Supplementary Material

Exploration of Microplastic Pollution with Particular Focus on Source Identification and Spatial Patterns in Riverine Water, Sediment and Fish of Swat River, Pakistan

Luqman Khan[1], Sidra Ghias[1], Mazhar Iqbal Zafar[1*], Aiyeshah Alhodaib[2*], Humaria Fatima[3], Tofeeq Ur-Rehman[3], Amir Waseem[4], Haidar Howari[5]

Affiliations and addresses of the authors

[1]Department of Environmental Sciences, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad 45320, Pakistan
[2]Department of Physics, College of Science, Qassim University, Buraydah 51452, Saudi Arabia
[3]Department of Pharmacy, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, 45320, Pakistan
[4]Department of Chemistry, Quaid-i-Azam University, Islamabad 45320, Pakistan
[5]Department of Physics, Deanship of Educational Services, Qassim University, Buraydah 51452, Saudi Arabia

Mr. Luqman Khan Email: luqmanenviron@gmail.com
Ms. Sidra Ghias (PhD Scholar) Email: sidraaghias@gmail.com
Dr. Mazhar Iqbal Zafar Email: mzafar@qau.edu.pk
Prof. Dr. Aiyeshah Alhodaib Email: ahdieb@qu.edu.sa
Dr. Humaria Fatima Email: hfchughtai@qau.edu.pk
Dr. Tofeeq Ur-Rehman Email: tofeeq.urrehman@qau.edu.pk
Prof. Dr. Amir Waseem Email: amir@qau.edu.pk
Dr. Haidar Howari Email: Haidarh1@yahoo.com

*** Corresponding author(s):**

1- Dr. Mazhar Iqbal Zafar* (Ph.D; Wageningen University, Netherlands)

Department of Environmental Sciences, Faculty of Biological Sciences,

Quaid-i-Azam University, Islamabad 45320, Pakistan.

Tel: +92-51-90644182

E-mail: mzafar@qau.edu.pk

ORCID: Mazhar Iqbal Zafar (0000-0001-7660-9283)

2- Dr. Aiyeshah Alhodaib*

Department of Physics, College of Science,

Qassim University, Buraydah 51452, Saudi Arabia

E-mail: ahdieb@qu.edu.sa

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Table SI 1: Survey of sampling stations for MPs source identification. Serial No. 1-10 represents sampling stations as 10 sampling stations were selected in the present study.

Sr. No.	Nearest centers to the river (Domestic or commercial)	Any developmental activity behind the site	Any industrial area near the site	Any industrial discharge near the site	Tourist Spot
1	Yes	No	No	No	Yes
2	No	No	No	No	No
3	Yes	No	No	No	Yes
4	Yes	No	No	No	Yes
5	No	No	No	No	Yes
6	Yes	No	Yes	Yes	No
7	Yes	No	Yes	Yes	Yes
8	No	No	No	No	No
9	Yes	No	Yes	Yes	Yes
10	Yes	No	No	No	Yes

Table SI 2: Microplastics abundance (numeric and percent), size fractions and shapes in urban and non-urban sediments of Swat River. Unit used is items/kg. S1 and S2 are two size fractions of MPs measured in present study.

Station Zone	Station name along with code	Numeric abundance	Abundance (%)	S1 0.5-1 mm	S2 1-5 mm	Fiber	Film	Fragment	Foam	Pellet
Non-Urban	Kalam (B1)	11/51	21.7	6/11 (54.5%)	5/11 (45.4%)	3/9 (33.3%)	2/3 (66.7%)	4/31 (12.9%)	0/0	2/8 (25%)
	Mankial (B2)	10/51	19.6	9/10 (90%)	1/10 (10%)	0/9 (0)	0/3 (0)	10/31 (32.2%)	0/0	0/8 (0)
	Bahrain (B3)	10/51	19.6	9/10 (90%)	1/10 (10%)	2/9 (22.2%)	0/3 (0)	6/31 (19.3%)	0/0	2/8 (25%)
	Madyan (B4)	12/51	23.5	11/12 (91.7%)	1/12 (8.33%)	2/9 (22.2%)	0/3 (0)	7/31 (25.6%)	0/0	3/8 (37.5%)
	Baghderai (B5)	8/51	15.7	7/8 (87.5%)	1/8 (12.5%)	2/9 (22.2%)	1/3 (33.3%)	4/31 (12.9%)	0/0	1/8 (12.5%)
Urban	Matta (A1)	26/131	19.8	16/26 (61.5%)	10/26 (38.5%)	5/28 (17.8%)	2/5 (40%)	14/76 (18.4%)	0/0	5/22 (22.7%)
	Kanju (A2)	26/131	19.8	22/26 (84.6%)	4/26 (15.4%)	3/28 (10.7%)	1/5 (20%)	18/76 (23.7%)	0/0	4/22 (18.2%)
	Hazara (A3)	26/131	19.8	23/26 88.5%	3/26 11.5%	8/28 (28.6%)	0/5	13/76 (17.1%)	0/0	5/22 (22.7%)
	Gugdara (A4)	34/131	25.9	28/34 (82.3%)	6/34 (17.6%)	6/28 (21.4%)	0/5	22/76 (28.9%)	0/0	6/22 (27.3%)
	Chakdara (A5)	19/131	14.5	15/19	4/19 (21%)	6/28	2/5	9/76 (11.8%)	0/0	2/22

				(78.4%)		(21.4%)	(40%)			(9.09%)

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49 **Table SI 3:** MPs abundance (numeric and percent) size fractions and shapes in urban and non-urban water samples of SR. Unit used is
50 items/L. S1 and S2 are two size fractions of MPs measured in present study.

Station Zone	**station name along with code**	**Numeric abundance**	**Abundance (%age)**	**S1 0.5-1 mm**	**S2 1-5 mm**	**Fiber**	**Film**	**Fragment**	**Foam**	**Pellet**
Non-Urban	Kalam (B1)	13/60	21.7	10/13 (76.9%)	3/13 (23.1%)	5/10 (50%)	1/6 (16.7%)	6/29 (20.7%)	0/0	1/15 (6.66%)
	Mankial (B2)	9/60	15	8/9 (88.9%)	1/9 (11.1%)	1/10 (10%)	1/6 (16.7%)	3/29 (10.3%)	0/0	4/15 (26.7%)
	Bahrain (B3)	13/60	21.7	10/13 (76.9%)	3/13 (23.1%)	0/10 (0)	0/6 (0)	9/29 (31%)	0/0	4/15 (26.7%)
	Madyan (B4)	14/60	23.3	12/14 (85.7%)	2/14 (14.3%)	2/10 (20%)	2/6 (33.3%)	4/6 (66.7%)	0/0	6/15 (40%)
	Baghderai (B5)	11/60	18.3	6/11 (54.5%)	5/11 (45.4.%)	2/10 (20%)	2/6 (33.3%)	7/29 (24.1%)	0/0	0/15 (0)
Urban	Matta (A1)	29/132	22	22/29 (75.9%)	7/29 (24.1%)	9/39 (23.1%)	1/7 (14.3%)	12/63 (19%)	0/3 (0%)	7/20 (35%)
	Kanju (A2)	34/132	25.7	25/34 (73.5%)	9/34 (26.5%)	17/39 (43.6%)	2/7 (28.6%)	12/63 (19%)	0/3 (0%)	3/20 (15%)
	Hazara (A3)	13/132	9.84	9/13 (69.2%)	4/13 (30.8%)	2/39 (5.12%)	0/7 (0%)	11/63 (17.5%)	0/3 (0%)	0/20 (0%)

	Gugdara (A4)	39/132	29.5	24/39 (61.5%)	15/39 (38.5%)	9/39 (23.1%)	3/7 (42.8%)	17/63 (27%)	3/3 (100%)	7/20 (35%)
	Chakdara (A5)	17/132	12.9	16/17 (94.1%)	1/17 (5.88%)	2/39 (5.12%)	1/7 (14.3%)	11/63 (17.5%)	0/3 (0%)	3/20 (15%)

Table SI 4: MPs abundance (numeric and percent), size fractions and shapes in urban and non-urban fish samples (*Shizothorax plagiostomus*) of SR. A1-A5 showed urban sites while B1-B5 demonstrated non-urban sampling stations. Unit used is items/kg. S1 and S2 are two size fractions of MPs measured in present study.

