

Supplementary Information

Integrating hydrological connectivity in a process-response framework for restoration and monitoring prioritization of floodplain wetlands in the Ramganga basin, India

Manudeo Singh^{1,2} and Rajiv Sinha¹

¹Department of Earth Sciences, Indian Institute of Technology Kanpur, India

²Institute of Geosciences, University of Potsdam, Germany

Results:

District-wise wetland status and connectivity scenario are presented below.

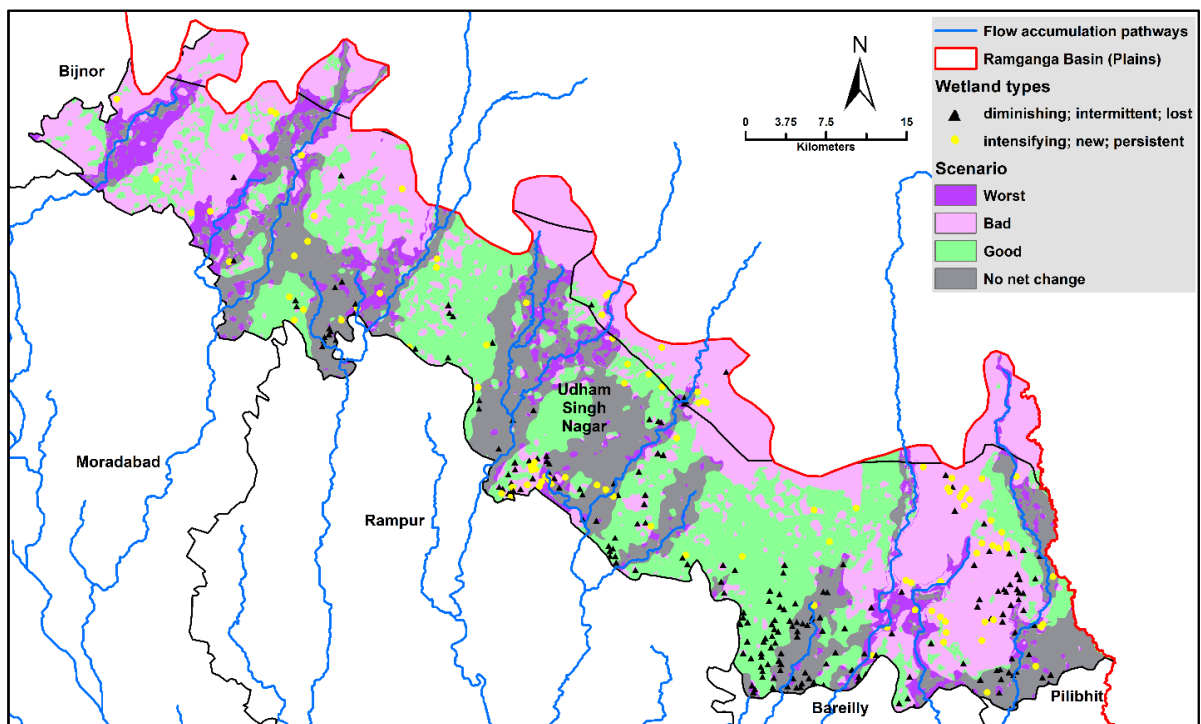


Figure S1: Wetland status and connectivity scenarios in Udham Singh Nagar district of the Ramganga Basin.

