Amsterdam, Netherlands
Photo by Fons Heijnsbroek

Indicators of a Biophilic City

By JD Brown

When Tim Beatley first explored the specific focus of the biophilic city, he identified that the qualities of the biophilic city extend beyond the physical abundance of nature and its accessibility to also include a consideration of the undertakings and ecoliteracy of the people of the city, along with a demonstration of the city's commitment to nature through its laws, planning, and budget (Beatley 2011).

Using those thoughts as a foundation, the Biophilic Cities Network asks its partners to each identify and monitor its own set of indicators within the context of five broad categories:

1. Natural conditions, qualities, and infrastructure
2. Biophilic engagement, participation, activities, and knowledge
3. Biophilic institutions, planning, and governance
4. Human health and well-being
5. Measures uniquely related to the culture and conditions of the city

Partner cities use selected indicators to assess changing biophilic conditions and evaluate progress over time toward the city's stated biophilic aspirations.

The result is a broad and growing library of indicators of the quality and quantity of biophilic conditions within cities (Table A). Often the indicators adopted by a partner city are already established through the city's plans and programs and reflect the city's planning priorities. An important starting point is a baseline assessment of biophilic conditions as a prerequisite for a city to chart progress. A variety of tools are available to aid cities in this baseline assessment (Table B). Network partner, the National Parks Board of Singapore (NParks), in partnership with the Secretariat of the Convention on Biological Diversity and the Global Partnership on Local and Subnational Action for Biodiversity, has designed a model index that communicates the dynamic conditions of urban

TABLE A: BIOPHILIC CITY INDICATORS

Category	Sub-Category	Indicator
Natural Conditions, Qualities, and Infrastructure	Land	Trails and greenways (linear miles and square acreage)
		Natural areas protected (total acres, percent of city)
		Parks (number and total acres)
		Community gardens (number and total acres)
		Vacant land incorporating green infrastructure (acres)
		Transformation of brownfields into green space (acres)
	Urban Forest	Percent canopy coverage
		Total number of trees
		Street tree species diversity (size class distribution)
	Proximity	Percent of city population living (or working) within 1/4 mile of accessible park or other nature space
	Green Roof and Walls	Green roofs, green walls, and other vertical nature (number and total acres)
	Native Habitat	Native habitat (total acres, percent of city)
		National Wildlife Federation Certified Wildlife Habitat (number and total acres)
		Native plant community restoration activities, e.g., wetland or wildlife corridor restoration (number and total acres)
		Removal of invasive species (acres)
	Urban Biodiversity	Pollinator nest boxes (number)
		Wildlife passage creation or restored connectivity (number of passages and acres or linear miles of restored connectivity) Annual wildlife counts
		Percentage change in biodiversity (including native species, lichens, plants, birds, butterflies, bats, and bees)
	Water	Stream restoration projects (number, linear miles, acres)
		Stream daylighting (number, linear miles)
		Nature-based stormwater mitigation projects (number, acres)
		Wetland and shoreline restoration ((number, linear miles, acres)
Human Health and Well-Being	Time spent outside	Percent of city population spending at least 30 minutes a day outside
		Percent of schools where children have daily access to nature
	Equitable nature	Households within a 10-minute (half-mile) walk of a park or nature space (number and percent)
		Communities or residents that lack access to park or natural area (population, census tracks)
		Percent tree canopy coverage by neighborhood
		Demographics of community members visiting nature spaces and participating in nature-based programs compared to the demographics of nearby communities and the city as a whole

biodiversity. The Singapore Index on Cities' Biodiversity, also referred to as the City Biodiversity Index (CBI), is a self-assessment tool for cities to evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines. The CBI measures existing biodiversity in terms of species counts, acreage of protected habitat, and connectivity. However, it also includes measures that look beyond the quantitative counts of species numbers and habitat acreage to the larger question of co-existence between humans and nonhumans in the urban landscape. These indicators examine the broad applications of ecosystem services that nature in the city can provide, such as contributions to health and well-being through the proximity and accessibility of parks. This is a reflection of the diversity of aspirations at play in the biophilic cities vision. One of the newest Biophilic Cities Network partner cities, the City of Los Angeles, applied the CBI in 2018 as a first step in a multi-year effort to develop its own, customized LA City Biodiversity Index.

