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Influence of the width on the cooling effect of waterfront green corridor

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Urban waterfront green corridor plays an important role in mitigating the urban heat island (UHI) effect, cooling down the extreme high temperature in summer and adjusting the urban local climate. Especially in the high-density cities, proper width of water front green corridor can expand the cooling effect of waterfront green corridor as far as possible in limited area. Former researches have proved that, with the increase of width, the cooled down area by green corridor will expand. However, the correlations between them are nonlinear. As a consequence, it is necessary to figure the threshold and saturation points of width of waterfront green corridor in cooling down city area, to efficiently utilize the land in high-density cities so as to adapt to climate change and adjust local climate. To realize that aim, empirical researches are conducted with the combination of measurement and modeling simulation. By using microclimate model ENVI-met, 51 scenarios including different widths and vegetation densities of waterfront green space are simulated, to calculate the threshold and saturation value of width of waterfront green corridor under different vegetation structures. At the same time, multi-line simulations are made to clarify the cooling effects of water body, green space and the combination of them both in the complicate situation that water and vegetation can both generate cooling effect. In additionally, in-situ measuring experiments are taken in Fengling green space alongside Suzhou river in Shanghai. By comparing the high-precise measuring data and the simulated data, the models are verified and analyzed to ensure the accuracy of results. The results show that, when the green corridor is arranged next to water body, the amplitude of cooled down air temperature can be additional combined. However, the range of cooled down area cannot expanded obviously. When the cooling capacity of waterfront green corridor is equal to that of water body, the benefit of waterfront green space on expanding cooling area can be observed. When the vegetation density is increasing in waterfront green corridor, the saturation value of width will turn to be shorter. The results can provide suggestion for the climate-adaptive design and planning of waterfront green corridor under the climate change and provide reference for the further research in the effect of green space on adjusting the urban climate.

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