

Table S1. Major landslide disasters in the Cox's Bazar District, Bangladesh.

Date	Location of Landslides	Rainfall Sequence	Consequences
16 June 2003	Light House Para, Cox's Bazar	474 mm – 12 days 4 – 15 June 2003	6 fatalities and 2 injuries
29 July 2003	Kalatali, Cox's Bazar	330 mm – 11 days 19 – 28 July 2003	6 killed and 9 injuries
3 July 2008	Cox's Bazar Sadar/ Municipality (CBM)	688 mm – 7 days 26 June – 2 July	12 fatalities and several injured
6 July 2008	Teknaf, Cox's Bazar	981 mm – 10 days 26 June – 5 July	4 people killed
7 April 2010	Ramu, Cox's Bazar District	No rainfall, but landslide occurred	2 fatalities and several injuries
15 June 2010	Different locations in Bandarban and Cox's Bazar districts	523 mm – 6 days 10 – 15 June 2010	47 fatalities in Cox's Bazar and 7 in Bandarban and over 100 injured
26 June 2015	Ramu, Saint Martin; Ghonapara, Lighthouse Para and Shahittika Polli in Cox's Bazar Municipality	978 mm – 4 days 23 – 26 June 2015	8 killed, 100 villages flooded, 1000 houses damaged, roads damaged, 2 people untraced and many injured
28 June 2015	Teknaf, Ramu, Chokoria, and Pekua Upazila, Cox's Bazar	5 days of heavy rainfall (674 mm)	21 killed, roads and municipalities are flooded
27 July 2015	South Baharchharha area, Cox's Bazar	682 mm rainfall in 6 days	5 fatalities, and 4 houses buried
13 June 2017	All five hill districts	300 mm rainfall in 24 hours	159 killed and 88 injured
25 July 2017	Sadar and Ramu Upazila, Cox's Bazar	677 mm rainfall in 6 days	5 killed and 5 injured
11 June 2018	Ukhia Rohingya camps	459 mm rainfall in 4 days	1 killed and 500 injured

Date	Location of Landslides	Rainfall Sequence	Consequences
12 June 2018	Maheshkhali Upazila		1 killed
25 July 2018	Miar Ghona, CBM and Dokkhin Mithachori, Ramu Upazila	228 mm rainfall in 24 hours	5 killed
May–July 2019	Ukhia Rohingya Camps, Cox's Bazar	Several days of continuous rainfall	Landslides affected more than 50,000 refugees, 6,300 refugees were temporarily displaced, 10 fatalities have been reported and 42 refugees have been injured
10 September 2019	Notun Pollan Para, Teknaf, Cox's Bazar	422 mm rainfall in 24 hours	2 children killed and 6 injured

Source: Ahmed, 2017 and national daily newspapers.

Table S2. Details of the satellite images used for land cover mapping.

Serial No	Satellite/Sensor	Row No	Path No	Date (dd/mm/yyyy)	Cloud Cover (%)
1	Landsat TM	136	45	27/03/1998	0.00
2	Landsat TM	136	45	31/10/2001	0.00
3	Landsat 8	136	45	15/03/2017	0.05
4	Landsat 8	136	45	02/03/2018	0.02

Table S3. Land cover classification system.

Land cover classification	Label
A3 = Trees (Main Layer) A11 = Open General (60-70%) – (20- 10%) (Main Layer) B2 = >30- 3 m (Tree height Main Layer) D1 = Broadleaved E1 = Evergreen E4 = Semi-Deciduous or Semi-Evergreen Zt38 = Floristic Aspect: Artocarpus chaplasha, Dipterocarpus spp	Forest
A4 = Shrubs (Main Layer) A10 = Close > 60-70% Main Layer B3 = 5-0.3m (Shrubs Height Main Layer) D1 = Broadleaved E1 = Evergreen L2 = Sloping Land L8 = Hilly Terrain	Shrubland
A6 = Graminoids A10 = Deciduous B4 = 3 - 0.03 m (Herbaceous Height Main Layer) A5 = Bare Soil and/or Other Unconsolidated Material(s)	Grassland
A3 = Herbaceous Crops C3 = One Additional Crop B2= Small Sized Field(s)	Cropland
A2 = Unconsolidated Bare Area	Barren land

Land cover classification	Label
A5 = Bare Soil & Unconsolidated Material	
A1= Inland Water	Waterbodies
A4 = Built Up Area – Non-Linear A13 = Urban Area(s) A15 = Medium Density	Builtup areas

Source: Gregorio, 2005.

Table S4. Land cover classification accuracy of 2018.

Land cover	Forest	Shrubland	Grassland	Cropland	Barren land	Waterbodies	Built-up areas	Total	User's Accuracy (%)
Forest	359	16		8				383	93.73
Shrubland	10	88	2	3			2	105	83.81
Grassland		1	38	2	2	2		45	84.44
Cropland	14		2	272	1	1		290	93.79
Barren land			1	3	74	6		84	88.10
Waterbodies			1	1	7	88		97	90.72
Built-up areas			1	1			10	12	83.33
Total	383	105	45	290	84	97	12		
Producer's Accuracy (%)	93.73	83.81	84.44	93.79	88.10	90.72	83.33		

Total Number of Samples	1016	Standard Error of kappa	0.02
No. of Accurate Samples	929	95% Confidence Interval	0.770 to 0.850
Overall Accuracy (%)	91.44	Weighted Kappa	0.906
Kappa	0.81		

Table S5. Land cover classification accuracy of 2017.

