EDG 84 SJ • February 2016 (Edited 28.08.2018)
environmentdesignguide.com.au
Reviewed and approved for currency in August 2018

ISSN 1442-5017

A summary of urban assessment tools for application in Australia

Suzette Jackson

Cover Image: The Curtin University Masterplan by Curtin University in consultation with Aecom and Donaldson and Warn. Curtin University was awarded Australia's first 5 Star Green Star – Communities rating from the Green Building Council of Australia. (Image: Courtesy Curtin University)

Abstract

With increasing world population, urbanization, and climatic changes impacting liveability there is a growing awareness of the urgent need for more sustainable and ecological approaches to urban settlements, city planning and infrastructure. This has led to the evolution of urban assessment tools that are visionary, holistic and designed to address complex issues facing global communities and cities today.

This paper provides an overview of international urban rating tools developed to assist with the regeneration of existing and new sustainable communities and cities, particularly those supported for use in Australia. The article covers the structure, themes and output of the tools, as well as the use and uptake in Australia. The summary is designed to provide awareness of the range of urban assessment tools available for use in Australia and to assist in an appropriate selection.

"This philosophy, advocacy tool and certification program covers communities and masterplan's at all scales ...it is a unified tool for transformative design allowing us to envision a future that is socially just, culturally rich and ecologically restorative." Living Community Challenge (ILFI, 2014)

Introduction

With growing urbanization, population, and climatic changes impacting liveability there is an increasing awareness of the need to develop more ecologically sustainable approaches to urban settlements, city planning and infrastructure. With 54% of the world's population living in urban areas, most resources are consumed in urban environments. The most urbanized regions include North America at 82% and Europe at 73% while in Australia and New Zealand 89% of the population live in urban environments (UN 2014). This impacts the social and economic sustainability of a region, in addition to its environmental sustainability.

In the 21st century, people aspire to live in cities that offer resilience to climate change, opportunities for diverse employment, equity, health and wellbeing. Urban communities need to accommodate the increasing global population, while developing mechanisms to deal with increased food, housing and resource demand, as well as extreme weather events. Urban challenges include reducing the urban heat island effect, the impact of urban flooding and increasing access to fresh water and food, renewable energy, and strong regional economies.

Since the development of international building frameworks and assessment tools in the 1980s, there has been a growing need to apply similar methodologies to the urban environment across the scale of neighborhoods, precincts and cities. To assist this, a number of tools outline a vision for 'sustainable communities'.

The Bioregional Development Group (UK) developed the One Planet Living Framework with assistance by the World Wildlife Foundation, with the vision of "living within one planet's resources", reflecting the need for reduced global resource consumption (BioRegional, WWF 2004). The International Living Future Institute in 2010 published their vision of "a future that is socially just, culturally rich and ecologically restorative" as part of their Living Building Challenge.

Urban assessment tools provide inspiration for the development and adaptation of communities and cities, through their vision, key themes and criteria. They present a holistic framework for industry, governance, built environment professionals and communities. Urban tools provide guidance and a consistent approach to urban design and performance against internationally recognized benchmarks.

Structure

This paper provides an overview of leading international urban assessment tools to provide practitioners with an understanding of the tools available and supported for use in Australia, and the considerations to identify the most suitable urban tool for application. It includes a summary of the tools' format, themes and assessment process in order to facilitate awareness of the tools.

The first section introduces contemporary urban issues the urban tools seek to address, followed by a discussion on tool formats and effectiveness. A summary of leading international urban assessment tools is provided. Of these, five urban tools are identified for use in Australia. The tools are holistic in coverage of urban issues, publicly available for Australian application, and range from the early stages of design or master planning through to operation.

The summary is designed to assist industry in the selection of appropriate urban tools, particularly those in planning, urban design, architecture, property development, and engineering. This paper includes an overview of each framework with references to published case studies found on respective websites.

This paper does not review building rating tools for specific building types (refer EDG 80 Residential Building Sustainability Rating Tools in Australia) nor does it assess customized urban development tools developed for internal use by independent design and engineering practices.

Addressing urban sustainability issues

Urban assessment tools provide an integrated approach to urban issues and innovative thinking and leadership for urban environments at community, neighbourhood, precinct and city scales. Key issues impacting the success of communities include: population growth and land use, climate change, urban and peri-urban ecological conditions, resource demand, housing quality and density, waste, water shortages and quality, food insecurity, political unrest, economic change, and cultural equality. International organisations, such as the Organisation for Economic Cooperation and Development (OECD) and United Nations (UN), frame urban issues under the four dimensions of sustainability: environment, society, economy and culture.

Urban rating tools frame the complexity of urban environments under core themes or categories, or reference the sustainability dimensions of economic, environment, and society. This approach is useful in providing a framework with which to address urban issues locally while providing comparisons globally. Urban environment themes include: energy, water, waste, transport, economy, ecosystems/ biodiversity, materials, food, health and happiness, culture and community, and innovation.

Urban rating tools include vision, principles and objectives, criteria, design indicators, baseline benchmarks and targets. The tools reference national and/ or internationally consistent metrics, utilising case studies for comparison of outcomes across countries (Refer Figure 1).

The term 'tool' is used in a broad sense encompassing a range of frameworks and assessment tools that can be used for guidance, modelling, or independent certification or endorsement at a national or international level. The term 'best practice' is used to describe urban assessment tools providing methodologies and systems that lead to optimum built environment outcomes, or better than 'good practice'. (Colantonio & Dixon, 2011).

Prior to tool selection, it is recommended that the urban area or project be reviewed against urban tool structures, themes, eligibility, urban typology and certification requirements in order to identify the tool most relevant to the project outcomes. Consideration should be given to regional urban issues identified by community and government and community indicators such as the OECD Health and Wellbeing Indicators.

Urban rating tool themes relative to Australia are referenced in Figure 2.

