#### Supplementary 1. Quantification of the ES supply and demand

Supplementary1.1. Water yield service

Water yield refers to the ability of ecosystems to intercept or store rainfall water resources to meet the water demand of human beings or natural ecosystems[1]. This service has contributed significantly to regional water circulation and assisted other ES. Water yield is mainly determined by geographical location and availability of river basins. The high population density in urban areas increases water consumption.

Supplementary 1.2. Carbon sequestration service

Carbon sequestration service is defined as a natural ecosystem that absorbs and sequesters carbon to alleviate the rise of atmospheric carbon dioxide concentration[2, 3]. This is crucial to the mitigation of climate change.

Supplementary 1.3. Recreation service

A recreational service is a recreational place and experience that can provide residents with recreation and relaxation because it benefits people in many aspects, such as increasing aesthetic expertise, mental health, and social cohesion. It gives relaxation, natural experiences, leisure facilities, and mental health, especially in dense urban areas[4]. In China, the development of urban green space is emphasized by national laws and regulations (such as China's New Urbanization Plan (2014-2020) and National Forestry City Development Plan (2018-2025)) to ensure entertainment services and other ecological benefits. Therefore, it is essential to incorporate recreational services into urban land planning[5].

Supplementary 1.4. Food production service

Food production is an important supply service provided by agricultural land[6]. TLB has been an essential food production area in China since ancient times, but with the expansion of urban construction, the cultivated land area and water area are shrinking[7].

Supplementary 1.5. Heat regulation service

Heat radiation refers to the high temperature in summer. In cities, the city's surface and its storage characteristics of solar radiation aggravate the high temperature[8]. The possible consequence for urban residents is heat stress, which can be described as a negative impact on human energy balance due to hot atmospheric conditions, increasing heat-related morbidity and mortality.

The supply of heat regulation service is the ability to regulate the temperature through evaporation and water bodies[4]. The lower the capacity, the greater the harm of heat stress. Therefore, the temperature difference between each grid and the regional average can be used to calculate the service supply. In order to ensure the simplicity and operability of the method, we calculate the local cooling capacity by taking the average maximum temperature in the highest temperature area of each grid in August. According to the spatial distribution of vulnerability in local areas, the demand for heat regulation is determined. The characteristics of urban vulnerability are the number of people exposed and the number of particularly sensitive people in each urban block. According to the paper, we think the number of people exposed is calculated according to the number of people in each grid, and compassionate people are calculated according to the people aged less than 4 years and older than 65 years in each grid because the thermoregulation decreases with age. Because age strongly correlates with the incidence rate, the incidence rate will make people more susceptible to heat stress diseases[9]. For the convenience of calculation, we normalize the population density and sensitive population from 0 to 1. In addition, it is assumed that the population density contributes more to vulnerability than the proportion of children and the elderly, which is reflected by setting different weights (0.7 and 0.3)[10].