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ARTICLE

The Use of Local Sustainability Indicators: case studies in two Swedish municipalities[1]

KATERINA ECKERBERG & EVA MINEUR

ABSTRACT *This article contributes to the debate on the role of local sustainability indicators in ongoing democratisation efforts. We examine the extent to which five different systems of local sustainability indicators within two Swedish municipalities—Stockholm and Sundsvall—are either expert or citizen oriented, and relate these findings to the indicator systems' profile, function and political/administrative context. Even though three of the indicator systems can be classified as citizen oriented, there are few signs of true engagement and dialogue with the citizens over a longer period of time. The remaining two indicator systems are expert oriented with an environmental focus. Hence, we conclude that the systems in use are largely symbolic responses to the demands for democracy within the agenda for sustainable development albeit attempts to include environmental, economic, social and democratic perspectives of sustainability. Despite the fact that Stockholm and Sundsvall show differences in governing styles in their approaches to sustainability indicators it seems difficult for both municipalities to put sustainable development into practice in terms of citizen participation.*

Introduction

Swedish municipalities have by tradition played a major role in implementing environmental policy, both by way of transforming national legislation and programmes into local practice and by initiating bottom-up new initiatives (Burström, 2000b; Eckerberg & Forsberg, 1998; Lundqvist, 1996). In international comparison, Sweden is often regarded as one of the forerunners in environmental policy; in terms of implementing Local Agenda 21 (LA21) Sweden is perhaps the leading country in Europe (Lafferty, 2001). Local systems for measuring and assessing the progress in the form of sustainability indicators have been developed in Swedish municipalities for over a decade (Kommunförbundet, 1996). One-quarter of the municipal health and environment departments say that they use indicators to analyse their activities (Kommunförbundet, 2000). According to a survey from late 2001, local sustainability indicators are part of

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LA21 work in about 42% of the 289 municipalities (Edström & Eckerberg, 2002). In this article we examine the role of these indicators in local work for sustainable development. We will use the concepts of 'sustainable development' and 'sustainability' as interchangeable terms; however, when we refer to 'environmental' policy or management, we regard this as emphasising only one dimension of the broader agenda for sustainability.

We will analyse the sustainability indicators' profiles in relation to the ecological, social and economic dimensions of sustainability as well as their function and role in political and administrative processes. It is clear that sustainability indicators play different roles in different contexts and their tasks seem to be continuously contested (Crilly *et al*., 1999; Leitmann, 1997; Bell & Morse, 2001). Our contribution to the discussion on the roles of indicators will be to link it to a discussion on participation in policy implementation by providing a typology in which we distinguish between expert-oriented and citizen-oriented systems. We examine the role of experts versus citizens in the policy processes surrounding the indicators. Hence the relationship between participation and the use of the indicators is discussed. Are the municipalities' systems of indicators different, and if so how and why? To what extent have they been developed to serve environmental management purposes as compared with a broader local agenda for sustainable development? Do they reflect an essentially top-down and expert-driven approach or are they targeted mainly at local citizens as a way of promoting more participatory processes of policy making? What lessons can be learned from different types of local sustainability indicator sets and their use in local policy processes?

These questions are also part of an ongoing research project in which we compare and analyse the use of local sustainability indicators in Sweden.[2] In the larger study, case studies are undertaken in five municipalities that have worked with local sustainability indicators for several years. In this first report we selected two of them, namely Stockholm and Sundsvall, to represent different approaches to the use of indicator systems, perhaps reflecting different understandings of how the indicators may impact on local practices and policies. Through interviews with key individuals within the municipal administration in the two towns (seven in Stockholm and six in Sundsvall) we investigate how various actors from local government administration interpret the role of the indicators. In addition, official documents, reports and internet sources are used to collect information at the local level.

