

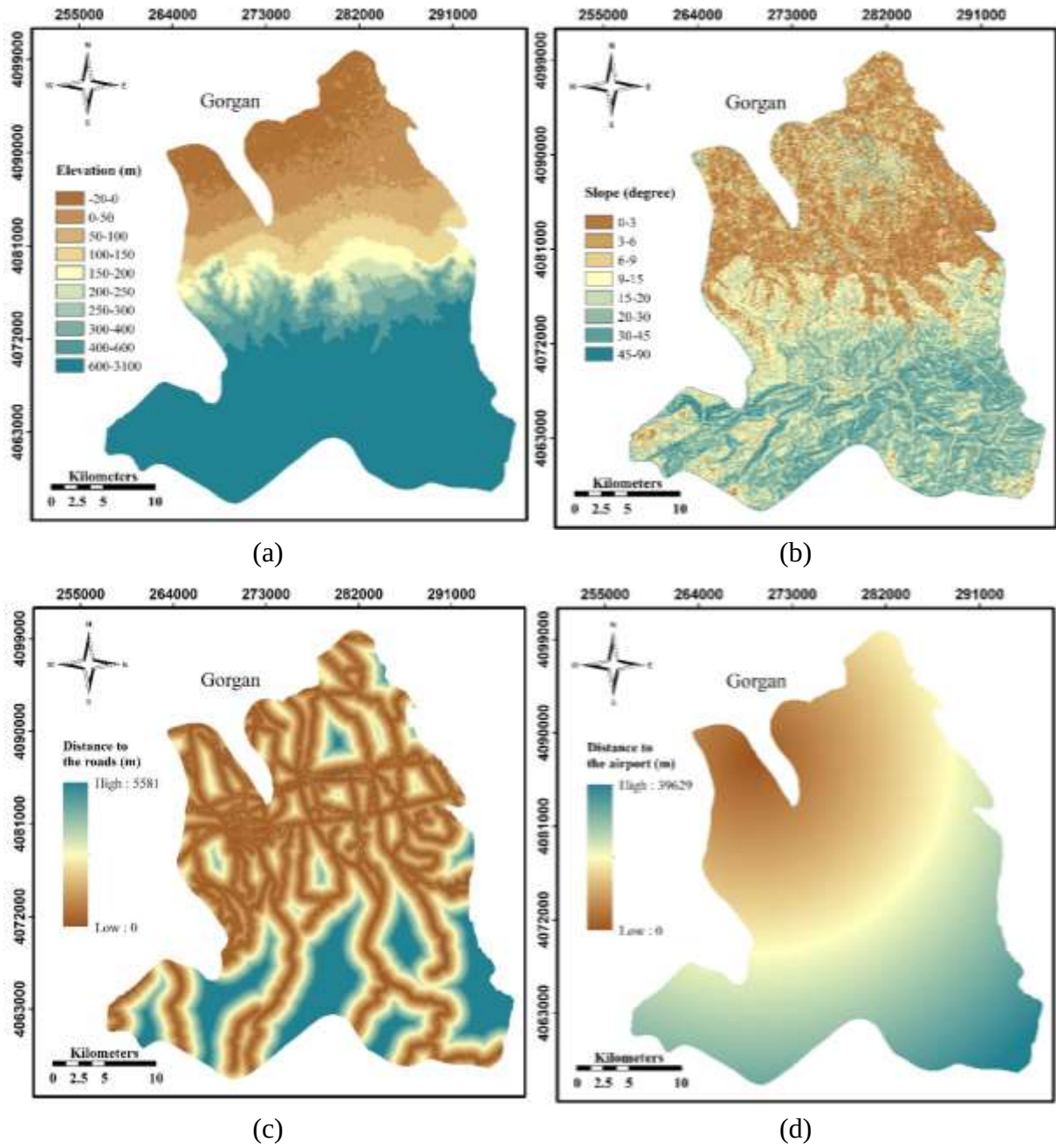


Fig. S1. Urban growth conditioning factors; (a) elevation, (b) slope, (c) roads, (d) airport (e) industrial sites, (f) qanats, (g) railways, (h) rivers, (i) forest, (j) spring

