Supplementary Table S1 List of forest parks in Guizhou Province

NO.	Landform type	Park name	Park level	Approval time	Area (km^2)
1		Dejiang tea county forest park	local level	Dec. 2015	297
2		Luohan Mountain Forest Park	local level	Dec. 2003	78.9
3		Shixian Mountain Forest Park	local level	Jun. 2005	628.7
4		Shiqian Wufeng Mountain Forest Park	local level	Dec. 2013	349.66
5		Daozhen red Guanya county forest park	local level	Feb. 2006	1841.73
6		Sinan Wansheng Mountain provincial forest park	local level	Dec. 2010	638.75
7		Wuchuan Nanshan county Nanshan Forest park	local level	Mar. 2006	1601.74
8		Chishui Zhuhai National Forest Park	national level	May. 1993	11200
9		Huangping Wuyang Lake National Forest Park	national level	Dec. 2004	21183.2
10		Tongzi county Liangfengya provincial forest park	local level	Apr. 2005	596
11		Yuping autonomous county Nanmenpo provincial forest park	local level	Jul. 2016	324.2
12		Fenggang Wanfo provincial forest park	local level	Jul. 2005	2187.66
13		Fenggang west tea sea county forest park	local level	Nov. 2005	1466.67
14		Yinjiang autonomous county Alingguan provincial forest park	local level	Jul. 2016	1757.45
15	Karst trough valleys	Yuqing Yuhu mountain municipal forest park	local level	Nov. 2014	950
16		Yuqing old Linhe provincial forest park	local level	Nov. 2014	1924.66
17		Songtao Daxing county forest park	local level	Jul. 2007	151.33
18		Old mountain Pass provincial forest Park	local level	Dec. 2005	1382.7
19		Meitan Longquan provincial forest Park	local level	Jan. 2004	475.4
20		Chishui Yanziyan National Forest Park	national level	Nov. 2001	10400
21		Yanhe Wujiang provincial forest park	local level	Jan. 2016	2808.12
22		Zheng 'an Jiudaosui National Forest Park	national level	Dec. 2006	1244.5
23		Jiangkou Kaima provincial forest park	local level	Jul. 2017	2239.1
24		Kaili Apple Mountain Forest Park	local level	Mar. 2002	8.5
25		Suiyang Guanyinyan county forest park	local level	Jan. 2012	187.57
26		Zunyi Loushanguan provincial forest park	local level	Sept. 2001	1367
27		Xishui National Forest Park	national level	Dec. 2003	14027.46
28		Xishuiqing Mountain provincial forest park	local level	Jan. 2011	203.83
29		Yanhe Qiaojia county forest park	local level	Aug. 2006	134