In this article, we begin by introducing our analytical framework based upon the profile, function and political-administrative context of the indicators and their use. In particular, we discuss the use of indicators in relation to expert-based versus citizen-based approaches, and in relation to government versus governance structures. The meanings of the concept of governance in the context of the role of the state in the policy process have been heavily debated in the past decade (see Pierre, 2000; Pierre & Peters, 2000; Rhodes, 1999). Hereafter, we give a brief overview of systems for monitoring environment and sustainability policies in Sweden at national (and international) levels, thus relating the local sustainability indicators to the wider context. This is followed by a description of the history and development of local sustainability indicators in the two

municipalities. The profile, function and political-administrative context of the different systems in use are analysed, drawing from both municipalities. Comparisons are made between the different approaches. Finally, we discuss the theoretical implications of our findings and draw more general conclusions that may be relevant for practitioners in this field.

Framework for Analysis

Sustainability Indicators in the Policy Process

It may be argued that sustainable development requires the broad participation of different societal groups in the policy process. Indeed, citizens must be able to influence the development of society if we are to speak about reaching sustainability goals that include not only the public but also the private spheres. Sustainable development as a concept can be defined from several perspectives (e.g. the dimensions of environmental, economic and social/cultural sustainability, the North–South dimension, inter- and intra-generational concerns and short- versus long-term commitments) and hence interpreted in several ways. It combines protection of the environment with global development, taking justice between North and South and across time into account. Furthermore, the interpretations include a demand for precautionary and economizing measures in the use of natural resources. Principles of collective responsibility, solidarity and differentiated duties among countries and actors have also become important parts of the concept of sustainable development (Adams, 1990; Meadowcroft, 1997; Lafferty & Langhelle, 1999). Jacobs (1996) distinguishes between (1) environmental and economic integration, (2) the welfare of future generations, (3) environmental protection, (4) equity, (5) quality of life issues and (6) participation. These six aspects will be used to operationalise our understanding of the sustainability concept and to compare it with interpretations within Swedish municipalities.

Sustainability indicators could play an important role when putting sustainable development into practice. As already mentioned, sustainability indicator systems are present in many Swedish local authorities' work. Indicators are applied as tools for sustainable development at all levels and in many different contexts. At the international level, the UN, the OECD (Organisation for Economic Cooperation and Development) and the EU have developed indicators and they have inspired the work with indicators at national as well as regional and local levels of government. Since policy making at the local level—even in Sweden with its strong municipalities—is so intertwined with national and international policies and regulations, local sustainability indicators need to operate in a wider framework. Today, the interactions between different actors are increasingly complex and characterised by 'networks', 'mutual adjustments' and 'cooperative management' rather than 'hierarchy' and 'government' (Lundqvist, 2001). According to Rosenau (1992) and others, this can be exemplified by the fact that the boundaries between public, private and voluntary sectors have become blurred, as well as by the growing interdependence between social, political and administrative actors in different policy areas. Within a

governance system there are greater opportunities for bottom-up initiatives, since much of the traditional policy-making hierarchy is broken down. Thus, it may be questioned whether the state still remains the crucial goal-setting actor. On the one hand, there are increasing links to the international arena and the EU—spelled out in the White Paper on European Governance (European Commission, 2001). On the other, there is a growing demand to 'democratise the democracy', that is, to increase the empowerment of citizens through participation in policy processes and political decisions. As stated, for example, in the Swedish Government Report on Democracy (SOU, 2000:1), local authorities have rather wide discretion when implementing policies from the national level.

Apart from national and international systems of indicators, the local political and administrative situation, in addition to specific socioeconomic and cultural prerequisites, also influences the actual development and use of the indicators. Because of this complexity of local policy making, local sustainability indicators can play very different roles. Given that sustainability indicators may be a tool that both *defines* and *operationalises* sustainable development, their potential power in formulating local (but also national and even international) sustainability policies is vast (Pinfield, 1996; Brugmann, 1997). Hence, the profile of the indicators reflects the way sustainable development is understood and which dimensions are emphasised and thus defines, to a large extent, the agenda for action.

A Typology of Local Sustainability Indicators

When examining existing sets of indicators at different levels it also becomes clear that they are oriented in different ways depending on how they are developed. According to PASTILLE (2002), the roles of the indicators can be summarised under three broad headings: 'citizen oriented' with a prime purpose of starting a dialogue with the citizens, 'expert oriented' with performance assessment and measuring effectiveness as the main functions and 'objective setting' in that they help to set sustainable development goals. It is argued that an indicator designed for a special purpose will address a specific audience (PASTILLE, 2002, p. 11). We will build on this argument by presenting a typology that focuses on the two above-mentioned ideal types, namely expert-oriented indicators and citizen-oriented indicators. These two types of indicator systems form the basis of our framework for analysis.

