Measuring and comparing local sustainable development through common indicators: Constraints and achievements in practice

Sara Moreno Pires [a,*], Teresa Fidélis [b,1], Tomás B. Ramos [c]

[a] UCILeR, University of Coimbra Institute for Legal Research, Pátio da Universidade, 3004-545 Coimbra, Portugal
[b] Department of Environment and Planning, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal
[c] CENSE, Center for Environmental and Sustainability Research, Departamento de Ciências e Engenharia do Ambiente, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Campus da Caparica, 2829-516 Caparica, Portugal

ARTICLE INFO

ABSTRACT

Many efforts have been made to standardize indicators that aim to assess, monitor and compare sustainable development at different territorial levels. Arguments in favor and against the need to design common indicators are many and highly contested, which is why this article intends to contribute to the study on the outcomes for cities that put common local indicators to practice. This article aims to discuss the constraints and achievements of standardizing these indicators. It first explores and analyzes the efforts of European institutions and research projects supported by them towards the harmonization of local sustainable development indicators. In a second stage, it analyzes a Portuguese initiative that uses common indicators to benchmark sustainable development across cities and municipalities – ECOXXI. Evidence is gathered from two case study municipalities, Oeiras and Cascais, that have applied this indicator set, through a review and analysis of documents and semi-structured interviews with relevant public officers. The lessons learned point to major benefits on the sharing of guidelines and the delivery of a top-down but flexible indicator approach in the absence of national or European official guidelines. The main constraints are linked to issues of communication and to limited political support and use of such indicators.

© 2014 Elsevier Ltd. All rights reserved.

Introduction

Several indicator systems have been designed by different institutions to provide quantitative and qualitative measures to assess and study the interrelation between social, environmental, economic and institutional development at different territorial levels (Ramos and Moreno Pires, 2013). Over the past two decades the 'indicator industry', as some call the proliferation of indicator systems (Herzi & Hasan, 2004), has seen fruitful debates emerging in regard to the roles, achievements, gaps and uses of sustainable development (SD) indicators for cities, regions, countries and at the global level. SD indicators aim to assess and benchmark SD conditions and trends across time and space, monitor progress toward goals and targets, inform planning and decision-making, raise awareness, encourage political and behavioral changes, promote public participation and improve communication on sustainability

(Holden, 2006; Moreno Pires, in press). However, they are frequently set aside, manipulated or under-resourced and face major constraints, such as costs or data suitability. Furthermore, SD indicators have received much criticism for trying to measure social life and natural complexities through quantitative and restricted indicator systems, but mostly for being ineffective in changing decision-making processes and outcomes, and in promoting action based on observed trends (Holden, 2013; Moreno Pires & Fidélis, 2012). The diversity in the aims and roles of SD indicators and their conflicting and unintended outcomes have been studied and nurtured by different rationales, discourses and approaches (Holman, 2009; Moreno Pires, in press; Rydin, 2007). The article analyzes this diversity around one particular indicator dilemma: the development and use of common or standardized indicators versus context specific indicators at the local level.

The article presents a brief literature review on the main arguments for the standardization of indicators and frameworks to compare SD, and major pitfalls and criticisms around standardization processes. It also reviews the efforts of European institutions and research projects supported by them towards the harmonization of SD indicators at the local level. Focusing on Portugal, it then

* Corresponding author. Tel.: +351 239 859 802.
  E-mail addresses: sarap@fd.uc.pt (S. Moreno Pires), teresafidelis@ua.pt (T. Fidélis), tabr@fct.unl.pt (T.B. Ramos).
  [1] Tel.: +351 234 370 200/349.

explores the constraints, achievements and uses of harmonized local indicators by analyzing a particular program – ECOXXI – that structures indicators to compare and benchmark SD across municipalities in the country. The study asks two main research questions: first, how are ECOXXI indicators built and how are they used; second, what are the constraints and achievements of using a common set of indicators in the context of Portuguese cities? To provide contextual evidence to these questions two municipalities that have applied ECOXXI, Oeiras and Cascais, were identified as case studies for further analysis. The findings are then discussed and the conclusion summarizes the main lessons extracted from the experience of implementing ECOXXI in these two municipalities and of developing common local SD indicators in Portugal and Europe.

The debate around standardized indicators

The United Nations has devoted efforts to establish standardized key indicators for cities through, for example, the Global Urban Observatory, to assess and compare urban indicators and to build capacities for countries to evaluate urban policies (Flood, 1997). Nevertheless, despite this attempt and according to Pintér, Hardi, and Bartelmus (2005), there is a continuous growth in the diversity of SD indicators – with no consensus around methodologies, not even general agreement on the best conceptual frameworks or standardized options to measure SD (Hammond, Adriaanse, Rodenburg, Bryant, & Woodward, 1995; Ramos, Caeiro, & Melo, 2004). For example, in urban SD many different approaches have been developed: from international rankings of cities based on different criteria such as quality of life, cost of living, innovation economy, city branding, personal safety or eco-city (Yigitcanlar & Lönnqvist, 2013), to compendiums of best practices, the use of future scenarios (Boyko et al., 2012) or self-organizing maps (Arribas-Bel, Kourtit, & Nijkamp, 2013). The lack of international consensus produced growing inefficiencies in terms of our ability to develop, monitor and benchmark progress towards goals and objectives (Pintér et al., 2005). Sébastien and Bauler (2013: 9) argue that prevailing standardized indicators such as GDP were developed by "institutionally appointed experts upon specific demand by policy makers facing specific policy situations". On the other hand, and justifying this lack of consensus, standardized indicators for SD have mostly been proposed by non-governmental actors (e.g., universities, think tanks, non-governmental organizations) – generally known as "middle actors" between civil society and political/institutional spheres – within a contested policy agenda and controversial vision for SD (Sébastien & Bauler, 2013).

The Rio+20 Conference on Sustainable Development gave this debate a prominent position and recommended a Global Sustainable Development Report that would bring integrated assessments together across sectors and territorial levels (UN, 2013). This has emphasized the worldwide challenge for unified efforts and has led to other underexplored and pressing questions, such as the understanding of the challenges of harmonized indicators at different territorial levels (e.g., how to balance local and global pressures, contextual and common universal indicators and expert and lay knowledge, and how to value diversity as an interesting and productive feature of SD indicators), the understanding of the expected outcomes of both standardized and context specific indicators for cities or the role of different types of institutions leading to the standardization process and its impacts.