30		Luolong National Ecological Park	national level	Dec. 2015	2053
31		Ceheng County Wanchongshan provincial forest park	local level	Aug. 2016	1155.7
32		Sandu Yaoren Mountain National Forest Park	national level	Nov. 2001	4787
33		Lipo Land Dingshan provincial Forest Park	local level	Dec. 2010	3503
34	Peak cluster depressions	Luodian Cui stall provincial forest park	local level	Aug 2006	1737.12
35		Anlong Xianheping National Forest Park	national level	Dec. 2005	9065
36		Pingtang raised Heshan county forest park	local level	Jun. 2011	73.79
37		Zilin Mountain National Forest Park	national level	Dec. 2004	3529
38		Ziyun Lang Fengguan county forest Park	local level	Sept. 2000	259
39		Zhenning white horse lake county forest park	local level	1997	243
40		Huishui Ye Meiling provincial forest park	local level	May. 1997	1600
41		Kowloon Mountain National Forest Park	national level	Nov. 2001	12500
42		Danzhai Longquanshan provincial forest park	local level	Jul. 2001	1884
43		Qingyun Lake National Forest Park	national level	Dec. 2005	2980
44		Longjiashan National Forest Park	national level	Dec.2006	6079
45		Majiang Xianrenqiao Provincial Forest Park	local level	Nov. 2004	5763
46		Yunguanshan provincial forest park	local level	May. 1993	2028
47		Pingba Dapo county forest park	local level	Feb. 2009	88.45
48		Guiyang Changpoling National Forest Park	national level	Nov. 2001	1294.21
49	Karst plateaus	Guiyang Denggao Yunshan provincial forest park	local level	Jul. 2016	284.4
50		Qingzhen Qianzhong bamboo Sea provincial forest park	local level	Jul. 2016	604.22
51		Guiyang Luchongguan provincial forest park	local level	Jan. 2001	404
52		Zhijin osmanthus provincial forest park	local level	Jul. 2016	739.44
53		Ganxi National Forest Park	national level	Jan. 2015	2680.04
54		Wudang Panlongshan provincial forest park	local level	Dec. 2010	1937.53
55		Nayong small lake bar county forest park	local level	Dec. 2003	1067
56		Fuquan National Forest Park	national level	Jul. 2017	5859.15
57		Jingyang provincial forest Park	local level	Jul. 2001	1163
58		Wudang district Yangchang Huanglian provincial forest park	local level	July 2016	1456
59		Kaiyang Yundingshan provincial forest park	local level	Jul. 2016	3207.53
60		Bijie Nayong Lianhuashan county forest park	local level	Dec. 2014	491

61		Qianxi Shuixi county forest park	local level	Mar. 2008	4297.7
62		Kaiyang Erchongshan provincial forest park	local level	Jul. 2016	480
63		Baili Cuckoo national Forest Park	national level	May. 1993	18114.6
64		Xifeng hot spring provincial forest park	local level	Aug. 1994	3554.3
65		Zhujiashan National Forest Park	national level	Dec. 2004	4888.2
66		Qixingguan district Majiaping county forest park	local level	Dec. 2014	896
67		Dafang sea dam provincial forest park	local level	Jul. 2016	677.56
68		Bijie National Forest Park	national level	Dec. 2005	4133
69		Jinsha Sanzhangshui provincial forest park	local level	Jun. 2001	4560
70		Bozhou Wujiang county forest park	local level	Jul. 2008	1242.4
71		Keyew River Grand Canyon National Forest Park	national level	Jan. 2015	5177.92
72		Jinsha partial Yanhe county forest park	local level	Dec. 2014	2285
73		Xixiang county forest park	local level	Mar.2016	515.59
74		Jinsha Coldwater River National Forest Park	national level	Jul. 2017	2110.81
75		Zunyi Xiangshan provincial forest park	local level	Jul. 2006	990.53
76		Sunjialin county forest park	local level	Mar. 2016	100
77		Phoenix Mountain National Forest Park	national level	Nov. 2001	1061.77
78		Dabanshui National Forest Park	national level	Dec. 2005	3132
79		Renhuai titty mountain provincial forest park	local level	Jul. 2017	1068.69
80		Pan county LaoHeiShan provincial forest park	local level	Apr. 2014	641.36
81	Karst basins	Puan Pubai provincial forest Park	local level	Nov. 2008	653.91
82		Puqing provincial forest Park	local level	Dec. 2017	1394
83		Pan county seven finger peak provincial forest park	local level	Sept. 2005	1139.3
84		Huangguoshu Waterfall Source National Forest Park	national level	Jan. 2015	5811.29
85		Guizhou Shuicheng National cuckoo Park	national level	Jan. 2017	866.7
86		Yushe National Forest Park	national level	Dec. 2002	924.47
87	Karst gorges	Shuicheng County Yiduo Forest Park	local level	Oct. 2007	113.33
88		Zhongshan Liangdu provincial forest park	local level	Feb. 2007	1415.5
89		Hezhang Yelang National Forest Park	national level	Dec. 2004	4733
90		Shuicheng Yangmei provincial forest park	local level	Jan. 2011	259
91	Non-karst area	Leigongshan National Forest Park	national level	Dec. 2002	4354.73
92		Tianzhu County Jiangpo Forest Park	local level	Dec. 2017	292.26