Tool effectiveness

In order for urban development tools to be effective, in guiding ecological urban development for communities and cities, they need to possess a number of key characteristics (Becker 2004; Gil & Duarte 2011; Berardi 2013; Sullivan et al. 2014). These include:

- Holistic vision, combined with international targets and objectives
- An integrated framework including relevant sustainability and urban environment themes
- Comparable and rigorous values and metrics
- Available guidance, training and expertise in the assessment process
- Capacity to assess alternative concepts, allowing for reiteration, and supporting design evolution and innovation
- Clear communication methods to illustrate outcomes to stakeholders.

Tool selection should be based on the tools and respective expert's ability to contribute to improved quality of life outcomes using robust metrics and relevance to the region. In some instances, the use of two tools may provide a more rigorous approach, combining theory, comparability, interactive design support and clear communication to stakeholders.

Tool structure

The structure of urban tools should support the selection and development of meaningful, measurable sustainability indicators able to be benchmarked (Gill and Duarte 2011; Archibugi 2006). The indicators should link core international urban themes and issues, specific regional issues, and regional and international policy targets, to measurable objectives (Gill and Duarte 2011; Briassoulis 2001, Mitchell 1996).

Urban tool structures are predominantly based on a set of core themes aligned to key urban sustainability issues. Together the themes provide an integrated methodology and comprise a holistic approach to urban environment issues.

Tools can be developed for a local market such as the Green Star Communities tool specific to Australia, or designed for application internationally, such as the One Planet Communities and Living Building Challenge. Tools designed for international application with the potential to benchmark outcomes internationally may still require adjustment to suit the geographic location or a country's regulations.

Tool format

Urban rating tools use various methods to demonstrate best practice with respect to urban environments. The urban rating tools under review include four tool formats: design guidelines, calculation tools, assessment tools and rating systems, with tools often utilising more than one of these formats.

These formats can be used individually to guide the process or two or more can be used to determine varying outcomes.

Guideline

Submission or design guidelines describe the assessment approach across a set of core themes and/or principles and a detailed structure of criteria or indicators that include benchmark values. For instance the Green Star Communities (GBCA 2015), EnviroDevelopment (UDIA 2009) and Living Community Challenge (ILFI 2014) provide a design submission guideline that is used for the rating system.

Calculation Tool

These are software tools that help users calculate urban development indicators. They offer a flexible evaluation framework that aggregates indicators for visualization in simple charts or thematic maps and can be viewed by individual themes.

Assessment Tool

These are advanced checklists with software implementation. They include structured evaluation frameworks across core themes. The results can be plotted in charts to give a visual and quantitative output. For example, the One Planet Community assessment spreadsheet provides results plotted into a table across each theme, a spider chart, percentage score achieved and star rating.

Rating System

These are advanced checklists or spreadsheets, similar to an assessment tool with the output as a label or score. They require the calculation of indicators, target values and weights for aggregating the results into a final score, such as that used for the Green Star Communities. The rating assessment must be verified or certified by a third party based on documentation provided in the submission. Most urban tools offer voluntary certification or verification rating systems.

Evaluation criteria

Each core theme contains a series of set objectives with evaluation criteria. The criterion sets the benchmark (metrics) to determine the overall successful application of the theme. The criteria include design indicators, performance-based or descriptive standards, targets and baseline benchmarks. Benchmarks reference regional industry or international standards, and internationally recognised urban metrics / databases to ensure rigour, comparability, and independence.

For example, a walkability indicator or measure, based on a set of specific criteria or conditions provides a consistent approach to measuring walking distance from housing to amenities.

The reference or baseline values are based on 'business as usual' (BAS) outcomes, or what is considered good or accepted practice. The target values set levels to be achieved to meet a specific level based on objectives. These may include reference to industry or international standards as a baseline to measure improvements against. Points are allocated based on the level of improvement achieved.

An overview of urban tools

Regional and international urban tools provide guidance, frameworks, consistent approaches and assessment of sustainable communities, neighbourhoods and cities. A recent study of international urban sustainability rating tools lists more than 35 individual tools for city, urban and neighbourhood use, across 22 countries (Criterion Planners, 2014). The variance in urban tools are often subtle and based on the regions or countries they are designed for, urban typology, phase measured, tool format, and how prescriptive the criteria.

The tool and/or measures differ across urban tools based on the project stage at time of assessment. For example an urban assessment completed at a master plan / design stage is based on a 'predicted' project outcome for a new development; while an urban assessment completed after 12 months of operation of a new urban environment or of an existing urban environment is characterised as a 'measured' assessment.

Some tools are prescriptive, such as the Green Star Communities and LEED ND - with identified processes and metrics required to achieve points. Consequently they provide clear and specific instructions to be followed, and generally relate to a defined region or country based on regional policy, climate or planning regulations and development practices. These tools incorporate submission guidelines and require varying levels of experience or expertise to apply the tool.

Tools that are non-prescriptive, such as the Circles of Sustainability and One Planet Communities - provide more flexibility and options for scenario development and assessment of performance modelling. While the outcome to be achieved will be outlined, the process of achievement may be more flexible and adaptive to a range of regulations and countries. Due to the flexibility, they require the use of skilled facilitators to apply the tool and detailed knowledge of the urban complexity, issues, and scenario and modelling tools to be used.

Of the twelve tools summarised (Figure 1) only five are currently supported for use in Australia with local staff and training. These include the Circles of Sustainability, EnviroDevelopment, Green Star Communities, Living Community Challenge, and One Planet Communities.

Tool formats impact the ease of useability and skill level required. Where guidelines are provided the tool themes, objectives and criteria are more easily disseminated and understood, providing opportunity for broader uptake and application. Guidelines also provide end-users with the ability to trial the tool at low or nil costs. Use of calculation and assessment tools require some training and a degree of familiarity for successful use. Where submission or design guidelines are not provided, professional training and local expertise is critical to the uptake and application of the tool.

This overview includes twelve leading international urban rating tools selected based on the operator's international reputation, comparability, and uptake. A number of successful urban tools, such as BREEAM Communities, DGNB for Urban Districts, LEED for Neighbourhood Development, and One Planet Communities, have been adopted or modified for use in other countries. The Circle of Sustainability tool was developed for use internationally and is not country specific.