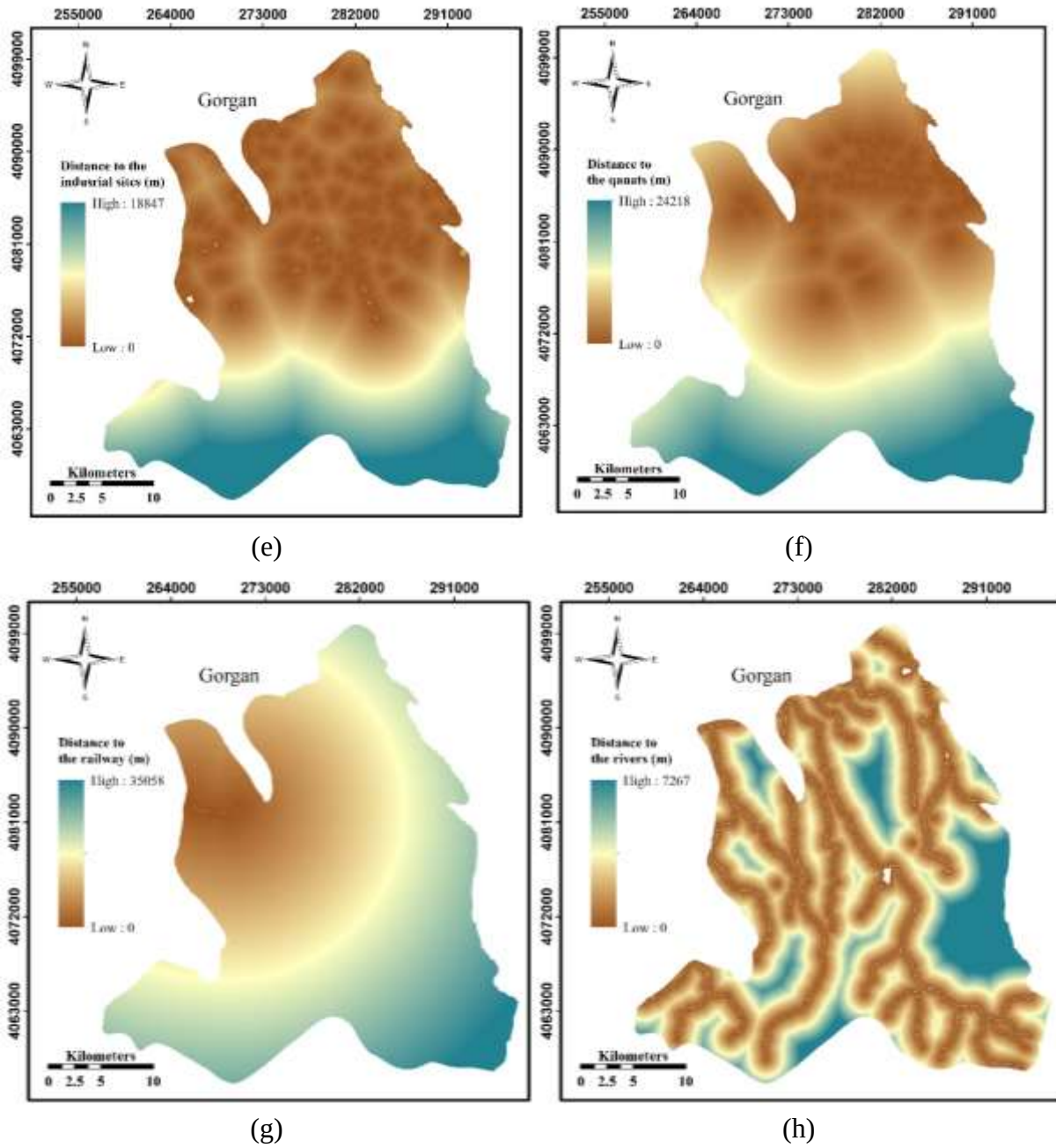
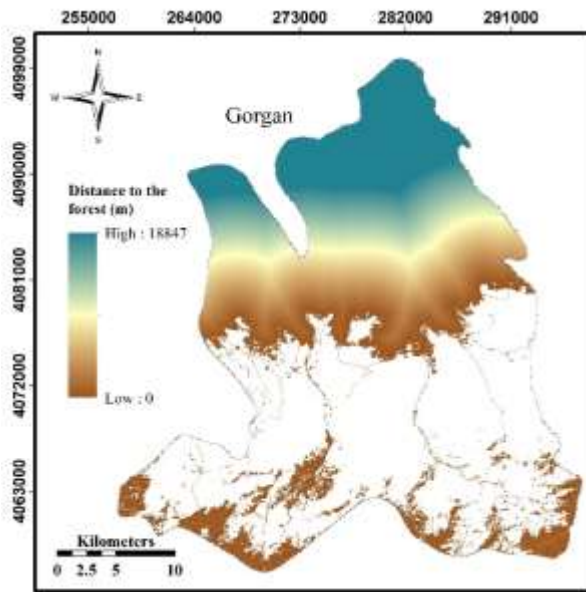
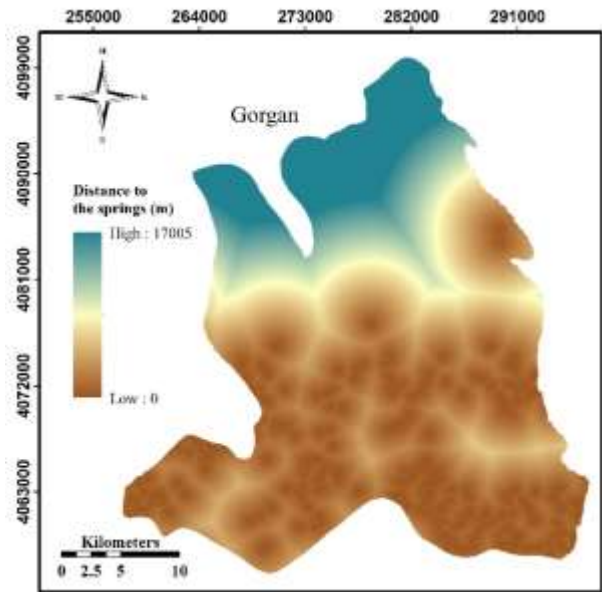


