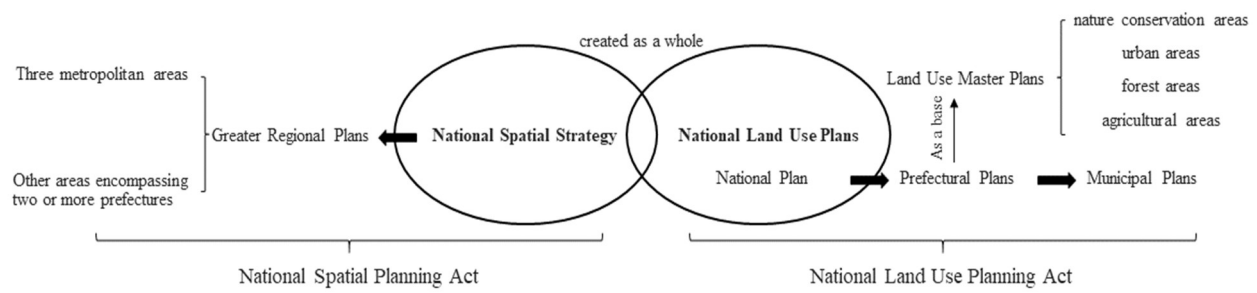
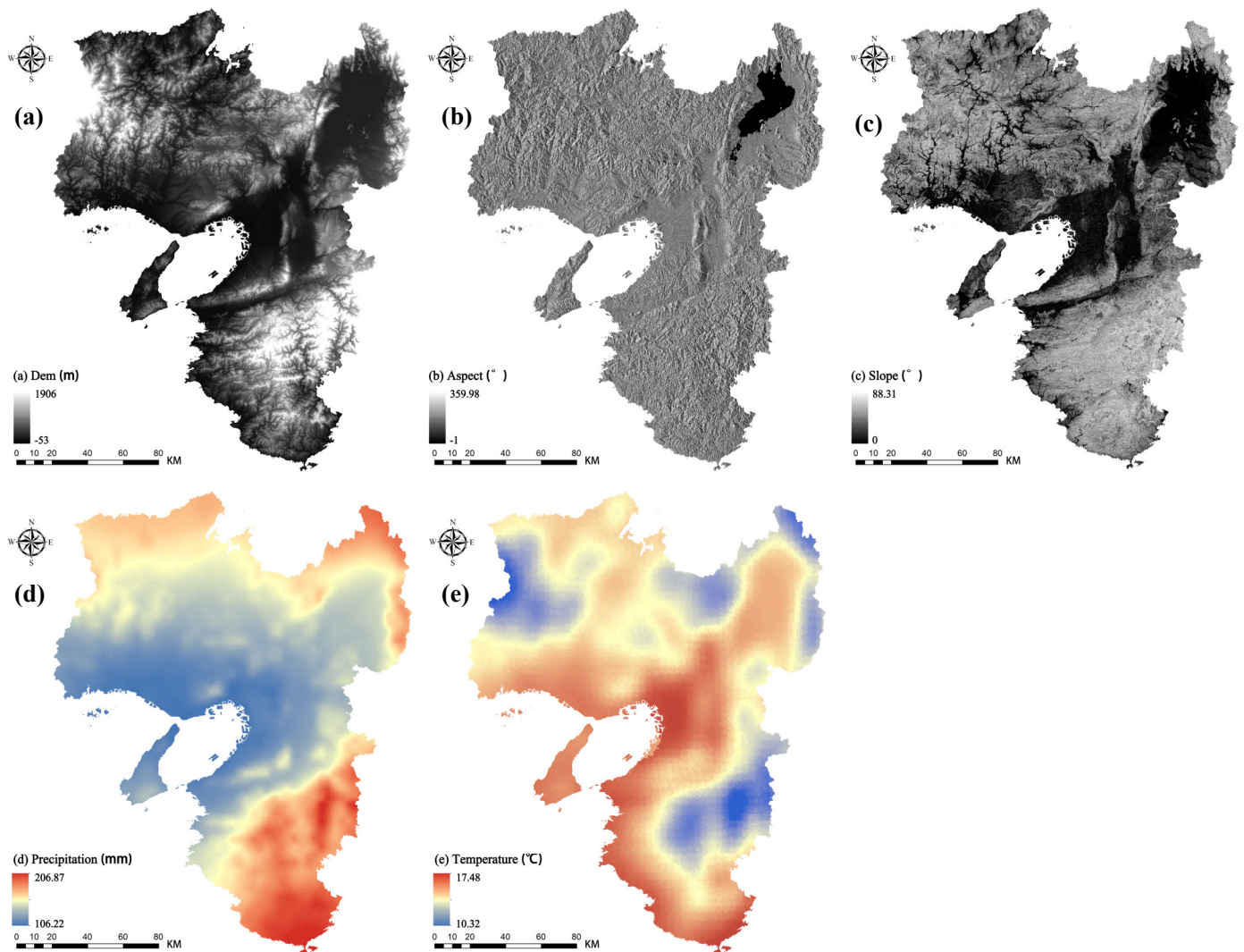
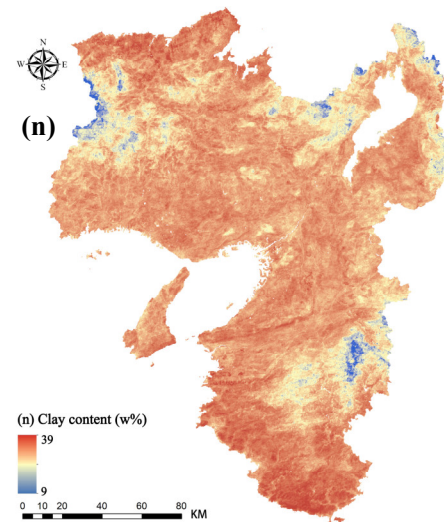
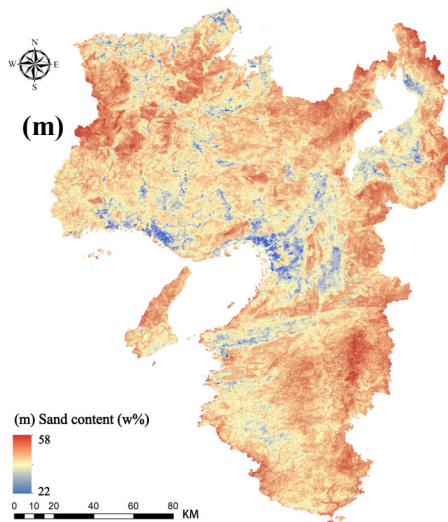
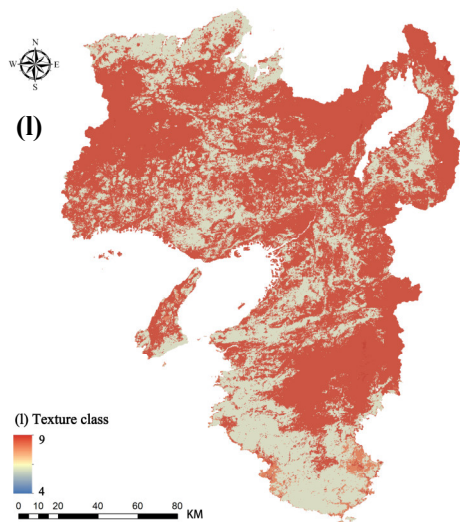
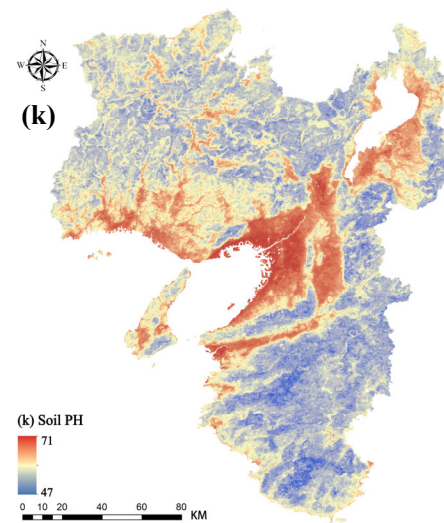