Station Zone	**Station Name with Code**	**Numeric abundance (items/fish)**	**abundance (%)**	**S1 0.5-1 mm**	**S2 1-5 mm**	**Fiber**	**Film**	**Fragment**	**Foam**	**Pellet**
Non-Urban	Kalam (B1)	14/67	21	12/14 (85.7%)	2/14 (14.3%)	4/24 (16.7%)	2/2 (100%)	8/37 (21.6%)	0/0	0/4 (0)
	Mankial (B2)	15/67	22.4	14/15 (93.3%)	1/15 (6.7%)	5/24 (20.8%)	0/2 (0)	10/37 (27%)	0/0	0/4 (0)
	Bahrain (B3)	13/67	19.4	11/13 (84.6%)	2/13 (15.4%)	5/24 (20.8%)	0/2 (0)	6/37 (16.2%)	0/0	2/4 (50%)
	Madyan (B4)	10/67	14.9	10/10 (100%)	0/10 (0%)	2/24 (8.33%)	0/2 (0)	7/37 (18.9%)	0/0	¼ (25%)
	Baghderai (B5)	15/67	22.4	15/15 (100%)	0/15 (0%)	8/24 (33.3%)	0/2 (0)	6/37 (16.2%)	0/0	¼ (25%)
	Matta (A1)	26/86	30.2	21/26 (80.8%)	5/26 (19.2%)	13/40 (32.5%)	0/3 (0)	4/21 (19%)	0/0	9/22 (40.9%)
	Kanju (A2)	20/86	23.2	17/20	3/20	12/40 (30%)	0/3 (0)	4/21 (19%)	0/0	4/22

Urban				(85%)	(15%)					(18.2%)
	Hazara (A3)	16/86	18.6	11/16 (68.7%)	5/16 (31.2%)	8/40 (20%)	3/3 (100%)	2/21 (9.52%)	0/0	3/22 (13.6%)
	Gugdara (A4)	8/86	9.3	7/8 (87.5%)	1/8 (12.5%)	4/40 (10%)	0/3 (0)	3/21 (14.3%)	0/0	1/22 (4.54%)
	Chakdara (A5)	16/86	18.6	14/16 (87.5%)	2/16 (12.5%)	3/40 (7.5%)	0/3 (0)	8/21 (38.1%)	0/0	5/22 (22.7%)

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56 **Table SI 5:** Field parameters of fish samples collected along Swat River. Data is presented as mean body length and weight (n=4).

Station Name	Station Code	GPS Coordinates	Number of S. Plagiostomus (n)	Fish Average Length (cm)	Fish Average Weight (g)	Sampling date
Kalam	B1	35°28”51’N 72°35”29’ E	4	16.6	41.4	28/03/2019
Mankial	B2	35°19”35’N 72°36”42’ E	4	16.5	41	28/03/2019
Bahrain	B3	35°12”15’N 72°32”49’ E	4	16.8	41.7	29/03/2019
Madyan	B4	35°08”40’N 72°32”17’ E	4	16.4	36.8	29/03/2019
Baghderai	B5	35°03”14’N 72°28”28’ E	4	18.8	58.7	01/04/2019
Matta	A1	34°53”50’N 72°25”44’ E	4	17.5	43.4	02/04/2019

Kanju	A2	34°47”34’N 72°20”47’ E	4	16.4	36.8	04/04/2019
Hazara	A3	34°47”27’N 72°18”09’ E	4	17.8	48.3	06/04/2019
Gugdara	A4	34°44”47’N 72°16”19’ E	4	17.2	38.8	06/04/2019
Chakdara	A5	34°38”48’N 72°01”58’ E	4	15.9	34.9	09/09/2019

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58 **Table SI 6:** MPs abundance (numeric and percent), size fractions and shapes in urban and non-urban sediment tributaries samples. Tr1-
59 Tr4 and Tr5-Tr7 represent the non-urban and urban tributaries respectively.

Station Zone	**Station Name along with Code**	**Numeric abundance (items/kg)**	**Abundance (%)**	**S1 0.5-1 mm**	**S2 1-5 mm**	**Fiber**	**Film**	**Fragment**	**Foam**	**Pellet**
Non-Urban	Kalam (Tr1)	24/69	34.8%	(100%)	0	4/15 (26.7%)	1/3 (33.3%)	15/25 (60%)	0/0	4/26 (15.4%)
	Mankial (Tr2)	16/69	23.2%	15/16 (93.7%)	1/16 (6.25%)	1/15 (6.66%)	1/3 (33.3%)	4/25 (16%)	0/0	10/26 (38.5%)
	Bahrain (Tr3)	16/69	23.2%	15/16 (93.7%)	1/16 (6.25%)	9/15 (60%)	1/3 (33.3%)	3/25 (12%)	0/0	3/26 (11.5%)
	Madyan (Tr4)	13/69	18.8%	12/13 (92.3%)	1/13 (7.69%)	1/15 (6.66%)	0/3 (0)	3/25 (12%)	0/0	9/26 (34.6%)

Urban	Matta (Tr5)	46/133	34.6%	42/46 (91.3%)	4/46 (8.7%)	5/19 (26.3%)	0/4 (0)	23/65 (35.4%)	0/1 (0)	18/44 (40.9%)
	Kanju (Tr6)	21/133	15.8%	20/21 95.2%	1/21 (4.8%)	1/19 (5.26%)	0/4 (0)	10/65 (15.4%)	0/1 (0)	10/44 (22.7%)
	Hazara (Tr7)	66/133	49.6%	65/66 (98.5%)	1/66 (1.51%)	13/19 (68.4%)	4/4 (100%)	32/65 (49.2%)	1/1 (100%)	16/44 (36.4%)

Table SI 7: MPs abundance (numeric and percent), size fractions and shapes in urban and non-urban tributaries water samples. Tr1-Tr4 and Tr5-Tr7 represent the non-urban and urban tributaries respectively.

Station Zone	Station Name along with Code	Numeric abundance (items/L)	abundance (%)	S1 0.5-1 mm	S2 1-5 mm	Fiber	Film	Fragment	Foam	Pellet
Non-Urban	Kalam (Tr1)	14/46	30.4	10/14 (71.4%)	4/14 (28.6%)	2/8 (25%)	2/6 (33.3%)	6/15 (40%)	1/3 (33.3%)	3/14 (92.8%)
	Mankial (Tr2)	12/46	26.1	12/12 (100%)	0	1/8 (12.5%)	2/6 (33.3%)	4/15 (26.7%)	1/3 (33.3%)	4/14 (28.6%)
	Bahrain (Tr3)	13/46	28.3	10/13 (76.9%)	3/13 (23.1)	4/8 (50%)	1/6 (16.7%)	3/15 (20%)	1/3 (33.3%)	4/14 (28.6%)
	Madyan (Tr4)	7/46	15.2	6/7 (85.7%)	1/7 (14.3%)	1/8 (12.5%)	1/6 (16.7%)	2/15 (13.3%)	0/3 (0)	3/14 (92.8%)
Urban	Matta (Tr5)	19/46	41.3	19/19 (100%)	0	4/12 (33.3%)	1/7 (14.3%)	5/10 (50%)	4/7 (57.1%)	5/10 (50%)
	Hazara (Tr6)	12/46	26.1	12/12 (100%)	0	4/12 (33.3%)	3/7 (42.8%)	2/10 (20%)	1/7 (14.3%)	2/10 (20%)
	Gugdara (Tr7)	15/46	32.6	11/15 (73.3%)	4/15 (26.7%)	4/12 (33.3%)	3/7 (42.8%)	3/10 (30%)	2/7 (28.6%)	3/10 (30%)

Table SI 8: Mass abundance of MPs in urban and non-urban water (mg/L) samples collected along the Swat River. A1-A5 are urban stations while B1-B5 are non-urban. Data is presented as average of replicates (n=3). X1 is filter mass before filtration while X2 after filtration (filter mass + MPs mass).

