

Supplementary Materials

Table S1. The annual sustainability index and the index of each subsystem in each city from 2002 to 2017

City	index	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Benxi	Risk	54.57	41.62	38.24	38.45	40.86	40.71	42.21	45.41	45.43	49.17	54.57	54.73	55.12	54.92	60.63	53.20
	Economy	28.53	28.79	29.65	30.45	31.29	32.24	33.63	35.53	37.09	40.10	42.65	44.32	45.36	45.08	43.19	37.74
	Livelihood	35.07	35.06	35.72	35.84	36.40	37.09	37.90	38.79	40.12	41.05	43.22	45.89	46.71	47.03	44.05	44.90
	Environment	37.31	36.83	38.27	36.51	36.92	37.49	37.60	36.27	39.01	37.70	37.28	44.65	43.58	45.36	31.39	48.15
	Pollution governance	43.93	45.48	56.87	57.43	58.73	59.05	58.76	58.16	56.97	55.80	54.54	52.84	52.56	52.43	54.93	54.64
	Resource	39.25	36.84	41.54	38.21	38.95	32.94	34.60	34.64	35.06	51.96	56.71	46.91	43.32	40.82	46.10	45.23
	Sustainability	40.05	37.21	39.60	39.07	40.18	39.35	40.35	41.28	41.98	46.54	49.18	48.47	48.01	47.62	47.97	46.98
Fuxin	Risk	33.29	34.84	41.11	43.91	40.91	42.71	43.55	47.53	48.03	51.44	51.94	51.76	52.34	53.30	57.17	49.60
	Economy	24.81	25.19	25.44	25.57	25.71	26.08	26.54	26.63	27.23	28.62	29.40	30.07	30.55	30.43	28.72	27.34
	Livelihood	10.01	10.01	10.82	11.18	12.85	13.64	14.79	15.68	20.20	21.41	28.01	30.87	35.28	35.83	28.94	30.36
	Environment	44.89	43.57	42.32	40.30	39.54	38.43	35.78	32.47	29.43	21.69	15.13	9.07	5.86	6.92	11.42	22.59
	Pollution governance	77.94	78.18	80.85	81.61	84.37	85.37	86.49	87.13	89.78	90.37	92.52	93.22	94.15	94.26	92.59	92.92
	Resource	80.57	83.40	83.10	85.00	84.71	85.17	82.49	82.54	82.19	81.85	81.21	80.92	79.51	79.53	78.07	78.56
	Sustainability	45.41	46.27	47.91	48.84	48.80	49.49	49.29	50.01	50.93	51.32	52.10	52.07	52.48	52.86	52.16	51.85
Hegang	Risk	16.91	27.71	37.68	51.95	46.83	44.88	52.03	56.17	46.26	51.58	54.37	53.58	51.91	47.07	43.83	41.82
	Economy	16.77	16.76	16.85	16.87	17.03	17.15	17.60	18.20	18.53	19.40	20.38	21.14	20.19	18.80	18.46	17.90
	Livelihood	6.76	6.96	8.33	8.67	9.43	11.06	12.18	13.66	16.49	19.16	22.09	26.91	25.91	26.22	30.91	36.21
	Environment	48.18	48.14	50.36	49.76	50.62	51.71	51.87	51.84	53.71	53.31	52.41	53.58	54.80	58.25	61.12	64.49
	Pollution governance	45.87	46.75	52.36	52.73	54.40	56.58	57.79	59.05	60.83	62.06	63.09	64.48	64.13	64.12	65.12	66.02
	Resource	82.44	84.13	92.30	93.66	94.71	89.82	90.53	91.52	91.90	91.73	89.67	89.59	89.78	90.52	92.83	91.47
	Sustainability	35.93	38.59	43.51	46.68	46.35	45.69	47.71	49.27	48.31	50.06	50.90	51.93	51.36	50.65	51.54	52.02
Jiamusi	Risk	47.03	50.82	31.03	47.03	46.08	44.16	30.30	46.87	42.68	42.58	46.54	45.59	43.21	43.46	42.66	44.21
	Economy	24.89	25.72	26.27	27.17	26.80	27.95	29.12	30.10	30.81	31.18	32.96	31.39	33.81	33.20	33.35	34.31
	Livelihood	10.83	10.48	10.74	10.51	10.98	10.92	11.01	11.35	11.80	13.33	13.64	15.79	16.57	16.31	17.68	18.37
	Environment	43.94	44.38	45.24	46.06	46.38	47.50	49.06	50.88	52.36	55.09	58.15	59.83	64.07	63.12	65.25	66.81
	Pollution governance	54.31	54.95	61.78	62.75	64.39	66.63	68.47	70.19	71.67	73.70	74.66	75.41	76.71	76.34	77.08	77.72

