



# Improving local measures of sustainability: A study of built-environment indicators in the United States

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## ABSTRACT

Indicator systems help organizations worldwide to understand their progress toward sustainability. But few systems include measures of the built environment, the primary area of agency for local planners seeking to contribute to sustainability. This paper uses the U.S. as a case study to explore the challenges of, and prospects for, filling that gap. Its main questions are: 1) Can a scan of existing built environment indicators yield a catalog of high-quality indicators that measure sustainability comprehensively? and 2) What gaps and challenges arise and how can they be overcome? The study triangulates answers through a review of sustainability literature, a scan of existing indicators, and consultation with panels of indicator experts. Results suggest that U.S. built-environment indicators do not robustly track local progress toward sustainability, confirm deficiencies in the equity dimension, and provide recommendations that allow communities in the U.S. and internationally to more successfully track their local progress toward sustainability goals.

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## 1. Introduction

Communities worldwide are striving to become more equitable, environmentally sensitive, and economically resilient. Consequently, the past decade has seen a rise in the number and variety of indicator systems measuring sustainability progress. Communities use sustainability metrics to make evidence-based decisions, discern whether their initiatives are making progress, and understand their contribution to broader sustainability goals. There are many perspectives on sustainability, with the natural environment, the economy, education, and public health among the most common. Sustainability metrics that are most useful for planners and local decision-makers will match the area in which these groups have the most control: the built environment.

In the context of sustainability, “built environment” can be conceptualized in a variety of ways. In this study, it encompasses building shelter (Brandon & Lombardi, 2011), and access to work, school, food<sup>1</sup> and leisure. An additional facet, land use, reflects the spatial distribution of these activities and the outcomes of related local decision-making. Planners and local governments have agency in these three domains: land use, housing and transportation.

The role of the built environment in local sustainability is a salient issue. In 2015, world leaders adopted the United Nations' 17 Sustainable

Development Goals (SDGs). Cities in developed and developing countries can make progress toward the vast majority of these goals via built environment actions. Targets that provide guidance on meeting the SDGs clearly show how local built environment actions connect to global sustainability goals. Examples are diverse. SDG #1, on poverty, identifies reducing exposure and vulnerability to climate-related extreme events. SDG #9, on infrastructure and industrialization, suggests building infrastructure that is supportive of “economic development and human well-being, with a focus on affordable and equitable access for all.” SDG #11 emphasizes the role of cities that are “inclusive, safe, resilient and sustainable” (UN 2016, 1). Numerous other goals and targets also have housing, transportation, and/or land use components. With leaders acknowledging that local built environment actions contribute to meeting sustainable development goals, it is increasingly important that communities are able to identify accurate and accessible metrics. This level of measurement is also critical because, in the United States – the subject of this case study – much of the recent work supporting sustainable development measurement has taken place at the local rather than the federal level.

Local variability makes built environment measures difficult to standardize across jurisdictions and prevents their inclusion in many national and international indicator systems (Brandon & Lombardi, 2011). For example, the International Standards Organization (ISO) has established 46 ‘indicators for city services and quality of life’ for the ‘sustainable development of communities.’ The measures cover environment, economy, education, and health, among others, but few directly measure the built environment (International Organization for Standardization, 2014). Many American sustainability indicator systems

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<sup>1</sup> Upstream processes on which planners and local governments have limited impact, such as the sourcing of materials and food, are not included.

include similar categories of measures. Such indicators are usually broad, state-based metrics (e.g. particulate matter concentration, unemployment rate) and make sense at a large scale, but are less actionable on a local scale and are often outside the direct authority of local planners and decision-makers.

Literature on sustainability identifies a similar deficit of built environment measures. Numerous studies connect metrics to the main tenets of sustainability, but few consider the built environment directly. Furthermore, while in practice many communities do use built environment indicators, it is unclear whether or not these existing measures are sufficient to understand local sustainability progress and how local actions are contributing to the broad goals of sustainability. If widely used indicators owe their prevalence to ease of calculation or popularity rather than to their effectiveness in measuring local progress toward a sustainable built environment, planners may find themselves with an abundance of measures, but persistent information deficits. This study uses the United States as a case study to explore the challenges of, and prospects for, filling these gaps in built environment sustainability information. Its main questions are: 1) Can a scan of in-use built environment indicators yield a list of measures that provide sufficient information on progress toward sustainability goals? and 2) What information gaps and challenges arise and how can they be overcome?

To address the built environment information deficit in theory and in practice, our methods span the two. We triangulate answers through a three-part analysis, a review of sustainability and livability literature, a scan of existing built environment sustainability indicators in the United States, and consultation with two diverse panels of indicator experts.

