

Supplementary Information

Table S1. Estimation of accuracy in LULC classification.

LULC classes	1988			1998			2008			2018		
	Producers	Users	Kappa	Producers	Users	Kappa	Producers	Users	Kappa	Producers	Users	Kappa
Agricultural land	0.99	0.99	0.99	0.99	0.97	0.97	0.96	0.86	0.86	0.99	0.99	0.99
RSv	0.99	0.88	0.88	0.71	0.87	0.87	0.87	0.93	0.92	0.99	0.99	0.99
Mangrove	0.98	0.99	0.99	0.89	0.77	0.77	0.96	0.98	0.98	0.99	1	1
Mudflat	0.99	0.63	0.63	1	0.95	0.95	0.99	0.99	0.99	0.99	0.98	0.98
Built up	1	0.88	0.89	0.99	0.95	0.95	1	0.92	0.92	1	0.98	0.98
Waterbody	0.98	0.99	0.99	0.99	1	1	0.99	1	1	0.99	1	1
Overall accuracy			0.98			0.99			0.98			0.99
Overall kappa			0.96			0.96			0.96			0.99

Table S2. Parameters and weights used in the simulation of suitability maps.

Land cover type	Variables	Description	Consistency	Factor weight	Function type ^b
Agricultural land	Temperature	16-28°C	0.086	0.079	IS
	Precipitation	292-518 mm, 400 mm ^a		0.195	SS
	Population density	0-5539, 330 ^a		0.252	SS
	Road network	100-20000 m, 4000 m ^a		0.073	SS
	Elevation	1-10 m, 7 m ^a		0.149	SS
	Slope	1-3 m		0.073	DS
	Soil type	Silty clay-silty loam		0.178	IS
RSv	Temperature	18-28°C, 20°C ^a	0.094	0.264	SS
	Precipitation	292-518 mm, 400 mm ^a		0.115	SS
	Population density	0-5539, 2000 ^a		0.176	SS
	Road network	300-10000 m		0.257	DS
	Elevation	0-39 m		0.089	IS
	Slope	0-3 m		0.099	IS
Mangrove	Temperature	16 - 28°C	0.069	0.105	IS
	Precipitation	292 - 450 mm		0.096	IS
	Population density	300 - 2000		0.360	DS
	Road network	2000 - 5000 m		0.217	IS
	Elevation	5 - 39 m		0.108	DS
	Slope	0 - 3 m		0.115	DS
Mudflat	Precipitation	292-518 mm	0.022	0.232	IS
	Elevation	3-10 m		0.417	DS
	Slope	1-3 m		0.350	DS
Built-up	Population density	500-800/sq.km	0.056	0.448	IS
	Road network	2000-5000 m		0.335	DS
	Elevation	0-5 m		0.125	IS
	Slope	1-3 m		0.092	IS
Waterbody	Elevation	3-10 m	0.001	0.645	DS

	Slope	1-3 m		0.355	DS
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Note:

^a The value at the symmetry point.

^b IS—Increasing sigmoidal function, SS—Systematic sigmoidal function, DS—Decreasing sigmoidal function.

