

Supplementary File

1. Supplementary tables and figures.

Table S1. Distribution of Counties in the Minjiang River Basin.

Prefectural-level division	Districts and counties
Aba	Songpan, Heishui, Maoxian, Lixian, Wenchuan
Chengdu	Dujiangyan, Pidu, Wenjiang, Chongzhou, Dayi, Chengdu urban area (Jinjiang, Qingyang, Jinniu, Wuhou, Chenghua, Longquanyi), Shuangliu, Xinjin, Qionglai, Pujiang
Meishan	Pengshan, Dongpo, Danling, Hongya, Renshou, Qingshen
Leshan	Shizhong, Wutongqiao, Shawan, Jiajiang, Emeishan City, Jingyan, Qianwei, Muchuan
Zigong	Rongxian
Yibin	Cuiping, Xuzhou

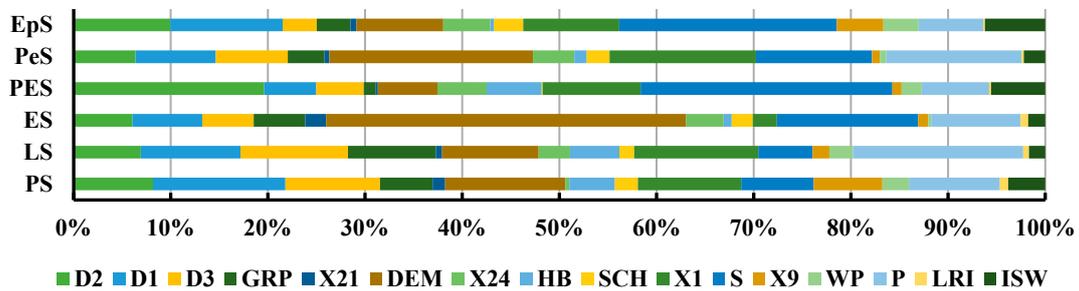


Figure S1. Contributions of driving factors in the Minjiang River Basin.

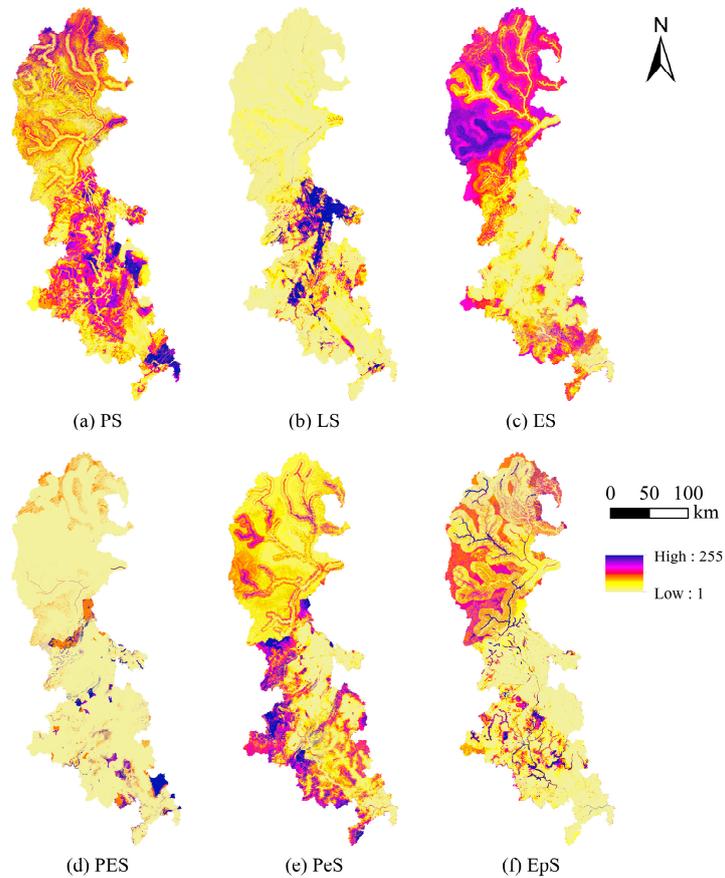


Figure S2. Growth probabilities of territorial space.

Table S2. Evaluation index system of territorial space development and utilization effect.