Fig. S1. Urban growth conditioning factors; (a) elevation, (b) slope, (c) roads, (d) airport (e) industrial sites, (f) qanats, (g) railways, (h) rivers, (i) forest, (j) spring



(i)



(j)

Fig. S1. Urban growth conditioning factors; (a) elevation, (b) slope, (c) roads, (d) airport (e) industrial sites, (f) qanats, (g) railways, (h) rivers, (i) forest, (j) spring

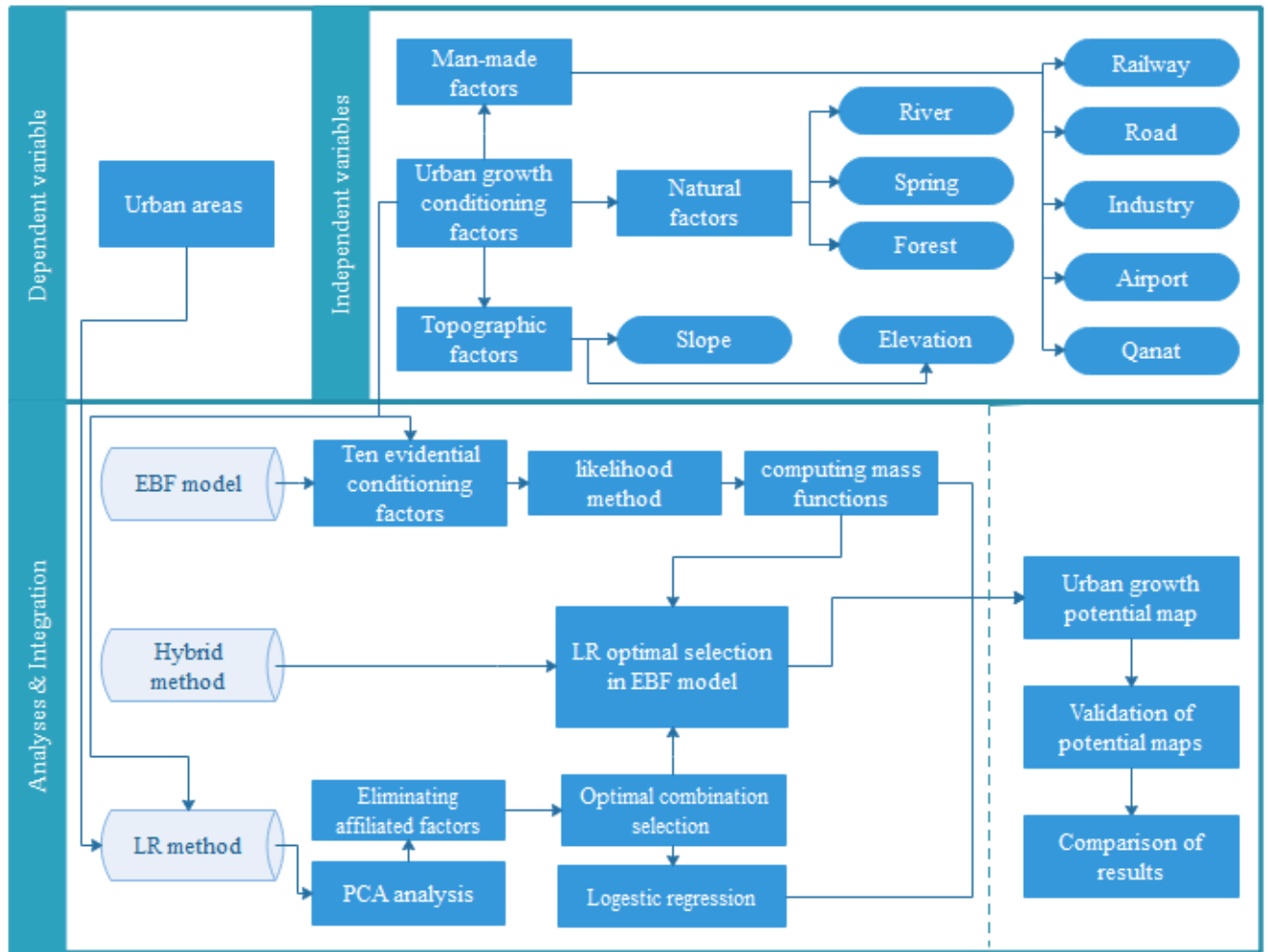


Fig. S2. Research flowchart

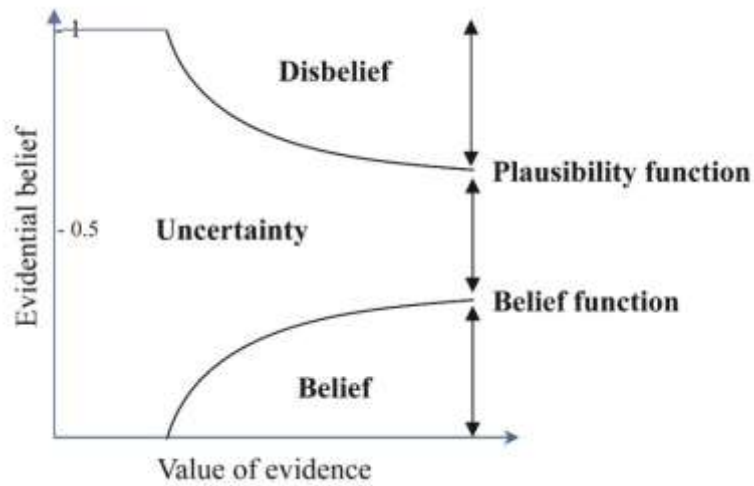


Fig. S3. Schematic relationships of evidential belief functions (Carranza et al. 2005)

