Supplementary materials

Table S1 The number of Baidu Street View-generating points and survey samples in each subdistrict

No.	Subdistrict	The number of BSV-generating points	Total survey sample	Field survey sample	Virtual survey sample
1	Minkang	9	9	5	4
2	Ziqiang	18	3	1	2
3	Chongqing	18	5	2	3
4	Yongchang	26	8	2	6
5	Shuguang	22	13	4	9
6	Quan'an	11	3	1	2
7	Xinchun	7	2	0	2
8	Xinfa	12	3	0	3
9	Dongguang	10	2	0	2
10	Nanguang	10	9	0	9
11	Zhanqian	40	11	7	4
12	Qinghe	34	12	3	9
13	Hongqi	42	11	2	9
14	Guilin	28	5	0	5
15	Nanling	18	20	8	12
16	Yongji	15	10	3	7
17	Taoyuan	10	6	0	6
18	Changtong	17	8	3	5
19	Qunying	48	13	4	9
20	Tiexi	24	5	1	4
21	Puyang	27	20	6	14
22	Chuncheng	20	15	7	8
23	Huxi	28	10	3	7
24	Nanhu	30	45	14	31
25	Hongcheng	35	9	4	5
26	Linhe	82	36	14	22
27	Dongsheng	34	13	8	5
28	Jilin	22	9	2	7
29	Dongzhan	24	5	1	4
30	Yuanda	58	22	7	15
31	Balipu	60	12	7	5
32	Tuanshan	60	7	2	5
33	Xingye	60	14	7	7
34	Kaixuan	32	15	8	7
35	Lanjia	44	8	1	7
36	Liuying	55	20	9	11
37	Qingnian	30	4	2	2

38	Chengxi	45	32	12	20
39	Zhengyang	48	18	4	14
40	Tongxin	58	26	6	20
41	Dongfeng	62	20	10	10
42	Jincheng	43	32	12	20
43	Xixin	103	24	13	11
44	Shuangde	107	69	22	47
45	Nanzhan	20	5	1	4
46	Mingzhu	58	36	11	25
47	Dongfangguangchang	141	61	16	45
48	Rongguang	40	7	0	7
49	Changqing	32	14	1	13

Table S2. List of landscape metrics and their descriptions (McGarigal et al., 2023).

Landscape metrics	**Calculation and range**	**Description**
Edge Density (ED)	$ED = \frac{E}{A}(10000)$ E = total length (m) of edge in landscape. $ED \geq 0$; Units, Meters pe hectare.	ED equals the sum of the lengths (m) of all edge segments in the landscape, divided by the total landscape area (m^2), multiplied by 10,000 (to convert to hectares).
Patch Density (PD)	$PD = \frac{N}{A}(10000)(100)$ N = total number of patches in the landscape. $PD > 0$; Units, number per 100 hectares.	PD equals the number of patches in the landscape, divided by total landscape area (m^2), multiplied by 10,000 and 100 (to convert to 100 hectares). PD is one of the most important indices to describe landscape heterogeneity.
Landscape Shape Index (LSI)	$LSI = \frac{0.25E}{\sqrt{A}}$ $LSI \geq 1$	LSI equals 0.25 (adjustment for raster format) times the sum of the landscape boundary and all edge segments (m) within the landscape boundary, divided by the square root of the total landscape area (m^2). LSI measures the aggregation of patches. A large LSI value indicates a more irregular landscape.
Largest Patch Index (LPI)	$LPI = \frac{Max(a_1, \cdots, a_n)}{A}(100)$; $0 < LPI \leq 100$ Units, Percent.	LPI equals the area (m^2) of the largest patch in the landscape divided by total landscape area (m^2), multiplied by 100(to convert to a percentage); in other words, LPI equals the percent of the landscape that the largest patch comprises. Note, total landscape area (A) includes any internal background present.
Percentage of landscape (PLAND)	$PLAND = \frac{\sum_{j=1}^{n} a_{ij}}{A}(100)$; $0 < PLAND \leq 100$	PLAND equals the sum of the areas (m^2) of all patches of the corresponding patch type, divided by total landscape area (m^2), multiplied by 100 (to convert to a percentage); in other words, PLAND equals the percentage the landscape comprised of the corresponding patch type. Note, total landscape area (A) includes any internal background present.