The summary, illustrated in figure 1, provides a comparison of the tool version, owner, year and country of origin, scale, phase of use and certification. In addition the comparison nominates where the tool has technical support or an owner office within Australia.

Tool Detail / Urban tool	Tool Owner / Country / Year est.	Australian Support / Training	Tool Format	Urban typology / Phase	Certification Basis
BREEAM Communities, Version 2.0	Building Research Establishment Ltd (BRE) UK 2012	No / No	Guideline, Assessment & Certification	New. District, Precinct, Neighbourhood Masterplanning / Design	PREDICTED
CASBEE for Cities	Institute for Building Environment & Energy Conservation, Japan 2006	No / No	Framework, Assessment & Ranking	New & Existing. City, Municipality Current & Future Assessment	MEASURED (& PREDICTED)
CASBEE for Urban Development	Institute for Building Environment & Energy Conservation, Japan	No / No	Framework, Assessment & Ranking	New. District, Precinct, Neighbourhood Masterplanning / Design	PREDICTED Valid for 5 years
Circles of Sustainability (CoS)	UN Global Compact Cities Programme, Australian 2014	RMIT Global Cities Programme	Framework / Questions, Facilitation & Assessment	Existing. City, Metropolis, Region	MEASURED
DGNB for Urban Districts	German Sustainable Building Council, Germany 2013	No / No	Guideline, Assessment & Certification	New & Operation District, Precinct, Neighbourhood	PREDICTED - Valid for 5 years MEASURED -Unlimited
EcoDistricts The Protocol V1.0 PILOT	EcoDistricts, USA 2015	No / No	Guide, Facilitation & Assessment	New & Operation District, Precinct, Neighbourhood	PREDICTED & MEASURED
Enviro-Development (ED)	Urban Development Institute of Australia (UDIA) Australia 2006	Enviro-Development	Guideline, Assessment & Certification	New. District, Precinct, Neighbourhood Masterplanning / Design	PREDICTED Valid 12 months.
Green Mark for Districts	Building & Construction Authority of Singapore, Singapore	No / No	Guideline, Assessment & Certification	New. District, Precinct, Neighbourhood Masterplanned / Design	PREDICTED
Green Star Communities (GSC)	Green Building Council of Australia, Australia 2012	Green Building Council of Australia	Guideline, Assessment & Certification	District, Precinct, Neighbourhood New & Operation	PREDICTED Valid 3-5 years Independent third party certification

LEED for Neighbourhood Development	U.S. Green Building Council (USGBC) USA 2009	No	Guideline, Assessment & Certification	New. & Operation District, Precinct, Neighbourhood, Masterplanned / Design	MEASURED Independent third party certification
Living Community Challenge 1.0 (LCC)	International Living Future Institute, USA 2014	Living Future Institute Australia	Framework, Assessment & Certification	New & Operation District, Precinct, Neighbourhood,	PREDICTED (stage) & MEASURED Independent third party certification.
One Planet Communities (OPC)	BioRegional Development Group, UK 2004	BioRegional Australia	Framework, Assessment & Certification	New & Operation District, Precinct, Neighbourhood, Design & As Built	PREDICTED & MEASURED Verification

Figure 1. Summary of Key International Urban Tools
Note: Urban tools supported for use in Australia are in highlighted row

A rating system provides the added benefit of benchmarking projects – dependent on the level of information provided in the rating. Benchmark projects published by the tool operator also assist in developing an understanding of the regional market place and urban outcomes. This can assist with the uptake of a tool and its attractiveness to developers based on the reputation involved in achieving a rating.

The success of urban assessment tools is dependent on the ability of the tool to address complex urban issues, as well as access to technical support by the tool operator throughout the process. The ability for industry professionals to obtain training, technical support and tool/workshop facilitation is important for tool uptake, improving the quality of built urban environments and industry development.

A guide to tool selection – sustainability & urban themes

The urban tools supported for use in Australia provide a holistic approach covering a range of sustainability dimensions and urban themes. These can be used to compare the level of consideration for quality of life, as illustrated in figure 2. All tools reviewed cover the core sustainability themes of social, environment and economic and governance. However a number of the tools go further to include themes on Politics (Circle Of Sustainability), Liveability, Health and Happiness (Green Star Communities, Living Community Challenge, and One Planet Communities) and Sustainable Food (One Planet Communities).

Note: while some tools limit the themes nominated they may still include coverage of theme topics. For example the EnviroDevelopment tool includes objectives for health and transport in 'Community'.

Tool / Themes	Circles of Sustainability	Enviro Development	Green Star Communities	Living Community Challenge	One Planet Community
Energy	In Ecology	✓	In Environment	✓	✓
Water	In Ecology	✓	In Environment	✓	✓
Waste	In Ecology	✓	In Environment	In Materials	✓
Food	In Ecology	In Community	In Liveability	In Place	✓
Materials	In Ecology	✓	In Environment	✓	✓
Ecology / Biodiversity	✓	✓	✓	In Equity	✓
Transport	In Ecology	In Community	In Environment	In Place	✓
Health / Liveability	In Culture	In Community	✓	✓	✓
Community	In Culture	✓	In Liveability	In Place	In Culture & Heritage
Culture	✓	In Community	In Liveability	In Health & Happiness	✓
Governance / Politics	✓	In Community	✓	In Health & Happiness	In Culture & Heritage
Economy / Equity	✓	In Community	✓	✓	✓
Design	In Culture	In Community	✓	In Beauty & Health & Happiness	In Health & Happiness
Education	In Culture	In Community	In Economic Prosperity	In Beauty	In Econocmy
Place	In Ecology	In Community	In Design	✓	In Culture & Heritage
Innovation	In Culture	✗	✓	In Health & Happiness	In Culture & Heritage
Beauty / Aesthetics	In Culture	✗	In Design	✓	In Culture & Heritage

Legend	
Topic Covered	
Elements of Topic Covered	

Figure 2. Urban tools for use in Australia – urban themes for quality of life improvements

All of the tools reviewed involve costs related to the use of the tool, i.e. tool registration, tool certification, and use of sustainability experts to facilitate and assist with the assessment and certification. Registration fees are available via websites or by request, and project certification fees vary depending on the urban typology. Facilitation and training costs provided by the tool owner will vary depending on the scale.