Matrix	Station Zone	Station name with Code	Filter Mass (X1)	Filter Mass with MPs (X2)	Mass abundance (mg)	Mean ± SD
Water	Non-Urban	Kalam (B1)	256	257	0.9	0.3±0.1
		Mankial (B2)	258	258	0.7	0.23±0.02
		Bahrain (B3)	253	253	0.7	0.23±0.02
		Madyan (B4)	255	255	0.9	0.3±0.02
		Baghderai (B5)	253	253	0.8	0.26±0.04
	Urban	Matta (A1)	254	256	2.7	0.9±0.4
		Kanju (A2)	253	256	3.2	1.06±0.01
		Hazara (A3)	265	265	0.9	0.3±0.1
		Gugdara (A4)	263	267	3.8	1.26±0.01
		Chakdara (A5)	268	269	1.1	0.36±0.01

Table SI 9: Mass abundance of MPs in urban and non-urban sediment (mg/kg) samples collected along the Swat River. A1-A5 are urban stations while B1-B5 are non-urban. Data is presented as average of replicates (n=3). X1 is filter mass before filtration while X2 after filtration (filter mass + MPs mass).

Matrix	Station Zone	Station name with Code	Filter mass (X1)	Filter mass with MPs (X2)	Mass abundance (mg) (X2-X1)	Mean ± SD
		Kalam (B1)	254	255	1.1	0.36±0.01

Sediment	Non-Urban	Mankial (B2)	255	256	0.7	0.23±0.02
		Bahrain (B3)	256	257	0.8	0.26±0.04
		Madyan (B4)	261	262	1.1	0.36±0.01
		Baghderai (B5)	258	258	0.6	0.2±0.1
	Urban	Matta (A1)	259	261	1.7	0.56±0.02
		Kanju (A2)	258	259.9	1.9	0.63±0/03
		Hazara (A3)	256.8	258.1	1.3	0.43±0.03
		Gugdara (A4)	256.3	258.8	2.5	0.83±0.03
		Chakdara (A5)	255.1	256.3	1.2	0.4±0.03

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73 **Table SI 10:** Mass abundance of MPs in urban and non-urban fish (mg/fish) samples collected along the Swat River. A1-A5 denotes
74 the urban stations while B1-B5 represent the non-urban stations. Data is presented as average of replicates (n=4). X1 is filter mass before
75 filtration while X2 after filtration (filter mass + MPs mass).

Matrix	Station Zone	Station name with Code	Filter mass (X1)	Filter mass with MPs (X2)	Mass abundance (mg)	Mean ± SD
Fish	Non-Urban	Kalam (B1)	254	255	1.2	0.3±0.16
		Mankial (B2)	254	251	1.1	0.27±0.02
		Bahrain (B3)	253	254	0.9	0.22±0.008
		Madyan (B4)	257	258	0.6	0.15±0.01
		Baghderai (B5)	256	257	0.9	0.22±0.008
		Matta (A1)	251	253	1.9	0.47±0.01

	Urban	Kanju (A2)	256	257	1.3	0.32±0.01
		Hazara (A3)	254	255	0.7	0.17±0.02
		Gugdara (A4)	253	251	0.6	0.15±0.01
		Chakdara (A5)	254	255	0.7	0.17±0.02

Table SI 11: Mass abundance of MPs in urban and non-urban water (mg/L) samples collected along the tributaries. . Tr1-Tr4 and Tr5-Tr7 represent the non-urban and urban tributaries respectively. Data is presented as average of replicates (n=3). X1 is filter mass before filtration while X2 after filtration (filter mass + MPs mass).

Matrix	Station Zone	Station name along with Code	Filter mass (X1)	Filter mass with MPs (X2)	Mass abundance (mg)	Mean ± SD
Water	Urban	Matta (Tr5)	255	255	0.8	0.26±0.04
		Hazara (Tr6)	254	255	0.8	0.26±0.04
		Gugdara (Tr7)	252	253	0.9	0.3±0.02
	Non-Urban	Kalam (Tr1)	254	255	1	0.33±0.03
		Mankial (Tr2)	255	256	0.9	0.3±0.02
		Bahrain (Tr3)	256	257	1.1	0.36±0.01
		Madyan (Tr4)	254	255	0.6	0.2±0.1

Table SI 12: Mass abundance of MPs in urban and non-urban sediment (mg/kg) samples collected along tributaries. Tr1-Tr4 and Tr5-Tr7 represent the non-urban and urban tributaries respectively. Data is presented as average of replicates (n=3). X1 is filter mass before filtration while X2 after filtration (filter mass + MPs mass).

Matrix	Station zone	Station name with Code	Filter mass (X1)	Filter mass with MPs (X2)	Mass abundance (mg)	Mean + SD
Sediment	Urban	Matta (Tr5)	254	258	3.7	1.23±0.03
		Hazara (Tr6)	256	257	1.4	0.46±0.04
		Gugdara (Tr7)	255	260	4.5	1.5±0.3
	Non-Urban	Kalam (Tr1)	260	262	1.7	0.56±0.02
		Mankial (Tr2)	258	259	1.1	0.36±0.01
		Bahrain (Tr3)	254	255	1.1	0.36±0.01
		Madyan (Tr4)	255	256	0.9	0.3±0.02

Table SI 13: Comparison of the reference peaks with the identified functional groups of all polymers found (PE, PP, PS, PVC and PET) in environmental samples (River Sediment, River Water, Tributaries Sediment, Tributaries Water).

Polypropylene (PP)							
Functional Group	C-H3 Asymmetric stretch	C-H2 Asymmetric stretch	C-H2 symmetric stretch	CH2 symmetric bend	CH3 bend	C-H bend, CH3 rock, C-C stretch	
Frequency	2950	2915	2839	1455	1377	1166	
Identified Peaks in Sediments	2950.12	2916.07	2836.13	1451.56	1375.47	ND	
Identified Peaks in water	2949.56	2916.74	2837.30	1456.75	1375.41	ND	
Identified peaks in tributary water	2949.41	2917.36	3837.68	1452.42	1375.35	1166.85	
Identified Peaks in tributary sediments	ND	2916.19	2848.07	1470.77	1366.01	ND	
Polystyrene (PS)							
Functional Group	Aromatic C-H stretch	C-H stretch	Aromatic ring stretch	Aromatic ring stretch	CH2 bend	Aromatic CH bend	Aromatic CH out of plane bend
Frequency	3024	2847	1601	1492	1451	1027	694
Identified Peaks in Sediments	3024.84	2849.18	1601.19	1492.53	1451.93	1025.80	696.85
Identified Peaks in water	3025.87	2848.07	1588.59	1502.85	ND	1014.72	3025.87
Identified peaks in	ND	2848.02	ND	1503.10	ND	1016.18	ND

tributary water							
Identified Peaks in tributary sediments	3025.87	2848.07	1588.59	1502.85	ND	1014.72	3025.87
Polyvinyl Chloride (PVC)							
Functional Group	CH2 bend	CH bend	CH bend	C-C stretch	CH2 rock	C-Cl stretch	
Frequency	1427	1331	1255	1099	966	616	
Identified Peaks in Sediments	ND	1326.90	1248.92	1075.25	ND	612.17	
Identified Peaks in water	1339.56	ND	1092.18	968.36	608.62	1339.56	
Identified peaks in tributary water	ND	1340.31	ND	1092.31	969.03	630.49	
Identified Peaks in tributary sediments	1421	ND	1243.60	1087.48	ND	611.02	
Polyethylene Terephthalate (PET)							
Functional Group	C=O stretch	C-O stretch	C-O stretch	Aromatic CH out of plane bend	-	-	
Frequency	1713	1241	1094	720	-	-	
Identified Peaks in Sediments	1713.37	1240.31	1091.92	721.34	-	-	
Identified Peaks in water	1713.01	1239.91	1092.24	721.84	-	-	
Identified peaks in	1712.24	1238.73	1086.43	722	-	-	

tributary water						
Identified Peaks in tributary sediments	1713.01	1239.91	1092.24	721.84	-	-
Polyethylene (PE)						
Functional Group	C-H stretch	C-H stretch	CH_2 bend	CH_2 bend	CH_2 rock	CH_2 rock
Frequency	2915	2845	1472	1462	717	730
Identified Peaks in Sediments	2914.94	2847.75	1470.64	1462.41	717.89	729.41
Identified Peaks in water	2914.30	2847.64	1471	1463.01	717.53	729.49
Identified peaks in tributary water	2915.11	2847.64	1469.55	ND	721.97	ND
Identified Peaks in tributary sediments	2916.72	2849.16	1469.37	1452.88	721.05	ND