Landscape metrics	Calculation and range	Description
Aggregation Index (AI)	$AI = \left[\frac{g_{ii}}{\max \to g_{ii}} \right](100)$ g_{ii} = number of like adjacencies (joins) between pixels of patch type (class) i based on the single count method. max-g_{ii} = maximum number of like adjacencies (joins) between pixels of patch type (class) i (see below) based on the single-count method. $0 \leq AI \leq 100$ Units, Percent	AI equals the number of like adjacencies involving the corresponding class, divided by the maximum possible number of like adjacencies involving the corresponding class, which is achieved when the class is maximally clumped into a i single, compact patch; multiplied by 100 (to convert to a percentage). If A_i is the area of class i (in terms of number of cells) and n is the side of a largest integer i i square smaller than A, and m = A - n, then the largest number of shared edges 2 ii for class i, max-g will take one of the three forms: max-g_{ii} = 2n(n-1), when m = 0, or max-g_{ii} = 2n(n-1) + 2m -1, when m # n, or max-g_{ii} = 2n(n-1) + 2m -2, when m > n. Note, because of the design of the metric, like adjacencies are tallied using the single-count method, and all landscape boundary edge segments are ignored, even if a border is provided.

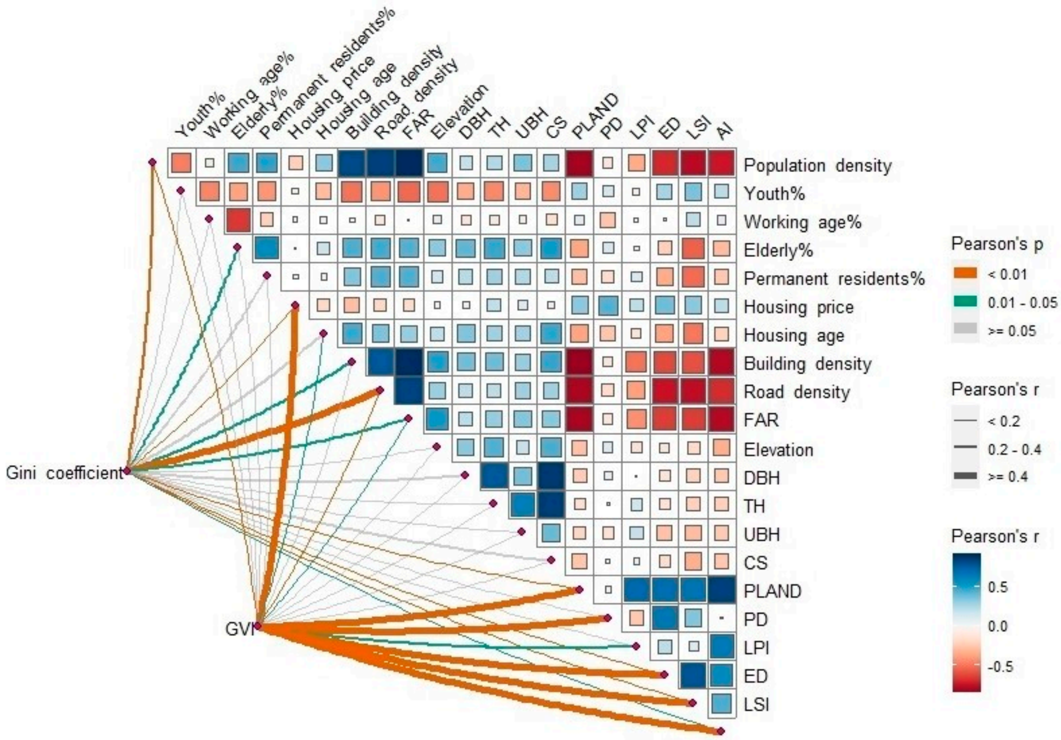
Table S3. Model selection of boosted regression tree analyses (BRT) of GVI and Gini coefficient. The *PE* percentage changes were used to determine the optimal BRT model from models with TC values from 1 to 6. *Trees*, R^2, and *PE* showed the average value of the 30 replicates of BRT models for both GVI and Gini coefficients.

