Supplementary Material

Table S1. Data sources and processing.

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| --- | --- | --- |
| Data type | Data content | Source and processing |
| Basic data | Land use | Resource and Environmental Science Data Platform（<http://www.resdc.cn>); reclassified according to the Chinese Academy of Sciences classification standards into six primary land types: cropland, forestland, grassland, Water bodies, building land, and unutilized land, with codes 1-6 respectively. |
| DEM | Geospatial Data Cloud（http://www.gscloud.cn） |
| Ecosystem service function assessment data | Precipitation | National Earth System Science Data Center（http://www.geodata.cn） |
| Root limiting layer depth | Harmonized World Soil Database（HWSD）（<https://www.fao.org/soils-portal/en/>） |
| Potential evapotranspiration | NASA EarthData（https://modis.gsfc.nasa.gov） |
| Available soil water capacity | ISRIC National Dataset（https://www.isric.org/） |
| Soil data (sand content, silt content, clay content, organic matter content) |  [National Tibetan Plateau Data Center (https://data.tpdc.ac.cn/)](https://data.tpdc.ac.cn/home) |
| Dominant factors of ecosystem services data | Average temperature |  [National Tibetan Plateau Data Center (https://data.tpdc.ac.cn/)](https://data.tpdc.ac.cn/home) |
| Slope | Extracted from DEM data |
| Vegetation coverage |  [National Tibetan Plateau Data Center (https://data.tpdc.ac.cn/)](https://data.tpdc.ac.cn/home) |
| Population density | Resource and Environmental Science Data Platform（http://www.resdc.cn) |
| GDP | Resource and Environmental Science Data Platform（http://www.resdc.cn) |
| Driving factors of land use change data | Aspect | Extracted from DEM data |
| Nighttime lights | Yangtze River Delta Science Data Center, National Earth System Science Data Sharing Infrastructure, National Science & Technology Infrastructure of China(http://geodata.nnu.edu.cn/) |
| Distance to national highways | Resource and Environmental Science Data Platform（<http://www.resdc.cn>), calculated using Euclidean distance |

Table S2. Transfer matrix under diverse development scenarios.

|  |  |
| --- | --- |
| Land use type | Natural development scenario |
| Cropland | Forestland | Grassland | Water body | Building land | Unutilized land |
| Cropland | 1 | 1 | 1 | 1 | 1 | 0 |
| Forestland | 1 | 1 | 1 | 1 | 1 | 0 |
| Grassland | 1 | 1 | 1 | 1 | 1 | 0 |
| Water body | 1 | 1 | 1 | 1 | 1 | 1 |
| Building land | 1 | 1 | 1 | 1 | 1 | 1 |
| Unutilized land | 1 | 1 | 1 | 1 | 1 | 1 |
| Land use type | Planning-oriented scenario |
| Cropland | Forestland | Grassland | Water body | Building land | Unutilized land |
| Cropland | 1 | 1 | 1 | 1 | 0 | 0 |
| Forestland | 1 | 1 | 1 | 1 | 1 | 0 |
| Grassland | 1 | 1 | 1 | 1 | 1 | 0 |
| Water body | 1 | 1 | 1 | 1 | 1 | 1 |
| Building land | 1 | 1 | 1 | 1 | 1 | 1 |
| Unutilized land | 1 | 1 | 1 | 1 | 1 | 1 |
| Land use type | Ecological priority scenario |
| Cropland | Forestland | Grassland | Water body | Building land | Unutilized land |
| Cropland | 1 | 1 | 1 | 1 | 0 | 0 |
| Forestland | 1 | 0 | 0 | 0 | 0 | 0 |
| Grassland | 0 | 1 | 1 | 0 | 0 | 0 |
| Water body | 0 | 1 | 1 | 1 | 0 | 0 |
| Building land | 1 | 1 | 1 | 1 | 1 | 1 |
| Unutilized land | 1 | 1 | 1 | 1 | 0 | 1 |

Table S3. Land use demand under various development scenarios.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario settings | Cropland | Forestland | Grassland | Water body | Building land | Unutilized land |
| Natural development  | 724917 | 1784721 | 498874 | 37002 | 53732 | 1653 |
| Planning-oriented | 731464 | 1805547 | 482110 | 37227 | 42844 | 1707 |
| Ecological priority  | 707222 | 1817668 | 492090 | 41783 | 40442 | 1694 |

Table S4. Neighborhood weight parameters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Land use type | Cropland | Forestland | Grassland | Water body | Building land | Unutilized land |
| Weight | 0.3482  | 0.9240 | 0.5286  | 0.1491  | 0.3712  | 0.0097  |