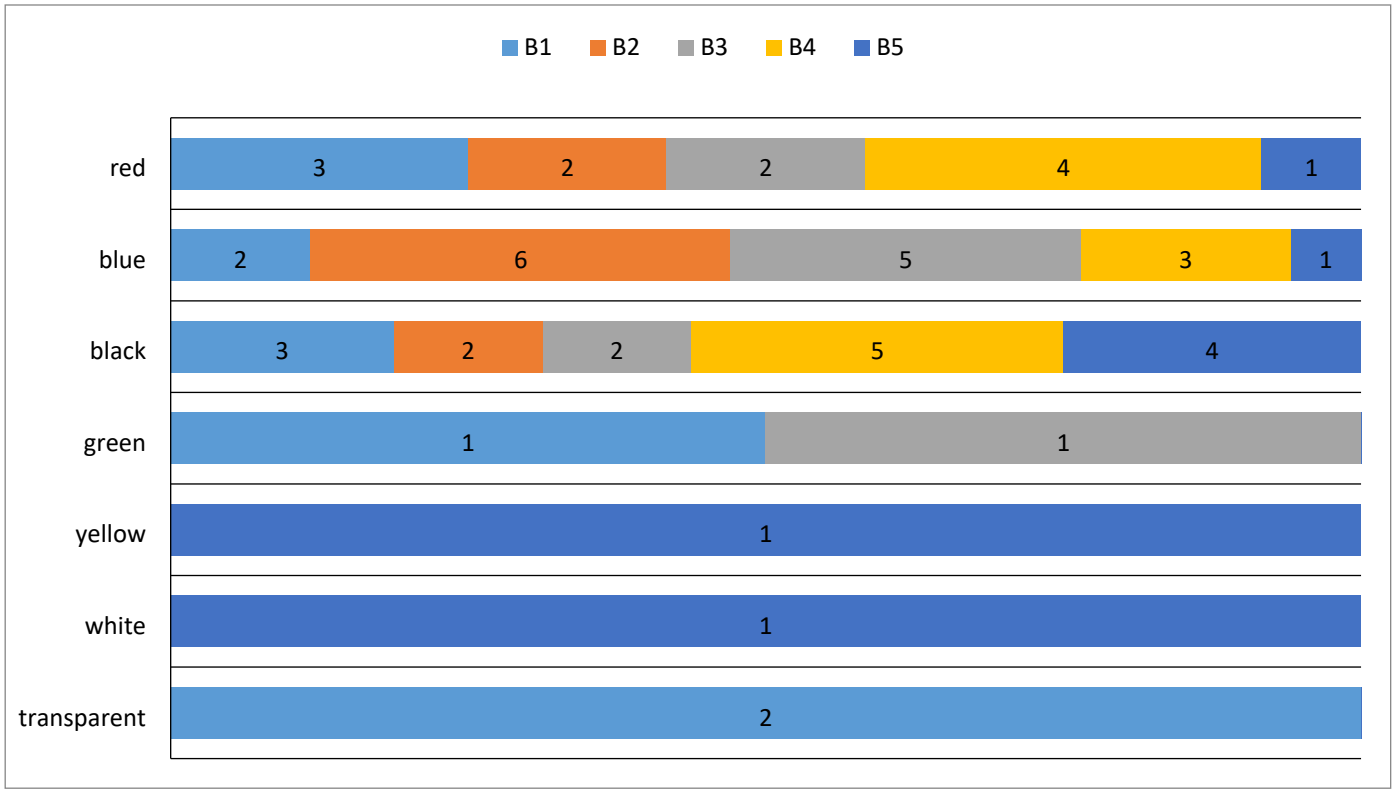

Figure SI 1: Ratio of MPs colors found in non-urban sediment samples collected from SR. Data is plotted as numeric abundance of colors against non-urban stations. The denotations B1, B2, B3, B4 and B5 represents Kalam, Mankial, Bahrain, Madyan and Baghderai sampling stations respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

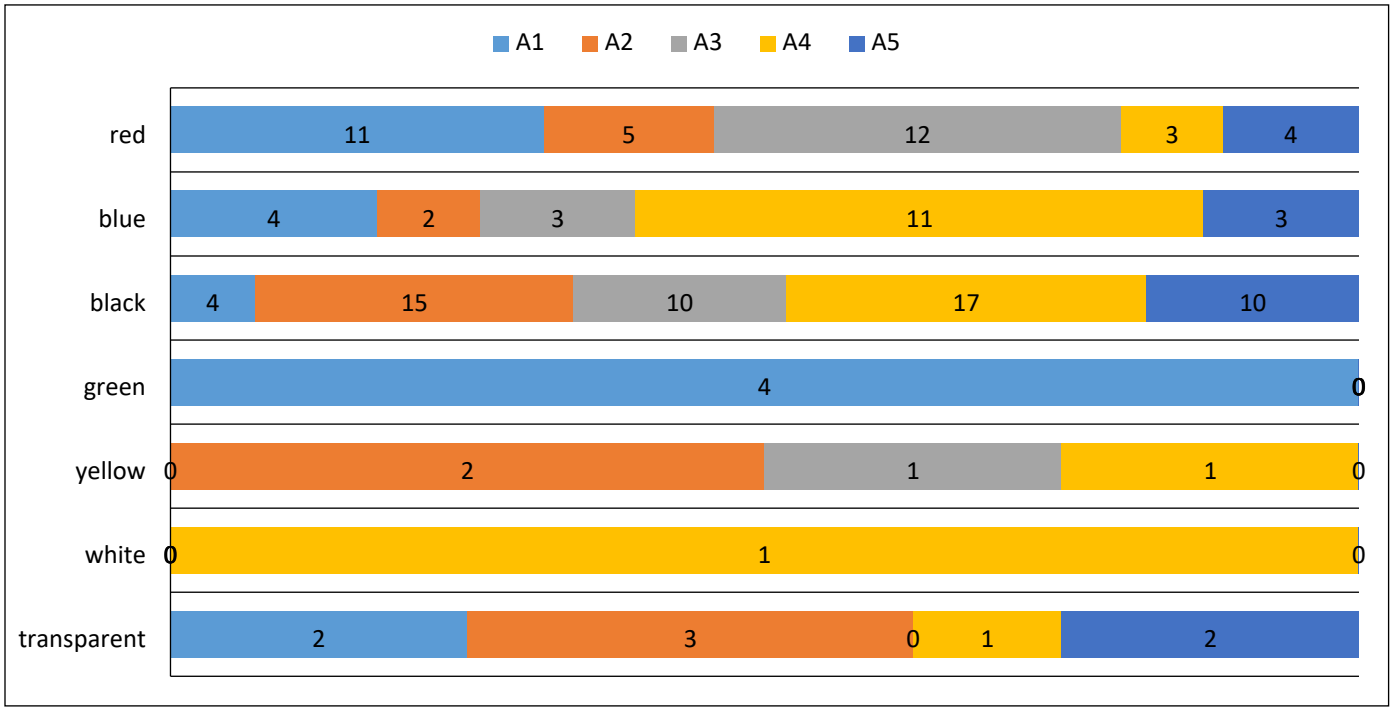

Figure SI 2: Ratio of MPs colors found in Urban Sediment stations (A1-A5). Data is plotted as numeric abundance of colors against urban stations against Non-Urban stations. The denotations A1, A2, A3, A4 and A5 represents sampling stations Matta , Kanju , Hazara, Gugdara and Chakdara respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