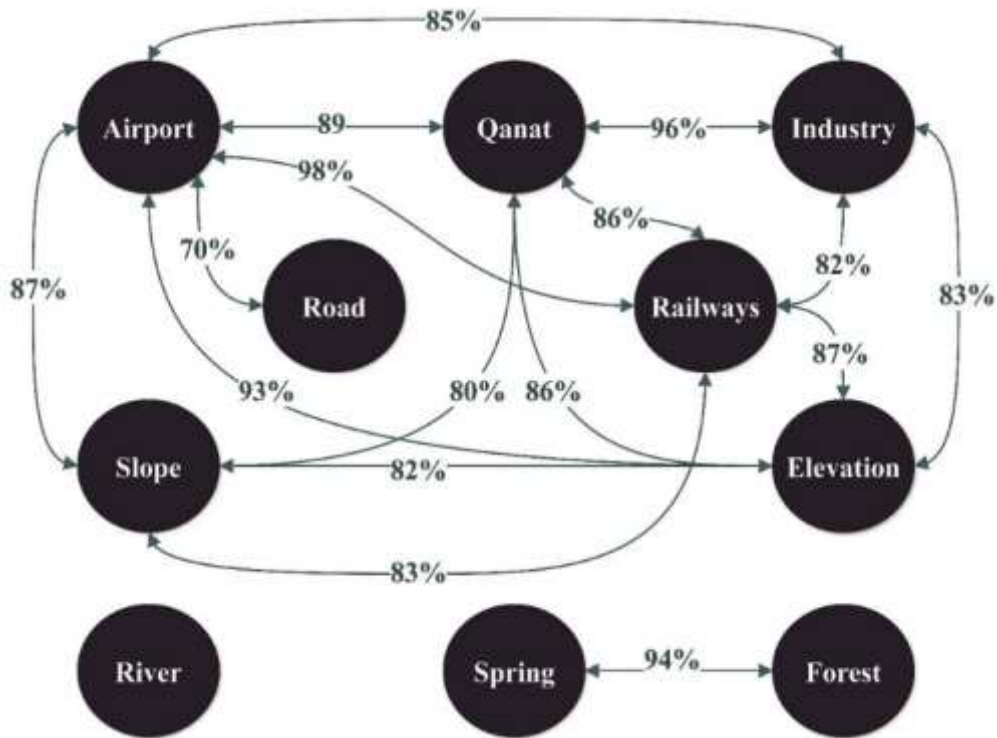


Fig. S4. Significant correlations among independent factors

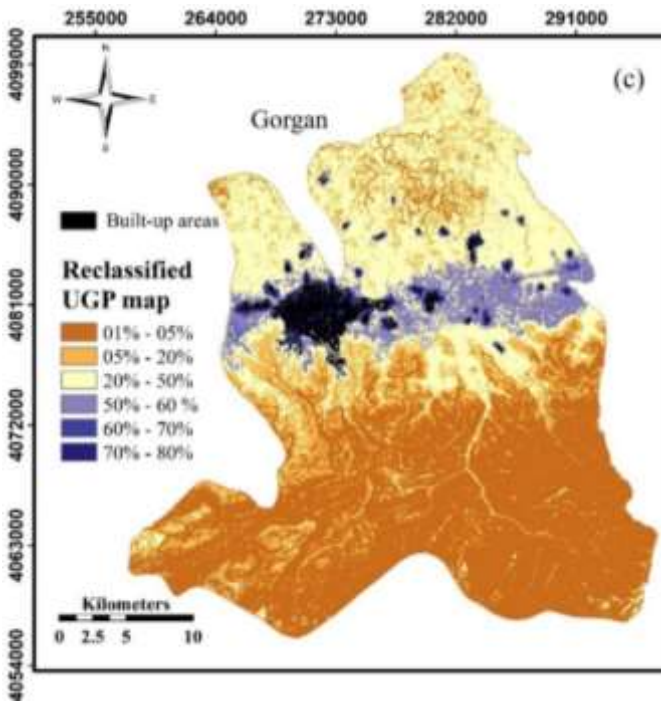
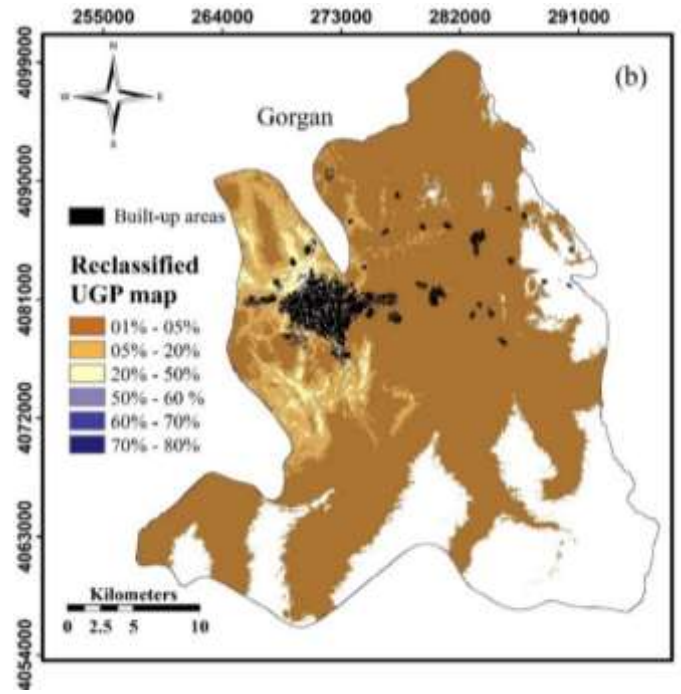