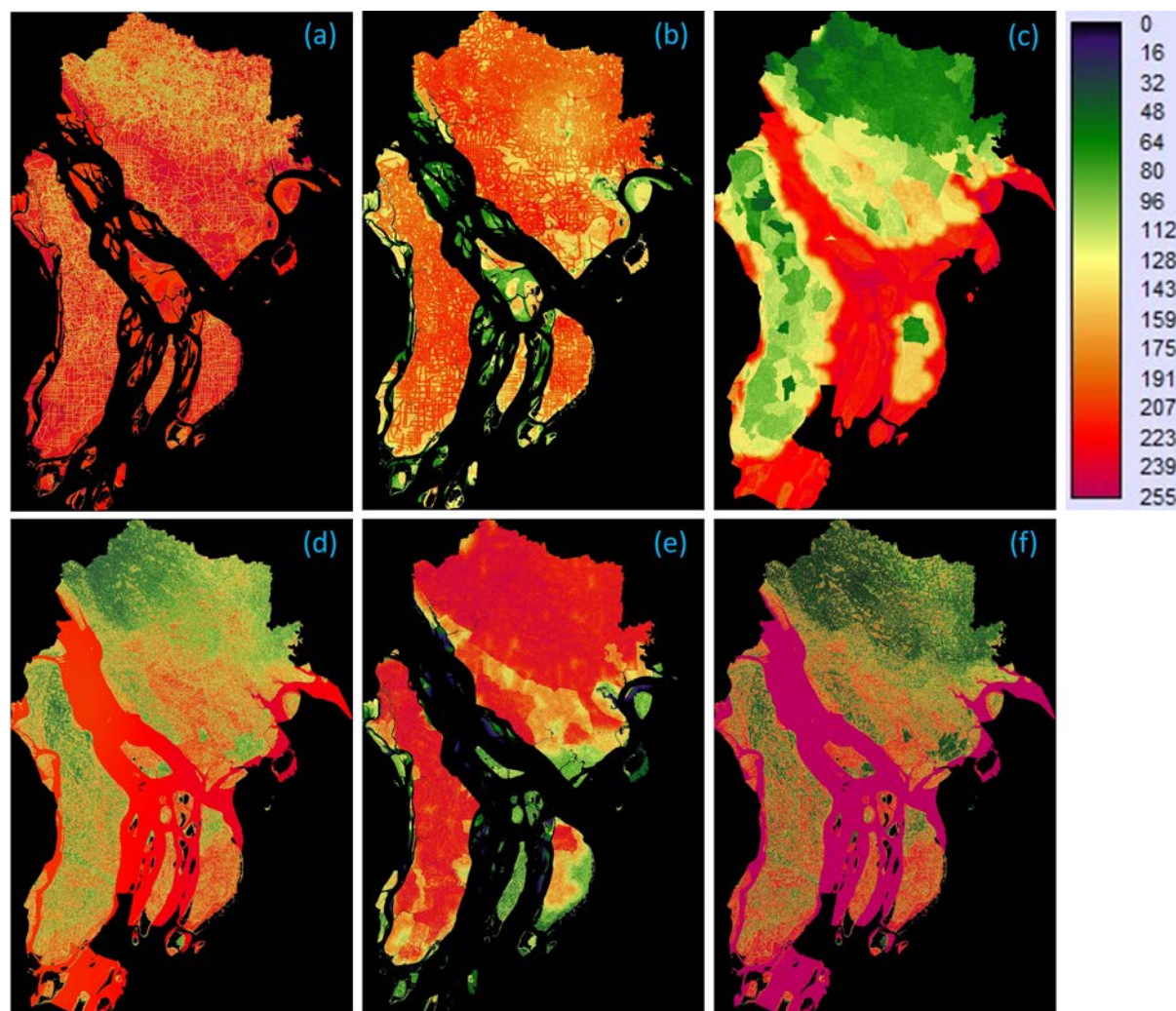


Figure S1. Suitability maps of different LULC types: (a) Agricultural land, (b) RSv, (c) Mangrove, (d) Mud-flat, (e) Built-up, (f) Waterbody.