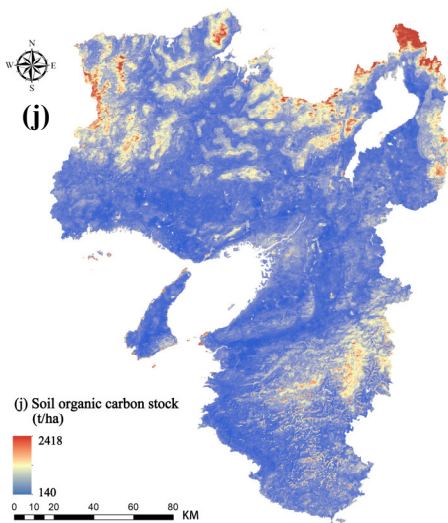
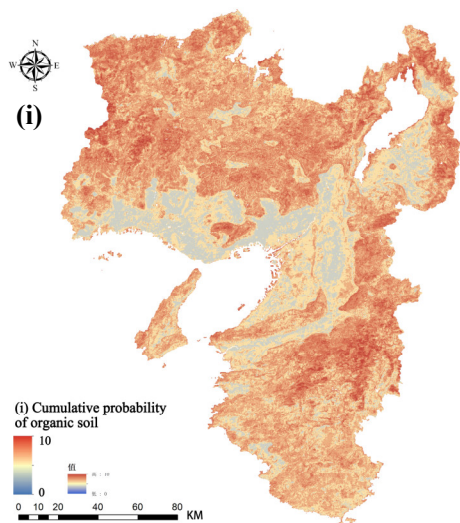
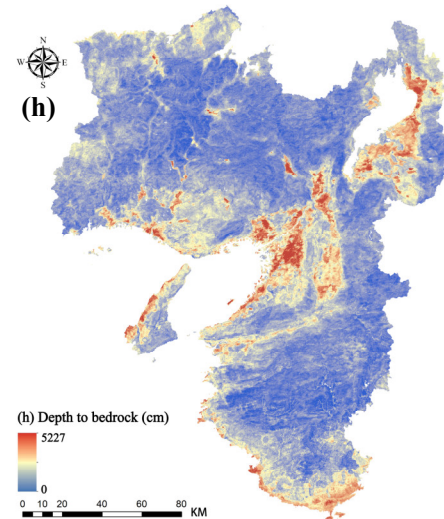
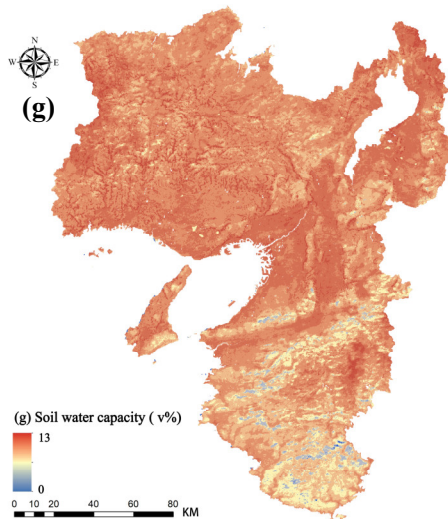
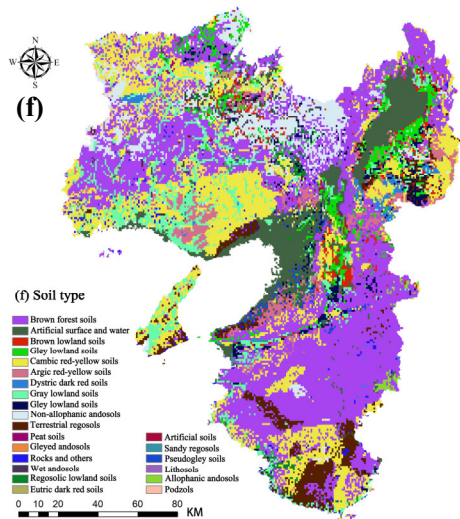


## Supplementary Materials

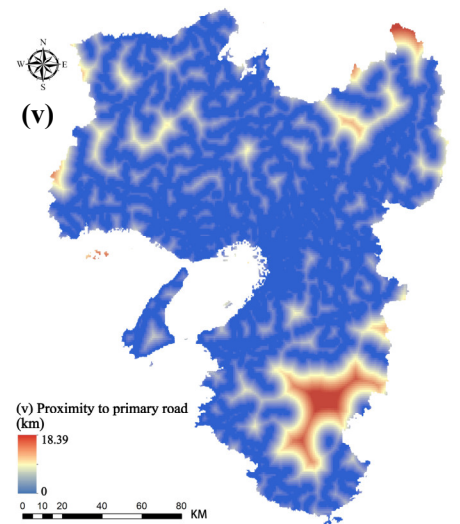