93	Jinping Chunlei Provincial Forest Park	local level	May 2002	10250
94	Leishan Danjiang Forest Park	local level	Dec. 2011	1077.67
95	Liping National Forest Park	national level	Dec. 2003	5475
96	Guizhou Taijiang National Forest Park	national level	Dec. 2011	6702.91
97	Yangasa National Forest Park	national level	Aug. 2016	2850

Supplementary Note S1.1. Ecological and Tourism Characteristics of Different Geomorphological Zones

Karst trough valleys

Low-lying corridors with fertile alluvial soils, dominated by evergreen broadleaf and mixed forests, often interspersed with tea plantations. They play a critical role in water regulation and soil retention. Tourism is characterized by river rafting, canyon hiking, and tea-culture experiences.

Karst plateaus

Areas with shallow soils and extensive bedrock exposure, dominated by Masson pine plantations, scrublands, and secondary forests. They are ecologically fragile and vulnerable to rocky desertification, with functions focused on erosion control and vegetation restoration. Tourism mainly involves eco-restoration education, hiking trails, and panoramic viewpoints.

Karst basins

Enclosed depressions with deeper soils and higher productivity. Vegetation includes secondary broadleaf forests, bamboo groves, and agro‐forest mosaics. Ecologically, they support both biodiversity and farmland‐forest interactions. Tourism is centered on rural sightseeing, agritourism, and cultural heritage experiences.

Peak-cluster depressions

Tower‐cone karst landscapes with dolines and caves, supporting mixed conifer‐broadleaf forests and shrublands. They have high habitat heterogeneity but fragile soils. They attract cave exploration, geosite tourism, scenic photography, and cultural geotourism.

Karst gorges

Deeply incised valleys with steep slopes and microclimatic refugia, harboring evergreen‐deciduous mixed forests. They are biodiversity hotspots with strong hydrological regulation. Tourism highlights include waterfall sightseeing, canyon hiking, rafting, and rock climbing.

Non-karst areas

Regions with more stable soils and dense secondary evergreen forests, with higher vegetation cover and stronger soil/water conservation. They serve as ecological baselines for comparison. Tourism focuses on forest recreation, bird watching, nature education, and health & wellness activities.

Supplementary Table S1.2. Representative Examples of Forest Parks in Each Geomorphological Zones

We provide the complete list of all 97 forest parks in Guizhou Province with their basic attributes in Supplementary Table S1. Furthermore, in Supplementary Table S1.2, we selected representative parks from each geomorphological zone to summarize their dominant forest types, key ecological attributes, and typical tourism activities. These examples effectively illustrate the ecological and cultural differences across geomorphological landscapes while avoiding redundancy that would result from presenting all parks in detail.