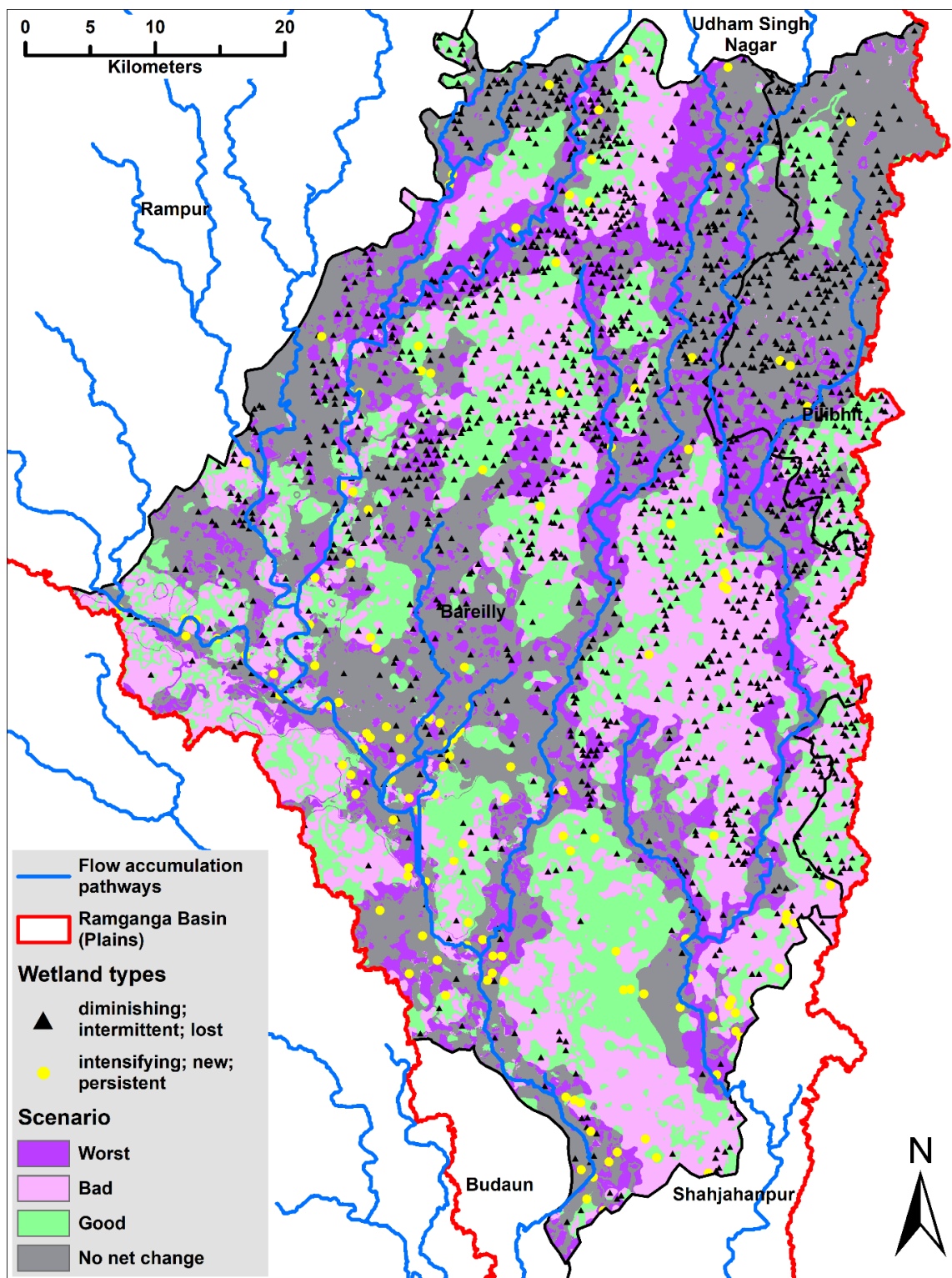


Figure S2: Wetland status and connectivity scenarios in Bareilly district of the Ramganga Basin.