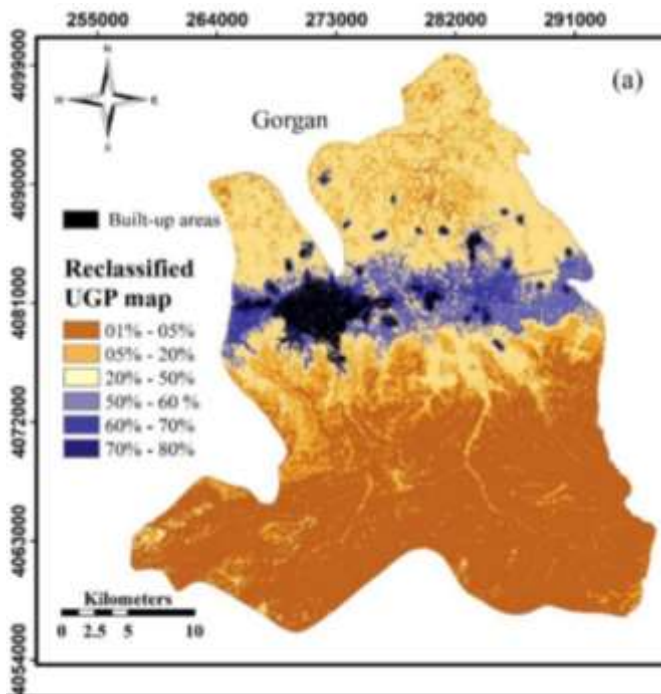


Fig. S5. Reclassified UGP maps derived from: (a) the EBF model, (b) the LR model, (c) the hybrid model.