Several authors and international organizations provide many arguments for finding ways to standardize indicators and frameworks to compare SD (e.g., AmbienteItalia, 2003; Flood, 1997; Hammond et al., 1995; Luque-Martinez & Munoz-Leiva, 2005; Mascarenhas, Coelho, Subtil, & Ramos, 2010; Pintér et al., 2005;

Ramos & Caeiro, 2010; Tanguay, Rajaonson, Lefebvre, & Lanoie, 2010; Yigitcanlar & Lönnqvist, 2013). They mainly claim that standardization is useful to assess and compare data, problems, contexts, cities and policy options regarding SD and to synthesize highly complex issues in a simplified and compact manner to spark debate and guide further in-depth analysis and policy-making (Yigitcanlar & Lönnqvist, 2013). Other arguments in favor of standardization are also linked to the strengthening of the capacities of cities, facilitating the evaluation of SD policies (Flood, 1997), enabling the benchmarking of key indicators, and reinforcing informed and strategic decision-making (Luque-Martinez & Munoz-Leiva, 2005).

On the other hand, other authors (e.g. Bakkes, 1997; Dahl, 1997; Dhakal & Imura, 2003; Miller, 2007; Rydin, 2007; Sébastien & Bauler, 2013) note the fact that promises of standardization are usually "rooted in a rationalistic and linear conception of the instrumental role played by knowledge in decision-making" (Sébastien & Bauler, 2013: 4), where indicators are "frequently conceived as consensus building tools (...) that pacify controversy" (Sébastien & Bauler, 2013: 4) or serving a neoliberal political agenda supported by evidence-based "governmental technologies" (Rydin, 2007), ready to be used in any context. The classical discussion on the advantage of having an index (or a few standardized indicators) to simplify and easily communicate a message versus the methodological disadvantage of aggregation and standardization options, portrays the prevalence of a rational discourse and takes attention from several other potential uses, impacts and discourses on standardized indicators. Dahl (1997, p. 78) questions if standardized indicators are "capable of covering the full spectrum of interest from the 'super powers' to the small island developing states, from indigenous subsistence to post-industrial communities, and from high-tech to no-tech situations". Bakkes (1997) argues that indicators must reflect their particular cultural, political and institutional context and Dhakal and Imura (2003) agree that a single set of common indicators that is equally applicable to all cities is not possible. Nevertheless, they claim that the identification of a few common universal issues to provide useful international and interregional comparisons is recommended.

The arguments presented in this critical debate are many and highly contested, which is why this article intends to contribute to the study on the outcomes for cities that put common local indicators to practice.

Harmonizing local sustainability indicators in Europe: multiple approaches and projects

The role of the European Union is precisely that of supporting efforts toward indicator harmonization, aiming to create common indicators that can be compared at the local level and across the different member states. Nevertheless, it has proven to be difficult to generate consensus on common guidelines even at the European level. This harmonization role is the result of the interaction between different levels of action and different actors within different projects. Several sustainability indicator research projects that aimed at this have been fostered over the past few years (EC, 2009; Moreno Pires, 2011). In this part, it is presented an overview of some of the most relevant projects with a focus on the local level, as well as their goals, main conclusions and recommendations (Table 1).

In 1998, in the report on 'Sustainable Urban Development in the European Union: a framework for action', the European Commission urged all members to embrace the importance of integrating local sustainability measures and monitoring methods into its policies and, particularly, to monitor the progress of LA21 (Wong, 2006). As a result, two European research projects on local indica-

Table 1
Overview of European research projects on local sustainable development indicators.