Urban assessments of existing and new urban areas are complex, requiring a range of professions and industries. Submission requirements for a certification process require documentation from various consultants. This review does not include an assessment of overall costs of each program as this will depend on specific urban typology and details.

All of the tools provide a level of information about the tool through tool guidelines, online web platforms, published case studies or assessment calculations.

Guidelines for the Green Star Communities, Living Community Challenge and EnviroDevelopment framework are available free online. The One Planet Living ten principles and a calculator for individuals are available online. The framework is available to trained Sustainability Integrators. The Circles of Sustainability process is described in the book 'Urban Sustainability in Theory and Practice (James 2015).

Summary of urban tools for use in Australia

The following five tools, tabled in figure 3 below, are voluntary and developed by organisations and associations for general use by industry. The Living Community Challenge and One Planet Communities tools have been developed in the USA and UK respectively and adapted to Australian conditions where necessary. The Circles of Sustainability tool has been developed in Australia for international application for the United Nations Global Compact Cities program. EnviroDevelopment and Green Star Communities have been developed in Australia for national use.

Matrix / Tools	Holistic / Vision	Urban Scale	Complexity / Expertise	Comparative / Region	User	Independent Certification
1. Circles of Sustainability	Hign	City (new & existing)	Specialist	International	Government	Industry Experts
2. Enviro Development	Medium	New Development	Industry	National	Developer	Board of Management
3. Green Star Communities	Medium	New Development / Campus	Industry / Specialist	National	Developer	3rd Party Advisors
4. Living Community Challenge	High	Nature, Urban & Campus(new & existing)	Industry / Specialist	International	Developer / Community	3rd Party Advisors
5. One Planet Communities	High	Urban & Campus(new & existing)	Industry / Community	International	Developer / Community	3rd Party Advisors

Figure 3. Evaluation Matrix for urban tools for use in Australia

Of the five tools the 'One Planet Communities' tool combines a holistic or integrated approach, and a strong aspirational vision with less complexity. It is third party assessed and applicable for new and existing communities. One Planet Living is accessible for mainstream application by industry professionals, developers and community and can be benchmarked internationally. The Living Community Challenge while more complex also provides a strong vision, is applicable for a range of purposes, and may also be benchmarked internationally.

1. Circles of Sustainability, UN Global Compact Cities Programme

The Circles of Social Life is a facilitated process that guides engaged and collaborative practice in making cities, locales and organizations more sustainable, resilient, adaptable and liveable. It takes the form of structured workshops and is supported by a bespoke evaluation model and industry expert/s. For example, instead of designating a prescribed set of indicators the approach sets out a process for deciding upon indicators and analyzing the relationship between them (James 2015).

Vision	Making cities more sustainable, resilient, adaptable and liveable.
Tool format	Guideline (Book) including questionnaire, Assessment Tool (online - Beta), Rating System, additional process and tools available through consultancy.
Project Types	Cities and regions, small to large scale
Themes	Domains – Ecology, Culture, Politics, and Economics, each with seven subdomains
Criteria	Non-prescriptive outcomes, international approach, five levels of profile mapping.
Eligibility Criteria	No set eligibility for use of the profile assessment; requirements by certification body to be negotiated.
Assessment / Certification	Circles of Sustainability Assessment Tool (online - Beta) & Urban Profile Questionnaire; Certification avenue: completion of an assessment profile and certification by the certifying body – World Association of Major Metropolises
Projects /Case Studies	Cape Town, Christchurch, Hobart, Punta Arenas, Ushuaia (current), Johannesburg (completed) (James 2015).
Assessment Communication	Profile circles (or spider chart) provide a simple way of presenting complex data about a city, urban settlement, or region, conducted on a nine-point scale. They provide a graphic comparison for international cities using complex data.
Website	www.circlesofsustainability.org