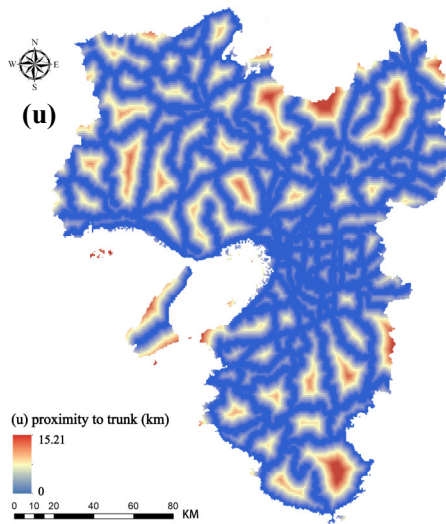
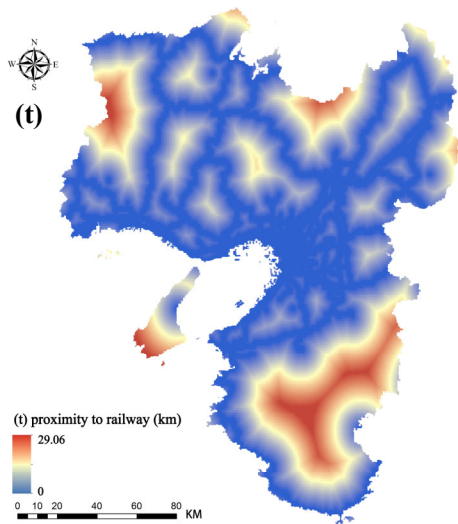
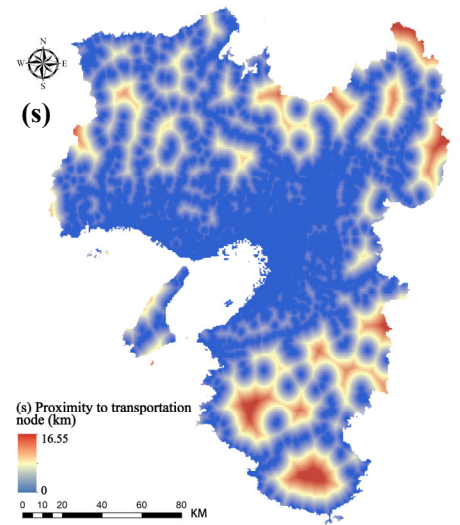
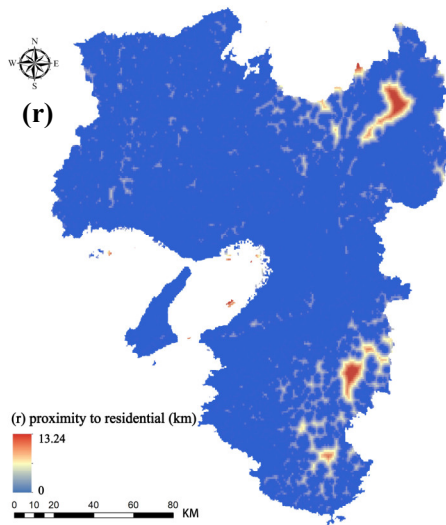
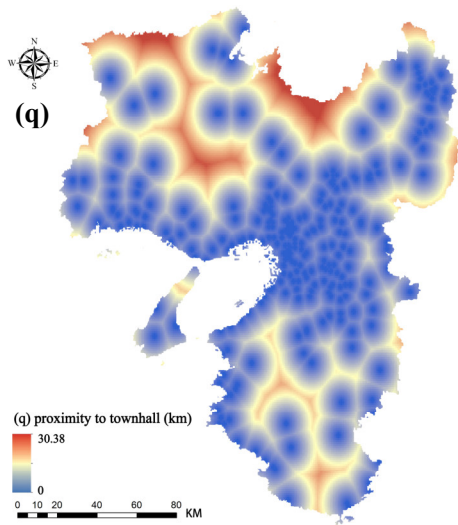
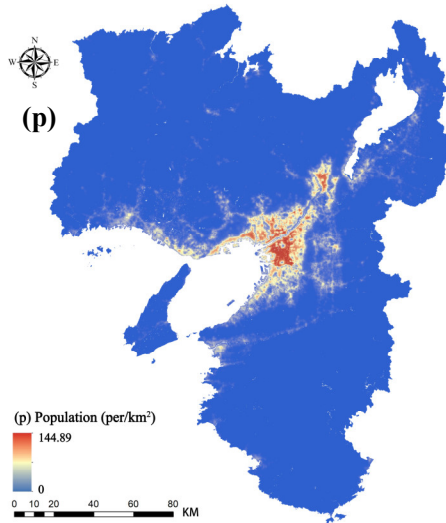