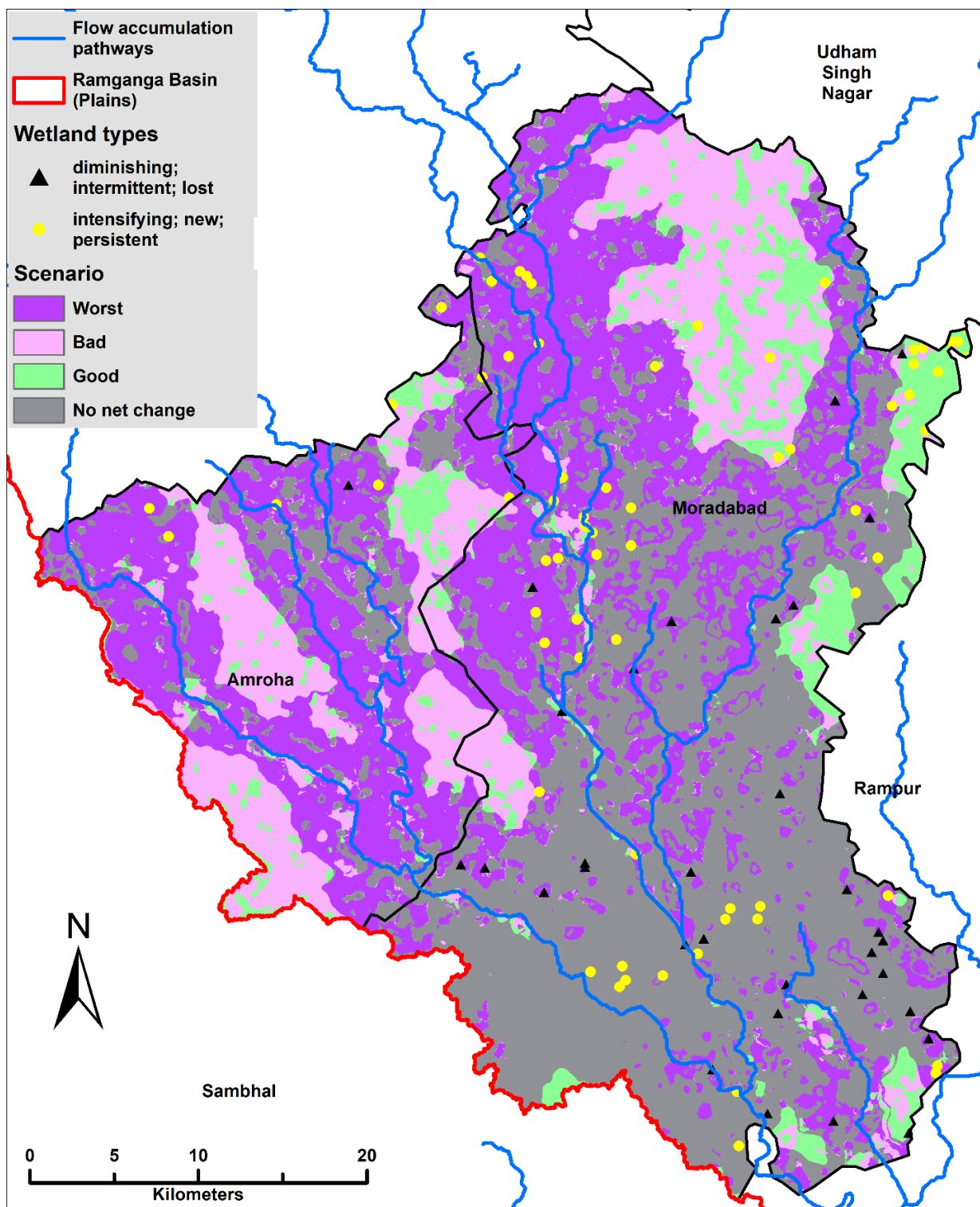


Figure S3: Wetland status and connectivity scenarios in Moradabad and Amroha districts of the Ramganga Basin.