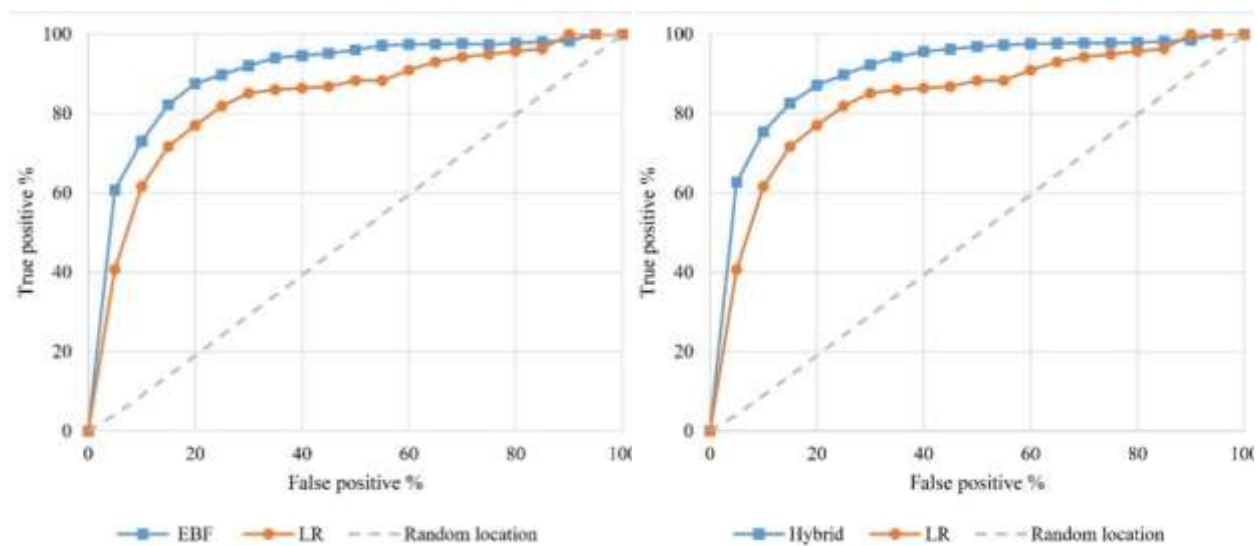


Fig. S6. Relative Operative Characteristic (ROC) curves

Table S1. The calculated mass functions for urban growth conditioning factors								
Factor	Class	No. of urban pixels	% of urban pixels	No. of pixels in domain	% of pixels in domain	$m(T_P)$	$m(\bar{T}_P)$	$m(\Theta)$
Spring	0-500	0	0.00	168771	15.43	0	0.035952	0.964048
	1000-1500	91	0.28	124086	11.35	0.000443788	0.034138	0.965418
	2000-2500	708	2.19	63961	5.85	0.006768467	0.031448	0.961784
	3000-3500	2434	7.52	38098	3.48	0.04126945	0.028934	0.929796
	4000-4500	3428	10.59	27902	2.55	0.084698167	0.027672	0.88763
	5000-5500	4122	12.73	22509	2.06	0.135561157	0.026851	0.837587
	6000-6500	3894	12.02	19186	1.75	0.15398195	0.026988	0.81903
	7000-7500	1241	3.83	16279	1.49	0.049902219	0.029494	0.920604
	8000-8500	234	0.72	14868	1.36	0.009669209	0.030436	0.959895
	9000-9500	616	1.90	13734	1.26	0.028395613	0.030031	0.941574
	10000-10500	50	0.15	12782	1.17	0.002374715	0.030554	0.967071
	11000-11500	13	0.04	12480	1.14	0.00063055	0.030582	0.968788
	12000-12500	3	0.01	12628	1.15	0.00014369	0.030596	0.969261
	13000-13500	0	0.00	11522	1.05	0	0.030566	0.969434
	14000-14500	81	0.25	9374	0.86	0.005270687	0.030425	0.964304
	15000-15500	47	0.15	7683	0.70	0.003721946	0.030409	0.965869
	More than 16000	0	0.00	6490	0.59	0	0.030421	0.969579
Slope	0-3	12598	38.93	167365	15.31	0.377111266	0.089406	0.533483
	3-6	12463	38.51	186241	17.03	0.332256945	0.091945	0.575798
	6-9	4439	13.72	107709	9.85	0.199139419	0.119519	0.681342
	9-15	2065	6.38	162218	14.84	0.059735327	0.137868	0.802397
	15-20	447	1.38	123007	11.25	0.016896822	0.139412	0.843691
	20-30	155	0.48	196213	17.95	0.003662633	0.152643	0.843695
	30-45	178	0.55	132938	12.16	0.006211536	0.142132	0.851656
	45-90	19	0.06	17673	1.62	0.004986051	0.127076	0.867938
Roads	0-100	11801	36.44	128557	11.75	0.295469042	0.054679	0.649852
	100-200	9003	27.80	105370	9.63	0.273106032	0.0608	0.666094
	200-300	5368	16.58	96419	8.82	0.172345587	0.069867	0.757787
	300-400	2878	8.89	84977	7.77	0.102476741	0.075609	0.821914
	400-500	1566	4.84	74323	6.80	0.062920093	0.078225	0.858855
	500-600	829	2.56	63508	5.81	0.038663828	0.079287	0.882049
	600-700	515	1.59	55622	5.09	0.027319506	0.079474	0.893207
	700-800	268	0.83	49174	4.50	0.016019355	0.079599	0.904382
	800-900	106	0.33	41024	3.75	0.007572928	0.079374	0.913053
	900-1000	36	0.11	36912	3.38	0.00285385	0.079232	0.917914
	1000-1100	13	0.04	33004	3.02	0.001151915	0.078989	0.919859
	1100-1200	1	0.00	28909	2.64	0.000101124	0.078706	0.921193
	More than 1200	0	0.00	295850	27.05	0	0.106158	0.893842
Rivers	0-100	2439	7.53	71603	6.55	0.044165834	0.028265	0.927569
	200-300	2647	8.17	62365	5.70	0.055514115	0.027804	0.916682

