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Indicator frameworks: Helping planners monitor urban sustainability

There is a common saying that goes “what gets measured gets managed”. With this in mind, Nordregio research has identified a number of perspectives that can be of value to planners considering whether to use indicator frameworks to monitor the performance of comprehensive urban planning strategies. We found this to be a pressing issue in light of the fact that a number of comprehensive city plans in large Nordic cities have been developed with little or no consideration given to the inclusion of indicator frameworks. This policy brief aims to provide planners with a clearer understanding of the opportunities and challenges presented by the use of sustainability indicators to support urban planning and policy-making.

WE USE INDICATORS because they help us to interpret information about complex phenomena in a simple, manageable way. But indicators come in a wide variety of formats and structures. For example, a basic indicator uses one measure to indicate a variable – kilometres per litre as a measure of a car’s fuel efficiency. Alternatively, comprehensive measures aggregate multiple indicators in a number of ways, with perhaps the most common example being ecological footprints. These combine many different indicators into single measure of how many Earths it would take to sustain our consumption patterns. Another example is European Green City Index, which uses 30 indictors spread across eight themes to provide a single urban sustainability indicator that can be used to benchmark urban sustainability performance against that of other cities.

Ecological footprints and the Green City Index are examples of indicator frameworks as they bring together multiple indicators in a structured way to span multiple dimensions of sustainability. This type of issue-based, theme-based or domain-based indicator framework is by far the most common type used by local and regional planning authorities.[i] They work by organising individual indicators (e.g. the proportion of commuters using public transport as an indication of the success of local transport policy) into groups reflecting key sustainability issues, themes, or domains (i.e. economic, social and environmental). They are the most common not just because they are relatively straightforward to develop, but also because the indicators themselves are directly linked to the policy visions or goals that headline planning documents. This in turn sends out clear and direct messages to decision-makers, other key stakeholders and the general public.

Key policy implications and opportunities for more effective use of indicator frameworks

- Comprehensive city plans almost always include overarching visions, which are often translated into a set of concrete city planning goals. It is at this point that indicator frameworks should be developed in order to monitor the progress of the city plan's implementation, and to communicate that progress to a wide range of stakeholders.
- The city-regional scale has emerged as an important governance scale for understanding the way cities function, not only in terms of planning and policy, but for a host of sustainability related issues as well. Therefore, the city region is a promising arena for developing indicator frameworks because it can be used to create buy-in to sustainability issues among the municipal authorities in the city.
- Not all indicator frameworks are created equal. For instance, benchmarking indicators have the benefit of being comparable, but often lack the ability to highlight place-based development opportunities or constraints. An indicator framework to be used in relation to a specific city plan needs to be just that – specific.
- Support from outside consultancies can provide effective guidance on how to implement a well-functioning framework. This is especially true if the task of developing an indicator framework would otherwise be given to a planner who doesn't have the necessary time or experience.
- If you develop an indicator framework and then use it, ensure that someone is trained to manage the framework properly, that the framework is included in key planning documents, and, if viable, that you create an online platform to publicly share the indicator framework in real time.

The main benefits of indicator frameworks

Indicator frameworks can provide a number of benefits that support urban planners in their day-to-day work. For example, they can:

- Help planners to define smart, measurable goals in regional development strategies and plans.
- Guide decisions by providing an evidence base, supplying a useful view of issues on the ground and how they change over time.
- Give structure to policy monitoring, evaluation and revision, allowing plans and targets to be defined.
- Improve performance comparability, allowing regions or cities with similar issues to compare their progress and share solutions.
- Add accountability to sustainability plans and actions, providing constructive feed-back that can shed light on what works and what doesn't.
- Identify impacts and challenges associated with policy-making, allowing policy-makers to understand what the toughest issues to tackle are.
- Involve stakeholders, giving them tangible material to comment on and allowing them to see where progress is being made.
- Be used as leverage against those who would undermine sustainability efforts, highlighting problems and showing where there is the greatest need for improvement.