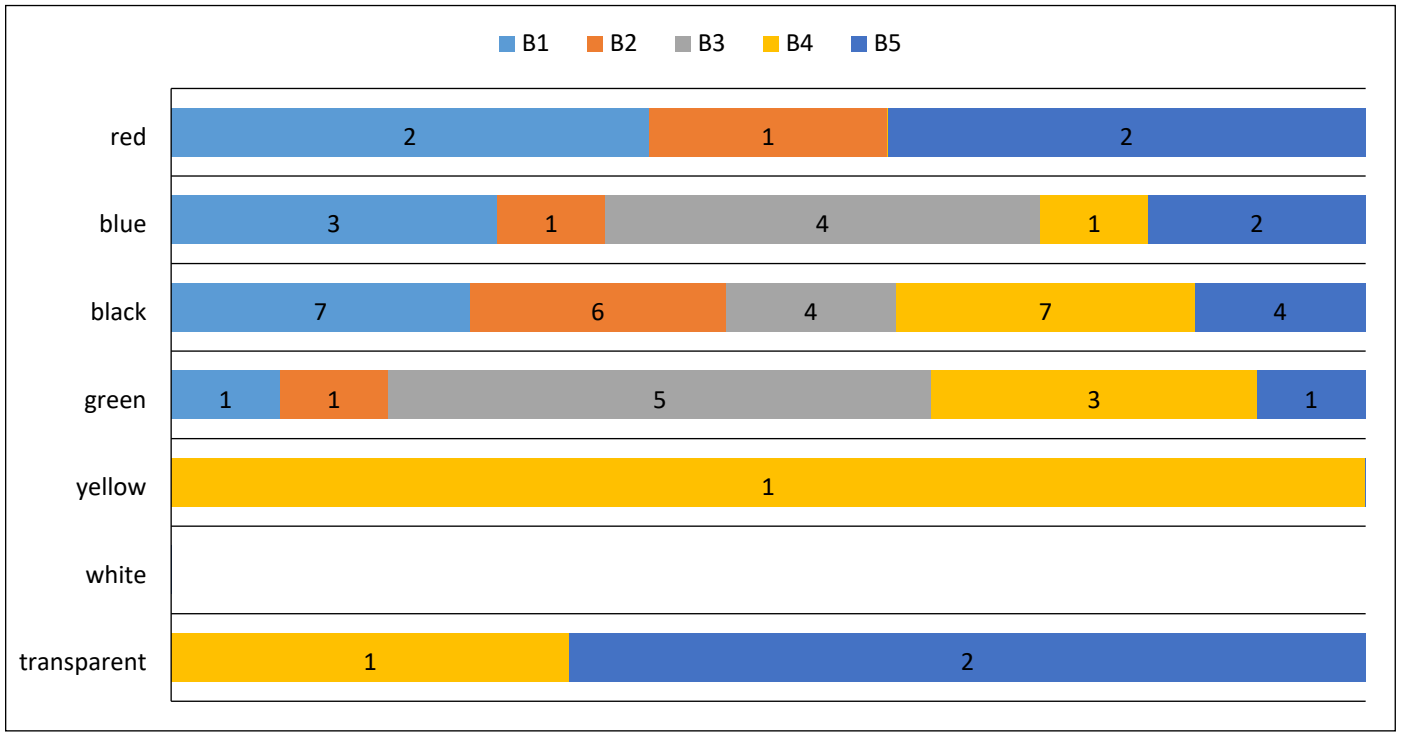

Figure SI 3: Ratio of MPs colors found in Non-Urban (B1-B5) Water stations of SR. Data is plotted as numeric abundance of colors against Non-Urban stations. The denotations B1, B2, B3, B4 and B5) represents Kalam, Mankial, Bahrain, Madyan and Baghderai sampling stations respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

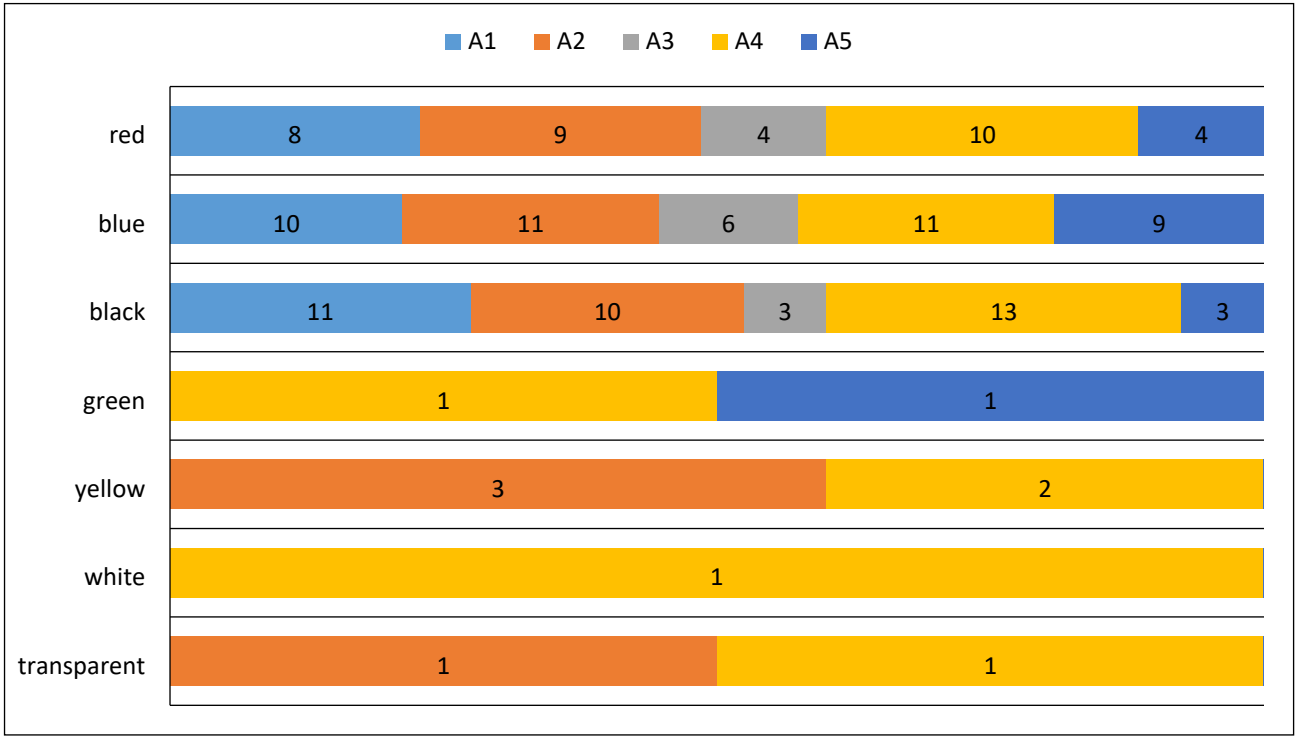

Figure SI 4: Ratio of MPs colors found in Urban Water (A1-A5) stations of SR. Data is plotted as numeric abundance of colors against urban stations. The denotations A1, A2, A3, A4 and A5 represents sampling stations Matta , Kanju , Hazara, Gugdara and Chakdara respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