Land Cover	Forest	Shrubland	Grassland	Cropland	Barren land	Waterbodies	Built-up areas	Total	User's Accuracy (%)
Forest	359	16		6				381	94.23
Shrubland	10	88	2	3			2	105	83.81
Grassland		1	37	2	3	2		45	82.22
Cropland	14		1	272	2	1		290	93.79
Barren land			1	4	72	7		84	85.71
Waterbodies			1	2	7	87		97	89.69
Built-up areas			1	1			10	12	83.33
Total	383	105	43	290	84	97	12		
Producer's Accuracy (%)	93.73	83.81	86.05	93.79	85.71	89.69	83.33		

Total Number of Samples	1014	Standard Error of kappa	0.02
No. of Accurate Samples	925	95% Confidence Interval	0.770 to 0.850
Overall Accuracy (%)	91.22	Weighted Kappa	0.906
Kappa	0.81		

Table S6. Land cover classification accuracy of 1998.

Land Cover	Forest	Shrubland	Grassland	Cropland	Barren land	Waterbodies	Built-up areas	Total	User's Accuracy (%)
Forest	368	46	6	13	7	3	5	448	82.14
Shrubland	0		0					0	
Grassland	6	41	35	7	1	1	3	94	37.23
Cropland	9	4	1	255	2	5	3	279	91.40
Barren land		8	3	5	62	16		94	65.96
Waterbodies		6		10	12	72		100	72.00
Built-up areas							1	1	100.00
Total	383	105	45	290	84	97	12		
Producer's Accuracy (%)	96.08	0.00	77.78	87.93	73.81	74.23	8.33		

Total Number of Samples	1016	Standard Error of kappa	0.02
No. of Accurate Samples	793	95% Confidence Interval	0.770 to 0.850
Overall Accuracy (%)	78.05	Weighted Kappa	0.906
Kappa	0.81		

Table S7. Land cover change pattern in CBD.

Land cover type	Area (km ²)		
	1998	2017	2018
Forest	962.73	907.62	851.87
Shrubland	0.00	33.90	221.19
Grassland	220.78	330.30	90.29
Cropland	611.25	508.37	618.61
Barren land	222.94	218.81	211.86
Waterbodies	111.83	121.00	111.71
Built-up areas	9.84	19.38	33.85