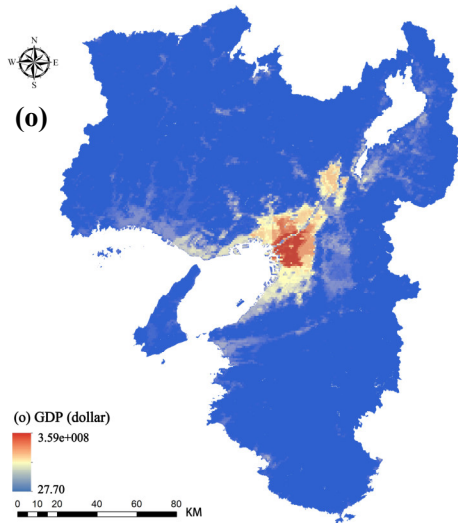


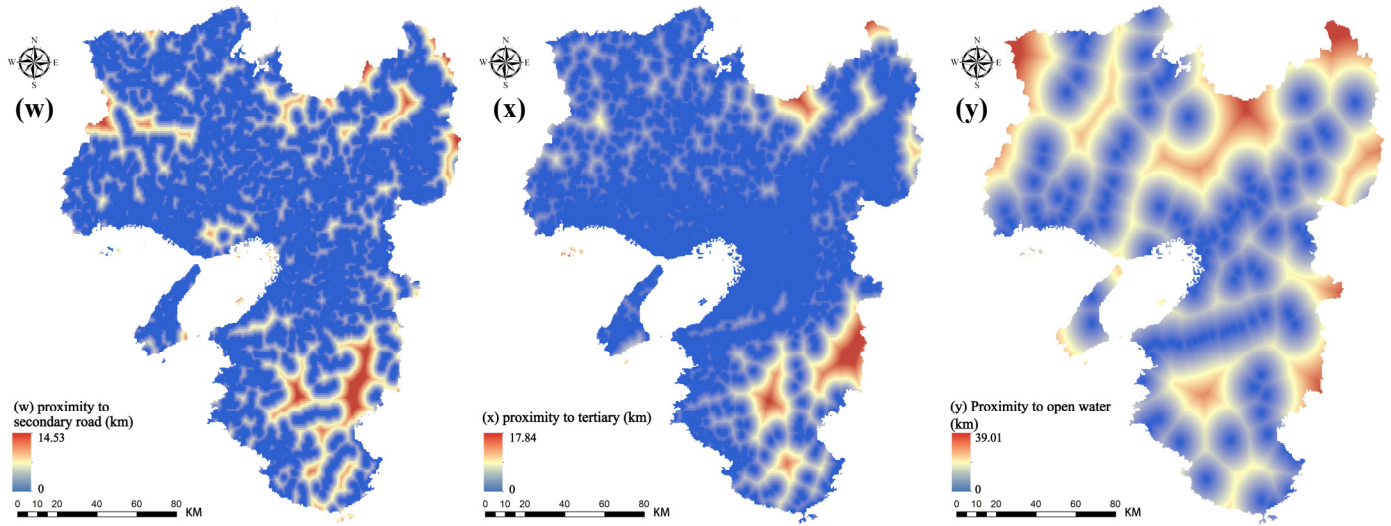
**Figure S1.** The planning system for national land use in Japan.







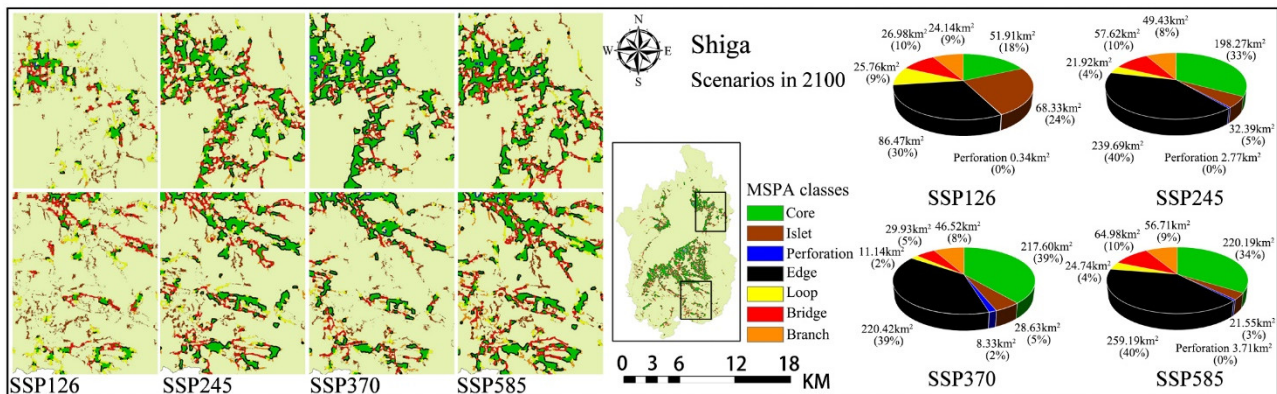
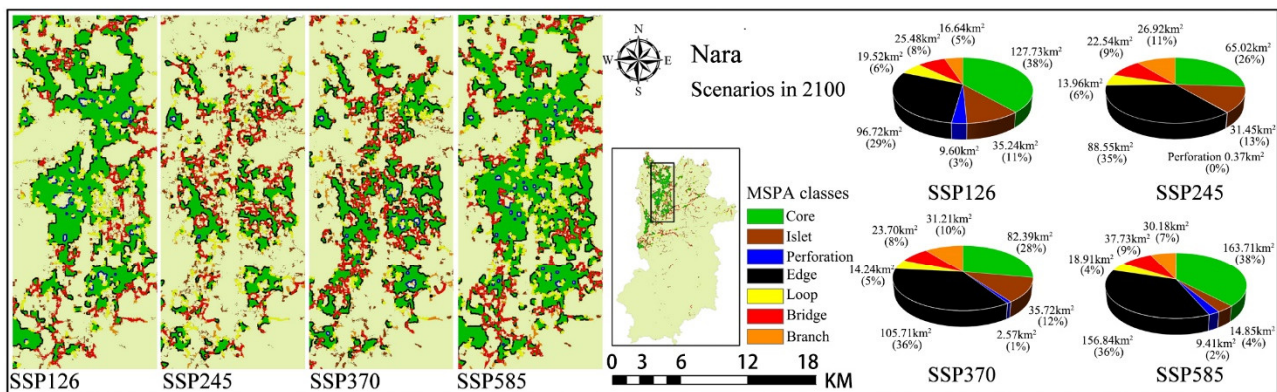
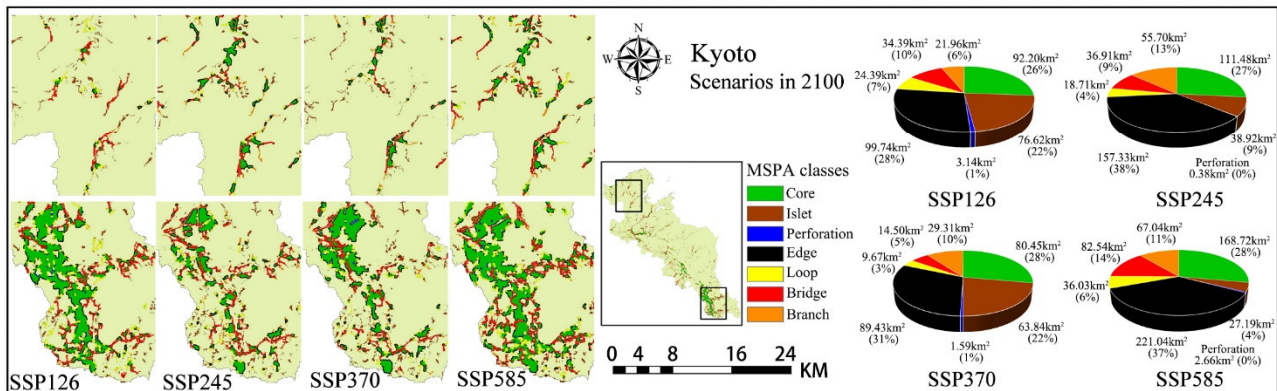