Project	Goals	Conclusions/Recommendations	Source
Making news for Monitoring Progress (1999–n.a.)	To **develop specific SD indicators** in 10 cities across Europe; to involve the media, citizens and other stakeholders in the choice of indicators, collection of data and communication of results	An ambitious project that did not survive because of over-ambitious participative goals	Mineur (2007)
European Common Indicators (ECI) (1999–2003)	To **provide comparable indicators** to monitor progress among local European authorities, rather than replace existing local, national and sectoral indicator sets	10 common local SD indicators were selected through a bottom-up process. The Final Report contains methodological refinements. The project had no continuity, though many European cities continue to use the ECI as a comparative approach with other European cities	AmbienteItalia (2003) and McMahon (2002)
LASALA – Local Authorities' Self Assessment of Local Agenda 21 (1999–2002)	To **provide a common framework** for the evaluation of LA21 and of local SD across 230 local governments in Europe; to provide data for the European Sustainable Cities and Towns Campaign and assist in the future development of local SD policy in Europe	One of the outcomes of the project was a *Good Practices Report* of 24 case studies of local authorities in Europe. It argues for more advice and support from national and European levels of government, particularly in areas such as the use of common benchmarks or SD indicators	Evans and Theobald (2003)
LASALA-ON-LINE – Local Authorities' Self Assessment of Local Agenda 21 On-line (2003–2004)	To improve urban governance and decision-making by setting up a fully automated **self-evaluation tool** for European local authorities engaged in LA21 processes, and to ensure its wide use amongst participants of the European Sustainable Cities and Towns Campaign	Developed a computer software that allows local authorities to self-assess their LA21 activities and to benchmark their individual responses against the LASALA database	Informed Cities (2013)
IANUS – Indicators to Assess New Urban Services (2000–2003)	To **develop an indicator system** to evaluate public urban facilities and services to determine impact on performance indicators such as functionality, end user satisfaction, cost and environmental impact	A Handbook of Indicators Systems to assess new urban services was published (not available for online consultation)	Brown and Symes (2002)
CRISP – A European Thematic Network on Construction and City Related Sustainability Indicators (2000–2003)	To **develop indicators** that could define and measure the performance of Europe's construction industry and give planners, building firms and developers the assessment tools they need to produce more sustainable building and urban development projects	CRISP developed a website with more than 500 indicators, along with a myriad of issues related to sustainable construction. The indicators were categorized at the neighborhood/urban scale, the individual building scale, and the product scale	CRISP (2005)
PASTILLE – Indicators into Action: Local Sustainability Indicator Sets in Their Context (2000–2002)	To evaluate if and how **specific SD indicators** were influencing local decision-making in 4 European cities and towns; to help local authorities to evaluate more clearly the contribution that local SD Indicators could make to promoting SD in their context	Creating successful indicators relies far more focusing on how they are integrated into the processes of urban governance and far less devising, designing, and tweaking of particular indicator sets	PASTILLE (2002)
ECOPADEV – Development Strategies for "Eco" Industrial, Technology and Science Parks (2001–2003)	To define and collect data to **build indicators** of eco-efficiency of industrial parks that could transform these areas into 'eco' industrial parks	Resulted in a web-based tool to be used by Europe's urban planners, although online access is no longer available	Ibarrondo (2004)
PROPOLIS – Planning and Research of Policies for Land Use and Transport (2000–2004)	To **define indicators** and create a computer model to monitor transport and land-use policies and forecast future paths in 7 cities in 6 European countries	The PROPOLIS Final Report concluded that the approach developed could be transferable and similar strategies could work in other European cities	Lautso et al. (2004)
ECO DEV – SD at local and regional levels: methods and techniques to support Ecosites and monitor urban sustainability (2003–2004)	To **produce monitoring tools and common indicators** to evaluate sustainable development at the local level and to develop and implement the concept of ecosites at the EU level	The project explicitly aimed to support the European Spatial Observatory Network and monitoring of environmental protection of Structural Funds	EC (2009)
TISSUE – Trends and Indicators for Monitoring the EU Strategy on SD of the Urban Environment (2004–2005)	To analyse trends, determine progress and compare strategies towards urban SD; to define a **harmonized set of indicators** and analyse the conditions of how to increase the acceptance of harmonized indicator sets in cities through an online database	The indicators in the Final Report are recommended for a harmonized application throughout Europe, through a gradual approach	EC (2009)
STATUS – Sustainability Tools and Targets for the Urban Thematic Strategy (2005–2006)	To develop a **package of local sustainability indicators** for local governments to self assess sustainable development progress	The project developed a set of over 60 indicators under 10 themes to be usable by local authorities and to implement the Urban Thematic Strategy	EC (2009)
INSURE – Flexible Framework for Indicators for SD in Regions using system dynamics modelling (2004–2007)	To develop a **common flexible** European framework for **sustainable development indicators** at a regional scale	The INSURE project sought to design a generic framework for determining SD of a region while allowing flexibility to include regional characteristics	EC (2009) and van Zeijl-Rozema and Martens (2010)
Informed Cities (2009–2012)	To enhance the connectivity between research and policy-making in SD with a focus on two particular tools for urban management: the Local Evaluation 21 (LE21) and Urban Ecosystem Europe (UEE) – a set of 53 **common indicators** on urban SD	Use the project findings to make a proposal for an EU Reporting Mechanism for Urban Sustainability. Common indicators are mostly environmental (air, water, noise, urban design, mobility, energy, waste, eco-management)	Bhagavatula, Garzillo, and Simpson (2013) and Informed Cit (2013)
CAT-MED – Changing Mediterranean Metropolises Around Time (2009–present)	The CAT-MED project aims to show the best characteristics of Mediterranean cities, highlighting their ability to save natural resources and reduce CO_2 emissions, and their relation to possible future natural risks. As part of the	While the CAT-MED network anticipated the need for a quantitative evaluation of common indicators, partner cities have always ensured that this remains a reference tool and not an end in itself. 20 indicators were developed in	CAT-MED (2012)

Table 1 (*continued*)

Project	Goals	Conclusions/Recommendations	Source
	project, partners developed a system of **common indicators** representing a tool to evaluate urban policies in a sustainability perspective. On of its current aims is to consolidate a common system of indicators which enables to track the evolution of urban sustainability and analyze the effectiveness of the applied public policies	common by the city partners, organized around four axes: (i) territorial management and urban design, (ii) mobility and transport, (iii) natural resources management and (iv) social and economic cohesion	
URBAN-NEXUS (2011–2014)	The "Integrated Information and Monitoring" theme tackles issues such as the data bases and information availability, transparency, accuracy and accessibility, quality assessment and data harmonization	It is closely linked with the Directive 02/2007/ EU-INSPIRE implementation in the urban management sector. Under development, no results found	URBAN-NEXUS (2013)

SD – Sustainable Development.

tors emerged: "Making news for Monitoring Progress" (Mineur, 2007) and the "European Common Indicators" (ECI) project (see Table 1). Since then, several other EU funded research projects on the definition of conceptual frameworks or methods to develop local sustainability indicators, as well as on the evaluation of successes and failures of implementation, have been carried out (Table 1).

Similarly, since 1998, and in parallel to these research efforts, the European Environment Agency, DG Regio and Eurostat have also been committed to the development of urban environmental indicators through the "EEA Environmental Indicators" initiative and through quality of life indicators from the "Urban Audit" project.[2] The "Urban Audit experience – Assessing the Quality of Life of Europe's Cities–" is of particular importance; the project is coordinated by Eurostat with the National Statistics Offices of member states and has been contributing to the development of a comparable database among the main European urban areas (EC, 2007). Since then, the project has evolved into: (i) a more focused list of variables; (ii) a larger program with more cities to improve coverage and comparability (covering over 370 urban European centers and all cities with more than 100,000 inhabitants); (iii) an annual data collection exercise of a restricted number of 30–40 variables since 2009; (iv) a process for developing an Urban Atlas with the objective of reaching a wider audience; and, (v) an exercise to assess the perceptions of citizens on quality of life in different countries, through a questionnaire, to incorporate a qualitative evaluation (EC, 2005; Eurostat, 2010). It is important that at the European level, data among cities is officially harmonized so results can be compared over time.

Together, the efforts of the last 15 years demonstrate the overwhelming number of projects in Europe aimed at developing common indicators, methodologies and guidelines to assess local SD. A more reduced number of research projects have been focusing on context specific indicator systems. Furthermore, a literature gap can be identified when assessing how useful these efforts have been for strategic decision-making at the European level or how distant scientific knowledge is from local practice or policy change (Sébastien & Bauler, 2013). Mascarenhas et al. (2010) further point at the lack of articulation between space, time and organizational complexity as a long standing and pressing problem to solve at the European and global levels.