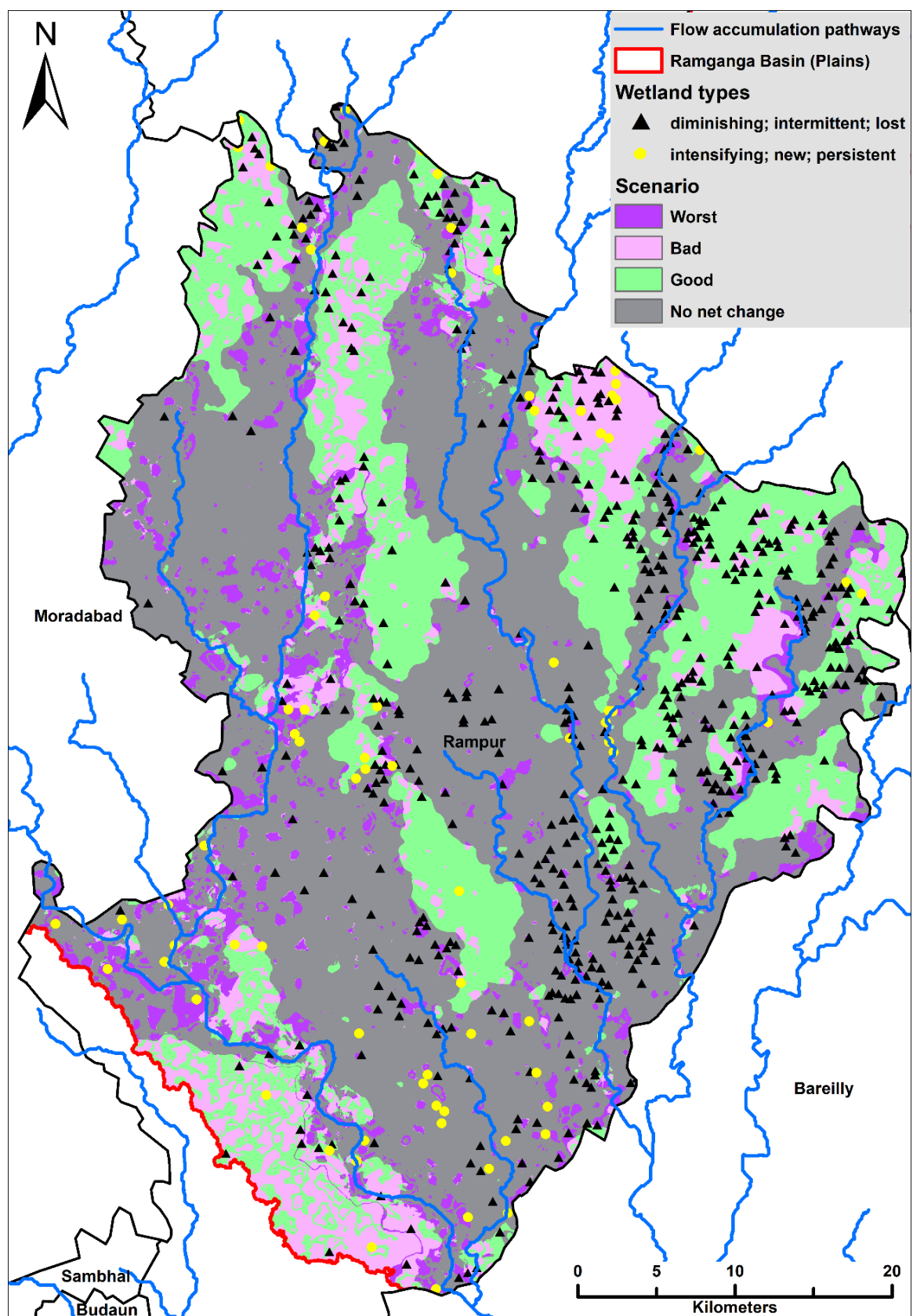


Figure S4: Wetland status and connectivity scenarios in Rampur district of the Ramganga Basin

