁻¹)	Temp.	pH
Mehmood Booti Drain	D1	1598	56.32	192.64	709.6	0.8	26.03	7.51
Sukh Naher Drain	D2	1488	6.18	21.21	78.0	0.4	26.05	7.21
Shadbag Drain	D3	2092	9.10	31.35	115.1	0.8	24.04	7.10
Shahdara Town Pumping Station	D4	1177	6.04	20.88	76.5	1.1	22.85	7.48
Forest Colony Pumping Station	D5	902	10.77	37.32	136.6	0.9	25.57	7.24
Farukhabad Drain	D6	20965	17.71	61.60	225.2	0.4	23.86	7.27
Budha Ravi Drain	D7	1488	4.73	16.50	60.2	0.9	24.11	7.17
Main Outfall Drain	D8	1194	20.38	71.35	260.0	0.9	24.05	7.06
Gulshan-E-Ravi Drain	D9	1381	5.51	19.37	70.5	0.7	23.36	7.43
Babu Sabu Drain	D10	1360	21.28	75.00	272.5	0.4	22.47	7.33
Hudiara Drain	D11	6033	7.28	25.75	93.4	0.9	22.01	7.71
Jaranwala Drain/Deg II	D12	6359	18.38	65.82	237.4	0.5	22.98	7.42
Samundari Drain	D13	5004	3.64	13.07	47.1	0.6	25.65	8.09
Sukhwara Drain	D14	2212	2.6364	10.873	16.761	1.164	20.56	7.566
Miral Ravi Link Canal	C1	537	0.42	1.42	2.6	6.1	22.98	7.9
U.C. Canal	C2	481	0.30	1.06	3.9	5.01	23.09	7.65
Q.B. Link Canal	C3	397	0.14	2.52	2.9	6.3	22.79	7.56
Miroo Wal	M1	628	0.77	2.65	2.96	6.52	22.15	7.74
Railway Bridge	M2	700	2.31	12.13	12.31	3.8	21.59	7.72
Sughyan Bridge	M3	790	2.1	14.12	16.29	3.16	21.12	7.81
Darbar Bridge	M4	1400	5.8	20.91	40.1	2.5	21.61	7.76
Karianwala	M5	1000	1.82	9.3	17.97	3.85	21.28	7.75
Moza Malayka	M6	1030	2.6	10.5	14.06	3.8	21.66	7.71

Table S2. Water-quality measurement collected along the Ravi River (2nd Survey).

Site/Parameters		TDS (mg L ⁻¹)	NH ₃ -N (mg L ⁻¹)	NO ₃ -N (mg L ⁻¹)	BOD (mg L ⁻¹)	DO (mg L ⁻¹)	Temp.	pH
Mehmood Booti Drain	D1	1917	56.32	192.64	731	0.21	26.31	8.24
Sukh Naher Drain	D2	1563	6.18	21.21	80.3	0.32	25.60	7.41
Shadbag Drain	D3	1435	9.10	31.35	118.34	0.23	23.86	7.36
Shahdara Town Pumping Station	D4	1448	6.04	20.88	78.59	0.97	24.91	7.61
Forest Colony Pumping Station	D5	1187	10.77	37.32	140.1	0.87	24.83	7.34
Farukhabad Drain	D6	19781	17.71	61.60	230.6	0.43	23.26	7.47
Budha Ravi Drain	D7	1951	4.73	16.50	61.6	0.82	24.16	7.37
Main Outfall Drain	D8	1547	20.38	71.35	265.6	1.1	24.14	7.26
Gulshan-E-Ravi Drain	D9	1687	5.51	19.37	71.9	0.69	23.63	7.53
Babu Sabu Drain	D10	1794	21.28	75.00	260.8	0.41	22.51	7.56
Hudiara Drain	D11	4719	7.28	25.75	88.8	0.89	22.13	7.95
Jaranwala Drain/Deg II	D12	4624	18.38	65.82	237.4	0.61	23.06	7.96
Samundari Drain	D13	5721	3.64	13.07	47.1	0.67	25.72	7.68
Sukhwara Drain	D14	3212	2.6364	10.873	16.761	0.98	21.81	7.85
Miral Ravi Link Canal	C1	655	0.42	1.42	2.6	6.01	22.98	7.9
U.C. Canal	C2	509	0.30	1.06	3.51	4.98	23.09	7.71
Q.B. Link Canal	C3	411	0.14	2.52	1.95	5.89	22.79	7.67
Miroo Wal	M1	648	0.71	2.65	2.96	6.48	22.15	7.74
Railway Bridge	M2	714	2.36	12.13	12.31	3.62	21.59	7.78
Sughyan Bridge	M3	806	2.07	14.12	16.29	3.14	21.12	7.91
Darbar Bridge	M4	1398	6.01	20.91	40.1	2.42	21.87	7.86
Karianwala	M5	987	1.81	9.3	17.97	3.72	21.56	7.91
Moza Malayka	M6	1077	2.32	10.5	14.06	3.83	21.92	7.85

Table S3. Water-quality measurement collected along the Ravi River (3rd Survey).

Site/Parameters		TDS (mg L ⁻¹)	NH ₃ -N (mg L ⁻¹)	NO ₃ -N (mg L ⁻¹)	BOD (mg L ⁻¹)	DO (mg L ⁻¹)	Temp.	pH
Mehmood Booti Drain	D1	1921	54.97	210.30	721.0	0.26	23.23	7.75
Sukh Naher Drain	D2	1563	6.14	78.2	80.23	0.51	22.15	8.06
Shadbag Drain	D3	1310	9.23	34.4	118.44	0.43	23.04	8.07
Shahdara Town Pumping Station	D4	1413	6.07	37.1	74.39	0.57	24.85	7.61
Forest Colony Pumping Station	D5	1085	10.81	20.88	139.13	0.46	24.57	7.63
Farukhabad Drain	D6	21634	17.13	58.92	231.59	0.42	23.86	7.17
Budha Ravi Drain	D7	1781	4.98	66.12	61.78	0.82	22.11	7.17
Main Outfall Drain	D8	1421	20.78	84.53	259.0	0.79	23.05	7.56
Gulshan-E-Ravi Drain	D9	1381	5.64	20.60	67.31	0.32	22.36	7.41
Babu Sabu Drain	D10	1857	21.98	42.13	258.3	0.74	23.47	7.24
Hudiara Drain	D11	4721	8.31	31.78	96.4	0.88	22.01	7.78
Jaranwala Drain/Deg II	D12	4031	14.89	71.34	224.3	0.53	23.01	7.65
Samundari Drain	D13	5765	5.03	19.25	44.23	0.56	24.76	7.89
Sukhwara Drain	D14	2874	3.21	16.14	19.16	0.78	21.04	7.66
Miral Ravi Link Canal	C1	594	0.67	2.18	3.12	6.21	22.41	7.81
U.C. Canal	C2	610	0.61	1.34	3.11	4.47	23.49	7.56
Q.B. Link Canal	C3	597	0.32	2.14	2.24	5.78	23.26	7.58
Miroo Wal	M1	680	0.7	3.6	2.81	6.03	22.13	7.64
Railway Bridge	M2	651	1.7	11.76	12.33	3.81	21.83	7.27
Sughyan Bridge	M3	840	2.1	14.23	16.28	2.87	22.22	7.81
Darbar Bridge	M4	1222	5.07	21.07	37.04	2.41	21.27	7.83
Karianwala	M5	937	1.83	7.84	15.41	3.53	21.06	7.86
Moza Malayka	M6	861	1.84	6.33	14.16	4.12	21.98	7.81