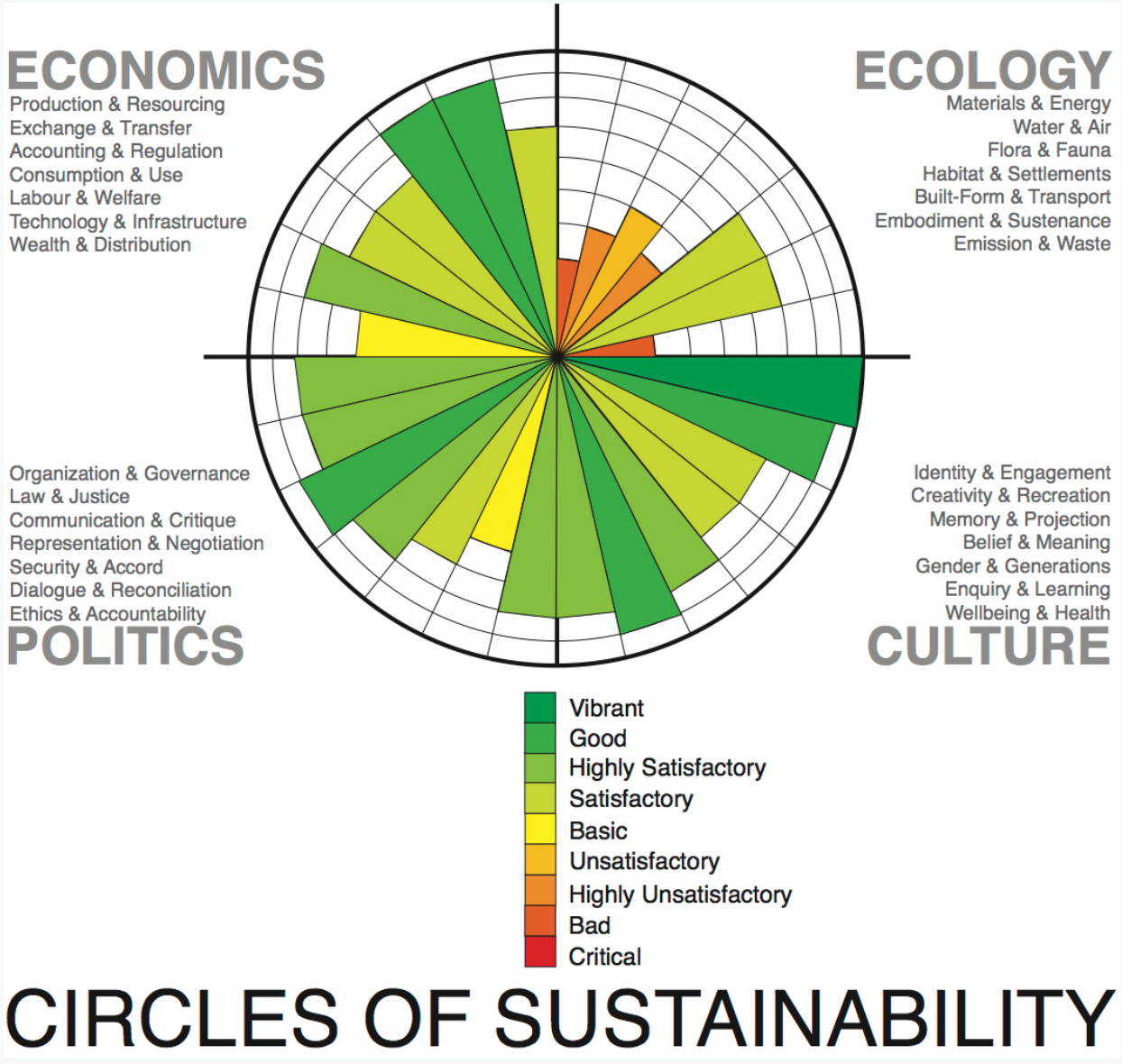

Figure 4. Spider Chart for Melbourne (Source: James, 2015)

2. EnviroDevelopment, UDIA

This tool provides independent review of development projects and awards certification against set criteria for an outstanding performance across four or more of the elements or themes. The Urban Development Institute of Australia (UDIA) developed the tool in conjunction with a panel of government, industry and environmental experts to determine the standards of certification. The tool is for new developments with an identifiable brand for consumers and government.

Vision	Drive the delivery of more sustainable communities and spaces in Australia.
Tool format	Guideline, Rating System
Project Types	A suite of tools for developments including: new masterplanned communities, residential subdivisions, seniors living, health and aged care facilities, multi-unit residential, mixed use, industrial, retail and education.
Themes	Ecosystems, Waste, Energy, Materials, Water, and Community.
Criteria	Prescriptive outcomes, national approach - Australia
Eligibility Criteria	Essential actions to be completed in each element. Other actions are either mandatory or to be considered and documentation provided to indicate intent.
Assessment / Certification	Internal assessment by the EnviroDevelopment Board of Management with advice and input from appropriately qualified experts as necessary. Certification across all or part of the six themes is available. Preliminary certification is available pre-development approval for marketing purposes.
Projects / Case Studies	More than thirty Australian case studies available on the website resource page
Assessment Communication	Clear themed logos (brands) demonstrate theme assessment achieved. No range of achievement provided.
Website	www.envirodevelopment.com.au

3. Green Star Communities, GBCA

Green Star Communities is an Australian based voluntary rating tool that provides best practice benchmarks of community and precinct-wide developments. The Green Building Council of Australia (GBCA) has developed the tool in close collaboration with governance, industry, academia and industry groups since 2010. The tool has evolved from the suite of tools used by industry nationally and supported by state governments.

Vision	Promote the development of sustainable precincts, neighbourhoods and communities in Australia.
Tool format	Guideline, Calculation Tool/s, Assessment Tool, Rating System.
Project Types	New development and regeneration projects at the neighbourhood scale or larger with a minimum of four buildings.
Themes	Governance, Design, Liveabiltiy, Economic Prosperity, Environment, and Innovation, with thirty-five credits.
Criteria	Prescriptive outcomes, national approach – Australia
Eligibility Criteria	Min of four buildings of Class 1-9 structures (BCA) excluding class 4; Clear site boundary; achieve at least a four star rating; and meet the Timing of Certification criterion.
Assessment / Certification	Third-party verification by an independent assessment panel. Projects achieve a rating of a 4, 5 or 6 stars based on the credits point score.
Projects /Case Studies	A number of projects have achieved a rating under the Pilot V0.0 and V0.1 rating tool versions. There are three projects listed as achieving a pilot version v0.0 rating including Alkimos Western Australia (6 star), Brisbane Airport Brisbane, Queensland (4 star) and Ecco Ripley Ipswich, Queensland (5 star). There is one project listed as achieving a pilot version v0.1, Greater Curtin, Curtin University Western Australia (5 star).
Assessment Communication	Simple star rating provides for high-level comparison. Little detail published on specific outcomes unless a case study is completed.
Website	www.gbca.org.au/green-star/green-star-communities

4. Living Community Challenge, International Living Future Institute

The Living Community Challenge is used to assist planners and developers rethink the design of community-scale projects. The tool is based on the Living Building Challenge first released in 2006. The tool provides a compliance review process at the master planning stage and certification for fully built community or campus scale projects. The Living Building Challenge is supported by the Living Future Institute Australia, a sister organization to the Internal Living Future Institute.