	400-500	2355	7.27	59050	5.40	0.052023658	0.027993	0.919984
	600-700	2084	6.44	55133	5.04	0.049201149	0.028143	0.922656
	800-900	1732	5.35	47915	4.38	0.046969991	0.028277	0.924753
	1000-1100	1392	4.30	43011	3.93	0.041889225	0.028463	0.929648
	1200-1300	1302	4.02	40003	3.66	0.042135052	0.028464	0.929401
	1400-1500	1088	3.36	31318	2.86	0.045076012	0.028425	0.926499
	1600-1700	613	1.89	25449	2.33	0.030912459	0.028706	0.940382
	1800-1900	341	1.05	22031	2.01	0.019690174	0.028864	0.951446
	2000-2100	162	0.50	17757	1.62	0.011531359	0.028912	0.959557
	2200-2300	138	0.43	15371	1.41	0.011346146	0.028868	0.959786
	2400-2500	129	0.40	12491	1.14	0.013069402	0.028797	0.958134
	2600-2700	144	0.44	9962	0.91	0.018369367	0.028714	0.952917
	2800-2900	81	0.25	8574	0.78	0.011944793	0.028734	0.959322
	3000-3100	54	0.17	6560	0.60	0.010395238	0.028703	0.960901
	More than 3400	0	0.00	61173	5.59	0	0.030323	0.969677
Railways	0-500	1099	3.39	6920	0.63	0.050001795	0.023066	0.926932
	2000-2500	2690	8.31	10227	0.94	0.094523385	0.021928	0.883548
	4000-4500	2336	7.21	12198	1.12	0.062732608	0.022239	0.915028
	6000-6500	747	2.31	16730	1.53	0.012377924	0.023552	0.96407
	8000-8500	240	0.74	16341	1.49	0.003947698	0.023932	0.97212
	10000-10500	349	1.08	18326	1.68	0.005141546	0.023894	0.970964
	12000-12500	0	0.00	19233	1.76	0	0.024184	0.975816
	14000-14500	190	0.59	21541	1.97	0.00235679	0.024091	0.973552
	16000-16500	77	0.24	28960	2.65	0.000706048	0.024352	0.974942
	18000-18500	72	0.22	32607	2.98	0.000586094	0.024442	0.974972
	20000-20500	172	0.53	28957	2.65	0.001582515	0.024278	0.974139
	More than 20500	0	0.00	296575	27.12	0	0.032966	0.967034
Qanat	0-500	1600	4.94	69050	6.31	0.029917709	0.070425	0.899657
	500-1000	2286	7.06	78448	7.17	0.037855431	0.069465	0.89268
	1000-1500	2567	7.93	63338	5.79	0.053274551	0.067757	0.878968
	1500-2000	2922	9.02	56518	5.17	0.06876036	0.066474	0.864766
	2000-2500	3294	10.17	50624	4.63	0.087776326	0.065229	0.846995
	2500-3000	4754	14.68	44851	4.10	0.149533193	0.061516	0.78895
	3000-3500	4989	15.41	42449	3.88	0.16797167	0.060836	0.771192
	3500-4000	4278	13.21	38188	3.49	0.159112134	0.062199	0.778688
	4000-4500	2942	9.08	33436	3.06	0.121679827	0.06494	0.81338
	4500-5000	1403	4.33	30637	2.80	0.060528476	0.068251	0.87122
	5000-5500	590	1.82	28497	2.61	0.026664237	0.069952	0.903383
	5500-6000	487	1.50	26659	2.44	0.023468339	0.070061	0.90647
	6000-6500	272	0.84	25763	2.36	0.013457746	0.070487	0.916055
	More than 6500	0	0.00	505191	46.19	0	0.132405	0.867595
Forest	0-200	59	0.18	627218	57.35	1.60766E-05	0.037056	0.962928
	800-1000	837	2.58	9422	0.86	0.01666111	0.014914	0.968425
	1600-1800	1246	3.85	6999	0.64	0.037011991	0.014681	0.948307
	2400-2600	1809	5.59	7052	0.64	0.058962717	0.014408	0.926629