	Resource	86.79	87.54	87.54	84.98	89.79	82.80	84.66	88.24	86.87	86.54	86.00	84.71	84.80	82.37	84.44	84.72
	Sustainability	45.91	47.07	44.37	47.43	48.48	47.36	45.64	50.36	49.83	50.62	52.16	52.00	52.77	52.02	52.83	53.74
Jixi	Risk	59.59	62.71	62.30	64.39	63.49	63.87	65.28	66.55	64.60	64.43	64.39	61.63	60.76	63.01	62.22	55.70
	Economy	20.58	20.64	20.57	20.78	20.35	20.60	20.98	21.50	21.91	22.68	23.34	23.69	23.77	22.68	22.32	23.43
	Livelihood	6.26	6.32	7.03	7.20	7.88	8.27	8.61	9.10	9.51	10.10	11.23	12.47	13.03	13.78	14.02	21.32
	Environment	52.26	52.12	52.24	52.07	52.21	52.08	51.79	51.68	51.50	50.96	50.58	50.33	50.92	51.81	51.91	56.21
	Pollution governance	66.55	66.60	68.21	68.51	69.19	69.84	70.54	71.29	71.87	72.71	73.72	74.55	75.27	75.49	75.37	81.68
	Resource	81.42	88.99	89.55	89.97	95.98	96.48	88.11	88.31	88.43	87.96	87.83	87.53	94.07	98.33	93.18	93.24
	Sustainability	48.47	50.62	50.99	51.59	52.75	53.12	51.92	52.50	52.34	52.53	52.91	52.66	54.06	55.38	54.14	55.55
	Risk	35.33	40.42	42.93	44.67	42.90	43.55	45.19	46.02	49.57	52.95	54.19	58.30	54.80	44.12	42.20	31.89
Qiqihaer	Economy	38.71	38.91	38.82	39.54	40.19	41.02	41.87	42.87	42.41	43.51	44.76	48.18	44.30	49.43	51.46	58.49
	Livelihood	9.26	9.24	10.54	10.06	10.03	9.75	9.94	10.17	9.72	10.33	10.54	12.71	10.67	13.74	15.00	19.16
	Environment	28.82	29.68	30.23	31.60	32.20	33.57	35.67	38.61	39.32	44.16	49.40	52.43	54.01	53.38	55.14	56.55
	Pollution governance	56.69	56.73	57.05	57.23	57.58	57.88	58.31	58.77	58.29	58.74	59.19	61.74	58.54	62.74	64.24	69.74
	Resource	91.49	89.00	88.14	89.27	80.23	88.61	91.94	90.87	85.85	75.62	67.70	65.38	66.57	66.58	68.59	60.64
	Sustainability	45.88	46.53	47.14	47.95	46.03	48.14	49.60	50.15	49.70	49.19	48.73	50.78	48.92	48.84	49.85	49.19
Suihua	Risk	62.04	57.46	50.93	54.45	43.14	41.78	43.77	47.87	49.97	48.37	54.81	49.46	54.58	53.63	53.47	52.48
	Economy	30.19	30.20	30.19	30.43	30.25	30.42	30.62	30.89	31.05	31.16	31.51	31.71	31.65	31.57	31.57	31.38
	Livelihood	-3.79	-3.90	-3.17	-3.13	-2.94	-2.69	-2.36	-1.68	-1.31	0.32	1.02	2.54	4.17	4.63	6.03	7.65
	Environment	46.46	46.42	46.26	46.24	46.12	46.08	46.00	45.86	45.84	45.55	45.79	45.49	45.66	45.65	45.48	45.24
	Pollution governance	35.44	38.36	68.69	70.89	73.41	76.29	79.56	83.48	84.90	89.52	90.14	92.97	93.88	94.46	95.72	96.52
	Resource	98.99	97.17	98.95	99.94	97.88	97.07	98.64	98.70	98.85	98.71	98.56	98.45	97.54	96.62	94.15	92.92
	Sustainability	47.64	46.78	50.47	51.75	49.43	49.50	50.79	52.35	53.10	53.68	55.23	54.80	56.03	55.79	55.65	55.50
	Risk	34.63	26.07	33.74	45.52	48.04	50.91	52.26	56.10	47.36	48.29	49.47	50.48	52.25	51.02	42.07	47.55
Yichun	Economy	18.16	18.21	18.02	18.16	18.12	18.16	18.51	18.93	18.78	19.34	19.55	19.88	19.96	19.31	19.12	18.64
	Livelihood	13.70	14.13	15.27	15.90	16.09	17.18	18.64	20.06	22.44	24.32	27.33	30.19	32.00	33.09	40.54	39.13
	Environment	57.37	57.47	57.70	57.94	58.05	58.29	58.62	58.92	59.50	59.76	60.56	60.97	61.54	62.01	64.05	63.86
	Pollution governance	55.96	56.41	57.12	57.56	57.54	58.11	58.86	59.38	59.90	60.15	60.30	60.34	60.33	60.32	60.03	60.19
	Resource	94.50	96.09	95.11	95.55	99.28	95.80	93.25	93.27	94.23	94.28	91.44	91.79	91.86	92.22	91.74	93.06
	Sustainability	45.64	44.40	46.00	48.66	49.94	50.10	50.29	51.47	50.37	51.03	51.29	52.11	52.82	52.72	52.08	53.13
	Risk	34.63	26.07	33.74	45.52	48.04	50.91	52.26	56.10	47.36	48.29	49.47	50.48	52.25	51.02	42.07	47.55