Bringing these benefits together, indicator frameworks can act as powerful monitoring and communication tools, giving structure and legitimacy to sustainability efforts. This is especially important when considering the practicalities of urban planning, which consists of roles and responsibilities distributed among a large number of departments, task forces, committees and other organisations. Indicator frameworks offer a platform that brings together diverse facets of sustainability that are usually managed individually and organises them directly in line with comprehensive plans.

Furthermore, when we consider that the larger Nordic metropolitan areas in particular are assemblages of multiple municipal and regional authorities, there is also great potential for planners working at the city-regional scale to take ownership of the development of indicator frameworks. The results can in turn be used to leverage support for the city-regional perspective among municipalities, which have a high degree of autonomy over many important issues relating to urban sustainability, particularly land-use planning.

Inspiring examples of urban sustainability indicator frameworks

There are a number of good examples of indicator frameworks that have been developed to monitor urban sustainability efforts. These can be used as inspiration for local and regional authorities in the Nordic region.

Figure 1 shows a breakdown of the 30 indicators comprising the European Green City Index. This framework ultimately produces an aggregated sustainability score, but the list also provides a general account of key issues

List of categories, indicators and their weightings

Category	Indicator	Type	Weighting	Description	Normalisation technique
CO_2	CO_2 emissions	Quantitative	33%	Total CO_2 emissions, in tonnes per head.	Min-max.
	CO_2 intensity	Quantitative	33%	Total CO_2 emissions, in grams per unit of real GDP (2000 base year).	Min-max; lower benchmark of 1,000 grams inserted to prevent outliers.
	CO_2 reduction strategy	Qualitative	33%	An assessment of the ambitiousness of CO_2 emissions reduction strategy.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Energy	Energy consumption	Quantitative	25%	Total final energy consumption, in gigajoules per head.	Min-max.
	Energy intensity	Quantitative	25%	Total final energy consumption, in megajoules per unit of real GDP (in euros, base year 2000).	Min-max; lower benchmark of 8MJ/€GDP inserted to prevent outliers.
	Renewable energy consumption	Quantitative	25%	The percentage of total energy derived from renewable sources, as a share of the city's total energy consumption, in terajoules.	Scored against an upper benchmark of 20% (EU target).
	Clean and efficient energy policies	Qualitative	25%	An assessment of the extensiveness of policies promoting the use of clean and efficient energy.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Buildings	Energy consumption of residential buildings	Quantitative	33%	Total final energy consumption in the residential sector, per square metre of residential floor space.	Min-max.
	Energy-efficient buildings standards	Qualitative	33%	An assessment the extensiveness of cities' energy efficiency standards for buildings.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
	Energy-efficient buildings initiatives	Qualitative	33%	An assessment of the extensiveness of efforts to promote energy efficiency of buildings.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Transport	Use of non-car transport	Quantitative	29%	The total percentage of the working population travelling to work on public transport, by bicycle and by foot.	Converted to a scale of 0 to 10.
	Size of non-car transport network	Quantitative	14%	Length of cycling lanes and the public transport network, in km per square metre of city area.	Min-max. Upper benchmarks of 4 km/km² and 5 km/km² inserted to prevent outliers.
	Green transport promotion	Qualitative	29%	An assessment of the extensiveness of efforts to increase the use of cleaner transport.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
	Congestion reduction policies	Qualitative	29%	An assessment of efforts to reduce vehicle traffic within the city.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Water	Water consumption	Quantitative	25%	Total annual water consumption, in cubic metres per head.	Min-max.
	Water system leakages	Quantitative	25%	Percentage of water lost in the water distribution system.	Scored against an upper target of 5%.
	Wastewater treatment	Quantitative	25%	Percentage of dwellings connected to the sewage system.	Scored against an upper benchmark of 100% and a lower benchmark of 80%.
	Water efficiency and treatment policies	Qualitative	25%	An assessment of the comprehensiveness of measures to improve the efficiency of water usage and the treatment of wastewater.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Waste and land use	Municipal waste production	Quantitative	25%	Total annual municipal waste collected, in kg per head.	Scored against an upper benchmark of 300 kg (EU target). A lower benchmark of 1,000 kg inserted to prevent outliers.
	Waste recycling	Quantitative	25%	Percentage of municipal waste recycled.	Scored against an upper benchmark of 50% (EU target).
	Waste reduction and policies	Qualitative	25%	An assessment of the extensiveness of measures to reduce the overall production of waste, and to recycle and reuse waste.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
	Green land use policies	Qualitative	25%	An assessment of the comprehensiveness of policies to contain the urban sprawl and promote the availability of green spaces.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Air quality	Nitrogen dioxide	Quantitative	20%	Annual daily mean of NO_2 emissions.	Scored against a lower benchmark of 40 ug/m³ (EU target).
	Ozone	Quantitative	20%	Annual daily mean of O_3 emissions.	Scored against a lower benchmark of 120 ug/m³ (EU target).
	Particulate matter	Quantitative	20%	Annual daily mean of PM^{10} emissions.	Scored against a lower benchmark of 50 ug/m³ (EU target).
	Sulphur dioxide	Quantitative	20%	Annual daily mean of SO_2 emissions.	Scored against a lower benchmark of 40 ug/m³ (EU target).
	Clean air policies	Qualitative	20%	An assessment of the extensiveness of policies to improve air quality.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
Environmental governance	Green action plan	Qualitative	33%	An assessment of the ambitiousness and comprehensiveness of strategies to improve and monitor environmental performance.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
	Green management	Qualitative	33%	An assessment of the management of environmental issues and commitment to achieving international environmental standards.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.
	Public participation in green policy	Qualitative	33%	An assessment of the extent to which citizens may participate in environmental decision-making.	Scored by Economist Intelligence Unit analysts on a scale of 0 to 10.