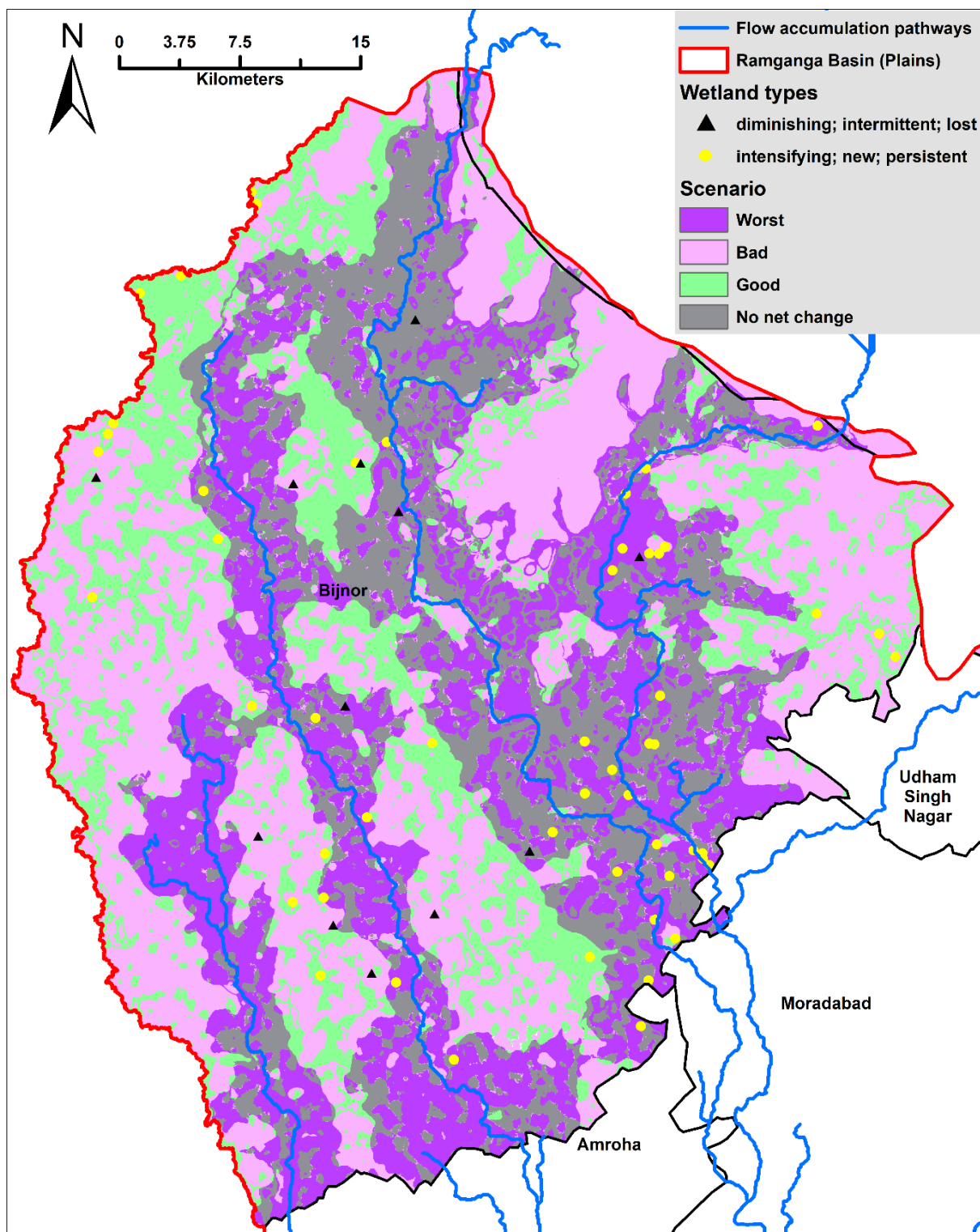


Figure S5: Wetland status and connectivity scenarios in Bijnor district of the Ramganga Basin.