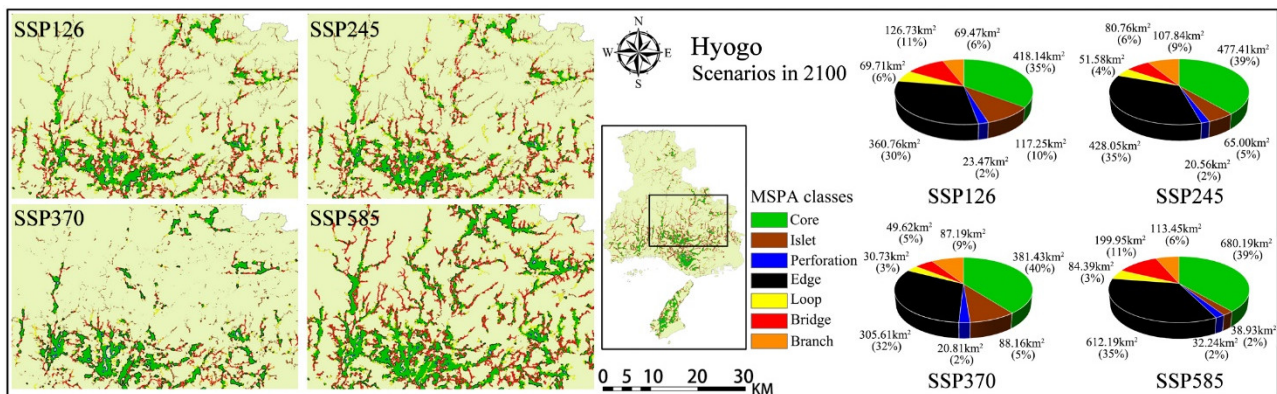


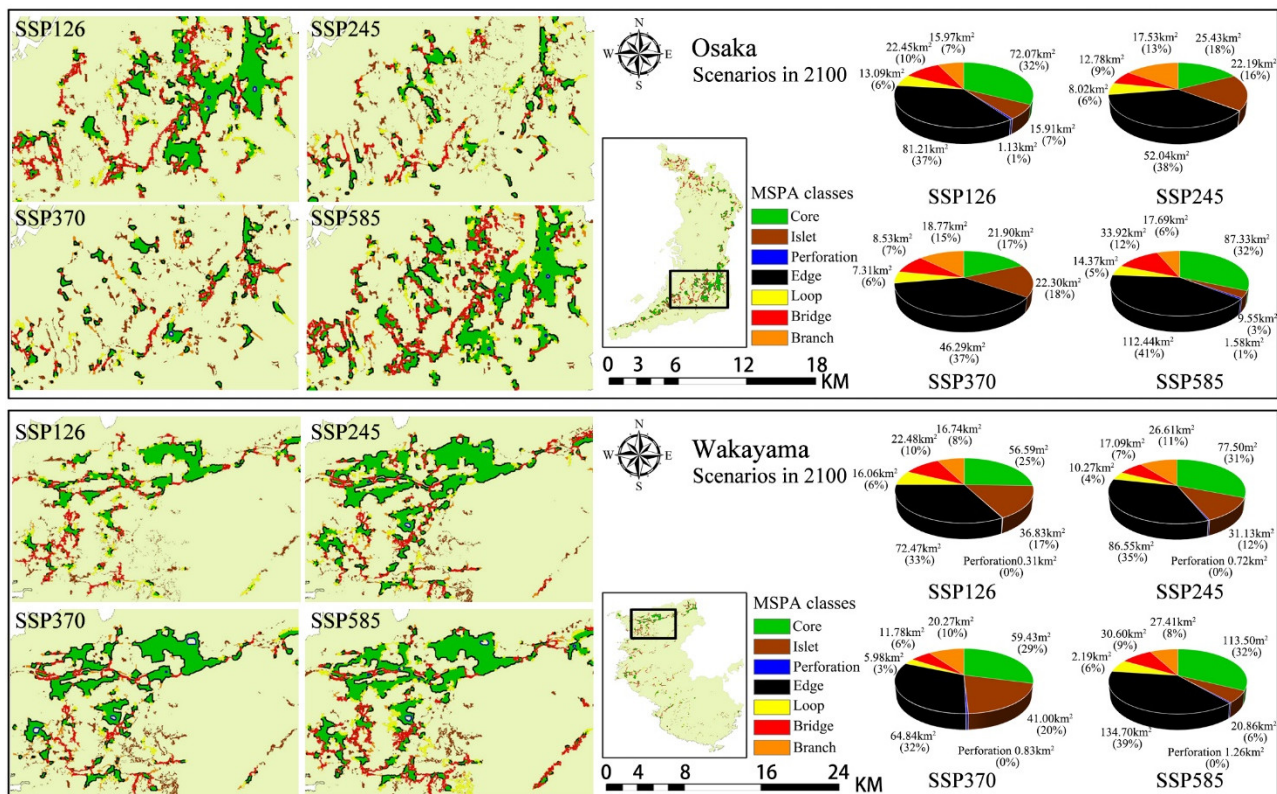


**Figure S2.** Driving factors in Kinki metropolitan

((a) DEM, (b) Slope, (c) Aspect, (d) Annual mean precipitation, (e) Annual mean temperature, (f) Soil type, (g) Soil water capacity, (h) Depth to bedrock, (i) Cumulative probability of organic soil, (j) Soil organic carbon stock, (k) Soil PH, (l) Texture class, (m) Sand content, (n) Clay content, (o) GDP density, (p) Population density, (q) Proximity to town hall, (r) Proximity to residential, (s) Proximity to transportation node, (t) Proximity to railway, (u) Proximity to trunk/motorway, (v) Proximity to primary road, (w) Proximity to secondary road, (x) Proximity to tertiary road, (y) Proximity to open water).