Figure 1: European Green City Index -List of categories, indicators and their weightings

and measureable indicators that planners can choose from when developing their own framework.

The Reference Framework for European Cities (RFSC) provides a knowledge base for local and regional planners investigating how to integrate a monitoring framework into their existing urban sustainability efforts. It is a joint initiative of the EU Member States, the European Commission and European local government organisations that provides an online toolkit and community for European local and regional authorities seeking to enhance their work towards integrated urban development. One of the core values of the RFSC is that it embraces local potential and circumstances, meaning that there is no one-size-fits-all solution for local sustainable urban development. The development of a sustainability strategy, the evaluation of the integrated approach and the establishment of a monitoring framework are just a few examples of the possibilities offered by the RFSC.

We have stressed that an important value of indicator frameworks is their communicative value. One of the best examples we've seen of this is the City of Vancouver's Greenest City 2020 Action Plan. The plan concisely breaks down its planning and development vision into 10 measurable goals: Green Economy, Climate Leadership, Green Buildings Green Transportation, Zero Waste, Access to Nature, Lighter Footprint, Clean Water, Clean Air and Local Food. As shown below in Figure 2, each goal is supplemented with indicator-based targets that are further supported by the identification of baseline conditions and required actions.

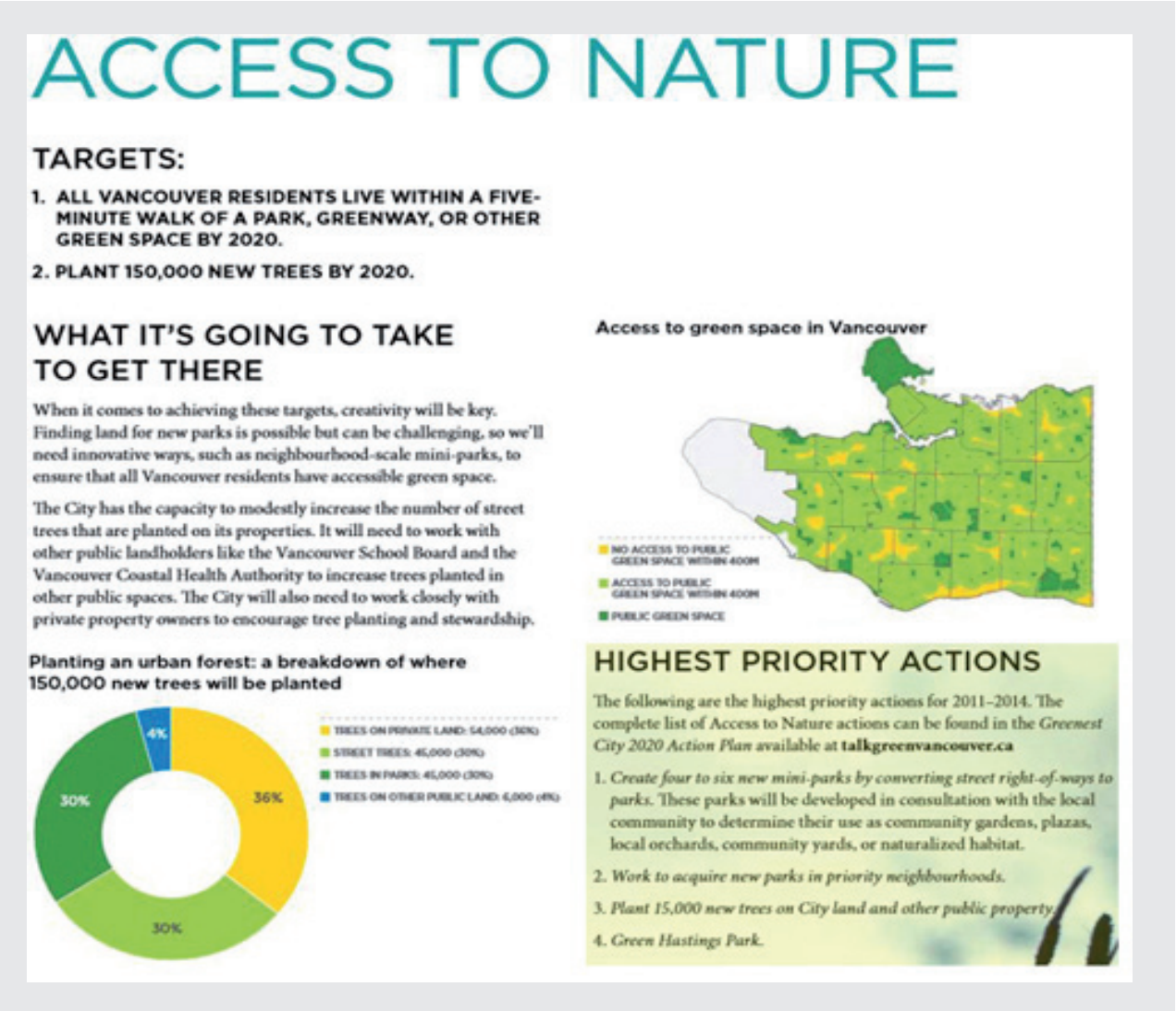

Figure 2: Targets, monitoring and actions according to the "Greenest City 2020 Action Plan" by the City of Vancouver

Box 1: Common types of urban sustainability frameworks

1. **Goal, issue or theme-based frameworks**. These organise indicators into different groups relating to sustainable development. They are the most widely used type of frameworks because of their ability to directly link indicators to policy visions and targets in a straightforward way.
2. **Aggregated frameworks.** These focus mainly on the individual domains or themes of sustainable development, particularly the environment. This type of framework brings together multiple measures into a single value that indicates sustainability performance.
3. **Benchmarking frameworks**. These incorporate indicator data from different cities to produce a comparison or ranking of urban sustainability performance. For instance, the Siemens Green City Index is both an aggregated and a benchmarking framework.
4. **Model frameworks**. These attempt to go beyond simple cause and effect explanations in order to acknowledge the complexity and interrelatedness of decisions concerning sustainable development. Ideally they should be able to acknowledge interactions between socioeconomic issues, environmental trends and other phenomena that influence, or are influenced by urban development. For instance, are investments in greening public buildings supporting or working against social initiatives to reduce inequality or segregation? Thus, a key aim of model frameworks is not simply to span diverse sustainability issues, but also to integrate them.

