Supplemental Information

An Investigation of Stormwater Quality Variation within an Industry Sector using the Self-Reported Data Collected Under the Stormwater Monitoring Program

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Table SI-1: The number of outfalls with available self-reported stormwater quality data

Site	Industrial Area (m^2)	2014				2015				2016				2017				2018				Average Outfall/ 10000 m^2
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
A1	8,903	0	0	0	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1.1
A2	2,833	0	0	0	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	3.5
A3	2,428	0	0	0	1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	4.1
A4	70,415	6	0	0	11	0	0	0	11	11	11	11	12	0	5	11	11	12	12	12	11	1.6
A5	118,978	6	6	6	6	6	6	6	6	7	6	0	7	0	5	7	7	7	0	0	7	0.5
A6	6,475	0	0	0	1	0	0	0	1	1	1	1	1	0	1	1	1	1	0	0	1	1.5
A7	101,576	0	0	0	3	0	0	0	3	4	3	4	4	0	3	4	4	4	3	2	4	0.3
A8	9,712	0	0	0	5	0	0	0	5	6	5	6	6	0	5	6	6	6	0	5	6	5.1
A9	441,512	0	0	0	5	0	0	0	5	5	5	0	6	0	5	5	6	6	6	6	6	0.1
A10	9,712	0	0	0	5	0	0	0	5	5	5	5	5	0	5	5	5	5	0	5	3	5.1
A11	214,888	7	8	8	6	8	8	8	8	9	8	0	9	0	9	9	9	9	0	9	9	0.4
A12	47,348	0	0	0	8	0	0	0	9	10	9	0	9	0	9	10	9	9	9	8	9	1.9

Table SI-2: The correlation matrix of water quality parameters (Pearson correlation coefficients (r)), correlation is significant at $p<0.01$ level (2-tailed)

	Al	NH_4^+	BOD_5	COD	Cu	Fe	Pb	Mg	NO_3^-/NO_2^-	Oil & Grease	pH	TSS	Zn
Al	1.00												
NH_4^+	.33	1.00											
BOD_5	.95	.34	1.00										
COD	.78	.39	.83	1.00									
Cu	-.04	.42	-.04	.08	1.00								
Fe	.18	-.19	.11	.06	-.17	1.00							
Pb	.75	.37	.79	.79	.01	.17	1.00						
Mg	.64	.37	.70	.67	.03	.04	.60	1.00					
NO_3^-/NO_2^-	.30	.52	.29	.37	.10	.11	.40	.40	1.00				
Oil & Grease	.79	.31	.83	.72	-.02	.12	.68	.80	.35	1.00			
pH	.64	.44	.67	.66	.12	-.01	.54	.72	.37	.75	1.00		
TSS	.58	.74	.59	.63	.30	-.05	.55	.61	.59	.55	.63	1.00	
Zn	.02	.54	.02	.15	.60	-.14	.04	.11	.15	-.00	.18	.39	1.00

Table SI-3: A comparison of median values of stormwater quality in studied industry sector with the levels reported in literature

Water Quality Characteristics		Industrial Sites								Commercial Sites		Residential Sites	
Inorganics (mg/L)	Al	2.4	-[1]	-	10.1	3.4	-	-	-	2.2	1.1	0.7	1.0
	Cr	-	7.2	141.0	-	-	-	<0.1	-	-	-	-	-
	Cd	BDL[2]	0.6	2.0	-	-	-	-	-	-	-	-	-
	Cu	<0.1	81.7	116.0	1.0	0.2	0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1
	Fe	3.2	48.6	-	25.5	7.5	-	-	-	-	-	-	-
	Ni	-	-	26.0	0.6	-	-	-	0.2	<0.1	<0.1	<0.1	<0.1
	Pb	<0.1	20.2	82.0	3.0	4.5	0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1
	Zn	0.3	311.0	593	5.0	2.2	0.5	0.4	4.9	2.6	2.1	1.3	2.4
	As	-	2.6	24.0	-	-	-	-	-	-	-	-	-
	Mg	3.1	-	-	-	-	-	-	-	-	-	-	-
Organics (mg/L)	COD	118.0	205.0	156.6	271.0	154.0	80.7	200.0	-	171.7	100.9	111.3	106.0
	BOD_5	12.0	-	-	165.0	-	-	-	-	-	-	-	-
	TOC	-	-	-	50.1	31.4	-	-	56.0	-	-	-	-
	Oil & Grease	1.8	-	6.0	16.6	11.3	-	9.0	13.6	7.4	5.5	5.8	5.3
Others	NH_4^+ (mg/L)	0.3	-	-	-	-	-	-	-	1.3	1.0	0.9	1.6
	NO_2^-+NO_3^- as mg/L N	0.6	-	2.7	-	-	2.5	10.0	-	0.1	0.1	0.2	0.3
	Phosphorous	-	-	0.8	-	-	-	25.0	-	-	-	-	-
	TSS (mg/L)	191.0	278.3	521.9	376.0	185.0	124.0	750.0	219.1	55.1	38.6	34.1	32.7
	pH	8.0	6.7	-	7.0	7.2	6.3	6.0-8.5	6.9	6.4	6.7	6.9	6.8
Location		TN, USA	SW[3]	NC, USA	CA, USA					NC, USA			
References		This study	[1]	[2]	[3]			[4]	[5]	[6]			