The European Commission study on relevant funded research on SD indicators (EC, 2009) identified other trends in the European research agenda and produced further recommendations. It underlined the tendency of EU indicator projects to reduce SD to its economic and environmental dimensions, disregarding social and governance aspects (EC, 2009). Several recommendations were made, including the need to rethink and restructure the SD indica-

tors landscape in areas such as governance-related or long term cross-cutting dimensions of SD and the need to further explore insights that can be derived from the use of indicators (EC, 2009).

The lack of official consensus, guidelines and systematic availability of common indicators for cities within EU institutions and entities remains and undermines their potential uses and real contributions to improve urban SD.

ECOXXI indicators

ECOXXI is an innovative program in Portugal and an international pioneer experience regarding the implementation of SD indicators at the local level. It is also the only regular SD indicator initiative developed in Portugal focusing on municipalities, which allows comparisons between cities and towns. In 2005, the Environmental Non-Governmental Organization (ENGO) ABAE (European Blue Flag Association), a Portuguese branch of the international ENGO FEE – Foundation for Environmental Education – decided to start the ECOXXI program. Many FEE member countries are planning to adopt this initiative; in 2012 the Netherlands became the first country to import it.

The main goals of the program are to contribute to the use of SD indicators at the local level – through a collaborative and interdisciplinary process – to identify good sustainable local practices, to promote education towards SD and to strengthen local environmental policies (ABAE, 2013a).

The program is based on the calculation of an ECOXXI index – a single percentage that aims to synthesize several themes – for every municipality that wishes to apply to the initiative. The index is a result of 21 indicators (Table 2) and their level of accomplishment of the set targets (see an example in Table 3).

Indicators are adapted as the program evolves and are considered according to the Pressure–State–Response (PSR) model. A major preference is given to the "Response" policies of local authorities.[3] They cover socio-cultural, economic-institutional and environmental areas, but with a clear emphasis on environmental and institutional issues, mainly disregarding social and economic aspects (Table 2) (ABAE, 2013a,b).

They have been defined by the input of an interdisciplinary and inter-institutional National Commission and by practical contributions of local authorities. This Commission is composed of 33 entities[4]:

---

[2] For further details see the *Urban Audit* website: http://www.urbanaudit.org.

[3] Indicators are also categorized according to the capacity to reach certain goals (divided into 4 Mandatory Indicators and 17 Optional Indicators), and to the capacity of accomplishing those goals (divided into 18 Universal Indicators – that can be applied to every local council –, and 3 Non Universal Indicators – for local authorities that may not have the capacity to accomplish them – such as targets for coastal areas, in the case of one municipality located in the countryside) (see Table 2).[$NoList$]

[4] See http://www.abae.pt/ECOXXI/en/index.php?p=programaecoxxi&s=comissao#googtrans%28pt|en%29 for further details.[$NoList$]

Table 2
ECOXXI indicators. *Source:* ABAE (2013a).

Sector	Code	Indicator name	Indicator type			Maximum Possible Score
			PSR	M/O	U/NU	
Environmental/Sustainable Development Education (SDE)	1	Promotion of Environmental Education/SDE municipal initiatives	R	M	U	10.0
	2	Environmental Education FEE Programs: Eco-Schools + Young Environmental Reporters	R	M	U	4.5 (+1.5)[a]
Environmental/SDE; Marine and Coastal Environment	3	Implementation of the Blue Flag Campaign	R	O	NU	2.0 (+0.2)[a]
Institutions	4	Public Participation and Local Agenda 21	R	O	U	6.5 (+0.9)[a]
	5	Information available to citizens	R	O	U	4.5 (+0.5)[a]
	6	Green Jobs	R	O	U	3.0 (+0.5)[a]
	7	Cooperation with Civil Society	R	O	U	2,5 (+max. 0.6)[a]
	8	Certification of Quality Management Systems	R	O	U	2.0
Nature Conservation and Biodiversity	9	Sensitive Areas (under the Nature Conservation)	R	O	U	0.0 (+3.0)[a]
	10	Nature Conservation (Biodiversity and Geodiversity). Know, Educate and Disseminate	R	O	U	5.0 (+2.0)[a]
Nature Conservation, Forest	11	Forest Management and Conservation	R	O	NU	3.0
Planning	12	Planning and Urban Environment	P–S–R	O	U	13.0 (+1.0)[a]
Air	13	Air Quality and Public Information	S	O	U	3.0
Water	14	Water Quality for Human Consumption	S	M	U	3.0
	15	Population Served by Public Water Supply Systems and Population Served by Systems Drainage and Wastewater Treatment	S	O	U	7.0 (+1.0)[a]
Waste	16	Production and Selective Collection of Municipal Waste and Recovery of Municipal Waste	P	M	U	7.0
Energy	17	Enhancement of the Role of Energy in Municipal Management	S	O	U	7.0 (+1.0)[a]
Transport	18	Sustainable Mobility	R	O	U	7.0 (+0.3)[a]
Noise	19	Noise Pollution	R	O	U	3.0
Agriculture	20	Sustainable Agriculture and Rural Development	P–S	O	NU	3.5 (+0.5)[a]
Tourism	21	Sustainable Tourism	S–R	O	U	3.5 (+1.0)[a]

PSR: P – Pressure/S – State/R – Response, according to the OECD (1993) framework.
M – Mandatory/O – Optional.
U – Universal (applicable to all municipalities)/NU – Non-Universal (non-applicable to some municipalities because of their characteristics).
Note 1: Total Maximum Possible Score of the Index:
(a) in municipalities where all Non-Universal Indicators are applicable: 91 points.
(b) in municipalities where none Non-Universal Indicator is applicable: 100 points.
Note 2: EcoXXI Index = Total Score/Total Maximum Possible Score × 100.
[a] A Bonus is applied under specified conditions for each indicator, usually when a municipality exceeds a certain sub-indicator.

several public organizations such as the Portuguese Environmental Agency, the National Statistics Institute, as well as Universities, the National Environment and Sustainable Development Council, among others. In this Commission, several expert groups function as review panels that analyze and evaluate indicators and their methodologies according to their field of expertise. ECOXXI thus represents a multidisciplinary initiative, involving national, regional and local entities.