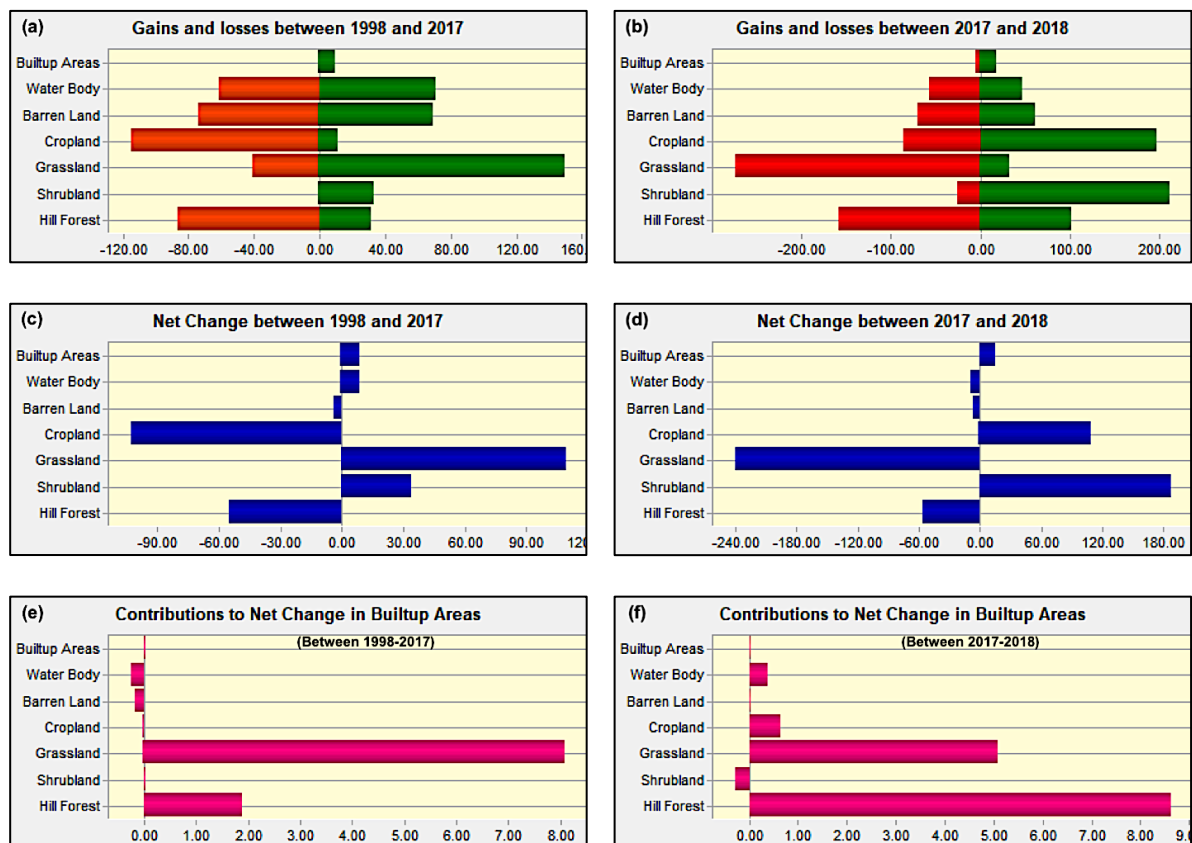


Fig. S1. Land cover changes between 1998-2017 and between 2017-2018 (all units are in km²).

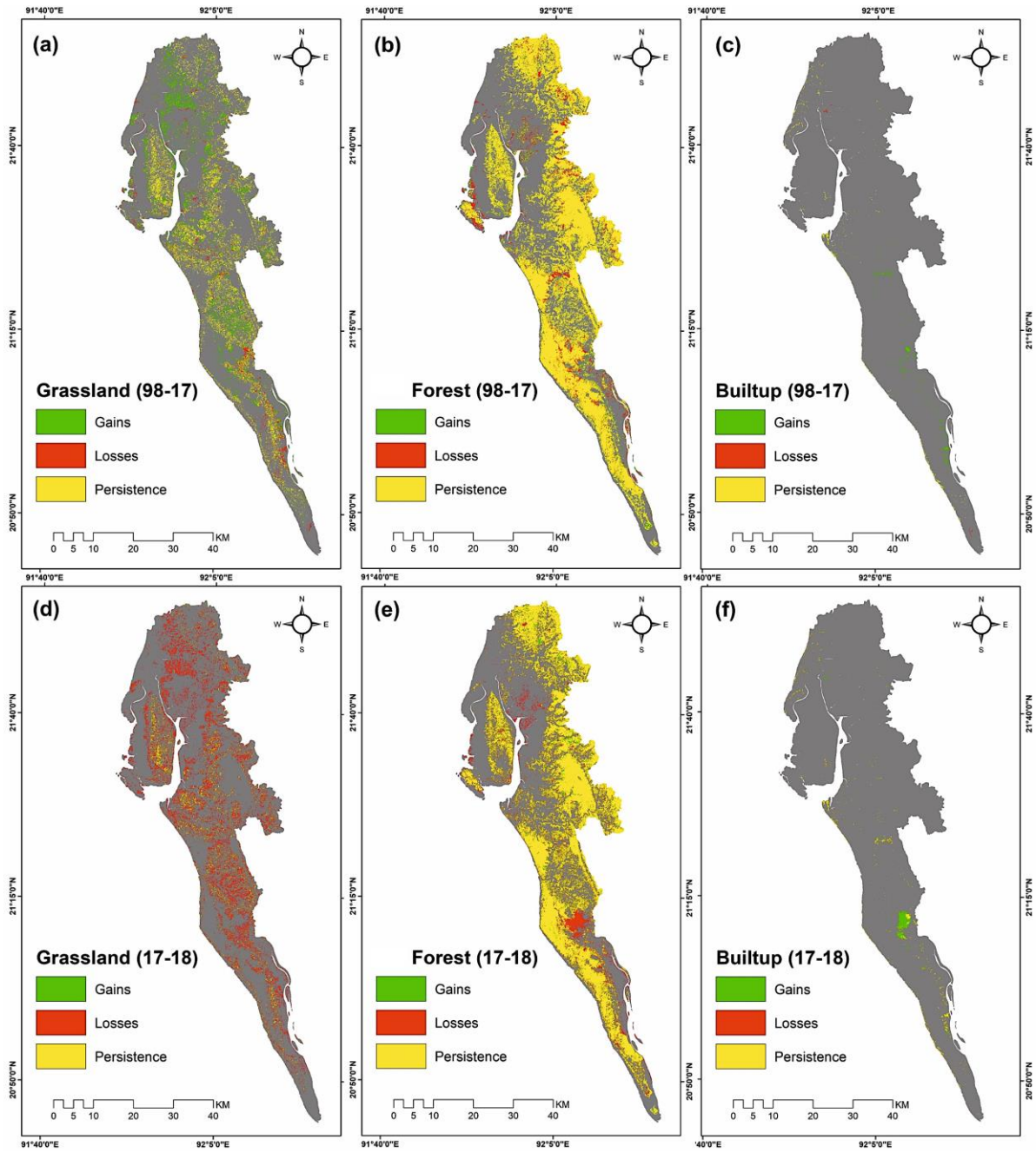


Fig. S2. Changes in grassland, forest, and builtup areas land cover types (a-c) between 1998–2017, (d-f) and between 2017–2018.