Landform type	Park name	Dominant forest type	Key ecological attributes	Representative tourism activities
Karst trough valleys	Dejiang Tea County Forest Park	Evergreen broadleaf	Fertile alluvial soils; strong water regulation; soil conservation	Tea-culture tourism, canyon hiking, river rafting
	Shiqian Wufeng Mountain Forest Park	Mixed evergreen–deciduous forest	Riparian corridors; habitat diversity; erosion control	Mountain trekking, eco-education, cultural sightseeing
	Chishui Zhuhai National Forest Park	Bamboo forests	Important bamboo ecosystem; biodiversity hotspot	Bamboo sightseeing, bird watching, eco-cultural tourism
Karst plateaus	Ziyun Langfengguan Forest Park	Masson pine plantations	Shallow soils; high rock exposure; rocky desertification risk	Scenic viewpoints, eco-restoration education, hiking
	Majiang Xianrenqiao Provincial Forest Park	Secondary conifer–broadleaf forest	Soil erosion control; water conservation	Forest recreation, cultural exploration, hiking
	Baili Cuckoo National Forest Park	Evergreen broadleaf	High species diversity; seasonal flowering; conservation significance	Bird watching, flower-viewing festivals, eco-tourism
Karst basins	Pan County LaoHeishan Forest Park	Secondary broadleaf forest	Deeper soils; agro–forest mosaics; high productivity	Rural tourism, agritourism, cultural heritage sightseeing
	Puan Pubai Provincial Forest Park	Broadleaf–conifer mixed forest	Stable soil–vegetation system; biodiversity support	Rural eco-tourism, local cultural experiences
	Puqing Provincial Forest Park	Evergreen broadleaf forest	Enclosed basin; farmland–forest interaction; soil fertility	Agritourism, eco-recreation, traditional village tourism
Peak-cluster depressions	Sandu Yaoren Mountain National Forest Park	Mixed conifer–broadleaf forest	High habitat heterogeneity; fragile karst soils	Cave exploration, eco-tourism, scenic photography
	Lipo Dingshan Provincial Forest Park	Evergreen broadleaf forest	Typical tower–cone karst; dolines and caves	Scenic sightseeing, geology tours, cave expeditions
	Anlong Xianheping National Forest Park	Mixed forest with limestone evergreen broadleaf	Biodiversity hotspot; karst cave ecosystems	Cultural geotourism, scenic tours, photography
Karst gorges	Huangguoshu Waterfall Source NFP	Evergreen–deciduous mixed forest	Steep slopes; microclimatic refugia; strong hydrological regulation	Waterfall sightseeing, canyon hiking, rafting
	Hezhang Yelang National Forest Park	Evergreen broadleaf	Deep valleys; species refugia; high ecological stability	Scenic tourism, cultural relics exploration, hiking
	Yushe National Forest Park	Evergreen broadleaf forest	Canyon corridors; ecological connectivity	River trekking, canyon hiking, eco-recreation
Non-karst areas	Leigongshan National Forest Park	Dense evergreen broadleaf forest	Stable soils; high NDVI; biodiversity refuge	Bird watching, forest recreation, wellness tourism
	Liping National Forest Park	Evergreen–deciduous mixed forest	Strong soil/water conservation; high forest coverage	Eco-tourism, cultural sightseeing, hiking
	Guizhou Taijiang National Forest Park	Evergreen broadleaf forest	Representative subtropical montane forest; baseline for comparison with karst ecosystems	Forest trekking, nature education, ethnic cultural tourism

Supplementary Table S2 Data sources, temporal coverage, harmonization, and processing steps

Dataset / Variable	Data Source	Native time span	Used time span	Native resolution	Harmonized resolution	Processing steps
DEM	Resource and Environment cience and Data Center (http://www.resdc.cn/)	2000	2000	12.5 m	30 m	Clipped; slope/aspect derived
Land use	Resource and Environment Sci-ence and Data Center (http://www.resdc.cn/)	2000, 2010, 2020	2000, 2010, 2020	30 m	30 m	Reclassified; nearest neighbor
NDVI	Resource and Environment Sci-ence and Data Center (http://www.resdc.cn/)	2000–2020	2000–2020	Monthly, 1 km	Annual mean, 30 m	Monthly→annual; bilinear resampling
NPP	MODIS MOD17A3	2000–2020	2000–2020	Annual, 500 m	Annual, 30 m	Bilinear resampling
Precipitation	CMA	2000–2020	2000–2020	Daily, 0.25°	Annual, 30 m	Daily→annual totals; bilinear resampling
Temperature	CMA / ERA5	2000–2020	2000–2020	Monthly, 0.25°	Annual mean, 30 m	Monthly→annual means; bilinear resampling
Soil	Database of the third stony desertification survey in Guizhou Province	2005, 2010, 2015,2020	2005, 2010, 2015,2020	Vector	30 m	Classified; rasterized
Rock exposure	Guizhou stony desertification survey	2005, 2010, 2015,2020	2005, 2010, 2015,2020	Vector	30 m	Rasterized; normalized
Tourism	Guizhou Forestry Bureau (tourist arrivals, tourism income); NPP-VIIRS (night-time lights, NLI); National Geographic Info Center (road vector); DEM (for viewshed analysis)	Monthly, 2000–2020	Annual, 2000–2020	County-level; 500 m (NLI); vector (roads, DEM)	Park polygons (30 m grid)	Monthly→annual; dasymetric downscaling
Road data	National Center for Basic Geo-graphic Information（http://webmap.cn）	—	—	Vector	30 m	Road density grid; dasymetric weights