	TC	Trees	R^2	AIC	PE	%PE	Best model
GVI	1	600	0.60	28.1	2.66	0.00	
	2	350	0.53	27.7	3.15	15.56	
	3	400	0.54	27.8	3.05	-3.28	
	4	**750**	**0.64**	**28.3**	**2.39**	-27.62	**Selected**
	5	500	0.58	27.9	2.82	15.25	
	6	400	0.54	27.8	3.05	7.54	
Gini coefficients	1	450	0.48	42.36	0.0021	0.00	
	2	500	0.50	42.40	0.0020	-3.24	
	3	400	0.46	42.28	0.0022	6.96	
	4	500	0.50	42.42	0.0020	-7.37	
	5	**500**	**0.51**	**42.48**	**0.0019**	**-3.04**	**Selected**
	6	450	0.49	42.39	0.0020	4.55	

Abbreviations are TC, tree complexity; PE, model prediction error; Trees, number of regression trees; R^2, percentage accounted for variation by all predictors; AIC, Akaike information criterion.

Table S4. Moran's *I* statistics of the residuals of the BRT analysis of GVI and Gini coefficient. The significance of the Moran's *I* statistic at each distance class was obtained by using the permutation test. These analyses were conducted in SAM v4.0.

Distances class	Residuals of GVI		Residuals of Gini coefficient	
	Moran's *I*	*p*	Moran's *I*	*p*
1	-0.228	0.118	0.384	0.002
2	-0.005	0.904	-0.113	0.494
3	0.085	0.449	0.075	0.493
4	0.07	0.509	-0.287	0.052
5	-0.259	0.088	-0.132	0.424
6	0.101	0.375	0.236	0.061
7	0.051	0.603	-0.215	0.161
8	-0.04	0.888	-0.152	0.34
9	0.02	0.764	-0.014	0.959
10	0.125	0.282	0.208	0.091
11	-0.158	0.321	0.085	0.444
12	-0.122	0.462	-0.067	0.735
13	-0.07	0.72	0.394	0.002
14	0.018	0.777	-0.114	0.496
15	0.071	0.504	-0.054	0.81
16	0.045	0.629	-0.062	0.764
17	-0.006	0.911	-0.132	0.415
18	0.094	0.4	-0.22	0.142
19	-0.042	0.876	-0.277	0.056
20	-0.005	0.907	0.035	0.676
21	-0.004	0.904	0.21	0.094
22	0.051	0.588	0.129	0.259
23	-0.056	0.774	-0.016	0.966
24	-0.18	0.184	-0.252	0.053
25	-0.127	0.079	-0.14	0.045



Figurs S1. Bivariate relationships between variables used in this study. Right upper: pairwise comparisons of 21 predictors factors of GVI and Gini coefficient are shown, with a color gradient denoting the Spearman's correlation coefficients; left bottom: edge width corresponds to the Pearson's correlations coefficient and edge color denotes the statistical significance.