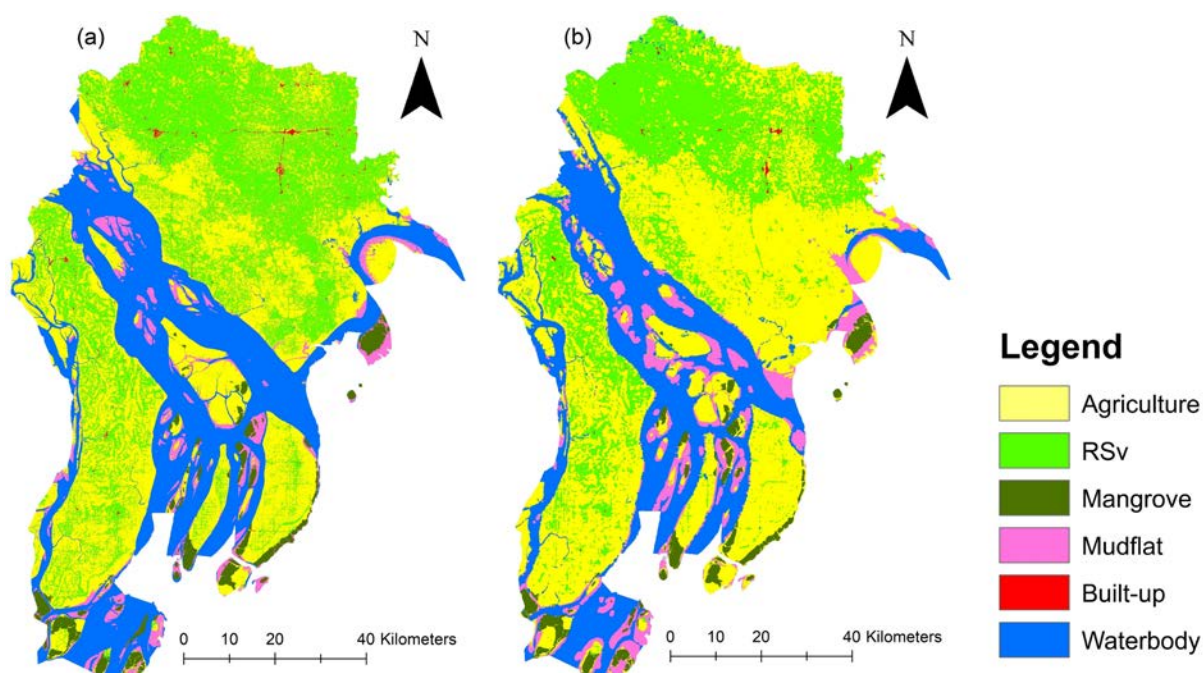


Figure S2. Validation of simulated LULC in 2018: (a) actual LULC map for 2018, (b) simulated LULC map for 2018.

Table S3. LULC transition matrix during 1988-2018 (km²).

1988-1998	Agriculture	RSv	Mangrove	Mudflat	Built-up	Waterbody	Total (1998)
Agriculture	2860.5	405.3	53.5	186.6	0.6	155.5	3662.1
RSv	788.4	753.2	4.6	5.2	0.5	10.0	1562.1
Mangrove	21.7	6.5	155.5	35.8	0.0	16.7	236.1
Mudflat	26.7	1.7	25.3	147.2	0.0	319.7	520.6
Built-up	2.1	1.5	0.0	0.0	1.1	0.0	4.8
Waterbody	136.9	18.6	15.4	142.0	0.0	1582.0	1894.9
Total (1988)	3836.3	1186.7	254.4	516.8	2.2	2083.9	7880.5
1998-2008	Agriculture	RSv	Mangrove	Mudflat	Built-up	Waterbody	Total (2008)
Agriculture	2776.4	598.0	109.4	179.1	1.3	113.9	3778.1
RSv	634.1	929.3	2.2	3.7	1.2	11.5	1581.9
Mangrove	37.0	1.5	109.5	43.6	0.0	13.0	204.5
Mudflat	21.7	0.7	3.3	163.4	0.0	261.2	450.3
Built-up	2.9	1.9	0.0	0.0	2.2	0.0	7.0
Waterbody	191.0	30.6	11.7	130.3	0.0	1494.9	1858.6
Total (1998)	3663.2	1561.9	236.0	520.1	4.8	1894.5	7880.5
2008-2018	Agriculture	RSv	Mangrove	Mudflat	Built-up	Waterbody	Total (2018)
Agriculture	2408.7	340.1	33.0	95.2	1.6	121.2	2999.7
RSv	1025.0	1197.5	8.4	1.9	1.0	2.7	2236.5
Mangrove	14.6	0.6	138.8	32.2	0.0	3.3	189.5
Mudflat	28.4	1.3	9.0	130.0	0.0	201.8	370.6
Built-up	10.4	8.8	0.0	0.0	4.4	0.1	23.7
Waterbody	291.0	33.6	15.3	191.0	0.0	1529.5	2060.4
Total (2008)	3778.1	1581.9	204.5	450.3	7.0	1858.6	7880.5
1988-2018	Agriculture	RSv	Mangrove	Mudflat	Built-up	Waterbody	Total (2018)
Agriculture	2111.2	218.9	77.9	194.1	0.4	397.2	2999.7
RSv	1247.7	889.7	43.2	35.2	0.4	20.4	2236.5
Mangrove	10.2	4.4	87.8	25.7	0.0	61.4	189.5

Mudflat	28.4	2.7	8.5	61.0	0.0	270.0	370.6
Built-up	12.4	9.5	0.0	0.0	1.5	0.3	23.7
Waterbody	426.5	61.5	36.9	200.9	0.0	1334.6	2060.4
Total (1988)	3836.3	1186.7	254.4	516.8	2.2	2083.9	7880.5