Vision	Making communities socially just, culturally rich and ecologically restorative.
Tool format	Guideline, Assessment Tool and Rating System.
Project Types	Masterplan and/or completed construction of numerous community types including a small city block or street, a planned residential development, a mixed-use transit community or a large college campus. Tool can be applied to one of six scales (referred to as Transect – refer Glossary) from natural habitat to urban core.
Themes	Seven themes (petals): Place, Water, Energy, Health and Happiness, Materials, Equity, Beauty and Spirit. Themes are subdivided into a total of twenty imperatives, each of which focuses on a specific sphere of influence.
Criteria	Prescriptive & non-prescriptive outcomes, international approach
Eligibility Criteria	All imperatives are mandatory and final certification is based on 'measured' performance. All buildings owned / developed by the community must meet the Living Building Challenge.
Assessment / Certification	Two levels of certification: Living Community Certification: all twenty imperatives across all seven themes must be achieved; Petal Community Certification: all imperatives of at least three themes (one of which must be the Water, Energy or Materials) must be achieved. A third-party audit ensures compliance with all pertinent imperatives. Requirements for the themes (petals) and imperatives vary in intensity based on the transect in which they are located. Refer the standard for more detail.
Projects /Case Studies	UniverCity, and the City of Bend (now complete), First Hill, Seattle, and Southwest Capital EcoDistrict, Washington D.C. (consulting), Normal, Illinois and the Holy Cross College in New Orleans (registered).
Assessment Communication	Clear communication of assessment outcomes across the ten principles using a spider graph and chart, score/s and star rating with relevant identifiable themed logos.
Website	www.living-future.org/lcc (US) www.living-future.org.au (Australia)

5. One Planet Communities, BioRegional

One Planet Living (OPL) - Communities uses the 'Common International Targets' and 'Ten Principles' to provide a vision and objectives, based on reducing the ecological footprint to one planet. It is one of three programs applying the One Planet Living framework. BioRegional is an international network using the One Planet living framework, with BioRegional Australia the local organization.

BioRegional Australia works in partnership with developers, alongside OPL Sustainability Integrators to fulfill the OPL Communities vision and objectives. The Community program is used internationally, and is based on the UK's first large-scale sustainable community for mixed use, the BedZED Community, UK completed in 2002. Bioregional Development Group was established in 1994.

Vision	For communities to live within one-planet resources.
Tool format	Guideline (Common International Framework and Ten Principles), Assessment Tool, Rating System (available to members and from OPL Sustainability Integrators).
Project Types / Scale	New and existing from small to large-scale communities, precincts and districts.
Themes	Zero carbon, zero waste, sustainable transport, sustainable materials, local and sustainable food, sustainable water, land-use and wildlife, culture and heritage, equity and local economy, health and happiness. There are ten objectives for each theme – 100 objectives.
Criteria	Based on principles, prescriptive and non-prescriptive outcomes, and international approach.
Eligibility Criteria	On request
Assessment / Certification	Workshop facilitation, national certification and international endorsement available.
Projects /Case Studies	WestWyck EcoVillage, Australia; BedZED, UK; One Brighton, UK
Assessment Communication	Clear communication of assessment outcomes across the ten principles using a spider graph and chart, score/s and star rating with relevant identifiable themed logos.
Website	www.oneplanetliving.org (UK) and www.oneplanetliving.org.au (Australia)

Figure 5. WestWyck EcoVillage (Stage Two). WestWyck Ecovillage is Australia's first internationally endorsed One Planet Community. One Planet Community is a program of Bioregional Australia. (Image: Courtesy of WestWyck)

Discussion

A number of urban tools have evolved from building tools to include sustainability considerations such as zero waste, zero energy, and sustainable water, as well as culture and community, land use and biodiversity, and health and happiness. Urban assessment tools assist in evaluating predicted outcomes and community measured outcomes in urban development. This is critical to governments, particularly local governments working towards more sustainable communities and a low carbon future while balancing urban growth.

Urban tools are applied across varying project scales and for varying audiences, from industry professionals through to the non-specialist end-user community. Tool selection should be based on themes, applicability and audience. The urban tool with the least jargon and clearest purpose for communities is the One Planet Living. This tool is suited for use by industry professionals or community members with ten core principles, clear objectives and simple but effective branding of outcomes. The Living Community Challenge is more complex, but provides additional support information for its technical requirements for use by industry.

The urban tool best suited for large-scale metropolitan or city scale assessment is the Circle of Sustainability. This tool requires an iterative workshop and engagement process to develop and address the measures, and is supported by ongoing academic research and the World Association of Major Metropolises.

The Australian Green Star suite of building tools, encompassing the Green Star Communities tool, has dominated the Australian market over the past decade. Industry professionals are familiar with the brand and it has strong support from major developers within Australia. The EnviroDevelopment tool, developed by the Urban Development Institute Australia (UDIA) for developers use provides a level of good practice across the core themes within Australia. Neither tool is applicable outside of Australia.

Of the five urban tools reviewed there are three methods of conveying the project outcomes:

1. The Circle of Sustainability provides a radar or spider chart clearly showing the outcomes achieved against each of the assessment themes (Refer figure 4).

2. The Living Community Challenge, One Planet Living and EnviroDevelopment provide a score against individual themes (if not all are certified) or a full score. The One Planet Living tool goes further to demonstrate this as a national standard in Australia or an international endorsement for high level outcomes.

3. The Green Star tool provides an overall achievement score that is conveyed as a 4, 5 or 6 star.

Of the urban tools summarised, two urban tools incorporate high-level aspirations for their vision of communities:

1. One Planet Living's 'living within one planet's resources' (Bioregional & WWF, 2004) and

2. Living Community Challenge's vision that communities are "socially just, culturally rich and ecologically restorative" (ILFI 2014).

Three of the urban assessment tools are supported and applied internationally: One Planet Living, Living Community Challenge and Circles of Sustainability. To date One Planet Living has the largest number of community projects completed internationally, while the Circles of Sustainability has a number of international cities assessed with published charts on five cities.

As the application of urban assessment tools mature, published learnings will be important in the uptake of integrated solutions for sustainable communities globally.