Local authorities are free to apply for ECOXXI as it is a voluntary process, which depends entirely on their interest. However, two particular conditions prevent them from participating: the first is meeting one pre-requisite (at least one school of the municipality needs to be involved in another ABAE/FEE project named "Eco-Schools" program) and the second is the payment of a fee,[5] which varies according to the number of local inhabitants and the number of times the local authority has applied for ECOXXI (see ABAE, 2013a).

Since 2005, ABAE publishes an annual final index for all the municipalities involved and a symbolic 'green flag' is awarded to the local authorities that accomplish more than 50% of the established goals.[6] In total, 82 different local authorities (out of 308 in Portugal) have applied over the eight years of the program, but on average, annual participation is around 37 local authorities, 12% of the national total.

The final ECOXXI index is released at the award ceremony and the national media disseminate a list of all municipalities involved and their final position in the ranking. Some criticism has emerged from this means of communication, namely because it prevents a better understanding of the local council's performance across the 21 indicators, as well as progress over time, or even an assessment of the best or worst areas for each municipality. The end-result is a national ranking of municipalities with few explanations. The potential of the indicators to raise awareness within and outside the local council is therefore limited by this narrow communication channel. ABAE has therefore decided to publish a final report online, where results can be analyzed in global terms and by the worst and best indicators in the general ranking.

To answer the first research question regarding how ECOXXI indicators are built and how they have been used at the national level, it is critical to start by summarizing the annual process of the program.

Every year, the process starts with a national training session for local authorities, where discussions and debates about specific indicators, methodologies and actions take place (first semester of each year). This is followed by a period of around four months where a call for applications is open. This is the most challenging and time-consuming phase for local municipalities, as they need to collect and treat the data required for the index. After collecting and inserting the data in a specific digital database created by ABAE, a final report is prepared; it consists not only of the data required for each indicator, but also by several other documents, links to websites or pictures that can help to detail all actions to-

---

[5] The fee will be 1.200,00 Euro maximum. See www.abae.pt/ECOXXI/ for further details.[$NoList$]

[6] There are also two other 'awards': a medal to the ones that achieve between 40% and 50% of the goals and a certificate to every local authority with less than 40% of accomplished goals. See www.abae.pt/ECOXXI/ for further details.[$NoList$]

Table 3

Targets and scores for Indicator 10: Nature Conservation (Biodiversity and Geodiversity), Know, Educate and Disseminate. *Source:* ABAE (2013b).

Sub-indicator	Required information	Score	Criteria and observations	
A	Nature Conservation Actions and Projects	2 points + 1 point of bonus	No. of Municipal Inhabitants	No. of Actions[a]
			<20,000	4
			⩾20,000 a 50,000	6
			⩾50,000 a 100,000	8
			⩾100,000	10
			Bonus to be awarded by the jury on the basis of information presented on ways of monitoring and evaluation of the actions presented: 0.5 points	
			Bonus to be awarded by the jury according to the diversity of actions presented: 0.5 points	
B	Education/Training	1 point + 0.5 points of bonus	Required Information	Score
			Interpretation Centres (yes/no)	0.6
			Actions in Schools (yes/no)	0.4
			Bonus to be awarded by the jury on the basis of information presented on ways of monitoring and evaluating activities in education and training in schools: 0.5	
C	Promotion/Dissemination of the Natural Environment	2 points + 0.5 points of bonus	Required Information	Score
			National/ Natural Parks, Natural Reserves or other areas (yes/no)	0.2
			Municipal Parks (yes/no)	0.6
			Municipal Green Areas (yes/no)	0.4
			Places of Municipal Interest (yes/no)	0.3
			Pedestrian Walks (yes/no)	0.3
			Production of information material (yes/no)	0.2
			Bonus to be awarded by the jury on the basis of information presented on ways of monitoring and evaluating actions regarding the promotion and dissemination of the natural heritage: 0.5	
	Total Score of Indicator 10:	5 points + 2 points bonus		

[a] Scores are awarded in proportion to the number of actions (e.g., if one municipality with less than 20,000 inhabitants has developed at least four actions under Nature Conservation, 2 points are awarded; if it only developed three actions, 1.5 points are awarded, and so on). ABAE (2013b) provides detailed information about the scores, type of actions or projects required, among others. See more information in www.abae.pt/ECOXXI/.

wards the achievement of every indicator. The effort to balance quantitative data with other qualitative material aims to transform "rigid numbers" into qualitative information to support the jury in their evaluation.

ABAE then evaluates all applications (for about three months) and establishes a period for discussion with the municipalities about the results. The index is only published for the award ceremony (usually at the end of each year). The program starts again with a review of the indicators by the National Commission (aiming to correct difficulties although trying not to change each indicator radically), before the call for applications is opened once again.

ECOXXI case studies

Oeiras and Cascais were chosen as case studies because of their involvement in ECOXXI since the trial year of 2005/6 and as a response to ABAE's call for applications. In addition, both took different options in regards to the continuity of the program in their municipalities. Cascais has applied to ECOXXI every year, recognizing the importance of using common indicators on a regular basis. Oeiras, however, decided to discontinue its participation after 2008 and opted to develop a specific indicator system for SD. Both municipalities share some key characteristics[7] such as geographical location, population and development dynamics, which further

strengthened the comparison of the constraints and achievements of ECOXXI.

Data from case studies was gathered from document analysis available from the ECOXXI or the municipalities' websites, from semi-structured interviews with the program coordinators in Oeiras and Cascais, and a public officer in Oeiras who was involved with ECOXXI, as well as from direct observation of an ABAE training session.

As the process of developing ECOXXI indicators is external to the local councils, the study first focuses its attention on the internal driving forces to apply for the program, then on the process of data collection and management in the case study municipalities and finally on the outcomes of applying these common indicators.