We have identified three main aspects that could distinguish between citizen- versus expert-oriented systems of indicators, including (1) their profile, (2) their function and (3) in which political/administrative context they operate (Table 1). We argue that these three aspects are most relevant to analyse in order to understand the role of sustainability indicators in local environmental work.

Profile

First, the profile of the indicators can be determined by what they actually measure. If the changes in the indicator value are directly linked to individual actions, it is classified as a citizen-oriented indicator. Such indicators can be

TABLE 1. A typology of local sustainability indicators

Aspects of indicators	Citizen oriented	Expert oriented
Profile		
• What do they measure?	• Changes clearly linked to individual behaviour	• Changes on a more aggregated levelmore
• How do they grasp sustainable development	• Multi-dimensional	• One dimensional
Function		
• Their purpose?	• Promote understanding of sustainable development	• Measure effectiveness (performance assessment)
• Target group?	• The public	• Experts
Context		
• The political-administrative context?	• Networks, governance	• Formal hierarchies in governmental institutions
• Actors involved?	• Broad range of actors outside as well as inside the administration	• Limited range of actors inside the administration as well as experts

rather easily understood by non-experts. A case study of Lancashire reveals that 'people show an interest in indicators only if they relate to what they value and if they can verify what the indicator shows from their own experience' (Pinfield, 1997, p. 187), hence indicators that measure and relate to individual behaviour should be more likely to be applicable to citizens. By contrast, expert-oriented systems are those where changes in indicators are measured on a more aggregated level, for example through technical data on emissions or state-of-environment variables that require a certain level of expert knowledge to understand. The extent to which they grasp the concept of sustainable development is a second question when determining the profile. As mentioned earlier, we have used the six key commitments to sustainable development as our basis for examining the profile of the indicators, including environmental and economic integration, the welfare of future generations, environmental protection, equity, quality-of-life issues and participation (Jacobs, 1996). The more of these dimensions that are covered in the sets of indicators, the more can they be classified as multi-dimensional and citizen-oriented systems that span many of these key commitments, while those indicator sets that cover only one—or few—of these dimensions have been classified as expert-oriented systems. The latter may be focused on, for example, purely environment or public health issues with little reference to the other dimensions of sustainability.

Function

When it comes to assessing the function of the indicator system the defining factors are, their purpose, and their main target group. If the purpose tends

to be less precise and instrumental and more concerned with promoting understanding of sustainable development, or facilitating a dialogue on how to reach sustainability, the indicators will be classified as more citizen oriented and linked to Agenda 21 processes. Generally, expert-oriented indicators are presumed to have a more instrumental purpose of measuring effectiveness and assessing the performance of governmental agencies. Target groups are naturally a broader audience, including the general public, for the citizen-oriented indicators, and experts and political and administrative decision makers for the expert-oriented ones.

Political-Administrative Context

Lastly, the context in which the indicators operate is important to map out. This is done by analysing the priorities made by the current political leadership in the municipality, and by identifying the local administrative structures and the various actors involved in the process. The administrative context is highly influenced by the municipality's governing structure. We examine whether the policy-making process concerning the indicators has mainly been carried out within a traditional governmental approach, with formal hierarchies and clear divisions of responsibility, or whether the process is rather characterised by the use of networks and less formal contacts across public–private borders. The former can be regarded as more of an expert-oriented approach in developing the indicators—involving key politicians and public officials—while the latter can be viewed as a wider approach that also includes local citizens. Naturally, more actors are likely to be involved in the context of networks and informal methods than in cases where formal hierarchies have dominated. Bell and Morse (2001) argue that if sustainability indicators are to be effective it is important to include the views of the stakeholders who are ultimately intended to benefit from them—because it is far more likely that if these groups are allowed to participate in the conceptualisation and development of the indicators they will also use and appreciate the results.