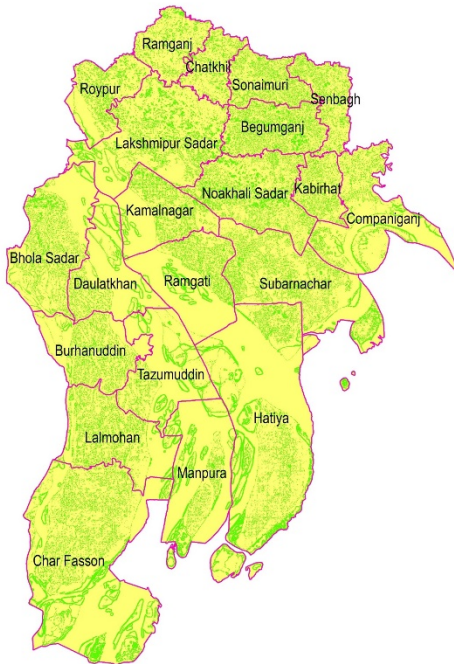
Table S4. Total ESVs and their change rates, 1988-2018.

		Agricultural land	RSv	Mangrove	Mud-flat	Built-up	Waterbody	Total
ESV(million US\$)	1988	1742.83	529.39	302.05	355.73	0.11	1590.77	4520.88
	1998	1663.19	696.77	279.90	357.84	0.22	1447.97	4445.89
	2008	1715.00	705.63	242.45	309.50	0.33	1421.69	4394.61
	2018	1361.98	997.73	224.78	254.90	1.11	1575.05	4415.54
ESV (%)	1988	38.55	11.71	6.68	7.87	0.00	35.19	100.00
	1998	37.41	15.67	6.30	8.05	0.01	32.57	100.00
	2008	39.03	16.06	5.52	7.04	0.01	32.35	100.00
	2018	30.85	22.60	5.09	5.77	0.03	35.67	100.00
ESV change (million US\$)	1988-1998	-79.65	167.38	-22.15	2.11	0.12	-142.80	-74.99
	1998-2008	51.82	8.87	-37.46	-48.34	0.11	-26.27	-51.28
	2008-2018	-353.02	292.09	-17.67	-54.60	0.79	153.35	20.93
	1988-2018	-380.86	468.34	-77.28	-100.83	1.01	-15.72	-105.34
Change rate	1988-1998	-0.46	3.16	-0.73	0.06	11.17	-0.90	-0.17
	1998-2008	0.31	0.13	-1.34	-1.35	4.71	-0.18	-0.12
	2008-2018	-2.06	4.14	-0.73	-1.76	23.91	1.08	0.05
	1988-2018	-0.44	1.77	-0.51	-0.57	19.12	-0.02	-0.05

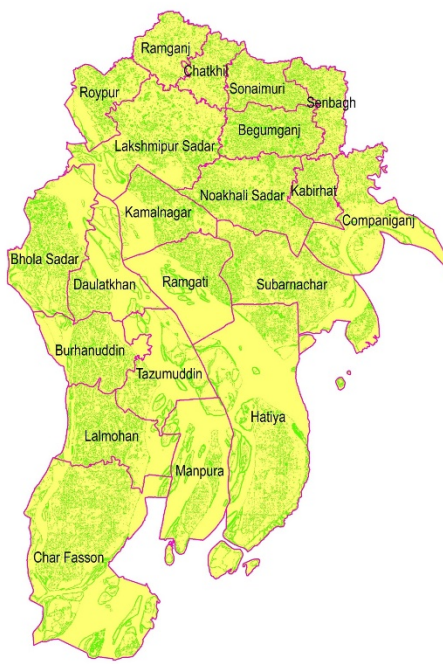
Table S5. ESV across the different ecosystem functions and their changes between 1988 and 2018.

		Ecosystem functions								
		Food production	Raw material	Extreme event management	Climate regulation	Water regulation	Biodiversity protection	Soil formation and retention	Waste treatment	Recreation, cultural and tourism
ESV (million US\$)	1988	535.22	236.94	165.16	411.04	1197.64	428.51	153.40	1132.43	260.54
	1998	520.76	231.37	157.79	411.74	1180.77	424.01	150.56	1112.46	256.42
	2008	528.19	233.68	148.24	406.24	1165.68	409.68	145.27	1103.69	253.94
	2018	490.49	231.09	146.20	410.19	1204.88	415.96	142.22	1117.90	256.62
Change (million US\$)	1988-1998	-14.47	-5.57	-7.36	0.70	-16.87	-4.50	-2.83	-19.97	-4.12
	1998-2008	7.43	2.31	-9.55	-5.50	-15.10	-14.33	-5.29	-8.77	-2.47
	2008-2018	-37.70	-2.60	-2.04	3.95	39.20	6.28	-3.05	14.21	2.68
	1988-2018	-44.74	-5.85	-18.95	-0.85	7.23	-12.55	-11.17	-14.54	-3.92
(%) Change	1988-1998	-2.70	-2.35	-4.46	0.17	-1.41	-1.05	-1.85	-1.76	-1.58
	1998-2008	1.43	1.00	-6.05	-1.34	-1.28	-3.38	-3.52	-0.79	-0.96
	2008-2018	-7.14	-1.11	-1.38	0.97	3.36	1.53	-2.10	1.29	1.05
	1988-2018	-8.36	-2.47	-11.48	-0.21	0.60	-2.93	-7.28	-1.28	-1.50