Supplementary Table S2 (continued): Robustness checks

Test	Baseline	Alternative	Metric	Result
Tourism downscaling	Dasymetric (road density + POI)	Area-weighted	Pearson r; RMSE	$r \approx 0.94$; low RMSE
Boundary tolerance	Exact boundary	±30 m buffer	ΔCES mean; rank stability	ΔCES mean < 3%; $\rho \geq 0.95$

Supplementary Table S3. Construct reliability and convergent validity

Model a

Construct	Indicators (outer loading)	Cronbach's α	CR	AVE
Vegetation	NDVI (0.942)	0.81	0.94	0.89
Tourism activity	ATA (0.654), ATI (0.738), NLI (0.703), RND (0.789)	0.74	0.84	0.57
Karst surface characteristics	EL (0.568), RE (0.658), SL (0.822), SR (0.761), ST (0.806)	0.79	0.86	0.55
Climatic	AAR (0.832), AE (0.863), AMT (0.832)	0.68	0.82	0.55
CES	–	0.83	0.82	0.54

Model b

Construct	Indicators (outer loading)	Cronbach's α	CR	AVE
Vegetation	NDVI (0.888)	0.80	0.93	0.84
Tourism activity	ATA (0.738), ATI (0.758), NLI (0.548), RND (0.508)	0.70	0.82	0.55
Karst surface characteristics	EL (0.426), RE (0.521), SL (0.860), SR (0.679), ST (0.836)	0.78	0.86	0.56
Climatic	AAR (0.842), AE (0.860), AMT (0.842)	0.72	0.82	0.55
CES	–	0.84	0.90	0.57

Model c

Construct	Indicators (outer loading)	Cronbach's α	CR	AVE
Vegetation	NDVI (0.927)	0.82	0.94	0.86
Tourism activity	ATA (0.733), ATI (0.754), NLI (0.703), RND (0.515)	0.71	0.83	0.56
Karst surface characteristics	EL (0.513), RE (0.568), SL (0.838), SR (0.761), ST (0.806)	0.79	0.87	0.55
Climatic	AAR (0.832), AE (0.863), AMT (0.832)	0.69	0.81	0.53
CES	–	0.83	0.89	0.56

Model d

Construct	Indicators (outer loading)	Cronbach's α	CR	AVE
Vegetation	NDVI (0.935)	0.83	0.94	0.87
Tourism activity	ATA (0.678), ATI (0.836), NLI (0.719), RND (0.701)	0.72	0.84	0.57
Karst surface characteristics	EL (0.422), RE (0.585), SL (0.859), SR (0.672), ST (0.885)	0.77	0.87	0.58
Climatic	AAR (0.867), AE (0.885), AMT (0.867)	0.71	0.82	0.55
CES	–	0.85	0.91	0.58

Supplementary Table S4 Discriminant validity and collinearity

Model a (a1) Fornell–Larcker criterion

Construct	Vegetation	Tourism activity	Karst surface	Climatic	CES
Vegetation	0.94				
Tourism activity	0.42	0.75			
Karst surface	0.38	0.36	0.74		
Climatic	0.40	0.28	0.41	0.73	
CES	0.56	0.45	0.52	0.48	0.75

Model a (a3) HTMT ratios

Construct	Vegetation	Tourism activity	Karst surface	Climatic
Tourism activity	0.43	–		
Karst surface	0.39	0.37	–	
Climatic	0.41	0.30	0.43	–
CES	0.58	0.47	0.54	0.50

HTMT values are based on 5,000 bootstrap resamples; 95% CIs did not include 1 in all cases.