Potential implementation challenges

As mentioned, many new urban planning strategies have been developed without consideration given to monitoring progress toward achieving the vision and goals set out in the plan. The obvious question is why? Our research identified some commonly cited challenges and limitations associated with indicator frameworks:

- Like many professions, planners are faced with time, resource and institutional constraints. Even applying a straightforward indicator framework adds yet another task to their already busy agendas. In one such case in Sweden it was noted how planners contend that it is better to actually "get things done" and that they are "too busy" to spend excessive time exploring potential links between sustainability issues. [ii]
- Planners are often drawn to benchmarking frameworks because of their comparability. But they must ask themselves what it is that this information can really tell them about the challenges and opportunities they face locally. Benchmarking frameworks may appear useful as a means by which to create positive 'competition' between cities in terms of sustainability, but finding indicators to isolate and compare can come at the expense of local context and methodological coherence. [iii]
- While model frameworks have been promoted on the basis of their ability to integrate causal relationships between indicators, there is little evidence that they are used successfully in practice. The United Nations Commission for Sustainable Development used a DSR model framework (identifying indicators as relating to a driving force, a state or a response to sustainability), but reverted to a domain-based framework in 2001. The Commission believed the DSR framework was not suited to addressing the complex links between issues, that the classification of indicators according to D, S or R was ambiguous, that there were uncertainties over causal links, and that it did not effectively highlight relationships between indicators and policy issues.
- While issue, theme or domain-based frameworks can be great for isolating problematic trends, there is skepticism as to whether they can actually support decision-making processes, particularly in terms of reflecting cause and effect relationships between different planning initiatives.

A way forward for urban sustainability indicator frameworks

In terms of future developments, instances where indicator frameworks can be used to improve city-regional governance of urban sustainability planning are especially promising. So too are new opportunities to increase the use of 'big data' and share information with stakeholders in real time. London's City Dashboard is one example of this, with real-time data providing an excellent source for local monitoring and communication. It is likely that this type of digital platform will continue to develop as the demand for accessible real-time data carries on growing.

Useful links

SIEMENS Green City Index - http://www.siemens.com/entry/cc/en/greencityindex.htm
City Dashboard - http://citydashboard.org/london/
City of Vancouver Greenest City 2020 Action Plan - http://vancouver.ca/files/cov/greenest-city-action-plan.pdf

Related reading:

Weber, R., Fredricsson, (2014) Integrated Models: Planning Urban Sustainability, Nordregio Policy Brief 2014:1.
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Endnotes

i Maclaren, V. (1996) Urban Sustainability Reporting, Journal of the American Planning Association, 62:2, 184-202

ii Anderson, L. (2013) Measuring Sustainable Cities: An approach for assessing municipal-level sustainability indicator systems in Sweden. Available at: <http://uu.diva-portal.org/smash/get/diva2:658303/FULLTEXT01.pdf>.

iii McManus, P. (2012) Measuring Urban Sustainability: the potential and pitfalls of city rankings. Australian Geographer, 43(4): 411-424 & Moreno Pires, S., Fidélis, T., & Ramos, T. B. (2014) Measuring and comparing local sustainable development through common indicators: Constraints and achievements in practice. Cities, 39: 1-9.

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Nordregio acts as the Secretariat of the Nordic Working Group on Green Growth – Sustainable Urban Regions. The activities of the working group are continuously developed via collaboration between the members of the working group (i.e. national representatives from ministries or national authorities) and key stakeholders (i.e. policy-makers and planners in the municipalities and regions in the larger city regions in the Nordic countries) with an equal focus on theoretical and practical approaches.
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