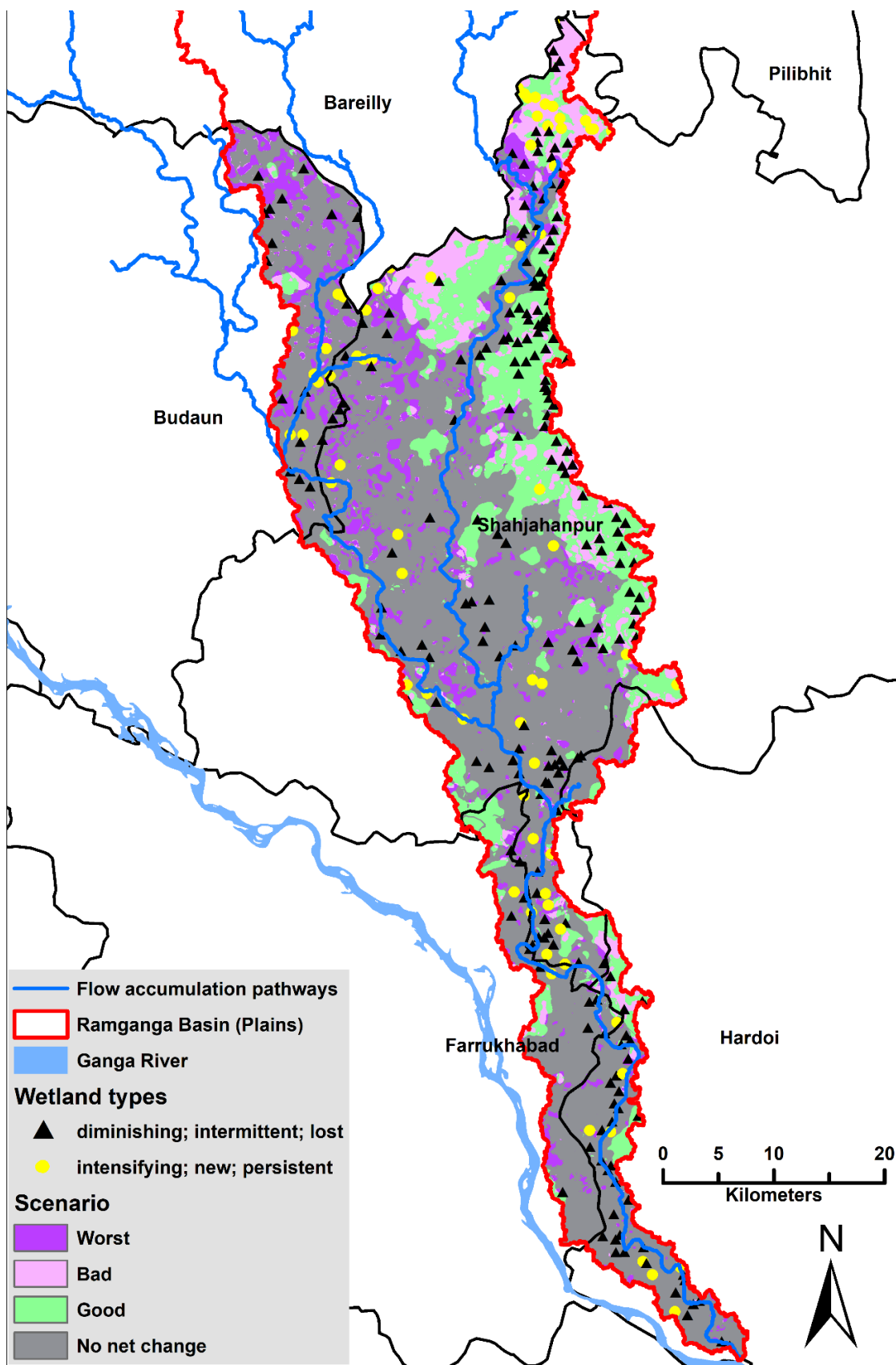


Figure S6: Wetland status and connectivity scenarios in Shahjahanpur district of the Ramganga Basin.

Table S1: District-wise distribution of wetland types based on the centroid location of the wetlands in the connectivity scenarios.

[illegible]

				Good	2 (18.1)	0 (0.0)	1 (5.5)	3 (23.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
				NNC	2 (6.2)	0 (0.0)	12 (73.7)	14 (79.9)	0 (0.0)	4 (39.3)	4 (17.5)	8 (56.8)
Farrukhabad	2184.0	157.5	14 (88.5)	Worst	1 (2.4)	0 (0.0)	0 (0.0)	1 (2.4)	0 (0.0)	1 (21.5)	0 (0.0)	1 (21.5)
				Bad	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
				Good	1 (7.5)	0 (0.0)	0 (0.0)	1 (7.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
				NNC	2 (9.8)	0 (0.0)	5 (31.5)	7 (41.3)	0 (0.0)	1 (4.2)	3 (11.6)	4 (15.8)
Hardoi	6006.5	188.6	46 (304.2)	Worst	4 (18.8)	0 (0.0)	0 (0.0)	4 (18.8)	0 (0.0)	0 (0.0)	1 (3.7)	1 (3.7)
				Bad	1 (8.5)	0 (0.0)	2 (5.4)	3 (13.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
				Good	3 (19.0)	0 (0.0)	2 (5.8)	5 (24.8)	0 (0.0)	0 (0.0)	1 (6.2)	1 (6.2)
				NNC	18 (102.6)	1 (2.5)	8 (42.4)	27 (147.5)	0 (0.0)	2 (49.6)	3 (39.8)	5 (89.4)
Moradabad	2106.8	1487.0	90 (560.6)	Worst	1 (3.2)	3 (36.6)	9 (72.5)	13 (112.4)	0 (0.0)	1 (4.4)	16 (87.4)	17 (91.8)
				Bad	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.3)	0 (0.0)	7 (35.9)	8 (38.1)
				Good	0 (0.0)	0 (0.0)	3 (30.1)	3 (30.1)	0 (0.0)	1 (7.2)	11 (46.2)	12 (53.5)
				NNC	1 (3.8)	3 (10.1)	12 (83.1)	16 (97.0)	1 (22.8)	2 (10.8)	18 (104.1)	21 (137.7)
Pilibhit	3589.7	415.3	358 (3949.0)	Worst	4 (13.3)	0 (0.0)	32 (593.9)	36 (607.2)	0 (0.0)	0 (0.0)	1 (6.2)	1 (6.2)
				Bad	1 (13.7)	2 (7.2)	67 (473.4)	70 (494.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
				Good	6 (24.2)	0 (0.0)	53 (780.5)	59 (804.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

