

Table S1: Calculation methods for evaluation indicators.

Subsystems	Codes	Indicators	Units	Calculation Methods
Driver	D1	Natural population growth rate	‰	Natural population growth of the year/ average population of the year
	D2	Urbanization rate	%	Urban population of the year / total population of the year
	D3	GDP growth rate	%	GDP of the current year / GDP of the last year
	D4	GDP per capita	CNY/person	GDP of the year / total population of the year
	D5	Share of tertiary industry	%	Tertiary industry output value of the year / GDP of the year
	D6	Value of agricultural output per capita	CNY/person	Agricultural output value of the year / total population of the year
	D7	Livestock and poultry population per capita	heads/person	Livestock and poultry population in pig equivalent of the year ¹ / total population of the year
	D8	Value of industrial output per capita	CNY/person	Industrial output value of the year / total population of the year
Pressure	P1	Population density	people/km ²	Total population of the year / total land area of the year
	P2	Annual disposable income per capita	CNY/person	Total disposable income of the year / total population of the year
	P3	GDP density	CNY/m ²	GDP of the year / total land area of the year
	P4	Chemical fertilizer usage per unit area of arable land	t/km ²	Total chemical fertilizer usage of the year / arable land area of the year
	P5	Pesticide usage per unit area of arable land	t/km ²	Total pesticide usage of the year / arable land area of the year
	P6	Plastic film usage per unit area of arable land	t/km ²	Total plastic film usage of the year / arable land area of the year
	P7	Emissions of livestock and poultry manure per unit area of arable land	kg/km ²	Total nitrogen emissions from livestock and poultry manure in pig equivalent of the year ² / total land area of the year
	P8	COD emissions in industrial wastewater per unit area of land	t/km ²	Total COD emissions in industrial wastewater of the year / total land area of the year
	P9	Industrial solid waste emissions per unit area of land	t/km ²	Total industrial solid waste emissions of the year / total land area of the year
State	S1	Arable land area per capita	m ² /person	Arable land area of the year / total population of the year
	S2	Garden land area per capita	m ² /person	Garden land area of the year / total population of the year
	S3	Forest land area per capita	m ² /person	Forest land area of the year / total population of the year
	S4	Grassland area per capita	m ² /person	Grassland area of the year / total population of the year
	S5	Wetland area per capita	m ² /person	Wetland area of the year / total population of the year
	S6	Construction land area per capita	m ² /person	Construction land area of the year / total population of the year
	S7	Transportation land area per capita	m ² /person	Transportation land area of the year / total population of the year
	S8	Water body area per capita	m ² /person	Water body area of the year / total population of the year
	S9	Grain production yield per unit area of arable land	kg/m ²	Total grain production yield of the year / arable land area of the year
Impact	I1	Frequency of occurrence of geological hazards	times	Frequency of occurrence of geological hazards in the year
	I2	Direct economic losses caused by geological hazards	million CNY	Direct economic losses caused by geological hazards in the year
	I3	Urban registered unemployment rate	%	Urban unemployed population of the year / urban employed and unemployed population of the year
	I4	Engel coefficient	%	Household food expenditure of the year / household disposable income of the year
	I5	Grain production yield per capita	kg/person	Total grain production yield of the year / total population of the year
	I6	Arable land area growth rate	%	Arable land area of the current year / arable land area of the last year
	I7	Rate of crops affected by natural disasters	%	Crop affected area of the year / crop sown area of the year
	I8	Rate of crops damaged by natural disasters	%	Crop damaged area of the year / crop affected area of the year
Response	R1	Proportion of afforested area	%	Total afforested area of the year / total land area of the year
	R2	Control rate of forest diseases, pests and rodents	%	Forest land area free of diseases, pests, and rodents of the year / forest land area affected by diseases, pests, and rodents of the year
	R3	Rate of street and road cleaning in built-up areas	%	Road cleaning area of the year / built-up area of the year
	R4	Harmless treatment disposal rate of domestic waste	%	Amount of domestic waste treated harmlessly in the year / amount of domestic waste collected in the year
	R5	Completed industrial pollution control investments per unit area of land	CNY/km ²	Completed industrial pollution control investments of the year / total land area of the year
	R6	Environmental protection expenditure per unit area of land	CNY/km ²	Environmental protection expenses of the year / total land area of the year
	R7	Degree of agricultural mechanization per unit area of arable land	kW/km ²	Total power of agricultural machinery of the year / arable land area of the year
	R8	Proportion of effective irrigated area	%	Effective irrigated area of the year / crop sown area of the year

¹ According to the Technical Guidelines for Measuring the Land Carrying Capacity of Livestock and Poultry Manure released by Ministry of Agriculture and Rural Affairs of the People's Republic of China (http://www.moa.gov.cn/gk/tzgg_1/tfw/201801/t20180122_6135486.htm), pig equivalent is a standardized measurement for calculating the amount of livestock and poultry within a specific region. One pig, excreting 11kg of nitrogen and 1.65kg of phosphorus is considered as one pig equivalent. Converting according to the amount of nitrogen and phosphorus in livestock and poultry manure, one hundred pigs are equivalent to 15 dairy cows, 30 beef cattle, 250 sheep, or 2500 poultry. The detailed formula was described as follows:

$$Q = q_{pig} + \frac{20}{3} q_{dairy\ cow} + \frac{10}{3} q_{beef\ cattle} + \frac{2}{5} q_{sheep} + \frac{1}{25} q_{poultry} \quad (S1)$$

where Q is livestock and poultry population in terms of pig equivalent, q_{pig} is total pig population, $q_{dairy\ cow}$ is total dairy cow population, $q_{beef\ cattle}$ is total beef cattle population, q_{sheep} is total sheep population, and $q_{poultry}$ is total poultry population.

² Total nitrogen emissions of livestock and poultry manure are also calculated using pig equivalent. According to the Technical Guidelines for Measuring the Land Carrying Capacity of Livestock and Poultry Manure released by Ministry of Agriculture and Rural Affairs of the People's Republic of China (http://www.moa.gov.cn/gk/tzgg_1/tfw/201801/t20180122_6135486.htm), the nitrogen supply per unit pig equivalent is 7.0 kg, taking into account the loss of livestock and poultry manure during collection, treatment and storage. The detailed formula was described as follows:

$$M = 7.0 \times Q \quad (S2)$$

where M is total nitrogen emissions of livestock and poultry manure in terms of pig equivalent, 7.0 is the annual nitrogen excretion coefficient of one pig equivalent, and Q is livestock and poultry population in terms of pig equivalent.