[1] Not reported; [2]BDL=Below detection limit of 0.002 mg/L; [3]SW = Sweden

Table SI-4: The results of Mood's Median test

Parameters / Contaminants	Variable	N	χ^2 value	Sig.
Zn	Facilities	381	12.46	0.014
	Years		9.45	0.051
	Quarters		18.39	0.000
Mg	Facilities	784	147.24	0.000
	Years		28.24	0.000
	Quarters		15.73	0.001
Cu	Facilities	585	45.30	0.000
	Years		14.28	0.006
	Quarters		12.36	0.006
Pb	Facilities	250	11.80	0.008
	Years		4.59	0.333
	Quarters		15.73	0.001
Fe	Facilities	317	8.46	0.133
	Years		4.94	0.293
	Quarters		9.39	0.025
Al	Facilities	647	53.55	0.000
	Years		11.78	0.019
	Quarters		15.68	0.001
O&G	Facilities	779	69.27	0.000
	Years		4.99	0.289
	Quarters		14.86	0.002
pH	Facilities	762	11.60	0.394
	Years		48.24	0.000
	Quarters		49.83	0.000
TSS	Facilities	779	68.90	0.000
	Years		8.19	0.085
	Quarters		21.07	0.000
Ammonia	Facilities	788	70.42	0.000
	Years		17.24	0.002
	Quarters		29.68	0.000
BOD_5	Facilities	787	41.34	0.000
	Years		10.83	0.029
	Quarters		21.96	0.000
COD	Facilities	783	68.01	0.000
	Years		5.58	0.233
	Quarters		27.44	0.000

Table SI-5: The results of Kruskal-Wallis test and Normality test

Water Quality	N	Median	Normality		Variables	df	Kruskal-Wallis		Facility groups			
			df	Sig.			H	Sig.	1	2	3	4
Zn	381	0.242	381	0.000	Facilities	4	27.21	0.000	3, 4, 5	10, 12	-	-
					Years	4	7.91	0.095	-	-	-	-
					Quarters	3	17.42	0.001	1	2, 3, 4	-	-
Mg	784	3.065	784	0.000	Facilities	11	173.91	0.000	1, 2, 3, 6, 8	7, 9, 12	4, 5, 11	10
					Years	4	33.97	0.000	1, 3, 4, 5	2	-	-
					Quarters	3	17.07	0.001	1	2, 3, 4	-	-
Cu	585	0.031	585	0.000	Facilities	7	64.48	0.000	2, 4, 5, 7, 8, 10	11, 12	-	-
					Years	4	16.62	0.002	2	3	1, 4, 5	-
					Quarters	3	13.94	0.003	3	1, 2, 4	-	-
Pb	250	0.021	250	0.000	Facilities	3	20.02	0.000	4, 5, 11	10	-	-
					Years	4	7.61	0.107	-	-	-	-
					Quarters	3	14.95	0.002	1	2, 3, 4	-	-

Fe	317	3.000	317	0.000	Facilities	5	23.48	0.000	5, 10	4, 7, 8,11	-	-
					Years	4	10.07	0.039	1, 2, 5	3, 4	-	-
					Quarters	3	16.71	0.001	2, 4	1	3	-
Al	647	2.435	647	0.000	Facilities	7	63.72	0.000	5, 10, 11, 12	4, 6, 7	8	-
					Years	4	23.91	0.000	1, 2, 5	3, 4		-
					Quarters	3	27.69	0.000	4, 2	1	3	-
O&G	779	1.800	779	0.000	Facilities	11	71.67	0.000	1, 2, 3, 5, 6, 7, 9, 10		4, 8, 11, 12	
					Years	4	9.32	0.054	-	-	-	-
					Quarters	3	14.66	0.002	1, 2, 4	3	-	-
pH	762	8.100	762	0.000	Facilities	11	12.62	0.319	-	-	-	-
					Years	4	72.84	0.000	1, 2	3, 4	5	-
					Quarters	3	53.21	0.000	1, 2	3	4	-
TSS	779	191.000	779	0.000	Facilities	11	95.74	0.000	1, 2, 3, 7, 8, 9	4, 5, 6, 10, 11, 12		-
					Years	4	14.19	0.007	1, 2, 3, 4	5	-	-
					Quarters	3	22.17	0.000	2, 3, 4	1	-	-
Ammo-nia	788	0.276	788	0.000	Facilities	11	114.27	0.000	1, 2, 3, 5, 6, 7, 8, 10, 11		4, 12	9
					Years	4	22.40	0.000	1, 2, 3	4, 5	-	-