The international community is collectively prioritizing the conservation and restoration of nature in cities over time as a critical measure of sustainability. Sustainable Development Goal 11 provides an overarching goal whereby cities can look to integrate nature to prioritize public health, equity, and climate resiliency. More recently, in the specific context of global biodiversity conservation, the Kunming-Montreal Global Biodiversity Framework includes a specific target (Target 12) to "significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas …" as a means to enhance native biodiversity and ecological

TABLE B: BIOPHILIC CONDITIONS ASSESSMENT TOOLS

Tool (linked)	Description
EJScreen	U.S. EPA environmental justice mapping and screening tool that combines environmental and demographic indicators.
EnviroAtlas	An evolving interactive web-based platform created by the U.S. EPA that provides geospatial data, tools, and other resources related to ecosystem services and human health.
i-Tree	A suite of free tools developed by the U.S. Forest Service and partners that aid in easily quantifying the benefits of trees, including canopy coverage, local urban forest structure and values, carbon sequestration, water management, and air quality.
NatureScore	A tool from technology company NatureQuant that measures the amount and quality of natural elements using data sources that include satellite infrared measurements, GIS and land classifications, park data and features, tree canopies, air, noise and light pollutions, and computer vision elements (aerial and street images).
ParkScore	Trust for Public Land index that measures U.S. park systems according to five categories: access, investment, amenities, acreage, and equity.
Singapore Index on Cities' Biodiversity	Also called the City Biodiversity Index or the Singapore Index, this self-assessment tool helps cities evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines.
Tree Equity Score	A tool developed by American Forests to measure the equitable distribution of trees across cities.
Urban Biodiversity Inventory Framework	Developed by a partnership of U.S. cities, this tool provides a methodology to assess, monitor, and guide planning of urban biodiversity.

TABLE A: BIOPHILIC CITY INDICATORS (Continued)

Category	Sub-Category	Indicator
Community Engagement and Knowledge	Engagement	Community BioBlitzes (number of events)
		Participation in comprehensive planning (number of participants)
		Participation in nature-based programs (i.e., guided hikes) and stewardship programs (number of participants)
		Volunteers for nature-based activities (number of volunteers)
	Visitation	Daily park, trail, and nature space visitation (number of visitors)
		Annual park, trail, and nature space visitation (number of visitors)
	Ecoliteracy	Ability of residents to identify common species of flora and fauna (percent of population)
		Primary school nature-based education (number of schools and programs, and percent of students)
Biophilic Planning and Governance	City Budget Allocation	Allocated budget for park, trail, and nature conservation, restoration maintenance, and programming (budget amount, percent of overall city budget)
	Adopted Plans and Policies	Existence of a biophilic strategy, action plan, or equivalent
		Number of comprehensive plan elements that incorporate biophilic principles and related specific recommendations
		Adopted plans with specific recommendations incorporating biophilic principles
	Interagency and Multi-stakeholder Coordination	Number of city or local government agencies involved in interagency cooperation pertaining to biophilic city planning (agencies involved)
		Non-governmental partners involved in nature-based planning efforts and programs (partners involved)

conditions, while also improving human health and well-being.

Despite this international consensus of the importance of nature in cities, the indicators of biophilic conditions can vary tremendously according to the ecology and culture of a city. This variety is reflected in the diversity of cities participating in the Biophilic Cities Network. Integrating nature can look very different in Edmonton, Canada, as compared to Colombo, Sri Lanka.

What are the biophilic indicators for your city or community? Biophilic Cities is available to consult on the preparation of a baseline conditions assessment and the identification of indicators that the reflect local priorities that are synergistic with local biophilic aspirations.

Resources

Biophilic Cities Consulting. https://www.biophiliccities.org/consult.

City of Los Angeles. 2020 Biodiversity Report. https://www.lacitysan.org/cs/groups/public/documents/document/y250/mduy/~edisp/cnt052553.pdf.