

# **Supplementary material**

## **Evaluating Trade-offs in Ecosystem Services for Blue–Green–Grey Infrastructure Planning**

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**Text S1.** Cost input analysis of blue-green-grey infrastructure.

In addition to considering the ecological benefits brought by different planning scenarios, it is also necessary to calculate their cost variation. To explore practicability, the specific results are shown in Table S2. The construction cost of grey infrastructures is much higher than that of blue-green infrastructure because of the high material price as well as labour and transportation costs. The construction cost of green infrastructure is usually low, while the maintenance cost is high. Because green infrastructures ( i.e. trees, shrubs and lawns) need regular pruning and deworming after planting. Therefore, in infrastructure planning and design, in order to maximize the net present value (NPV), it is inevitable to consider the costs comprehensively. For example, the application of grey infrastructures in parks could perform outstandingly on energy-saving and air purification benefits. However, due to the high construction cost, whether the cost and benefit synthesized in the life span can be balanced still needs further analysis to maximize the NPV.

**Table S1.** Units in this study and the corresponding interpretations.

Unit	Interpretation
$\mu\text{g}/\text{m}^3$	The unit describes the concentration of $\text{PM}_{2.5}$ in the air and indicates how many micrograms of $\text{PM}_{2.5}$ there are per cubic meter of space.
$\text{W}/\text{m}^2$	The unit refers to how many watts of energy are being consumed across a square meter of the study area.
$\text{USD}/\text{kW}\cdot\text{h}$	<p>This unit is used in the electricity billing in this study. The unit refers to the price per kilowatt-hour of electricity consumption in dollar terms.</p> <p>The electricity charge in this study, calculated at a rate of 0.086 <math>\text{\\$/kW}\cdot\text{h}</math>, is based on the electricity price list of Yuexiu District, Guangzhou City, effective from July 2019. Specifically, we have chosen the price of the first tranche of residential electricity for our calculations (given that the energy consumption variation in this study is within 260 <math>\text{kW}\cdot\text{h}</math>). This rate also serves as the reference for assessing the cooling energy-saving benefits during the summer in Guangzhou.</p>
$\text{USD}/\text{m}^2$	The unit indicates how many dollars it costs/benefits for a square meter of a specific manual/ecosystem service in this study.
$\text{USD}/\text{m}^2/\text{yr}$	The unit indicates how many dollars it costs/benefits for a square meter of a specific manual/ecosystem service on an annual basis in this study.

**Table S2.** Cost input per unit area under different planning scenarios.

Scenarios	Cost	Adding			Replacing		Integrated
		+Grey	+Green	+Blue	→Grey	→Blue	+Grey&→Grey
<b>Ersha Island Park</b>	Construction (USD/m <sup>2</sup> )	6.48	0.31	1.47	6.17	1.17	12.66
	Maintain (USD/m <sup>2</sup> /yr)	−0.01	0.04	0.02	−0.05	−0.02	−0.06
<b>Haixinsha Square</b>	Construction (USD/m <sup>2</sup> )	6.47	0.31	1.47	6.16	1.16	12.63
	Maintain (USD/m <sup>2</sup> /yr)	−0.01	0.03	0.02	−0.04	−0.01	−0.05
<b>Residential district</b>	Construction (USD/m <sup>2</sup> )				6.16	1.16	
	Maintain (USD/m <sup>2</sup> /yr)				−0.05	−0.02	

*Note: “+” represents adding 5% specific infrastructure, “→” represents replacing 5% green with blue or grey infrastructure.*