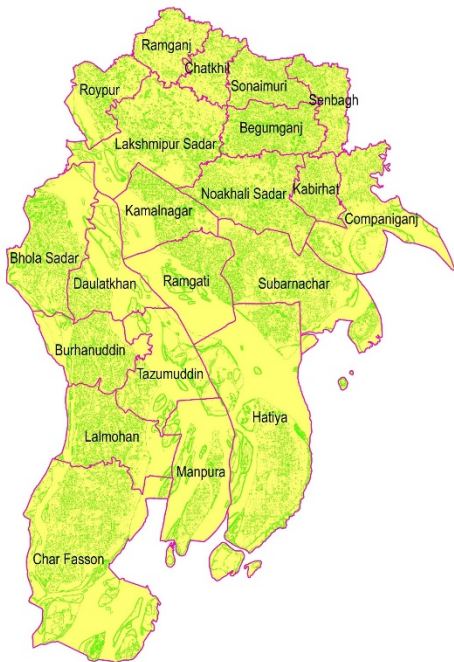
BAUD scenario (2018-2038)



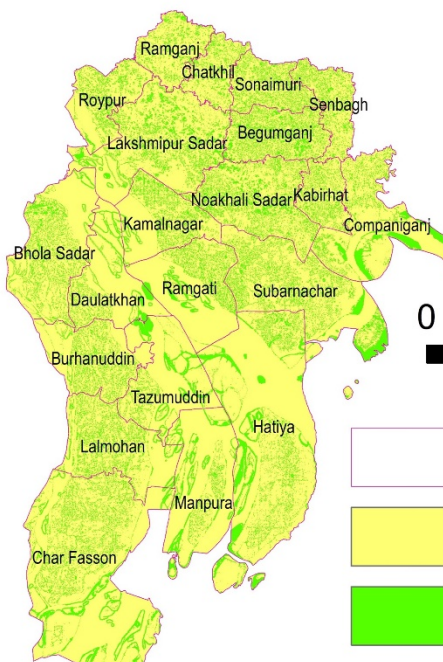
EDP scenario (2018-2038)



EPP scenario (2018-2038)



ADP scenario (2018-2038)



0 10 20 40
km

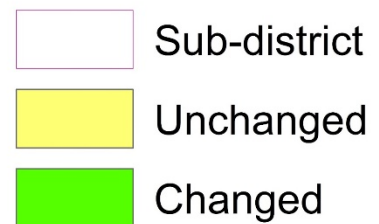


Figure S3. Change detection of LULC during 2018-2038 under the different land management scenarios.

Table S6. ESVs under different scenarios in 2038 and their change rates.

ESV (million US\$)	Time period	Agriculture	RSv	Mangrove	Mudflat	Built-up	Waterbody	Total
	2018	1361.98	997.73	224.78	254.90	1.11	1575.05	4415.54
	2038BAU	1266.12	1099.89	188.60	318.59	2.03	1498.95	4374.18
	2038EDP	1155.95	1161.90	185.86	323.91	2.33	1569.22	4399.16
	2038EPP	1189.84	1077.42	308.94	398.98	2.03	1498.95	4476.15
	2038ADP	1200.53	1077.99	490.14	276.86	2.03	1498.95	4546.50
ESV (%)	2018	30.85	22.60	5.09	5.77	0.025	35.67	100.00
	2038BAU	28.95	25.15	4.31	7.28	0.046	34.27	100.00
	2038EDP	26.28	26.41	4.22	7.36	0.05	35.67	100.00
	2038EPP	26.58	24.07	6.90	8.91	0.05	33.49	100.00
	2038ADP	26.41	23.71	10.78	6.09	0.04	32.97	100.00
ESV change (million US\$)_	2018-2038BAU	-95.86	102.16	-36.17	63.69	0.91	-76.10	-41.37
	2018-2038EDP	-206.03	164.17	-38.92	69.01	1.21	-5.83	-16.38
	2018-2038EPP	-172.14	79.69	84.16	144.08	0.91	-76.10	60.61
	2018-2038ADP	-161.45	80.27	265.37	21.95	0.91	-76.10	130.95
Change rate	2018-2038BAU	-0.70	1.02	-1.61	2.50	8.21	-0.48	-0.09
	2018-2038EDP	-1.63	1.49	-2.06	2.17	5.99	-0.04	-0.04
	2018-2038EPP	-1.49	0.69	4.53	4.45	3.92	-0.48	0.14
	2018-2038ADP	-1.36	0.74	8.59	0.55	4.50	-0.51	0.29