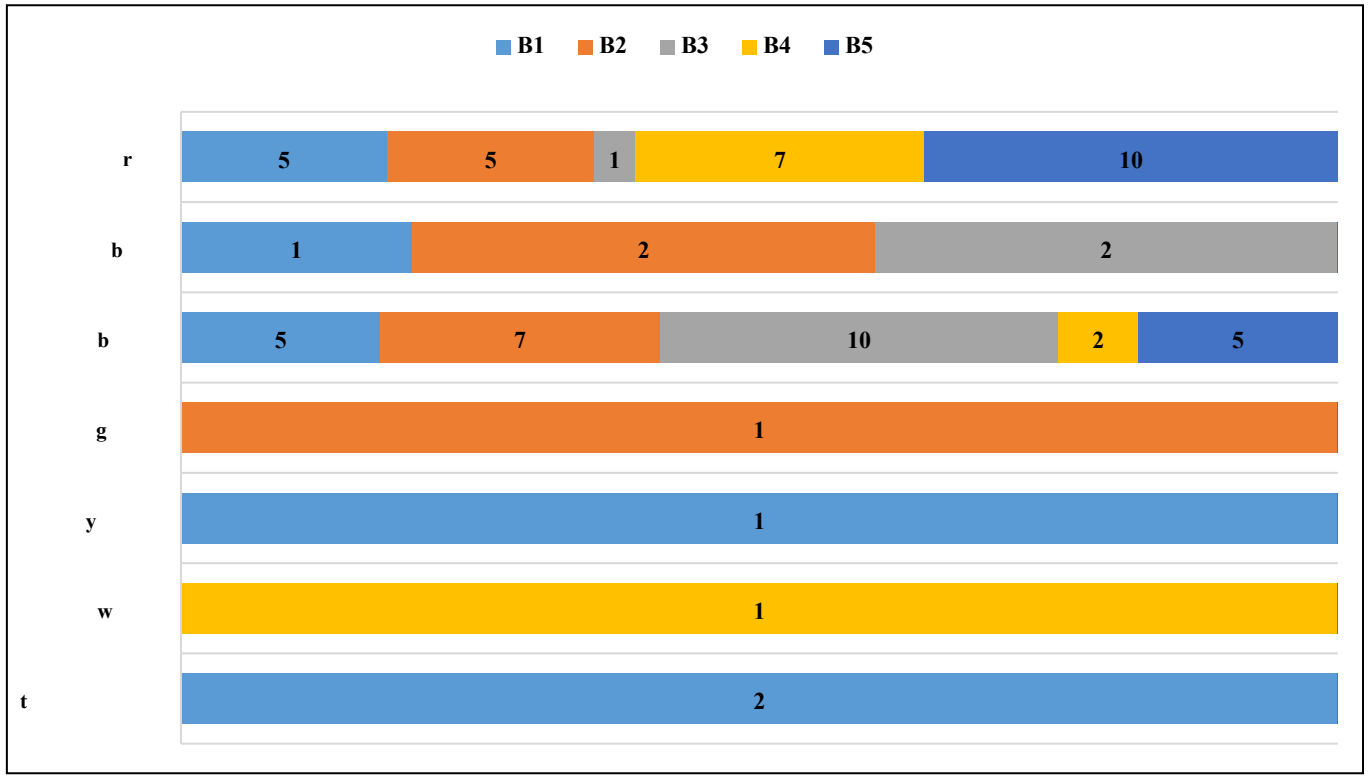

Figure SI.5: Ratio of MPs colors found in Non-Urban (B1-B5) fish. Data is plotted as numeric abundance of colors against Non-Urban fish. The denotations B1, B2, B3, B4 and B5) represents Kalam, Mankial, Bahrain, Madyan and Baghderai sampling stations respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

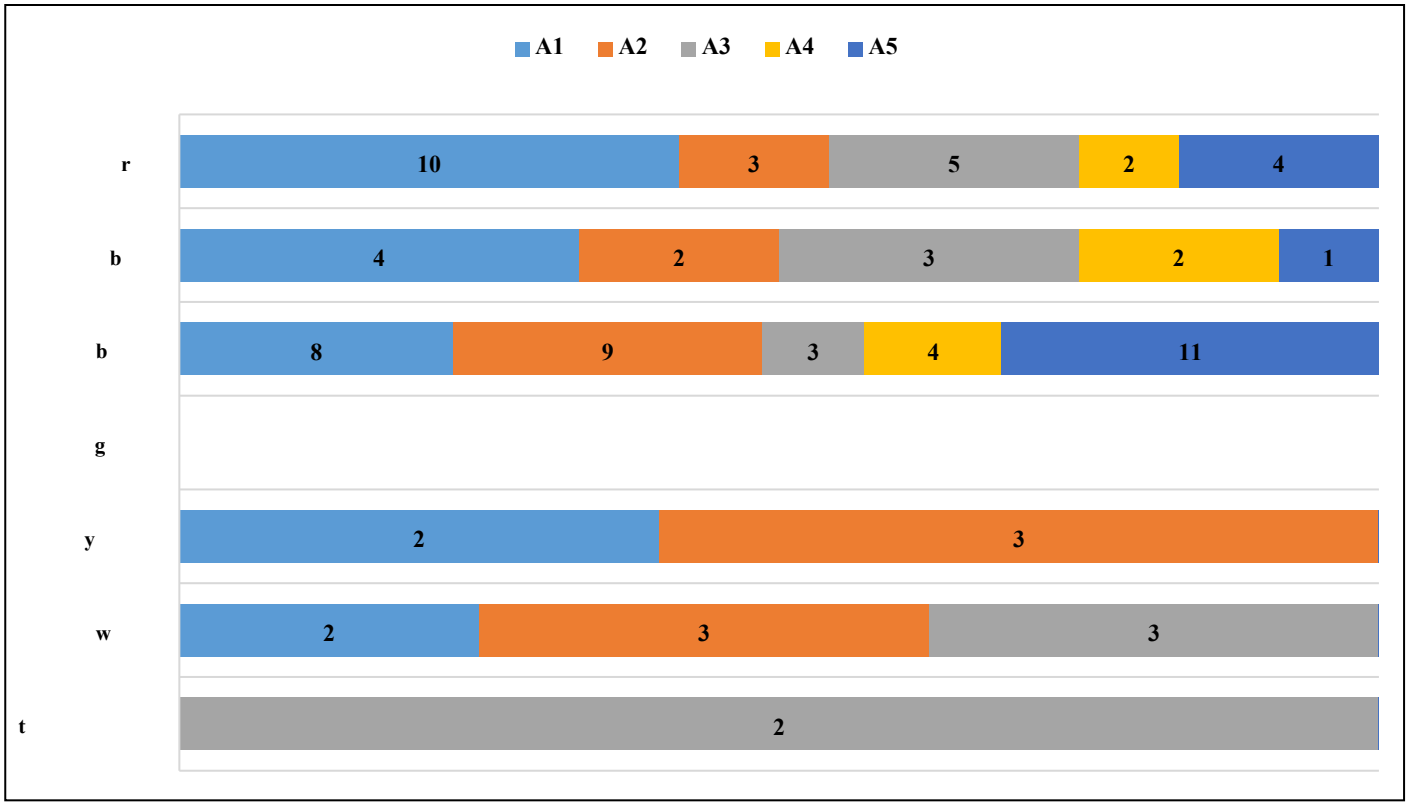

Figure SI 6: Ratio of MPs colors found in Urban (A1-A5) fish. Data is plotted as numeric abundance of colors against urban fish. The denotations A1, A2, A3, A4 and A5 represents sampling stations Matta , Kanju , Hazara, Gugdara and Chakdara respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