This research was conducted in the course of building the Sustainable Communities Indicator Catalog (SCIC), a U.S.-based tool to help communities of all sizes and capacities to adopt measures that match their goals and resources. It was launched in late 2014 and is available to the public on the website of the Partnership for Sustainable Communities (the Partnership) at <http://www.sustainablecommunities.gov/indicators>. The Partnership – which includes the United States' Department of Housing and Urban Development, Department of Transportation, and Environmental Protection Agency – contributed topical expertise to the study. In March 2015, we used the SCIC to assess the need for more information on built environment indicators. Our brief online survey of U.S. planners and other public officials sought feedback on how well the SCIC provides information that communities need on built-environment measures useful and appropriate (see [Appendix A](#)). Results show user satisfaction, regardless of community size or location across the country. Each of the 21 PSC grantees who answered the survey (100%) would recommend the catalog to other organizations or communities.<sup>1</sup> While the sample is too small to allow for statistical analysis, results suggest that a variety of communities in the U.S. could benefit from further support in measuring local sustainability.

## 2. Sustainability indicators for the built environment: A literature review

Sustainability indicator literature suggests that individual cities, counties, and neighborhoods face challenges in directly applying the broader concepts of the sustainability agenda to their built environment. Sustainability results are diffuse and difficult to track at the local level. The concept of livability focuses on time frames, systems, and scales that effectively bring sustainability down to the level of the built environment where planners have real agency. Under a livability framework, it is possible to identify and organize built environment

sustainability indicators, but such an endeavor faces challenges similar to those of other sustainability indicator systems. This study helps to understand and address the gaps in urban sustainability indicator systems suggested by the literature, such as equity and economic development, and the challenges of implementing such systems.

### 2.1. Sustainability and the built environment

Sustainability offers a holistic environmental, economic, and social perspective that planners have long embraced ([Campbell, 1996](#)). It also includes a global, intergenerational concern ([Mori & Christodoulou, 2012](#)) that challenges local planning by imposing a large-scale and long-term outlook, the weaving together of planning subfields (e.g. transportation, land use, economic development), and an acceptance of limits to growth ([Wheeler, 2004](#)). As a result, sustainability efforts typically focus on larger scales, such as the metropolitan region, rather than on local levels, like the neighborhood or the project site ([Banai, 2012](#)). However, urban sustainability has taken on a new urgency in recent years with adoption of the Sustainability Development Goals discussed earlier, and the identification of cities as essential in mitigating a major global concern, climate change, by the Intergovernmental Panel on Climate Change ([Seto et al., 2014](#)). Sustainable urban development can be defined as “the capacity of any significant human settlements to maintain environmental quality and carrying capacity, to support socio-economic development and management, and to provide sufficient services and livelihoods to all current and future inhabitants” ([Tang & Lee, 2016](#)).

Livability, in contrast, is focused on community attributes that planners can more easily influence, in particular the physical environment ([Gough, 2015](#)). Livability is defined by the U.S. nonprofit Partners for Livable Communities as “the sum of the factors that add up to a community's quality of life—including the built and natural environments, economic prosperity, social stability and equity, educational opportunity, and cultural, entertainment and recreation possibilities” ([Partners for Livable Communities, n.d.](#)). The concept of livability provides a bridge between the scale of sustainability and the scale of local agency, via the built environment. It embraces the neighborhood and the community as units for implementing change, making livability more actionable for local planners than the broader sustainability agenda.

Some scholars critique livability for focusing on the “here and now,” to the detriment of intergenerational equity and global concerns ([Gough, 2015](#)). This concern could be valid for areas like climate, which require large-scale management. More radical global changes are required to limit reliance on carbon-based energy ([Unruh, 2000, 2002](#)) or to implement truly sustainable infrastructure planning. However, research suggests that radical changes of many types are difficult for planners to realize ([Malekpour, Brown, & de Haan, 2015](#)), so such assessments are not limited to livability, specifically.

Despite its flaws, livability's local focus offers opportunities for local planners to move the needle on sustainability in their community and to make small, but critical, contributions to global sustainability ([Gough, 2015](#)). Recent support for the concept of livability highlights the importance of the local built environment – and role of local planning – in supporting broad movement toward sustainability ([Gough, 2015](#)). Built environment sustainability indicators exist at a critical juncture. Even if sustainability could be tracked effectively at the country level, it would be necessary to add an intermediary level of sustainability indicators at the sub-national government level ([Dahl, 2012](#)). These indicators would reflect change in areas in which local planners and decision-makers have agency.

As previously discussed, the built environment can be defined in a variety of ways. For example, “the facilities and civil infrastructure systems that people use, [it] is the fundamental foundation upon which a society exists, develops, and survives” ([Vanegas, 2003](#)). Such broad definitions must be further operationalized for a local planning context.

<sup>1</sup> The survey was addressed to 199 PSC grantees for whom a contact was available. The response rate (10%) led to only 21 exploitable answers, which were not sufficient for a full analysis of the results. As a consequence, we only report here the trend from the survey but not its detailed results, which are not representative of the perceptions of the SCIC by its target audience. Responses stemmed from all regions of the United States (Northeast, Southeast, Midwest, Southwest and West) and from urban and suburban areas.

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