Table S7. ESV changes across ecosystem functions under the different scenarios in 2038.

	Scenario	Ecosystem functions								
		Food production	Raw material	Extreme event management	Climate regulation	Water regulation	Biodiversity protection	Soil formation and retention	Waste treatment	Recreation, cultural and tourism
ESV (million US\$)	2018	490.49	231.09	146.20	410.19	1204.88	415.96	142.22	1117.90	256.62
	2038BAUD	473.68	225.19	139.06	412.51	1210.39	406.60	138.00	1113.49	255.25
	2038EDP	461.85	224.33	140.08	414.87	1230.21	409.41	137.62	1123.63	257.17
	2038EPP	460.50	219.39	165.92	424.21	1223.61	448.99	154.14	1119.68	259.71
	2038ADP	464.14	220.09	199.50	427.55	1189.50	508.22	175.94	1099.74	261.81
Change (million US\$)	2018-2038BAUD	-16.81	-5.90	-7.14	2.32	5.51	-9.36	-4.22	-4.41	-1.37
	2018-2038EDP	-28.64	-6.75	-6.12	4.68	25.33	-6.55	-4.61	5.74	0.55
	2018-2038EPP	-29.99	-11.70	19.72	14.02	18.74	33.03	11.92	1.79	3.09
	2018-2038ADP	-26.35	-10.99	53.29	17.36	-15.38	92.26	33.72	-18.15	5.19
(%) Change	2018-2038BAUD	-3.43	-2.55	-4.88	0.57	0.46	-2.25	-2.97	-0.39	-0.53
	2018-2038EDP	-5.84	-2.92	-4.19	1.14	2.10	-1.57	-3.24	0.51	0.21
	2018-2038EPP	-6.11	-5.06	13.49	3.42	1.56	7.94	8.38	0.16	1.21
	2018-2038ADP	-5.37	-4.76	36.45	4.23	-1.28	22.18	23.71	-1.62	2.02

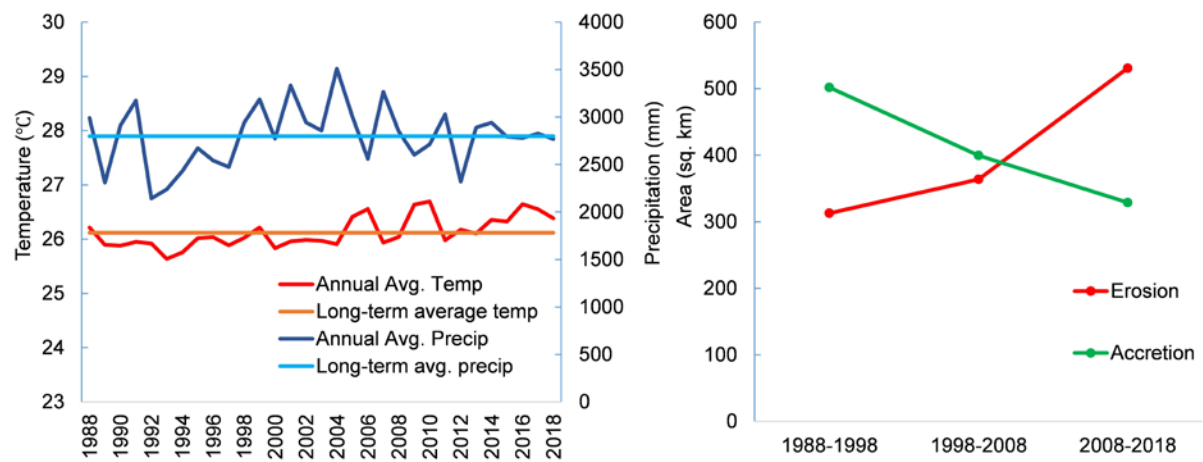


Figure S4. Changes of climatic factors in the LMRE during 1988-2018.