Type	Index (unit)	Attribute	Definition	Weight	
Social effects	Population situation	Population density	+	Raster data	0.1234
		Urbanization rate (%)	+	Statistical yearbook	0.0473
		Nonfarm payrolls ratio (%)	+	(Total employment – Number of employees in the primary industry) / Total employment × 100%	0.0231
	Cultural education	Number of education (primary, secondary) schools per 10 ⁴ people	+	Number of primary and secondary schools / Population	0.1295
		Number of students enrollment of primary and secondary schools per 10 ⁴ people	+	(Students enrollment of primary schools + Students enrollment of regular secondary schools) / Population	0.0800
		Each primary school teacher is responsible for the number of students	–	Students enrollment of primary schools / Teachers of primary schools	0.0184
		Each secondary school teacher is responsible for the number of students	–	Students enrollment of regular secondary schools / Teachers of secondary schools	0.0217
	Urban-rural construction	Traffic accessibility (km/km ²)	+	Length of highway / Gross area	0.0378
		Number of beds in health institutions per 10 ⁴ people	+	Number of beds in health institutions / Population	0.0502
		Urban-rural income ratio (%)	–	Per capita urban disposable income / Per capita rural disposable income × 100%	0.0354
Number of local telephone subscribers per 10 ⁴ people		+	Number of local telephone subscribers / Population	0.0676	
Number of mobile telephones subscribers per 10 ⁴ people		+	Number of mobile telephones subscribers / Population	0.0428	
Economic effects	Economic level	Total retail sales of consumer goods (10 ⁴ yuan)	+	Statistical yearbook	0.3228
		Per area gross regional product (10 ⁴ yuan/km ²)	+	Raster data	0.1920
		Economic growth rate (%)	+	Statistical yearbook	0.0331
		Per area fixed asset investment (10 ⁴ yuan/km ²)	+	Total investment / Gross area	0.1252
		Local financial general budgetary revenue (10 ⁴ yuan)	+	Statistical yearbook	0.2547
	Balance of saving deposits of urban and rural residents (10 ⁴ yuan)	+	Statistical yearbook	0.1963	
	Industrial development	Gross output value of farming, forestry, animal husbandry and fishery (10 ⁴ yuan)	+	Statistical yearbook	0.0427
		Indices of gross output value of all state-owned industrial enterprises and non-state-owned industrial enterprises above designated size (Preceding year = 100)	+	The report period constant price output value / Base period constant price output value × 100	0.0072
		Number of all state-owned industrial enterprises and non-state-owned industrial enterprises above designated size	+	Statistical yearbook	0.0764
		The rationalization of industrial structure	–	Equation (S1) [1]	0.0108
Industrial structure upgrade		+	Gross output value of the tertiary industry / Gross output value of the secondary industry	0.0616	
Ecological effects	Environmental level	Carbon emission intensity (t/10 ⁴ yuan)	–	Carbon emission / GDP	0.0081
		Carbon emission per capita	–	Carbon emission / Population	0.0144
		Eco-environmental quality index	+	Raster data	0.0372
		Whole-year mean value of PM2.5 (μg/m ³)	–	Raster data	0.0448
	Resource state	Cultivated land area per capita	+	Cultivated land area / Population	0.0417
		Water capacity per capita	+	Water resources / Population	0.3037
		Produced water modulus (10 ⁴ m ³ /km ²)	+	Water resources / Gross area	0.0691
	Consumption and utilization	Water resources utilization ratio (%)	+	Water consumption / Water resources × 100%	0.1485
		Land reclaimed index (%)	+	Cultivated land area / Gross area × 100%	0.0496
		Effective irrigation index (%)	+	Effective irrigation area / Total sown area × 100%	0.0244
Fertilizer input intensity (g/m ²)		–	Consumption of chemical fertilizers / Cultivated land area	0.0168	
Water consumption per GDP (m ³ /10 ⁴ yuan)		–	Water consumption / GDP	0.0565	
Water consumption per capita		–	Water consumption / Population	0.0245	
Household electricity consumption (kW·h)		–	Statistical yearbook	0.0080	
Management	Common industrial solid wastes comprehensively utilized (10 ⁴ t)	+	Statistical yearbook	0.1433	
	Wastewater treatment rate (%)	+	Statistical yearbook	0.0094	

$$TL = \sum_{j=1}^J \left(\frac{Y_j}{Y} \right) \ln \left(\frac{Y_j}{L_j} / \frac{Y}{L} \right) \quad (S1)$$

where TL is the rationalization of industrial structure; Y and Y_j represent total output value and the output value of the j industry, respectively; L and L_j denote the total employment and employment in the j industry, respectively.

Table S3. Territorial space quantity structure under natural development scenario in 2030.

Territorial space types	Area/km ²	Proportion/%
PS	660.70	1.25
LS	1972.19	3.72
ES	32065.77	60.44
PES	207.65	0.39
PeS	17605.11	33.19
EpS	538.24	1.01

Table S4. Driving factors.