Model b (b1) Fornell–Larcker criterion

Construct	Vegetation	Tourism activity	Karst surface	Climatic	CES
Vegetation	0.92				
Tourism activity	0.40	0.74			
Karst surface	0.37	0.34	0.75		
Climatic	0.42	0.29	0.39	0.74	
CES	0.59	0.47	0.55	0.51	0.76

Model b (b3) HTMT ratios

Construct	Vegetation	Tourism activity	Karst surface	Climatic
Tourism activity	0.41	–		
Karst surface	0.38	0.36	–	
Climatic	0.43	0.31	0.41	–
CES	0.61	0.49	0.57	0.53

HTMT values are based on 5,000 bootstrap resamples; 95% CIs did not include 1 in all cases.

Model c (c1) Fornell–Larcker criterion

Construct	Vegetation	Tourism activity	Karst surface	Climatic	CES
Vegetation	0.93				
Tourism activity	0.41	0.75			
Karst surface	0.36	0.33	0.74		
Climatic	0.43	0.31	0.40	0.72	
CES	0.57	0.44	0.54	0.49	0.75

Model c (c3) HTMT ratios

Construct	Vegetation	Tourism activity	Karst surface	Climatic
Tourism activity	0.42	–		
Karst surface	0.38	0.35	–	
Climatic	0.45	0.33	0.42	–
CES	0.59	0.46	0.56	0.52

HTMT values are based on 5,000 bootstrap resamples; 95% CIs did not include 1 in all cases.

Model d (d1) Fornell–Larcker criterion

Construct	Vegetation	Tourism activity	Karst surface	Climatic	CES
Vegetation	0.93				
Tourism activity	0.39	0.75			
Karst surface	0.35	0.32	0.75		
Climatic	0.41	0.30	0.38	0.73	
CES	0.58	0.46	0.53	0.50	0.76

Model d (d3) HTMT ratios

Construct	Vegetation	Tourism activity	Karst surface	Climatic
Tourism activity	0.40	–		
Karst surface	0.37	0.34	–	
Climatic	0.42	0.32	0.41	–
CES	0.60	0.48	0.55	0.53

HTMT values are based on 5,000 bootstrap resamples; 95% CIs did not include 1 in all cases.

(a2–d2) Collinearity (VIF values): All indicator- and construct-level VIFs were below 3.0, suggesting no multicollinearity issue.

Supplementary Table S5. Bootstrapping results (a–d, 5,000 resamples)

Model	Path	β	t-value	p-value	95% CI	R^2 (CES)
a	Vegetation → CES	0.214	2.65	0.012	[0.06, 0.37]	0.721
	Tourism activity → CES	-0.364	3.22	0.001	[-0.48, -0.12]	
	Karst surface → CES	-0.402	2.89	0.004	[-0.61, -0.20]	
	Climatic → CES	0.208	4.12	<0.001	[0.17, 0.47]	
b	Vegetation → CES	0.232	2.85	0.008	[0.07, 0.39]	0.733
	Tourism activity → CES	-0.294	2.91	0.004	[-0.45, -0.11]	
	Karst surface → CES	-0.386	3.02	0.003	[-0.56, -0.23]	
	Climatic → CES	0.102	2.01	0.045	[0.02, 0.22]	
c	Vegetation → CES	0.319	3.22	0.001	[0.13, 0.47]	0.722
	Tourism activity → CES	0.094	1.12	0.289	[-0.05, 0.24]	
	Karst surface → CES	-0.314	3.14	0.002	[-0.50, -0.15]	
	Climatic → CES	0.319	3.88	<0.001	[0.14, 0.47]	
d	Vegetation → CES	0.422	3.95	<0.001	[0.21, 0.61]	0.736
	Tourism activity → CES	-0.194	2.17	0.027	[-0.32, -0.07]	
	Karst surface → CES	0.274	3.05	0.003	[0.10, 0.45]	
	Climatic → CES	0.321	3.88	<0.001	[0.15, 0.47]	

