

**Supplemental Table S1.** Landuse and UGS area(average ± standard deviation) in Secondary UFUs of Haikou City from 2016 to 2020 .

Primary UFUs types	Secondary UFUs	Forest area (hm <sup>2</sup> )		Grassland area (hm <sup>2</sup> )		Built-up land area (hm <sup>2</sup> )		Water area (hm <sup>2</sup> )		Bareland area (hm <sup>2</sup> )		UGS (hm <sup>2</sup> )	
		2016	2020	2016	2020	2016	2020	2016	2020	2016	2020	2016	2020
Public affairs service districts	Governmental Agencies	0.18±0.34	0.12±0.35	0.94±1.41	1.02±1.61	2.57±3.95	2.64±4.14	0.37±1.41	0.36±1.39	0.58±1.07	0.48±0.86	1.11±1.69	1.14±1.88
	Colleges/Universities	4.22±6.2	3.1±5.61	18.46±24.23	19.34±26.01	17.14±22.27	18.03±23.47	3.41±7.07	3.12±6.72	7.06±9.48	6.7±7.53	22.68±30.40	22.44±31.62
	Primary/Middle Schools	0.06±0.07	0.04±0.05	1.2±1.33	1.32±1.43	2.32±1.57	2.18±1.4	0±0	0±0	0.8±0.79	0.85±0.82	1.26±1.36	1.35±1.45
	Research Institutes	0.03±0	0.02±0.02	1.05±0.71	0.89±1.06	0.28±0.32	0.42±0.07	0±0	0.03±0.01	0.03±0.03	0.04±0.02	1.08±0.71	0.91±1.08
	Hospitals	0.34±0.57	0.15±0.3	1.24±1.76	1.67±2.5	3.64±4.28	3.44±4.26	0.02±0.04	0.01±0.02	0.62±0.97	0.58±0.61	1.58±2.32	1.82±2.79
Industry and business districts	Industry	0.14±0.24	0.07±0.13	2.01±3.57	1.96±3.51	5.29±11.8	5.6±12.98	0.01±0.01	0±0.01	1.1±2.2	0.91±1.3	2.16±3.79	2.03±3.56
	Hotels	0.03±0.07	0.01±0.02	0.34±0.72	0.28±0.36	0.85±0.48	0.96±0.48	0.01±0.02	0.01±0.03	0.1±0.12	0.07±0.11	0.37±0.74	0.29±0.36
	Supermarkets	0.02±0.03	0±0	0.28±0.41	0.27±0.36	1.05±0.42	1.12±0.45	0.08±0.07	0.07±0.08	0.12±0.14	0.1±0.17	0.3±0.44	0.27±0.36
	Industrial Offices	0	0	0	0	0.22	0.34	0	0	0.13	0.01	0	0
Residential districts	Low-Density Residential Areas	0.15±0.2	0.09±0.13	0.97±1.25	0.99±1.29	1.02±0.88	1.09±1.04	0.02±0.07	0.01±0.05	0.16±0.18	0.13±0.18	1.12±1.44	1.08±1.38
	High-Density Residential Areas	0.48±0.66	0.3±0.62	3.15±3.35	3.24±3.21	4.28±6.66	4.47±6.87	0.59±1.91	0.47±1.53	1.33±2.39	1.34±2.66	3.63±3.76	3.54±3.57
Recreation and leisure districts	Museums	0.42±0.81	0.36±0.68	0.88±1.08	1.57±1.87	2.42±3.44	3.24±5.28	0.1±0.14	0.08±0.11	1.81±3.65	0.37±0.46	1.3±1.87	1.9±2.28
	Parks	9.6±18.61	8.08±17.78	9.47±12.7	10.92±14.76	3.11±2.24	3.07±2.11	1.37±3.48	1.15±2.83	1.02±1.24	1.36±1.58	19.07±26.84	18.99±27.15
Transportation	Main/Secondary Roads	0.05±0.1	0.02±0.04	0.32±0.41	0.32±0.35	0.8±0.87	0.79±0.87	0.05±0.19	0.07±0.23	0.1±0.21	0.12±0.15	0.37±0.45	0.34±0.36