Index	Unit
Per area gross regional product (GRP)	10 ⁴ yuan
Value-added of the primary industry (X21)	10 ⁴ yuan
Total profits from sales of industrial products (X24)	10 ⁴ yuan
DEM (DEM)	m
Slope (S)	\
Annual precipitation (X1)	mm
Distance from the river system (D1)	m
Per capita water capacity (WP)	m ³
Land Reclaimed index (LRI)	%
Common industrial solid wastes comprehensively utilized (ISW)	10 ⁴ t
Population density (P)	\
Distance from the expressway (D2)	m
Number of primary and secondary schools per 10 ⁴ people (SCH)	\
Number of beds in health institutions per 10 ⁴ people (HB)	\
Per capita residential land area (X9)	m ²
Distance from the railway (D3)	m

Table S5. Territorial space transfer matrix for the Minjiang River Basin from 2020 to 2030 under natural development scenario.

(unit: km²)

Year	Territorial space types	2030						Total
		PS	LS	ES	PES	PeS	EpS	
2020	PS	438.42 99.94%	\	0.01 0.01%	\	0.24 0.05%	\	438.67
	LS	\	1835.47 100.00%	\	\	\	\	1835.47
	ES	11.20 0.03%	4.02 0.01%	32036.33 99.82%	\	37.45 0.12%	5.32 0.02%	32094.32
	PES	0.23 0.11%	0.58 0.28%	\	207.65 99.58%	\	0.06 0.03%	208.52
	PeS	210.84 1.18%	132.11 0.74%	29.43 0.16%	\	17567.42 97.91%	2.47 0.01%	17942.28
	EpS	\	\	\	\	\	530.39 100.00%	530.39
	Total	660.70	1972.19	32065.77	207.65	17605.11	538.24	53049.65

Table S6. Territorial space transfer matrix for the Minjiang River Basin from 2020 to 2030 under double optimization scenario.

(unit: km²)

Year	Territorial space types	2030						Total
		PS	LS	ES	PES	PeS	EpS	
2020	PS	438.49 99.96%	\	\	\	0.13 0.03%	0.05 0.01%	438.67
	LS	\	1835.47 100.00%	\	\	\	\	1835.47
	ES	3.16 0.01%	0.73 0.002%	32087.90 99.98%	\	\	2.54 0.008%	32094.32
	PES	0.08 0.04%	0.06 0.03%	\	208.35 99.92%	\	0.02 0.01%	208.52
	PeS	107.38 0.60%	21.72 0.12%	\	\	17806.60 99.24%	6.59 0.04%	17942.28
	EpS	0.37 0.07%	\	\	\	0.98 0.18%	529.04 99.75%	530.39
	Total	549.47	1857.98	32087.90	208.35	17807.71	538.24	53049.65

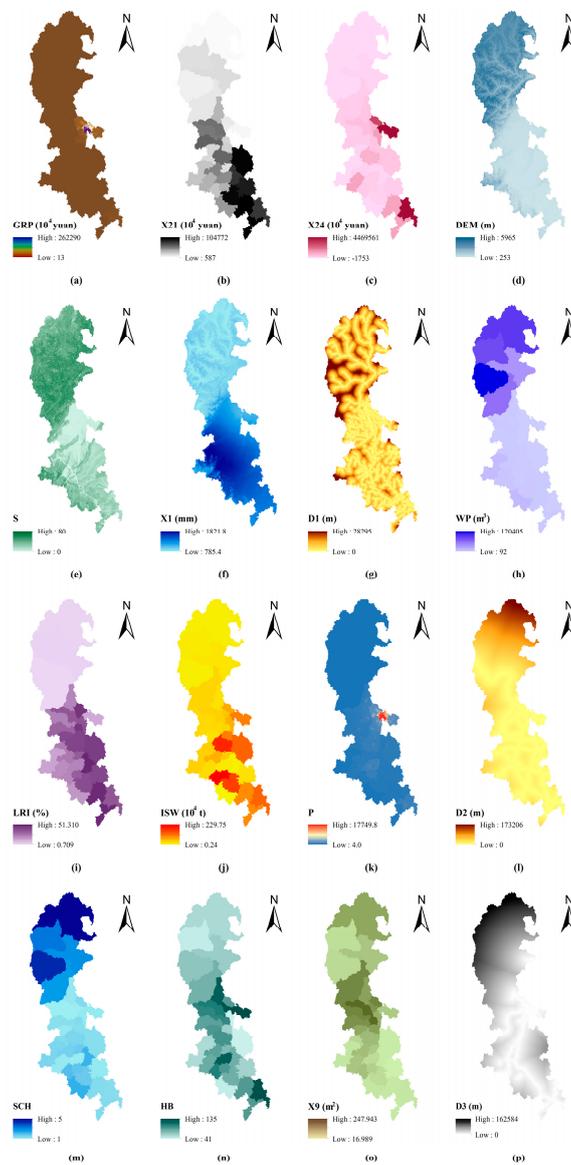


Figure S3. Driving factors.