Conclusion

There is a range of urban assessment tools available in Australia that assist in the progression towards more sustainable and resilient communities within Australia across neighbourhood, precinct, and city scales. These tools can be used for design guidance, modelling, to test ideas, assist in communicating outcomes, and to achieve national and international recognition of the project's sustainability.

All tools are voluntary, however the complexity of the tools make some easier to use for mid to small scale developments or existing communities, while other tools can only be used for new developments or are best used at a city scale.

Ultimately, the urban tool selection should be aligned with the primary purpose of the project. Considerations should be given to long-term project benefits of community health and wellbeing, and regeneration of economic, cultural and environmental health of the precinct and region.

When selecting an urban tool, it is important to consider the purpose of the tool, the vision for the project, urban issues to be managed and the phase or stage of the project for assessment. It is also important to understand the level of support, training and local expertise available to the project team in applying the framework assessment, and the comparability of the metrics used nationally and internationally.

As urban metrics and assessments mature and their use increases, increased awareness of innovative solutions and improved sustainable urban environments occurs. Urban assessment tools inspire transformative thinking and urban change to occur in our cities and regions in order to improve the quality of life and resilience of urban areas. It is critical that practitioners keep up to date with the evolving range of urban tools available.

Glossary

Best Practice

A combination of commercially proven techniques, methodologies and systems. Appropriate to the scale of development and site-specific opportunities and constraints, which are demonstrated and locally available and have already led to optimum ESD outcomes. Best practice in the built environment encompasses the full life of the build. (DTPLI 2014)

Beta Testing (or Pilot)

Refers to the second stage of testing, including engagement with the end user, prior to a full version release.

Built Environment

Refers to the entirety of human made forms, including infrastructure, landscapes, products, buildings, factories, cities etc. Its design is reciprocally related to social relations, cultures and personal development, but the focus here is on physical spaces and structures (Birkeland 2008).

Certification

Third-party endorsements of a (organization's) system or product by impartial panels / committees or independent bodies. Impartiality is defined as actual and perceived presence of objectivity. The value of certification is the degree of public confidence and trust that is established by an impartial and competent assessment by a third-party.

ISO/IEC 17021 states that qualifying bodies or parties should demonstrate these characteristics: impartiality, competence, responsibility, openness, confidentiality, and responsiveness to complaints (GBCA 2012).

Community / Communities

A group or collection of people living in a geographic area or having a particular characteristic in common. The community: the people of a district or country considered collectively, especially in the context of social values and responsibilities. May also reference cultural, digital or virtual communities. (GBCA 2012) (Oxford 2014)

City

A capital, regional or rural city forms its own Greater Capital City Statistical Area (GCCSA), and may represent a broad socioeconomic definition of each of the eight state and territory capital cities. These correspond to the more common and international usage of metropolitan areas. Significant Urban Areas are similarly defined but include population centres that are not capital cities. Refer 'Urban'. (ABS 2011a).

Ecosystem

An interconnected and symbiotic grouping of animals, plants, fungi and microorganisms that sustains life through biological, geological and chemical activity (GBCA 2012)

Local Government Area (LGA)

A geographical area under the responsibility of an incorporated local government council, or an incorporated Indigenous government council (ABS 2011a). They may be termed cities, towns, shires, councils, boroughs or other names, and all function similarly.

Masterplan

A comprehensive plan that describes and illustrates the entire development plan for a precinct, including existing and future land uses, urban design, landscaping, built form, infrastructure and service provision (GBCA 2012).

One Planet Living

For the global (human) population to live within one planet's resources (BioRegional, WWF 2004). This requires intact ecosystems to ensure the earth's processes/cycles occur naturally and species continue to have clean protected habitats to continue life cycles.

Precinct

A precinct represents an urban locality of variable size that is considered holistically as a single entity in the context of broader urban planning processes. It typically comprises multiple land parcels occupied by constructed facilities (generally buildings or major infrastructures) or open space. Precinct objects are clustered into urban zones that share some common characteristics and are supported by infrastructure services to manage energy, water, waste, communication and transport, as well as a range of social infrastructures related to health care, education, safety, retailing and entertainment. Used interchangeably with neighbourhood, district and community (Newton et al. 2014)

Rating

Assessment that includes a quantitative approach as part of an independent third party certification process.

Rural

Any settlement or land that does not meet the definition of urban. For statistical purposes people living in 'Bounded Localities' are classified as rural (i.e. non-urban). A 'bounded locality' is generally defined as a population cluster of between 200 and 999 people (ABS 2011a).

Spider chart (radar chart or star chart)

A spider chart is a graphical method of displaying multivariable data in the form of a two-dimensional chart of usually five or more quantitative variables represented on axes starting from the same (central) point. Also referenced as a chart / diagram.

Transect

Referenced in the Living Community Challenge, a transect refers to a range of six defined urban scales (ILFI 2014).

Urban (Significant Urban Area, SUA)

Defines all cities and towns with a population over 10,000 within a tract of predominantly built-up land. May combine one or more related urban centres (ABS 2011b).

Urban Centre/ Locality (UCL)

A population cluster of 1,000 or more people, within an area that is 'of urban character'. 'Major Urban' represents a combination of all urban centres with a population of 100,000 or more; and 'Other Urban' represents a combination of all urban centres with a population between 1,000 and 99,999 (ABS 2011b).

References

ABS, 2011a, *2901.0 - Australian Statistical Geography Standard (ASGS): Census Dictionary,* Australian Bureau of Statistics

ABS, 2011b, *1270.0.55.004 - Australian Statistical Geography Standard (ASGS): Volume 4 - Significant Urban Areas, Urban Centres and Localities, Section of State*, Australian Bureau of Statistics

Albino, V., Berardi, U., Dangelico, R.M. 2015, 'Smart cities: Definitions, dimensions, performance, and initiatives', *Journal of Urban Technology,* 22 (1), 3-21

Archibugi, F. 2006, 'Pitfalls in planning and plan-evaluation' in Alexander, E.R. (ed), *Evaluation in Planning: Evolution and Prospects,* Ashgate, Aldershot, UK, pp. 267-276

BCA Green Mark, 2015, Green Mark for Districts (Version 2.0) Singapore, http://www.bca.gov.sg/greenmark/others/GM_District_V2.pdf

Becker, J. 2004, 'Making sustainable development evaluations work', *Sustainable Development*, 12(4): 200-211.