					Quarters	3	44.43	0.000	1, 3, 4	2	-	-
BOD_5	787	12.000	787	0.000	Facilities	11	58.97	0.000	1, 2, 3, 5, 6, 7, 8, 9, 10		4, 11, 12	
					Years	4	11.96	0.018	2, 3, 4, 5	1	-	-
					Quarters	3	20.87	0.000	1, 3, 4	2	-	-
COD	783	118.000	783	0.000	Facilities	11	76.28	0.000	1, 2, 3, 6, 7, 8, 9, 10		4, 5, 11, 12	
					Years	4	6.09	0.192	-	-	-	-
					Quarters	3	27.13	0.000	1, 2	3, 4	-	-

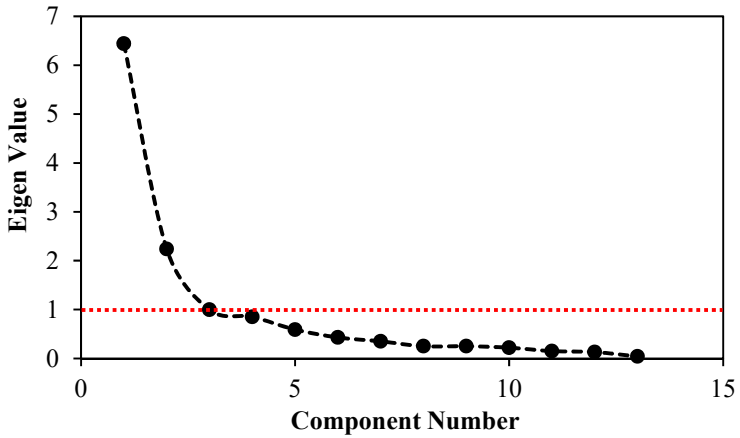

Figure SI-1: The scree plot for the components

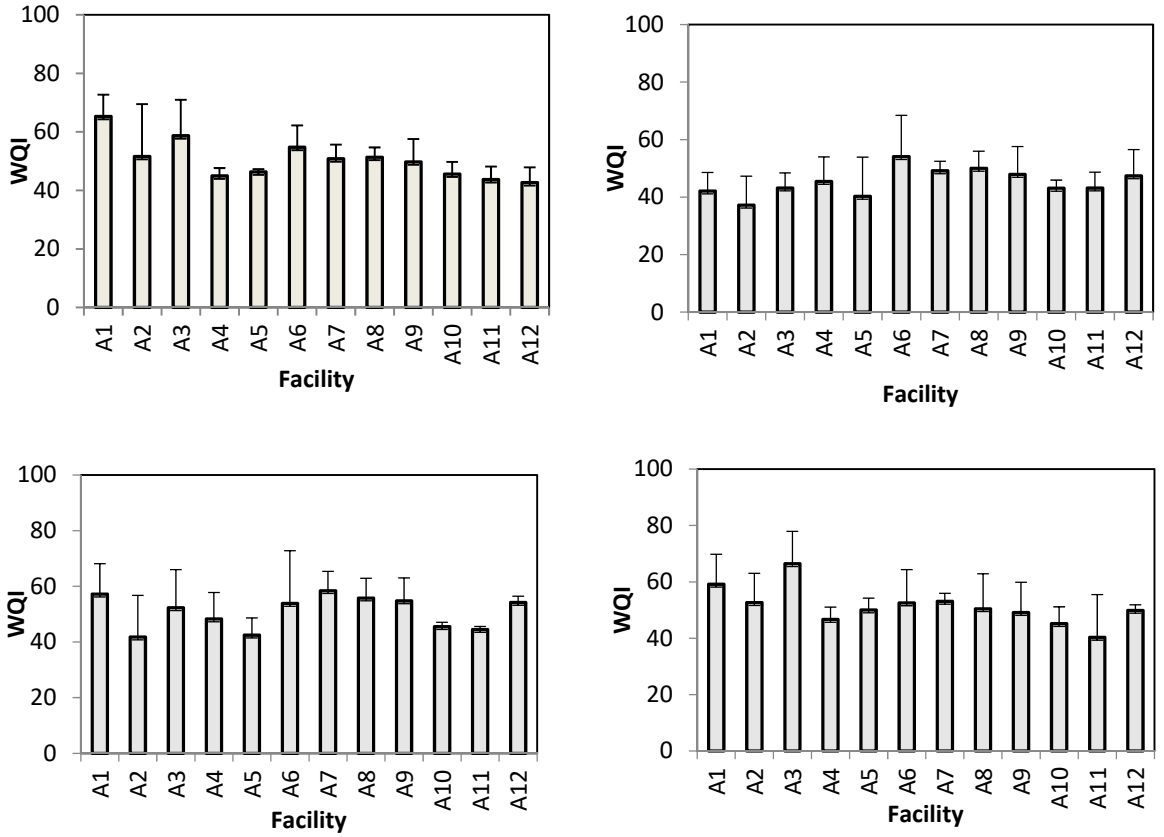

Figure SI-2: The seasonal variation of stormwater WQI at studied industrial facilities

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