**Figure S3.** MSPA classes of cultivated land in four scenarios at 2100.



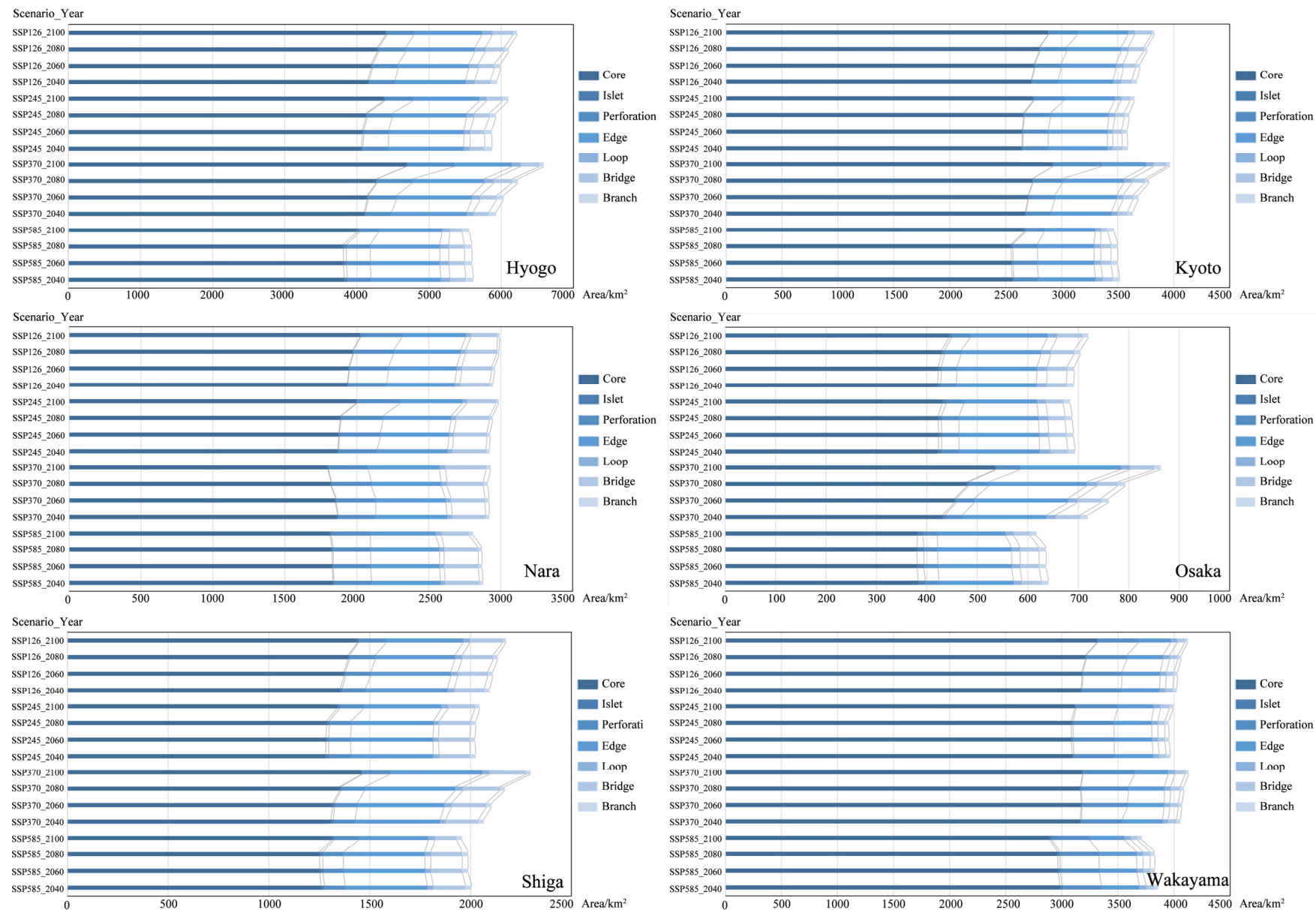


Figure S4. MSPA classes change of forest in prefectures under four scenarios

**Table S1.** Some scenarios used in this study ("✓" represents we have chosen)

	sustainability	Middle of the road	regional rivalry	Inequity	Fossil-Fuels
Shared socio-economic pathways	SSP1 ✓	SSP2 ✓	SSP3 ✓	SSP4	SSP5 ✓
Representative concentration pathways	RCP1.9	RCP4.5 ✓	RCP7.0 ✓	RCP3.4	RCP8.5 ✓
	RCP2.6 ✓			RCP6.0	
SSPs-RCPs scenarios used in this study	SSP126	SSP245	SSP370		SSP585

**Table S2.** Comparison between actual LULC in 2020 and simulation result in 2020

LUCC type	2020_Actual data (km <sup>2</sup> )	Simulation_ Markov chains (km <sup>2</sup> )	Error (%)
Cultivated land	3531.61	3984.14	12.81%
Forest	19273.82	19069.41	1.06%
Grassland	338.39	299.32	11.55%
Waterbody	857.24	819.83	4.36%
Artificial surfaces	3199.80	3030.42	5.29%
Bare land	128.85	126.68	1.68%