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Sustainable Cities Initiative

Sustainable Urban Design
A Framework

The Issue

Given that more than half of the world's population now lives in urbanized areas, these areas are accounting for approximately two-thirds of global energy use. With urban spaces holding such a great share of the world's energy consumption, implementing sustainable design practices in urban centers is crucial in moving towards a more sustainable global future. Sustainable design began with core disciplines such as land use and transportation planning, landscape architecture, civil engineering, real estate, and public policy. However, as the need for sustainable design expands, so does the breadth of disciplines to which sustainable design becomes applicable.

Along with the core disciplines, stakeholder disciplines have been expanded out to ecology, plant and wildlife biology, and environmental engineering. This wide range of disciplines leads to the inevitable challenge of streamlining baseline metrics to relate each discipline's opportunities and constraints to another in an effective manner. This barrier requires a bottom-line framework to focus sustainable development efforts by practitioners and researchers in a global language.

The Implications

Looking to the future, this framework can be partnered with resilience practices to help infrastructure withstand long-term changes such as economic or technological shifts, and short-term changes caused by catastrophic weather events like earthquakes or tornadoes. Many of the urban design elements explored pertain to resilience in design, but how these elements can more specifically lead to urban adaptation remains to be explored. Similarly, further examination into the complex relationships between natural systems, urban design, and human behavior can help propel the urban design field further into achieving sustainability goals.

Ultimately, the sustainable design matrix framework can serve as a roadmap of issues that need to be addressed in sustainable urban design. Considering the increasingly wide breadth of disciplines applying sustainable urban design principles to their development projects, this framework can serve as a foundation for cross-disciplinary goal-setting and can reduce the risk of applying a monothematic lens to the design and evaluation of sustainable urban development.

Project Information

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The Research

Urban design is defined by the researcher as the process, design, and organization of urban form and uses, including the design of public space, transportation systems, and open space. Urban design development is complex to research, as development opportunities and constraints can vary greatly depending on the disciplinary lens used when approaching the project. The researcher proposes the following overarching framework for sustainable urban design as a baseline for weighing these trade-offs and aiding in identifying where a single design decision can accomplish synergistic goals.

The proposed framework is broken into five primary focus areas of sustainable urban design: Energy Use and GHG Emissions (based on transport related uses), Water Quality and Recharge, Habitat and Ecological Quality, Energy Use and Production (based on non-transport related uses), and Equity and Health. These primary focus areas are then broken into metrics. Primary metrics directly translate the sustainability foci into a measurable form, and related metrics are indicators of the primary metrics. However, even with this framework, designers and researchers may still not be able to conceptualize how to manifest these elements in the physical realm.

The proposed matrix includes the sustainability principles on one axis, and geographic scales on the other. These geographic scales range from the Region to the Neighborhood/District, and the Block/Street, to the Project/Parcel. At the nexus of each geographic scale and sustainability principle is a list of applicable urban design elements or issues. These elements or issues can be used by researchers or practitioners for actual urban design decisions or practices. Each of the five sustainability principles and coinciding elements are further explored to provide ideas and suggestions for future sustainable development that meets the five principles.

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