Oeiras

Internal driving forces

In 2005, the Environment Department of the Oeiras Local Council recognized the importance of learning from ECOXXI, an appealing and new experience with local SD indicators. This decision needed political support from the Executive, as it implied the payment of a fee. Oeiras then applied for three consecutive years and always received a 'green flag' for its SD performance and policies. However, in 2008, the two officers responsible for ECOXXI established that Oeiras did not benefit from its annual participation, for several reasons: the need to pay an annual fee and the time required for data collection; the indicators changed only slightly from year to year; limited political interest and involvement in making use of the ECOXXI results; limited capacity to raise public environmental awareness on ECOXXI results; and finally, the most important reason, the willingness to focus (human and financial)

[7] Oeiras and Cascais are located in the Metropolitan Region of Lisbon, with a population of approximately 172,120 and 205,117 residents, respectively (INE, 2013). These municipalities represent some of the most populated and fastest growing municipalities in Portugal when compared with the previous 2001 census. Both Local Councils are also some of the biggest in the country with around 1817 and 1521 employees (2010), respectively.[$NoList$]

resources in the development and consolidation of a specific system of SD indicators in Oeiras (SIDSO). The experience around ECO-XXI was one of the driving forces for the Oeiras Local Council decision to develop SIDSO in addition to having an indicator system with a broader scope and tailored specifically to local needs, policies and goals.

Data collection and management process

Environmental public officers had always attended the annual training session promoted by ABAE. Those sessions enabled them to clarify doubts regarding data collection procedures and specific actions that would strengthen their position in a specific indicator. The most time-consuming and challenging phase was the data collection. Most of the difficulties were related to the lack of response and interest demonstrated by most departments that did not submit data on time, as well as the need to collect data from external entities. In addition, the constant restructuring processes and changes in personnel responsible for department information were additional obstacles for data collection and analysis. These permanent administrative adjustments were considered major barriers in the swiftness required for this process. After data had been collected, a final report was prepared and submitted for political consideration before being sent to ABAE. The final result was then published by the Oeiras Local Council in small news articles featured in the local media, presenting the overall position of Oeiras and the indicators that received the higher scores. Internally, the Environment Department provided similar information to all the departments involved. Nevertheless, detailed information about each indicator remained in the Environment Department and was not shared with other departments or used for political decision-making.

Constraints and achievements of ECOXXI in Oeiras

The interviewed officers recognized this tool as an important transversal platform, to connect activities with other departments and, above all, a tool that offered them the capacity to have access to information on several projects within the municipality. From their perspective ECOXXI also had the capacity to strengthen data collection processes and to improve assessment and analysis of their own local policies to better plan future initiatives, as well as to consolidate methodologies for the development of their own sustainability indicator system in the absence of any other national or regional recommendations.

Beyond these arguments the interviewed officers shared the general belief that evaluation procedures are only now becoming part of the local administration culture in Portugal. The current pressure of assessments and indicators is a result of a late maturity in urban planning and decision-making at the local level in Portugal. They generally recognize their own recent awareness on how to better manage and evaluate local projects.

Indicators from ECOXXI have been used in Oeiras in a number of different ways. First, the ABAE annual training sessions served as debate platforms and delivered an important capacity building role for public officers. Those sessions provided practical and specific knowledge that supported conceptual changes together with improvements in policy and evaluation strategies, mainly in the field of environment; for example, environmental education programs have been implemented in schools for more than 14 years, yet they have not been properly evaluated (e.g., qualitative data to measure behavior changes over time has not been collected). Most data collected has been quantitative (e.g., number of programs or participants) that do not tell us enough about the outcomes and effectiveness of the programs. Furthermore, ECOXXI served as an internal audit mechanism that was used to adjust and integrate thematic actions that before applying the program were not considered priorities (e.g., nature conservation policies).

Nevertheless, a critical challenge was recognized: the need to consider local citizens as key target groups, for whom the provision of indicators, through a stronger communication strategy, could help to strengthen sustainability education strategies and improve the transparency of local policies. Citizens are unaware of the targets established for each indicator and they do not have the chance to evaluate the performance of the local council in different areas across time and space.

Cascais

Internal driving forces

As in Oeiras, the decision to participate in ECOXXI came from the Environment Department, but was then transferred to the Local Agenda 21 office. The public officer interviewed has been the coordinator of the program since 2007. Applying for ECOXXI is considered to be a strategic activity of this office that, on an annual basis, submits the application process and the payment of the ECOXXI fee for political consideration. The fee is considered symbolic for the Local Council given the benefits the process brings to Cascais.

Data collection and management process

The internal process of applying to ECOXXI is similar to the one undertaken in Oeiras, since both local councils have similar characteristics. Although in Cascais the public officer never attended the ABAE training sessions, he recognized similar barriers in the collection of data from different departments in such a large municipal structure, as well as from external entities that do not feel obligated to reply within the given timeframe. Data collection is a time consuming stage that allows the officer to contact with several colleagues, projects and departments from different areas. The officer noted that the ABAE online platform is very clear, that indicators are easy to understand and relevant, with the same structure from year to year and are critical in the performance evaluation of several policies. The final report is submitted to ABAE and the results are then disclosed to the Local Council and to the local media, focusing on the best results for Cascais. Besides the recognition of efforts in promoting environmental and SD policies ECOXXI allows the authority to direct actions to improve performance indicators in one way and consequently improve SD policies in others.

Constraints and achievements of ECOXXI in Cascais

The main challenges identified for Cascais include problems related to internal communication during the ECOXXI application process and the disclosure of final results by ABAE. The officer argued that ABAE should improve indicator analysis, trends and reporting within and among municipalities and reinforce the communication strategy to strengthen transparency and best practices and present results as evidence to challenge the limited political support toward increased and more effective SD local policies.

It is argued that ECOXXI is a top-down initiative that pre-determines the indicators to be collected and the determined number of actions needed to fulfill indicators' goals (e.g., five education programs allows a municipality to be awarded the maximum score). On the other hand, if municipalities tried to develop their own indicator systems they would have to deal with difficult internal, political and financial challenges.

Yet, the uses attached to those indicators are manifold. From the perspective of the ECOXXI coordinator in Cascais it allows

the assessment and comparison of the performance of different lo-cal programs and policies with sound methodologies and to be in contact with colleagues from different departments. Additionally, it provides an opportunity to present several studies, outputs and communication materials to different kinds of audiences; to net-work and exchange knowledge with other municipalities; and to benchmark local efforts towards SD.