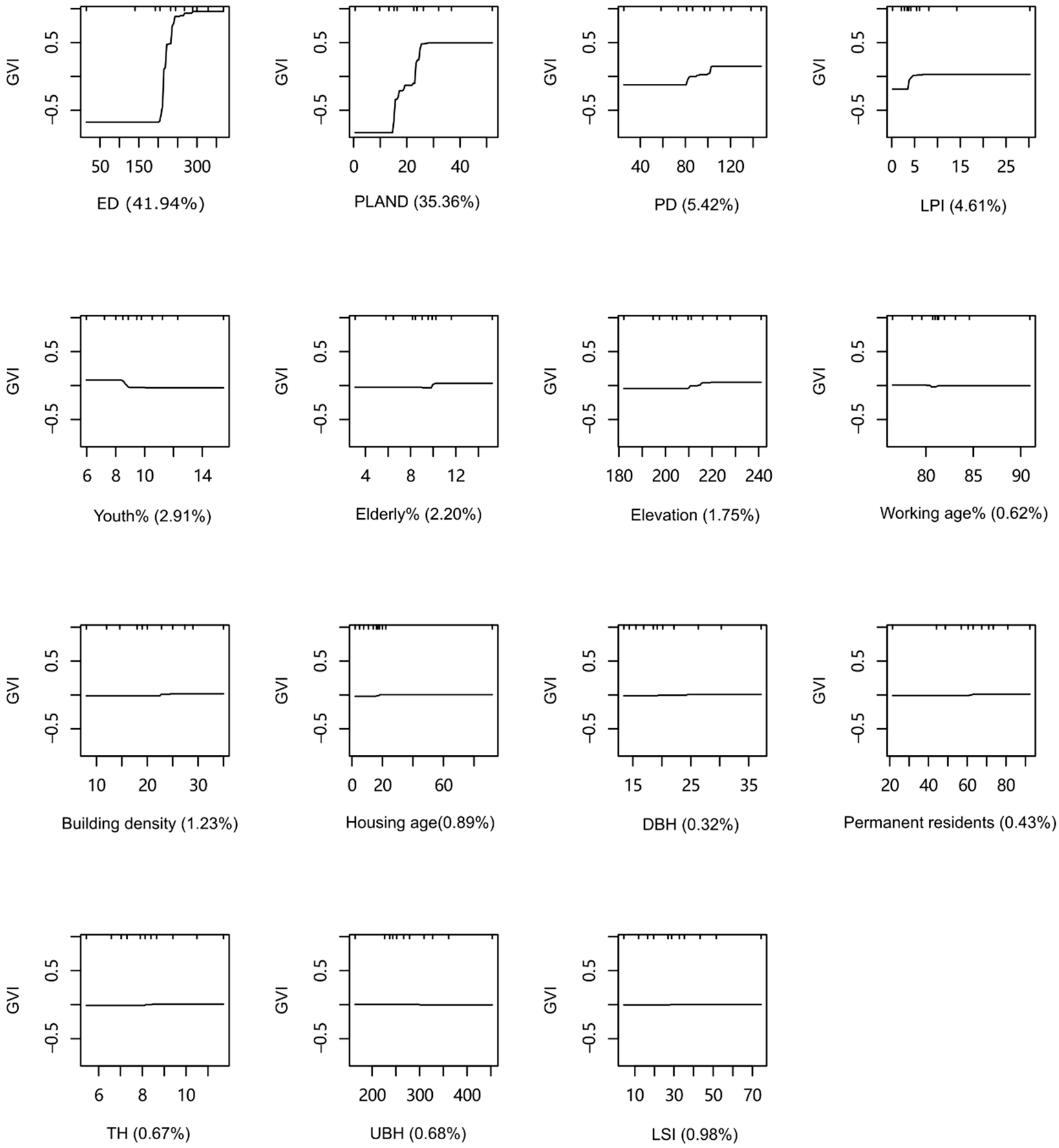


Figure S2. Partial dependence plots showing the marginal relationship between GVI and each predictor while accounting for the average effects of the other predictors in BRT analysis.