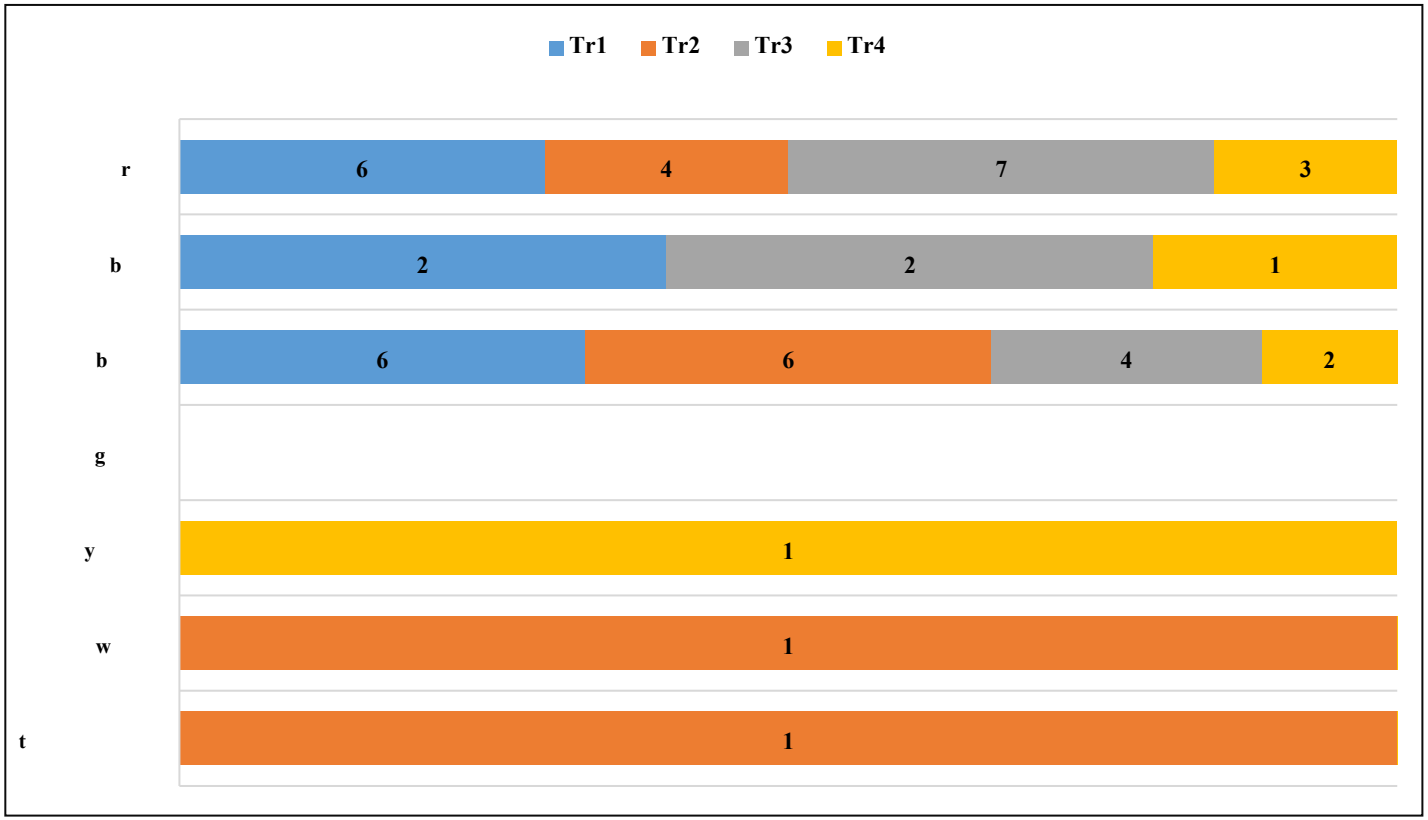

Figure SI 7: Ratio of MPs colors found in Sediment of Non-Urban (Tr1-Tr4) tributaries. Data is plotted as numeric abundance of colors against Non-Urban tributaries. The denotations Tr1, Tr2, Tr3 and Tr4 represents Mankial, Bahrain and Madyan sampling sites respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

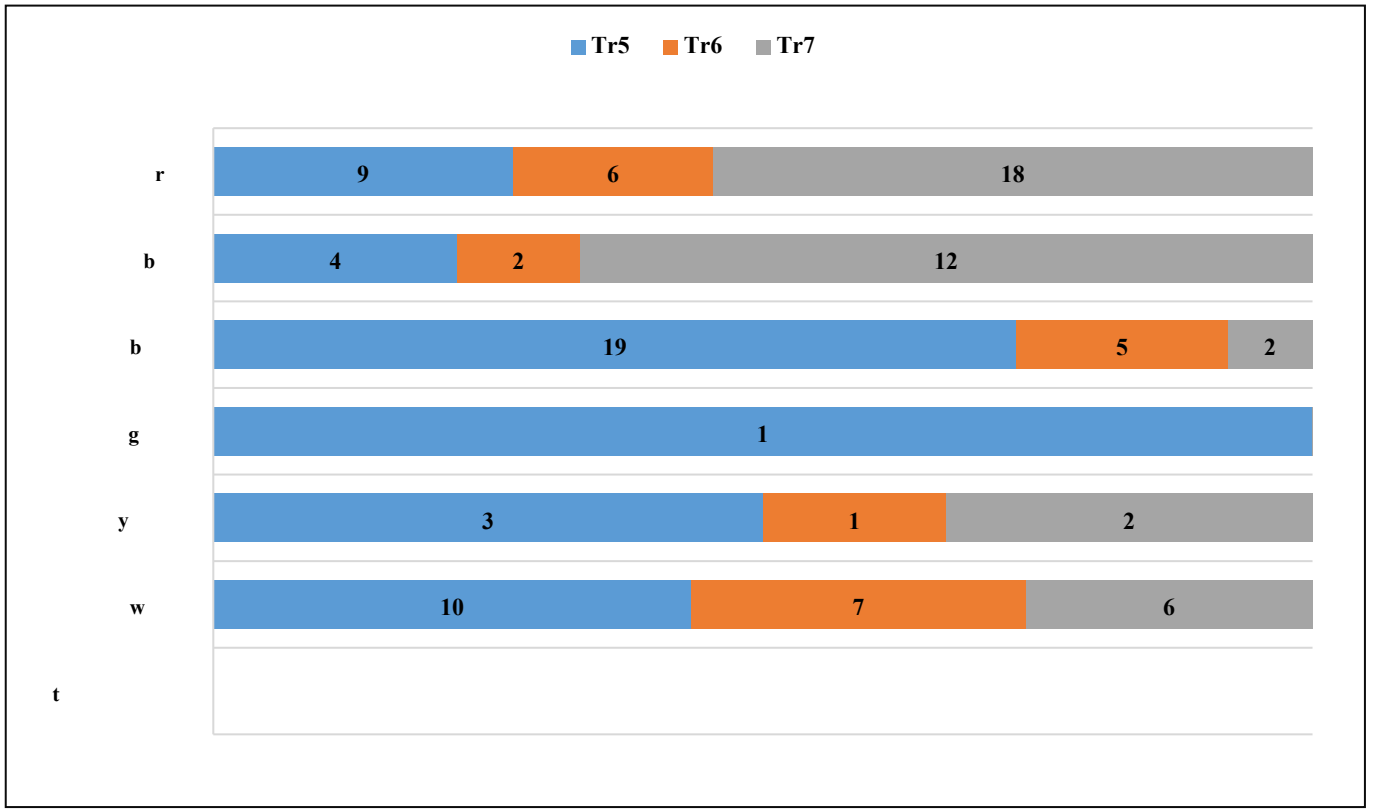

Figure SI 8: Ratio of MPs colors found in Sediment of Urban (Tr5-Tr7) tributaries. Data is plotted as numeric abundance of colors against urban tributaries. The denotations Tr5, Tr6 and Tr7 represents Matta, Hazara and Gugdara sampling sites respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

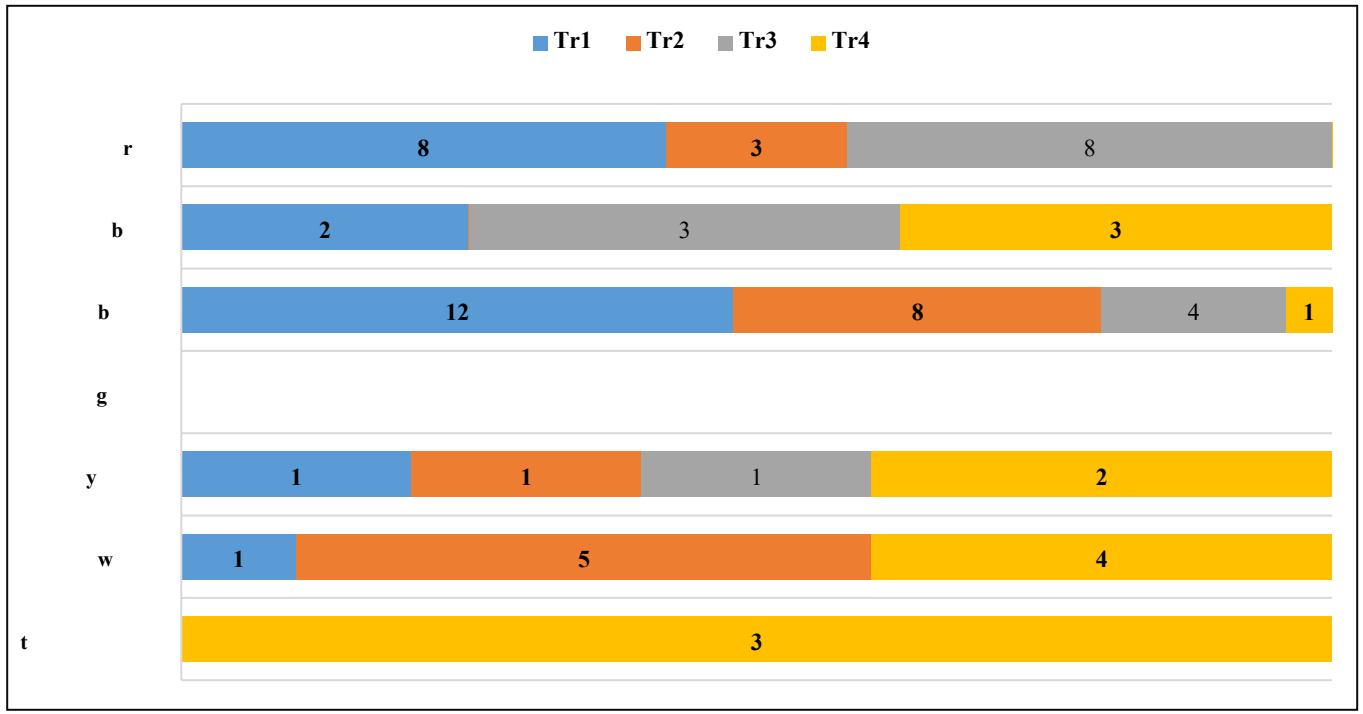

Figure SI 9: Ratio of MPs colors found in Water of Non-Urban (Tr1-Tr4) tributaries. Data is plotted as numeric abundance of colors against Non-Urban tributaries. The denotations Tr1, Tr2, Tr3 and Tr4 represents Mankial , Bahrain and Madyan sampling sites respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