Discussion

As indicated in the previous sections, one of the rational argu-ments for standardization is the benefit of having an index or a few common indicators to deliver and compare a simple message that easily reaches high level policy makers and the general public. Nevertheless, what can be assumed from the case studies is that neither mayors, the political executive nor the local population di-rectly use ECOXXI indicators. On the one hand, the lack of political interest and support undermined the use of the indicators and lim-ited their potential for medium and long-term policy changes to-wards SD. On the other hand, the inadequate communication strategy directed at the local community restricts any potential conceptual use to reframe local debates on SD conditions and trends. In addition, the limited scope of the ECOXXI indicators and the narrow influence of the indicators, mainly centered on the public officer that coordinates the initiative at the local council, have produced limited impact on transversal and comprehensive policy setting and evaluation. Furthermore, the conditions imposed by ABAE in the application process undermine the potential for more municipalities to apply and weaken the assessment and com-parison potential of standardization for local SD policies in Portugal.

Nevertheless, further exploration of the outcomes of ECOXXI behind this traditional analysis of the advantages of standardiza-tion, demonstrates some key achievements. As authors such as Bakkes (1997) or Dhakal and Imura (2003) argue, flexibility is needed when using standardized indicators. ECOXXI provides a balanced approach between standardized indicators and a qualita-tive evaluation of local specificities, even if centered on the role of local governments and not taking its respective administrative area as a whole. In addition, the methodological guidelines and com-mon indicators, the training sessions and the whole application process provided by ECOXXI help public officers to better self-as-sess their actions and plans, to improve their knowledge, to encourage networking activities and to learn and exchange infor-mation among many municipalities. This type of capacity-building benefits are reinforced by the project's continuity that makes it particularly significant in a European context of efforts lost and dispersed among many projects that have no follow-up (e.g., ECI, ECOPADEV, STATUS, among others). Furthermore, as an award sup-ported by a structured assessment system of common indicators, it provides a different characteristic from other European projects that can strengthen the benchmarking of SD indicators and policies.

As a "middle actor" between civil society and political/institu-tional spheres, ABAE appears to be a critical intermediate actor for the standardization of SD indicators in Portuguese cities through ECOXXI. It is able to deliver a top-down approach and re-quired expertise – supported by a multi-disciplinary and multi-institutional commission – and to provide a consensus on indica-tors. This is particularly vital when there are no other national or European governmental guidelines or when bottom-up approaches appear to be unfeasible in certain contexts, in a country with a weak record of participatory approaches in the development of SD indicators at the local level and very few governmental initia-

tives to develop their own local SD indicator system (Moreno Pires, 2011).

Conclusions

Several institutions and projects around the world, and particu-larly in Europe, have been working on the development of stan-dardized indicators to better evaluate and assess SD. Consensus on common indicators has been undermined by the proliferation of initiatives, particularly at the local level. At the European level, this distribution of projects has been poorly evaluated in terms of governance impacts and the different related uses and has not been linked to official or political agreements on common indicators.

As the only regular initiative in standardizing SD indicators for local municipalities in Portugal, ECOXXI provided an interesting case to study the outcomes for cities that put common local indi-cators to practice. Despite the constraints and problems demon-strated in the case studies, it is possible to recognize critical merits to an initiative delivered by a "middle actor" in a country where national and local governments play a passive role in the ef-forts to assess and compare local SD. More than assessing, compar-ing or benchmarking cities and towns, the valuable outcome of ECOXXI is the sharing of guidelines, ideas and experiences on SD policies. These key learning and networking benefits, together with the delivery of top-down but flexible harmonized indicators and the provision of sound procedures to collect and organize internal information in a systematic way, have rendered these indicators as efficient tools to be applied locally.

References

ABAE (2013a). *ECOXXI 2013, Associação Bandeira Azul da Europa (FEE Portugal), Lisboa.* <http://www.abae.pt/ECOXXI/docs/apoio/projeto_ecoxxi_2013.pdf>.
ABAE (2013b). *Guia de Apoio à Candidatura do Município ECOXXI 2013.* <http://www.abae.pt/ECOXXI/docs/apoio/guia_de_apoio_ecoxxi_2013.pdf>.
AmbienteItalia (2003). *European common indicators: Development, refinement, management and evaluation, final report to the European Commission.* Milan: AmbienteItalia Research Institute.
Arribas-Bel, D., Kourtit, K., & Nijkamp, P. (2013). Benchmarking of world cities through self-organizing maps. *Cities, 31*, 248–257.
Bakkes, J. (1997). Research needs. Part One – Introduction. In B. Moldan, S. Billharz, & R. Matravers (Eds.), *Sustainability indicators: Report of the project on indicators of sustainable development* (pp. 379–388). Chicester: John Wiley and Sons. 396–398.
Bhagavatula, L., Garzillo, C., & Simpson, R. (2013). Bridging the gap between science and practice: An ICLEI perspective. *Journal of Cleaner Production, 50*, 205–211.
Boyko, C., Gaterell, M., Barber, A., Brown, J., Bryson, J., Butler, D., et al. (2012). Benchmarking sustainability in cities: The role of indicators and future scenarios. *Global Environmental Change, 22*, 245–254.
Brown, C. J., & Symes, M. (2002). *IANUS handbook: Indicators system to assess new urban services.* Diputacio de Barcelona, for IANUS Indicator Group.
CAT-MED (2012). *CAT-MED sustainable urban models – Work methodology and results.* <http://www.catmed.eu/archivos/desc7_CatMed%20Esp-Eng.pdf or http://www.catmed.eu/downloads.php>.
CRISP (2005). *A European thematic network on construction and city related sustainability indicators – Final report.* <http://www.pebbu.nl/resources/allreports/downloads/24_CRISP_finalreport.pdf>.
Dahl, A. L (1997). The big picture: Comprehensive approaches. Part One – Introduction. In B. Moldan, S. Billharz, & R. Matravers (Eds.), *Sustainability indicators: Report of the project on indicators of sustainable development* (pp. 69–83). Chichester: John Wiley and Sons.
Dhakal, S., & Imura, H. (2003). Policy-based indicator systems: Emerging debates and lessons. *Local Environment, 8*(1), 113–119.
European Commission (2005). *Urban audit perception survey: Local perceptions of quality of life in 31 European Cities, Urban Audit.* EC. <http://www.urbanaudit.org/UAPS%20leaflet.pdf>.
European Commission (2007). *State of European cities report – Adding value to the European Urban Audit.* Brussels: EC. <http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/urban/stateofcities_2007.pdf>.
European Commission (2009). *Sustainable development indicators overview of relevant FP-funded research and identification of further needs, study.* Brussels: EC.
Eurostat (2010). *European regional and urban statistics: Reference guide.* Eurostat methodologies and working paper. Eurostat.