				NNC	42 (404.4)	0 (0.0)	147 (1620.8)	189 (2025.1)	0 (0.0)	0 (0.0)	3 (11.6)	3 (11.6)
Rampur	2571.0	2366.9	635 (3911.2)	Worst	8 (170.7)	0 (0.0)	37 (151.1)	45 (321.8)	0 (0.0)	2 (21.4)	8 (53.5)	10 (75.0)
				Bad	5 (17.5)	1 (3.6)	79 (413.4)	85 (434.5)	0 (0.0)	1 (3.8)	16 (96.5)	17 (100.3)
				Good	14 (133.5)	2 (8.7)	139 (850.4)	155 (992.6)	0 (0.0)	3 (10.2)	11 (38.5)	14 (48.7)
				NNC	94 (763.1)	5 (13.8)	176 (894.8)	275 (1671.7)	0 (0.0)	12 (76.5)	22 (190.1)	34 (266.6)
Shahjahanpur	4649.8	1212.7	211 (4424.5)	Worst	2 (30.8)	1 (3.1)	15 (201.0)	18 (234.8)	0 (0.0)	1 (3.0)	5 (209.5)	6 (212.4)
				Bad	3 (42.5)	0 (0.0)	41 (2996.7)	44 (3039.2)	0 (0.0)	0 (0.0)	14 (119.7)	14 (119.7)
				Good	11 (83.9)	0 (0.0)	28 (187.4)	39 (271.3)	0 (0.0)	3 (10.2)	3 (42.0)	6 (52.2)
				NNC	17 (101.4)	1 (2.4)	43 (250.7)	61 (354.5)	2 (9.7)	9 (50.0)	12 (80.7)	23 (140.4)
Udham Singh Nagar	2861.6	1783.7	297 (8630.1)	Worst	1 (2.5)	3 (8.4)	12 (75.4)	16 (86.3)	0 (0.0)	1 (18.0)	10 (39.3)	11 (57.4)
				Bad	3 (10.0)	8 (33.1)	44 (321.2)	55 (364.2)	0 (0.0)	3 (5316.0)	47 (407.1)	50 (5723.0)
				Good	6 (18.7)	3 (9.6)	64 (268.6)	73 (297.0)	0 (0.0)	3 (1664.3)	15 (66.1)	18 (1730.4)
				NNC	8 (33.6)	3 (8.1)	49 (253.3)	60 (295.1)	0 (0.0)	1 (4.1)	13 (72.6)	14 (76.7)

*I: Intensifying, P: Persistent, N: New, D: Diminishing, L: Lost, In: Intermittent; RGB: Ramganga Basin; NCC: No net change

Table S2: Restoration priority distribution (in order of priority) for wetlands in Budaun, Bareilly, Shahjahanpur, Moradabad, and Rampur districts in Ramganga basin. Area in ha.

Priority List	Budaun		Bareilly		Shahjahanpur		Moradabad		Rampur		Total	
	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area
DJX	3	23.6	67	553.4	1	6.8	3	30.1	41	241.4	115	855.3
DJY	0	0	118	774	15	102	0	0	94	554.1	227	1430.1
DJZ	0	0	52	286.8	23	162.5	0	0	20	197.1	95	646.4
DKX	4	25	207	1839.9	21	118.8	6	48	111	871.7	349	2903.4
DKY	10	54.9	116	761.7	32	200.7	9	46.7	126	612.7	293	1676.7
DKZ	0	0	16	127.1	8	35	1	2.3	38	187.3	63	351.7
DLX	0	0	90	1455.6	2	37.6	0	0	9	70.2	101	1563.4
DLY	0	0	228	1814.7	20	241	0	0	61	293.6	309	2349.3
DLZ	0	0	103	681.4	22	2760.6	0	0	15	70.8	140	3512.8
DMX	1	46.6	158	1311.4	8	62.5	3	22.1	18	203.9	188	1646.5
DMY	3	12	142	1030.1	9	161.8	10	90.4	23	96.9	187	1391.2
DMZ	0	0	35	331.9	1	10.5	0	0	4	21	40	363.4
TOTAL	21	162.1	1332	10968	162	3899.8	32	239.6	560	3420.7	2107	18690.2

Table S3: Monitoring priority distribution (in order of priority) for wetlands in Budaun, Bareilly, Shahjahanpur, Moradabad, and Rampur districts in Ramganga basin. Area in ha.