	3200-3400	2018	6.23	6843	0.63	0.0714731	0.014304	0.914223
	4000-4200	1026	3.17	6361	0.58	0.032864854	0.014779	0.952357
	4800-5000	273	0.84	6112	0.56	0.007989929	0.015141	0.976869
	5600-5800	42	0.13	5718	0.52	0.00126452	0.015247	0.983488
	6400-6600	165	0.51	5248	0.48	0.005547312	0.015181	0.979272
	7200-7400	398	1.23	5070	0.46	0.014557909	0.015065	0.970377
	8000-8200	125	0.39	4825	0.44	0.004544969	0.015194	0.980261
	8800-9000	27	0.08	4665	0.43	0.000994837	0.015239	0.983766
	9600-9800	0	0.00	4727	0.43	0	0.015253	0.984747
	10400-10600	49	0.15	4646	0.42	0.001821547	0.015228	0.98295
	11200-11400	0	0.00	4580	0.42	0	0.015251	0.984749
	12000-12200	99	0.31	4889	0.45	0.003531982	0.015208	0.98126
	More than 13000	0	0.00	71856	6.57	0	0.016288	0.983712
Elevation	-20	316	0.83	98211	8.64	0.005357	0.105084	0.889559
	0-50	1736	4.55	123214	10.84	0.023717	0.103585	0.872699
	50-100	7555	19.79	84170	7.40	0.163652	0.083226	0.753122
	100-150	18773	49.17	113760	10.01	0.327997	0.053708	0.618294
	150-200	5799	15.19	43208	3.80	0.257263	0.084746	0.65799
	200-250	2398	6.28	33465	2.94	0.128101	0.09309	0.77881
	250-300	1400	3.67	28309	2.49	0.086344	0.095315	0.818341
	350-400	206	0.54	45374	3.99	0.007569	0.100115	0.892316
	400-600	0	0.00	61096	5.37	0	0.102203	0.897797
	600-3100	0	0.00	505988	44.51	0	0.178928	0.821072
Industry	0-200	901	2.78	41371	3.78	0.017334378	0.054908	0.927757
	400-600	2759	8.52	69142	6.32	0.032360223	0.053014	0.914626
	800-1000	3101	9.58	61452	5.62	0.041378062	0.051982	0.90664
	1200-1400	2334	7.21	46470	4.25	0.041174142	0.052598	0.906228
	1600-1800	1905	5.88	32534	2.97	0.048426027	0.05265	0.898924
	2000-2200	1946	6.01	20340	1.86	0.082372706	0.051962	0.865665
	2400-2600	1653	5.10	15742	1.44	0.091350171	0.052247	0.856403
	2800-3000	1360	4.20	11198	1.02	0.107633824	0.052531	0.839835
	3200-3400	368	1.14	7750	0.71	0.038814184	0.054085	0.907101
Airport	0-500	0	0.00	843	0.08	0	0.022093	0.977907
	2000-2500	4	0.01	4535	0.41	0.000300753	0.022168	0.977531
	4000-4500	224	0.69	10781	0.99	0.007228553	0.022143	0.970628
	6000-6500	1870	5.77	11773	1.08	0.064330759	0.020997	0.914672
	8000-8500	2844	8.78	13199	1.21	0.093567137	0.020336	0.886097
	10000-10500	898	2.77	15557	1.42	0.020869682	0.021764	0.957366
	12000-12500	579	1.79	18558	1.70	0.010971269	0.022055	0.966974
	14000-14500	733	2.26	20283	1.85	0.01277324	0.021981	0.965246
	16000-16500	69	0.21	21813	1.99	0.001081069	0.02249	0.976429
	18000-18500	34	0.10	18288	1.67	0.000634548	0.022439	0.976927
	20000-20500	11	0.03	17950	1.64	0.0002089	0.022448	0.977343
	More than 22000	0	0.00	443631	40.56	0	0.037932	0.962068

Table S2. The calculated ROC values and ODD ratios for the LR model																			
ODD	ROC	Slope	Elevation	Industry	Forest	Rail	Road	River	ODD	ROC	Slope	Elevation	Industry	Forest	Rail	Road	River		
5.0049	0.7576								39.4259	0.8941									
4.4267	0.6999								35.4692	0.8929									
17.1416	0.8456								5.8792	0.8089									
3.9584	0.7805								45.3424	0.901									
0.3974	0.7767								19.2419	0.841									
0.0212	0.8217								0.3555	0.8686									
0.2556	0.7923								34.6146	0.8851									
0	0.8492								54.7449	0.8941									
0.4151	0.7373								7.6149	0.7795									
0.0639	0.7822								38.0455	0.8947									
6.419	0.7747								3.2291	0.8161									
32.6717	0.8776								17.9121	0.8394									
2.1307	0.7958								4.3778	0.7757									
10.9573	0.8316								18.0317	0.8470									
2.9246	0.7521								0.1083	0.8591									
16.7103	0.8419								0.2747	0.7923									
0	0.7722								0.2850	0.8347									
0.0223	0.7124								0.0862	0.8507									
0	0.7632								29.8595	0.8802									
0.131	0.8088								4.1223	0.7938									
0.543	0.7142								37.3927	0.8865									
43.3839	0.8891								16.7400	0.8381									
1.6533	0.7829								0.3057	0.8121									
3.5762	0.8178								42.4239	0.8793									
4.8632	0.7256								2.5653	0.7680									
4.5853	0.8118								47.1634	0.8913									
0.2879	0.8611								3.2241	0.8144									
0.4199	0.7732								0.4868	0.8679									
0.2135	0.8314								36.8551	0.8776									
0.1313	0.8489								0.813	0.813									
30.4116	0.8768								0.2172	0.8093									
1.7322	0.7709								38.7677	0.8821									