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#2944 Synergies and Co-benefits of Climate-oriented Planning in "Street Open Space" – Urban Renewal as a Driver

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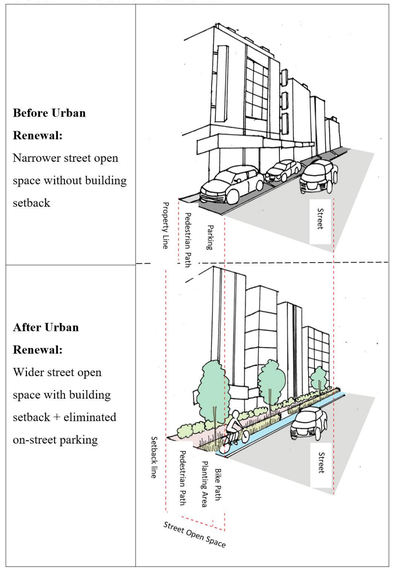
Introduction

Climate change-oriented spatial planning appears less proclaimed and comprehensive for planners than green buildings guidelines for architects. Furthermore, limited research has shed light on mitigation and adaptation spatial planning for "street open space (SOS)," composed of the sidewalk and building setback, or even removed on-street parking, in highly developed neighborhoods where limited space constraints improvement.

Objectives

This study focuses on the street open spaces due to the recent wake of urban renewal in Taiwan, which has embodied some relevant planning strategies and is highly likely to continue for decades. This study, phase two of a series of research, moves from the primary streets to the community streets to

- compile spatial planning and design tools for pursuing mitigation and adaptation and analyze their impacts; and
- explore the synergies and sustainable development co-benefits of the planning/design tools.

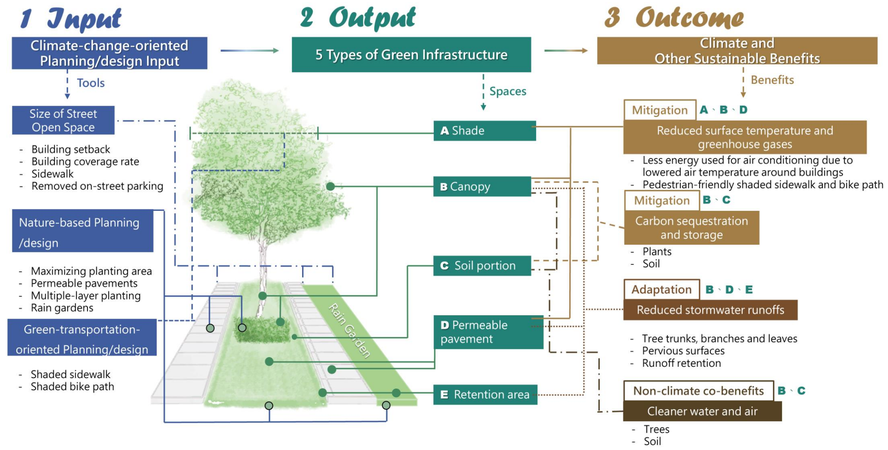


Methods

- A sample size of 112 street open space cases of rebuilt buildings (finished between 2015-2019) on community streets in Taipei, Taiwan, is collected with quota sampling.
- A before-and-after comparative analysis is conducted with paired sample t-test, among others.
- Synergies analysis are conducted with the qualitative method.

Results

- Cause-effect framework Concept Diagram: Planning/design Input- Built Environment Output - Climate Benefits



Built Environment Output: before and after the buildings are rebuilt

- The width of SOS increases by 3m on average, and 92% of on-street parking has been removed.
- Multiple-layer planting is 84%, and no case has a rain garden, and 27% has shallow planting holes.
- Canopy area per unit area increases by 11%, planting hole area per unit increases by 6%, and permeable pavement increases from zero to 5%.
- Shaded pedestrian path increases from 8% to 35%.

More Climate-change-oriented

Less Climate-change-oriented

Climate-change Benefits

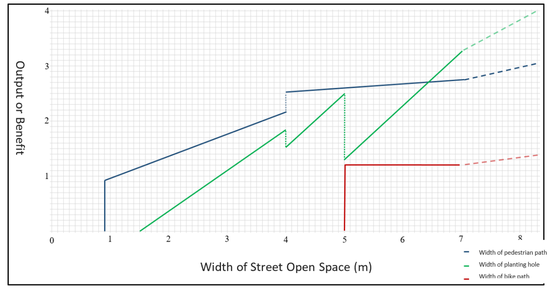
- Carbon storage per unit area increases by 650%.
- Canopy per unit area increases by 17 times.
- Temperature cooling index increases by 500%.
- Shaded pedestrian path increases by 270%.
- Stormwater runoffs per unit area decreases by 20%.

Co-benefits (for non-climate sustainable Development)

- PM10 reduction capacity per unit area increases by five times.

Synergies (between climate-oriented planning tools)

- SOS Size and NBS planning/design are respective necessary and sufficient conditions for achieving climate benefits..
- Super-additive synergy: Theoretically, the SOS width is positively related to mitigation and adaptation in a rising-step pattern.
  - Only when the SOS width reaches the thresholds can the benefits be realized by incorporating multiple design elements, such as building setbacks and eliminated on-street parking.



Conclusions

- To implement an areawide width plan for street open space in the periodic urban plan review to guide building setback and the incorporation of removed on-street parking when conducting new renewal plans.
- To adopt nature-based planning and design wherever accepted.

Funding

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