Priority List	Budaun		Bareilly		Shahjahanpur		Moradabad		Rampur		Total	
	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area
SMZ	0	0	1	3.4	0	0	0	0	2	23.4	3	26.8
SMY	0	0	7	57.1	5	209.3	6	23.8	3	15.5	21	305.7
SMX	0	0	15	138.8	1	3.1	11	68	5	36.1	32	246
SLZ	0	0	5	45.4	12	113.6	2	5.3	2	5.6	21	169.9
SLY	0	0	22	141.5	2	6.1	4	27.5	13	87.7	41	262.8
SLX	0	0	10	53.9	0	0	2	5.4	2	7	14	66.3
SKZ	0	0	1	2.9	1	2.5	2	5.8	3	13	7	24.2
SKY	2	28.6	15	107.4	11	67.1	7	30.2	18	129.8	53	363.1
SKX	6	28.3	20	151.9	11	70.8	12	101.8	13	123.9	62	476.7
SJZ	0	0	6	22.7	6	52.2	1	4.7	2	5.5	15	85.1
SJY	0	0	17	79.7	0	0	6	26.9	7	25.3	30	131.9
SJX	0	0	12	156.2	0	0	5	21.9	5	17.9	22	196
TOTAL	8	56.9	131	960.9	49	524.7	58	321.3	75	490.7	321	2354.5

Table S4: Restoration priority distribution (in order of priority) for wetlands in Pilibhit, Udham Singh Nagar, Hardoi, Farrukhabad, Bijnor, and Amroha districts in Ramganga basin. Area in ha.

Priority List	Pilibhit		Udham Singh Nagar		Hardoi		Farrukhabad		Bijnor		Amroha		Total	
	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area
DJX	1	5.3	15	60	0	0	0	0	0	0	0	0	16	65.3
DJY	39	587.7	44	189.1	5	24.8	1	7.5	1	4.6	0	0	90	813.7
DJZ	19	211.8	14	47.9	0	0	0	0	0	0	0	0	33	259.7
DKX	10	159.6	24	152.6	0	0	0	0	1	4.1	0	0	35	316.3
DKY	153	1691.4	34	136	27	147.5	6	33.5	1	3.2	0	0	221	2011.6
DKZ	26	174.2	2	6.5	0	0	1	7.8	0	0	0	0	29	188.5
DLX	0	0	6	36.2	0	0	0	0	0	0	0	0	6	36.2
DLY	33	248.7	44	305.6	3	13.9	0	0	5	24.3	0	0	85	592.5
DLZ	37	245.6	5	22.4	0	0	0	0	1	7.6	0	0	43	275.6
DMX	11	169.4	5	26.8	0	0	0	0	1	6.3	1	5	18	207.5
DMY	22	427.6	11	59.5	4	18.8	1	2.4	2	6.4	0	0	40	514.7
DMZ	3	10.2	0	0	0	0	0	0	0	0	0	0	3	10.2
TOTAL	354	3931.5	204	1042.6	39	205	9	51.2	12	56.5	1	5	619	5291.8

Table S5: Monitoring priority distribution (in order of priority) for wetlands in Pilibhit, Udham Singh Nagar, Hardoi, Farrukhabad, Bijnor, and Amroha districts in Ramganga basin. Area in ha.

Priority List	Pilibhit		Udham Singh Nagar		Hardoi		Farrukhabad		Bijnor		Amroha		Total	
	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area
SMZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMY	1	6.2	7	40.9	1	3.7	1	21.5	6	26.5	3	11.4	19	110.2
SMX	0	0	4	16.5	0	0	0	0	7	33.5	0	0	11	50
SLZ	0	0	2	1577.7	0	0	0	0	8	526.9	0	0	10	2104.6
SLY	0	0	43	2794.2	0	0	0	0	1	12.2	0	0	44	2806.4
SLX	0	0	5	1351.1	0	0	0	0	4	15.8	0	0	9	1366.9
SKZ	1	2.9	0	0	0	0	0	0	1	4.5	0	0	2	7.4
SKY	2	8.6	7	37.5	5	89.4	1	4.2	6	33.2	1	4.2	22	177.1
SKX	0	0	7	39.2	0	0	3	11.6	10	74.1	2	13	22	137.9
SJZ	0	0	5	21.5	0	0	0	0	6	28.5	1	2.9	12	52.9
SJY	0	0	13	1708.9	1	6.2	0	0	3	9.4	0	0	17	1724.5
SJX	0	0	0	0	0	0	0	0	1	6.4	1	3.2	2	9.6
TOTAL	4	17.7	93	7587.5	7	99.3	5	37.3	53	771	8	34.7	170	8547.5