Table S2. The annual sustainability index of each city under different scenarios from 2018 to 2035

City	Scenarios	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Benxi	S1	47.47	47.99	48.52	49.08	49.65	50.25	50.87	51.51	52.17	52.49	52.85	53.23	53.64	54.08	54.55	55.06	55.59	56.16
	S2	47.05	47.13	47.22	47.32	47.44	47.57	47.72	47.88	48.06	48.25	48.46	48.60	48.57	48.57	48.59	48.64	48.71	48.80
	S3	46.83	46.67	46.50	46.33	46.16	45.98	45.79	45.60	45.40	45.19	44.98	44.75	44.52	44.28	44.04	43.64	43.15	42.65
	S4	47.15	47.33	47.53	47.74	47.96	48.20	48.46	48.74	49.03	49.34	49.51	49.56	49.63	49.73	49.86	50.02	50.22	50.44
	S5	46.66	46.37	46.10	45.86	45.64	45.46	45.31	45.20	45.12	45.08	45.08	45.12	45.21	45.14	45.12	45.17	45.27	45.44
Fuxin	S1	52.12	52.32	52.46	52.54	52.56	52.57	52.56	52.54	52.53	52.55	52.61	52.71	52.86	53.08	53.36	53.72	54.15	54.66
	S2	51.85	51.81	51.71	51.59	51.42	51.22	51.01	50.81	50.61	50.43	50.27	50.15	50.07	50.04	50.08	50.18	50.34	50.58
	S3	51.58	51.27	50.91	50.52	50.09	49.63	49.14	48.62	48.08	47.54	46.98	46.43	45.88	45.33	44.78	44.25	43.74	43.25
	S4	51.84	51.75	51.61	51.39	51.11	50.81	50.49	50.15	49.81	49.50	49.21	48.97	48.78	48.65	48.59	48.61	48.72	48.92
	S5	51.62	51.34	51.03	50.69	50.33	49.95	49.59	49.26	48.96	48.69	48.48	48.32	48.24	48.22	48.28	48.41	48.61	48.87
Hegang	S1	52.36	52.72	53.11	53.53	53.84	54.17	54.53	54.92	55.35	55.80	56.29	56.81	57.36	57.94	58.54	59.17	59.82	60.49
	S2	52.13	52.25	52.39	52.54	52.70	52.81	52.90	53.00	53.12	53.26	53.42	53.59	53.79	54.00	54.24	54.49	54.76	55.06
	S3	51.97	51.91	51.84	51.76	51.67	51.57	51.46	51.26	51.03	50.78	50.51	50.21	49.89	49.55	49.17	48.76	48.32	47.83
	S4	52.09	52.16	52.24	52.34	52.44	52.52	52.54	52.58	52.62	52.68	52.76	52.84	52.95	53.07	53.21	53.36	53.53	53.72
	S5	51.94	51.88	51.84	51.84	51.86	51.90	51.91	51.95	52.04	52.17	52.35	52.57	52.84	53.15	53.51	53.90	54.34	54.82
Jixi	S1	55.79	56.05	56.34	56.52	56.71	56.93	57.18	57.46	57.76	58.10	58.47	58.86	59.28	59.73	60.21	60.71	61.23	61.78
	S2	55.60	55.66	55.73	55.80	55.77	55.73	55.70	55.66	55.63	55.59	55.55	55.49	55.43	55.34	55.23	55.09	54.91	54.68
	S3	55.57	55.58	55.56	55.53	55.47	55.39	55.21	55.00	54.75	54.47	54.13	53.73	53.26	52.69	51.99	51.11	49.95	48.37
	S4	55.52	55.50	55.48	55.45	55.43	55.40	55.34	55.24	55.13	55.01	54.89	54.74	54.58	54.39	54.18	53.92	53.62	53.26
	S5	55.44	55.37	55.32	55.30	55.21	55.15	55.12	55.13	55.18	55.27	55.39	55.55	55.75	55.99	56.26	56.57	56.91	57.29
Jiamusi	S1	54.22	54.72	55.24	55.77	56.32	56.88	57.45	57.95	58.46	58.98	59.51	60.05	60.60	61.14	61.67	62.21	62.75	63.30
	S2	54.04	54.34	54.64	54.95	55.27	55.58	55.89	56.19	56.43	56.67	56.91	57.15	57.39	57.63	57.86	58.09	58.32	58.54
	S3	53.84	53.92	53.98	54.02	54.03	54.02	53.98	53.91	53.80	53.67	53.50	53.29	53.03	52.74	52.41	52.03	51.60	51.12
	S4	53.94	54.14	54.35	54.56	54.77	54.99	55.20	55.40	55.54	55.69	55.83	55.97	56.11	56.25	56.38	56.51	56.63	56.74
	S5	53.86	54.00	54.16	54.36	54.57	54.81	55.04	55.22	55.43	55.65	55.89	56.14	56.42	56.70	57.01	57.32	57.66	58.00
Qiqihaer	S1	50.00	50.84	51.71	52.60	53.53	54.47	55.43	56.41	57.40	58.41	59.42	60.34	61.24	62.14	63.04	63.95	64.75	65.52
	S2	49.71	50.25	50.80	51.37	51.94	52.52	53.10	53.68	54.27	54.85	55.43	56.00	56.53	57.01	57.50	57.98	58.45	58.92
	S3	49.57	49.93	50.26	50.56	50.84	51.08	51.28	51.45	51.58	51.66	51.71	51.71	51.66	51.56	51.41	51.20	50.94	50.62
	S4	49.61	50.04	50.48	50.93	51.37	51.83	52.28	52.73	53.17	53.61	54.04	54.47	54.83	55.16	55.48	55.79	56.10	56.39
	S5	49.11	49.08	49.08	49.13	49.21	49.34	49.50	49.70	49.88	49.98	50.09	50.24	50.40	50.60	50.81	51.05	51.31	51.59