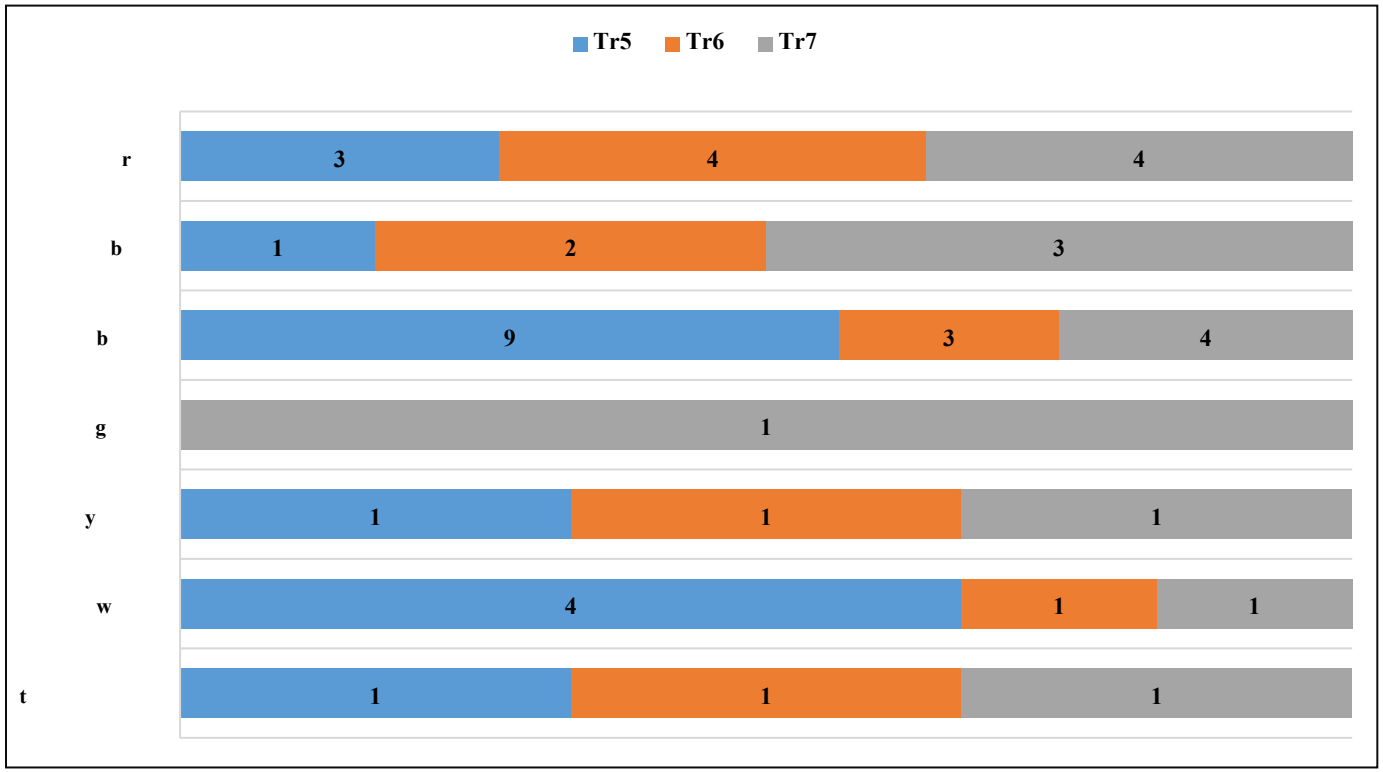

Figure SI 10: Ratio of MPs colors found in Water of Urban (Tr5-Tr7) tributaries. Data is plotted as numeric abundance of colors against urban tributaries. The denotations Tr5, Tr6 and Tr7 represents Matta, Hazara and Gugdara sampling sites respectively. Numbers 1, 2, 3 etc. in main graph is numeric abundance of colored MPs items observed on optical microscopy.

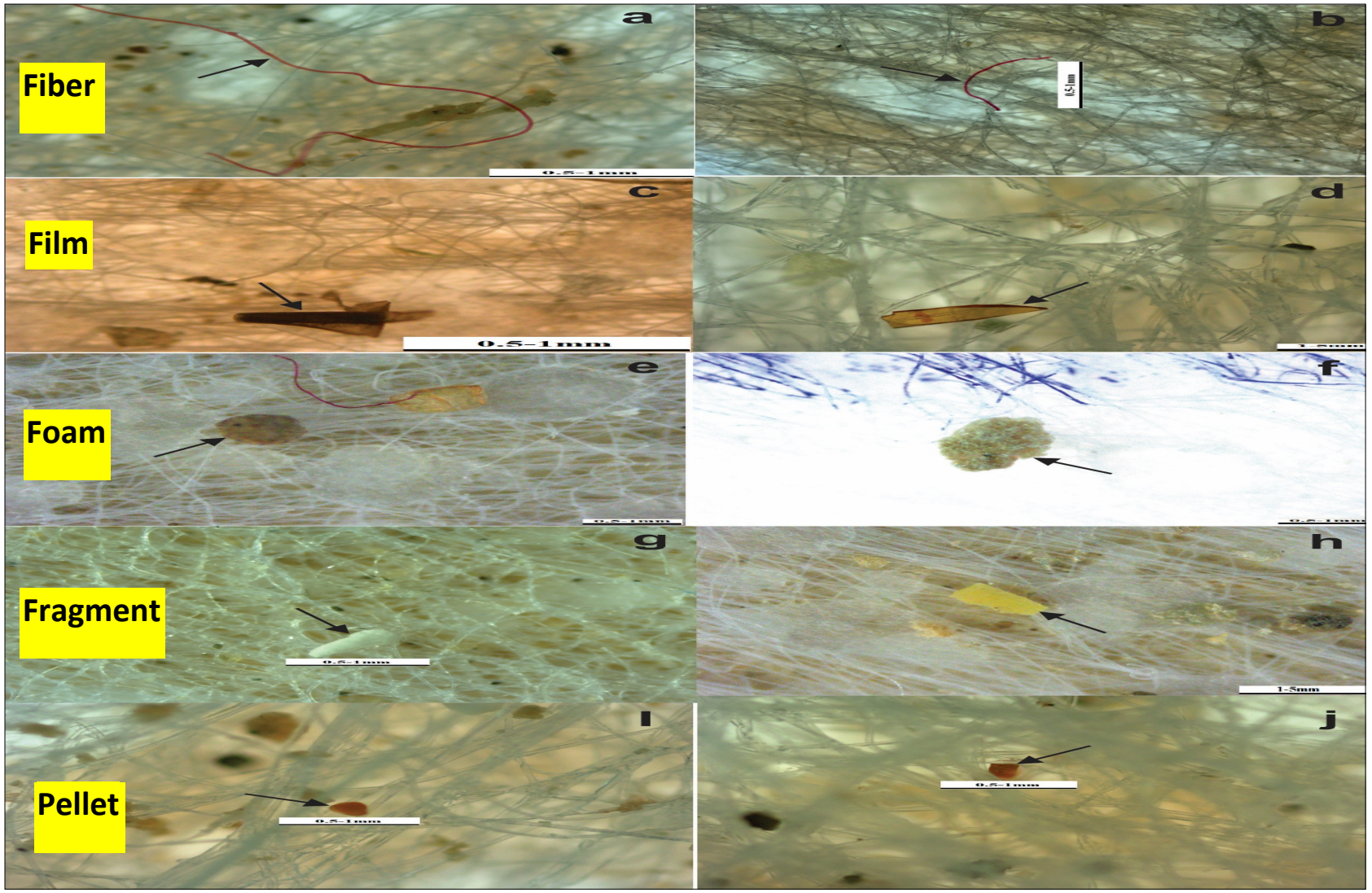

Figure SI 11: Optical microscope images of selected MPs items on filter paper observed in sediment, water and fish samples. Arrows shows MPs items with scale bar in millimeter (mm). These images of suspected MPs were edited using Aphelion Dev. 4.0 software.