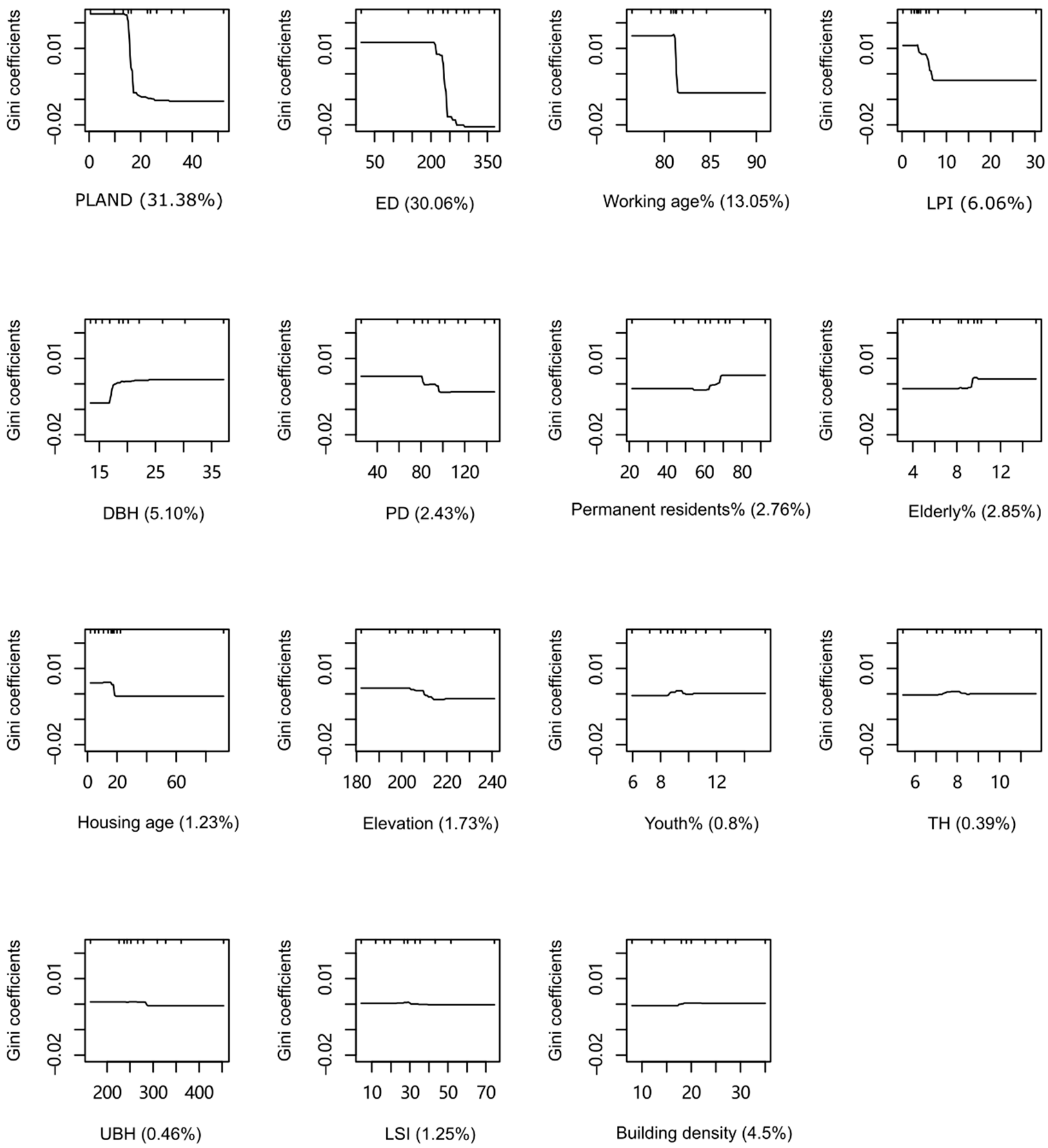


Figure S3. Partial dependence plots showing the marginal relationship between Gini coefficient and each predictor while accounting for the average effects of the other predictors in BRT analysis