Suihua	S1	55.67	55.84	56.02	56.21	56.41	56.61	56.83	57.05	57.26	57.45	57.64	57.83	58.02	58.22	58.42	58.61	58.81	59.00
	S2	55.60	55.69	55.79	55.89	56.00	56.10	56.21	56.32	56.43	56.54	56.64	56.74	56.81	56.88	56.95	57.02	57.08	57.13
	S3	55.55	55.59	55.61	55.62	55.61	55.59	55.56	55.51	55.44	55.35	55.25	55.13	54.98	54.82	54.63	54.41	54.17	53.90
	S4	55.45	55.40	55.36	55.32	55.28	55.25	55.21	55.18	55.15	55.12	55.08	55.03	54.96	54.89	54.81	54.73	54.65	54.56
	S5	55.46	55.42	55.40	55.40	55.41	55.43	55.47	55.52	55.59	55.67	55.75	55.84	55.92	56.01	56.11	56.22	56.34	56.46
Yichun	S1	53.56	54.02	54.52	55.06	55.62	56.21	56.81	57.44	58.07	58.71	59.35	60.00	60.64	61.28	61.90	62.51	63.11	63.70
	S2	53.39	53.68	53.99	54.32	54.67	55.03	55.41	55.79	56.18	56.58	56.98	57.38	57.78	58.18	58.56	58.94	59.31	59.67
	S3	53.34	53.56	53.77	53.98	54.19	54.40	54.60	54.80	54.98	55.16	55.32	55.47	55.60	55.71	55.81	55.88	55.93	55.94
	S4	53.29	53.49	53.71	53.96	54.24	54.54	54.85	55.18	55.52	55.87	56.22	56.58	56.94	57.30	57.66	58.01	58.35	58.68
	S5	53.27	53.45	53.65	53.87	54.12	54.38	54.67	54.97	55.28	55.60	55.93	56.26	56.60	56.94	57.28	57.61	57.94	58.27