Berardi, U., 2013, 'Sustainability assessments of communities through rating systems', *Environ. Dev. Sustainability,* 15 (6), 1573_ 1591.

Berardi, U., 2015, 'Sustainability assessments of buildings, communities and cities' in Klemes, J. J. (ed) *Assessing and Measuring Environmental Impact and Sustainability*, 01/2015; 1(15): 497-545. DOI: 10.1016/B978-0-12-799968-5.00015-4 Elsevier Inc. UK

BioRegional & WWF, 2004, *One Planet Living: A joint initiative by BioRegional and WWF*, BioRegional UK.

Birkeland, J. 2008, *Positive Development: from viscous circles to virtuous cycles through built environment design*, Earthscan, London, UK.

BRE, 2012, BREEAM Communities Technical Manual SD202 – Issue: 1.0 Date: 18/08/2014. Building Research Establishment (BRE), Watford, UK, http://www.breeam.org/bre_PrintOutput/BREEAM_Communities_0_1.pdf

Briassoulis, H. 2001, 'Sustainable development and its indicators: through a (planner's) glass darkly', *Journal of Environmental Planning and Management*, 44(3): 409-427.

Colantonio, A., & Dixon, T, 2011, *Urban regeneration & social sustainability: best practice from European cities*, Wiley Blackwell, UK

CASBEE, 2013, *Overview of CASBEE* for Cities. Edited by Committee for the Development of an Environmental Performance Assessment Tool for Cities. Japan Sustainable Building Consortium, Tokyo, Japan, http://www.ibec.or.jp/CASBEE/english/document/Outline_CASBEE_City.pdf

Criterion Planners, 2014, *A Global Survey of Urban Sustainability Rating Tools,* Portland, USA, http://crit.com/wp-content/uploads/2014/11/criterion_planners_sustainability_ratings_tool.pdf

DGNB, 2014, Excellence defined. Sustainable building with a systems approach, DGNB System, http://www.dgnb.de/en/shop/dgnb-broschueren/broschuere_system_en_detail.php

DGNB, 2014, New Urban Districts, DGNB System, http://www.dgnb-system.de/en/schemes/about-schemes/certification_requirements_urban_city_districts.php

DTPLI, 2014, *Environmentally Efficient Design Local Policies, Advisory Committee and Panel Report*, Department of Transport, Planning and Local Infrastructure, Victoria, http://www.portphillip.vic.gov.au/Environmentally_Efficient_Design_AC_Report(1).pdf

EcoDistricts, 2015, *Living Infrastructure Guide*, EcoDistricts, Portland, USA, http://ecodistricts.org/wp-content/uploads/2013/05/Bullitt-Project-4_New.pdf

GBCA, 2015, Green Star – Communities PILOT Submission Guideline V0.2. Version dated Feb 2015. First released June 2012. Green Building Council of Australia, Sydney, Australia. http://www.gbca.org.au/green-star/green-star-communities/the-rating-tool/#Subguidelines

Gil, J., Duarte JP. 2011, 'Tools for evaluating the sustainability of urban design: a review. Proceedings of the Institute of Civil Engineers', *Urban Design and Planning,* Ice Publishing.

ILFI, 2014, *Living Community Challenge 1.0*, International Living Future Institute (ILFI), https://living-future.org/sites/default/files/reports/LCC1_0_Final_sm.pdf

James, P. 2015, *Urban sustainability in theory and practice: circles of sustainability*, Routledge, London, UK, http://www.circlesofsustainability.org/cities

Mitchell, G. 1996, 'Problems and fundamentals of sustainable development indicators', *Sustainable Development*, 4(1): 1-11

Newton, P., Marchant, D., Mitchell, J., Plume, J., Seo, S., Roggema, R. 2013, *Performance assessment of urban precinct design: a scoping study,* Low Carbon Living CRC, Australia.

Oxford, 2014, *Oxford Dictionary*, Oxford University Press, London, UK.

Poveda, CA., Lipsett, MG. 2011, 'A review of sustainability assessment and sustainability / environmental rating systems and credit weighting tools', *Journal of Sustainable Development*, Vol. 4, No. 6.

Sullivan, L., Ridin, Y., Buchanan, C. 2014, 'Neighbourhood Sustainability Frameworks – A literature Review', *Working Paper Series,* Number: 001 UCL, Centre for Urban Sustainability & Resilience, University College London, London, UK.

UDIA, 2009, EnviroDevelopment National Technical Standards Version 2, Urban Development Institute of Australia, Queensland, http://www.envirodevelopment.com.au/_dbase_upl/National_Technical_Standards_V2.pdf

UN, United Nations, 2014, *World Urbanization Prospects: The 2014 Revision, Highlights,* Department of Economic and Social Affairs, Population Division. New York (ST/ESA/SER.A/352).

WCED, World Commission on Environment and Development, 1987, *Our common future, the report of the Brundtland Commission*, Oxford: Oxford University Press.

Further Resources

Transformative Tools, A global registry of urban sustainability rating tools. Accessed 4 May 2015, website
http://www.transformativetools.org/resources/

About the Author

Suzette Jackson, B Des, is a designer and sustainability consultant with over 25 years experience in buildings and communities. She has worked with numerous international building and urban assessment tools in tool development, testing, training, application and assessment.

Suzette is a trainer and assessor for urban assessment tools One Planet Living and Green Star Communities and chaired the Environment Committee for the development of the Green Star Communities tool from 2009 to 2011.

Suzette was a founding director of the Living Future Institute Australia in 2012 and participated in workshops on the Circles of Sustainability tool led by Dr. Paul James. Suzette is a director of Innate Ecology.