Evans, B., & Theobald, K. (2003). Policy and practice LASALA: Evaluating local agenda 21 in Europe. *Journal of Environmental Planning and Management, 46*, 781–794.

Flood, J. (1997). Urban and Housing Indicators. *Urban Studies, 34*(10), 1635–1665.

Hammond, A., Adriaanse, A., Rodenburg, E., Bryant, D., & Woodward, R. (1995). *Environmental indicators: A systematic approach to measuring and reporting on environmental policy performance in the context of sustainable development.* Washington, DC: World Resources Institute.

Herzi, A. A., & Hasan, N. (2004). Management framework for sustainable development indicators in the Stated of Selangor, Malaysia. *Ecological Indicators, 4*, 287–304.

Holden, M. (2006). Urban indicators and the integrative ideals of cities. *Cities, 23*(3), 170–183.

Holden, M. (2013). Sustainability indicator systems within urban governance: Usability analysis of sustainability indicator systems as boundary objects. *Ecological Indicators, 32*, 89–96.

Holman, N. (2009). Incorporating local sustainability indicators into structures of local governance: A review of the literature. *Local Environment, 14*(4), 365–375.

Ibarrondo, M. (2004). *Development strategies for "eco" industrial, technology and scientific parks – ECOPADEV project.* <http://cordis.europa.eu/sustdev/environment/ev030504_oralpresentations.htm>.

INE (2013). Censos 2011, Instituto Nacional de Estatística, <http://mapas.ine.pt>.

Informed Cities (2013). <http://informed-cities.iclei-europe.org/> Accessed 24.07.13.

Lautso, K., Spiekermann, K., Wegener, M., Sheppard, I., Steadman, P., Martino, A., Domingo, R., & Gayda, S. (2004). *PROPOLIS: Planning and research of policies for land use and transport for increasing urban sustainability. PROPOLIS final report.* Helsinki: LT Consultants.

Luque-Martinez, T., & Munoz-Leiva, F. (2005). City benchmarking. *Cities, 22*(6), 411–423.

Mascarenhas, A., Coelho, P., Subtil, E., & Ramos, T. B. (2010). The role of common local indicators in regional sustainability assessment. *Ecological Indicators, 10*(3), 646–656.

McMahon, S. K. (2002). The development of quality of life indicators – A case study from the City of Bristol, UK. *Ecological Indicators, 2*, 177–185.

Miller, C. A. (2007). *Creating indicators of sustainability: A social approach. Draft version.* Winnipeg: IISD.

Mineur, E. (2007). *Towards sustainable development: Indicators as a tool of local governance.* PhD dissertation. Print and Media, Umeå University, Sweden. <http://umu.diva-portal.org/smash/record.jsf?pid=diva2:141019>.

Moreno Pires, S. (2011). *Sustainability indicators and local governance in Portugal.* PhD dissertation. University of Aveiro, Portugal. <https://ria.ua.pt/bitstream/10773/3647/1/Tese%20Sara%20Pires.pdf>.

Moreno Pires, S. (2014). Sustainability indicators. In: A. C. Michalos (Ed.), *Encyclopedia of quality of life and well-being research.* Dordrecht:

Springer + Business Media. http://dx.doi.org/10.1007/978-94-007-0753-5 (in press).

Moreno Pires, S., & Fidélis, T. (2012). A proposal to explore the role of sustainability indicators in local governance contexts: The case of Palmela, Portugal. *Ecological Indicators, 23*, 608–615.

OECD (1993). OECD core set of indicators for environmental performance reviews, OECDenvironment monographs, vol. 83. Paris: OECD. Retrieved from <http://www.smallstock.info/reference/OECD/gd93179.pdf>.

PASTILLE (2002). *Indicators into action – Local sustainability indicator sets in their context.* London: PASTILLE Consortium, London School of Economics and Political Science.

Pintér, L., Hardi, P., & Bartelmus, P. (2005). *Sustainable development indicators: Proposals for a way forward.* Winniped: IISD.

Ramos, T. B., Moreno Pires, S. Sustainability assessment: The role of indicators. In S. Caeiro, W. Leal Filho, C. J. C. Jabbour, & U. M. Azeiteiro (Eds.), *Sustainability assessment tools in higher education – Mapping trends and good practices at universities around the world.* Springer 2013 , Chp 5, 81-100. ISBN 978-3-319-02374-8.

Ramos, T. B., & Caeiro, S. (2010). Meta-performance evaluation of sustainability indicators. *Ecological Indicators, 10*, 157–166.

Ramos, T. B., Caeiro, S., & Melo, J. (2004). Environmental indicator frameworks to design and assess environmental monitoring programs. *Impact Assessment and Project Appraisal, 22*(1), 47–62.

Rydin, Y. (2007). Indicators as a governmental technology? The lessons of community-based sustainability indicator projects. *Environment and Planning D, 25*, 610–624.

Sébastien, L., & Bauler, T. (2013). Use and influence of composite indicators for sustainable development at the EU-Level. *Ecological Indicators, 35*, 3–12.

Tanguay, G. A., Rajaonson, J., Lefebvre, J. F., & Lanoie, P. (2010). Measuring the sustainability of cities: An analysis of the use of local indicators. *Ecological Indicators, 10*, 407–418.

UN (2013). *United Nations sustainable development knowledge platform.* <http://sustainabledevelopment.un.org/index.php?menu=1621>.

URBAN-NEXUS (2013). <http://www.urban-nexus.eu/> Accessed 24.07.13.

van Zeijl-Rozema, A., & Martens, P. (2010). An adaptive indicator framework for monitoring regional sustainable development: A case study of the INSURE project in Limburg, The Netherlands. *Sustainability: Science, Practice, & Policy, 6*(1), 6–17.

Wong, C. (2006). *Indicators for urban and regional planning: The interplay of policy and methods.* Oxon, UK: Routledge.

Yigitcanlar, T., & Lönnqvist, A. (2013). Benchmarking knowledge-based urban development performance: Results from the international comparison of Helsinki. *Cities, 31*, 357–369.