Supplementary Table S6. Sensitivity analysis of CES under different weighting schemes

Scenario	WY (Water yield)	SC (Soil conservation)	CS (Carbon storage)	TC (Tourism & cultural services)	Main finding (CES ranking)
Baseline (expert weights)	0.307	0.245	0.193	0.255	WY > TC > SC > CS
Equal weights	0.250	0.250	0.250	0.250	All balanced; CES pattern consistent
WY +10%	0.338	0.221	0.174	0.239	WY dominance strengthened
WY –10%	0.276	0.269	0.212	0.273	WY weakened; TC slightly exceeds WY
SC +10%	0.284	0.270	0.174	0.241	SC importance increased, close to TC
SC –10%	0.328	0.221	0.212	0.239	SC reduced, WY dominance clearer
CS +10%	0.297	0.229	0.212	0.262	CS importance increased but still lowest
CS –10%	0.317	0.262	0.174	0.247	CS reduced further; WY/SC/TC more balanced
TC +10%	0.289	0.228	0.174	0.309	TC nearly equals WY as top factor
TC –10%	0.326	0.262	0.212	0.200	TC reduced; WY remains highest

Sensitivity analysis shows that CES rankings remain largely consistent across different weighting schemes, indicating the robustness of the results against variations in subjective judgments.

Supplementary Table S7. Carbon pool parameters and sources

lucode	name	C_above(Mg/ha)	C_below(Mg/ha)	C_soil(Mg/ha)	C_dead(Mg/ha)
1	Farmland	46.5	80.7	108.4	1
2	Woodland	29.36	67.5	170	7.8
3	Grassland	4.3	86.5	89.02	0
4	Water	0	0	0	0
5	Urban	0	0	0	0
6	Unused land	0.74	0.13	69.92	0

Supplementary Table S8. Biophysical parameters for water yield model

Lucode	LULC_desc	LULC_veg	Kc	Root depth (mm)
1	Farmland	1	0.7	300
2	Woodland	1	1	3500
3	Grassland	1	0.65	2400
4	Water	0	1.1	1
5	Construction area	0	0.3	1
6	Unused land	0	0.5	1

Supplementary Table S9. C and P factors for RUSLE model

description	lucode	usle_c	usle_p
Farmland	1	0.13	0.35
Woodland	2	0.01	1
Grassland	3	0.25	1
Water	4	1	0
Construction area	5	1	0
Unused land	6	0.85	1

Supplementary Table S10. Supplementary Table S10. Data sources, resolutions, and processing methods for socio-ecological indicators

Indicator	Data source	Resolution / Unit	Processing method
Annual tourist arrivals (ATA)	Guizhou Forestry Bureau statistics	County level; 10^4 persons	Aggregated to annual scale; downscaled to forest parks using dasymetric mapping (road density + POI as weights)
Annual tourism income (ATI)	Guizhou Forestry Bureau statistics	County level; 10^4 yuan	Aggregated to annual scale; normalized (adjusted to constant prices where applicable)
Night-time light index (NLI)	NPP–VIIRS (annual average composites)	500 m; Lm/m²	Resampled to 30 m; normalized to [0–1]
Road network density (RND)	National Basic Geographic Information Center	Vector roads; km/km²	Vector-to-raster conversion; density calculated within 30 m grid
Viewshed index (VIS)	DEM-based visibility analysis (scenic spot POIs from Forestry Bureau & tourism datasets)	30 m grid	GIS viewshed analysis performed on DEM, calculating visibility index for each forest park