Monitoring Environment and Sustainable Development in Sweden

At present, there is a wide array of activities in Sweden relating to sustainable development at national, regional and local levels of government. In addition, civil society represented both by interest organisations and voluntary associations of various kinds is highly involved. For our purpose, it is hardly necessary to review the myriad of different environment and sustainable development initiatives in various contexts within Sweden. Rather, we will give a brief introduction to the main processes into which local sustainability indicators may fit. In the case studies we will explore some of these connections in more detail.

Three different developments—which are to some extent related to each other—have shaped the development of sustainability indicators in Sweden. First, the Swedish government's interpretation of sustainable development has changed somewhat over the last 15 years. At first the emphasis was put almost solely on the ecological dimension, while the social and economic dimensions have been lifted only recently. Second, the introduction and implementation of

environmental management systems have literally exploded in the private as well as in the public sectors, including EMAS (Eco-Management and Audit Scheme), ISO 14000 (International Organisation for Standardisation) and other environmental audit systems. Third, the issue of public health has come to be highly prioritised in the discussion about sustainable development in more recent years. Hence, depending on the timing when particular indicator systems were developed, different trends may have shaped their profile and function.

'Sustainable Sweden' is the government's programme for implementing sustainable development at national level. The goal has been set to leave a society for the next generation in which the major environmental problems have been solved. This includes three overall goals: protection of the environment, an effective use of the earth's resources, and sustainable provisions. These goals have been translated into 15 National Environmental Quality Objectives (NEQO),[3] which have been further specified into subgoals and implementation strategies (SOU 2000:52). Hence, 'sustainable development' in this context has been largely interpreted as 'ecologically sustainable development' and closely related to traditional environmental policy. Finally, the municipalities are asked to translate and implement the 15 NEQOs at the local level of government. The Swedish Environmental Protection Agency (SEPA), which administers the NEQOs, has developed indicators that are based on the European Environmental Agency's DPSIR model (explained later) for the follow-up of the objectives.

At the national level, there are at present two parallel systems of sustainability indicators. The first was developed by the Environmental Advisory Council[4] and consists of 12 'green indicators' targeted at both decision makers and the general public. The purpose is to provide information about the progress towards ecological sustainability in a way that is simple and easily understood. It is stated in the finance plan that the green indicators may be used along with economic indicators as guidance for decisions about the future, as well as to stimulate the political debate. This indicator system is focused on environmental aspects, but it also measures change of behaviour among certain societal groups.

The second system has been developed by Statistics Sweden in collaboration with the Ministry of Environment. It includes 30 different indicators within the economic, environmental and social dimensions of sustainable development. They are structured under the themes of efficiency, contribution and equality, adaptability and values, and resources for coming generations. These indicators are closely related to international initiatives from the UN, the EU, OECD and countries like Great Britain and Finland. It is emphasised in this report that the selection of indicators should be seen as a way to focus the different facets of sustainability, rather than to serve as a judgement on the present state of sustainability (Ministry of Environment, 2001). This system is broader than the 'national green indicators' described above, in that social and economic dimensions of sustainability are covered in addition to the environmental.

It is not the place in this article to analyse if and how the two national systems may merge or stay complementary in the future. Neither is it our intent to discuss how the national systems may develop in relation to various initiatives at the regional and local levels. Still, the existing systems at national level most

likely have an impact on how municipalities develop their local sustainability indicator systems. Inspiration is often sought from national (or even international) practice. In particular, the NEQOs are likely to connect in various ways to the municipal work. This is an issue we will explore further in the case studies below.

Similar to the national situation, there seem to be at least two different processes whereby indicators are being used at the local level within municipal work. First, there is the use of environmental management systems (EMS) of various kinds that are primarily geared towards monitoring and evaluating environmental policy within the municipal organisation. The Environment and Health Boards and their administration extensively develop EMS. Case studies of local environmental management show that EMSs may serve as bridges of the gaps among different professions in municipalities (Burström, 2000a). Second, there are the Local Agenda 21 processes, which tend to include a somewhat larger array of sustainability issues as well as municipal concerns in various sectors.

The role of the Swedish Association of Local Authorities (SALA) should also be mentioned. They played an important part in inspiring and coordinating LA21 processes from Rio onwards. With regard to local sustainability indicators, SALA has taken the initiative to develop a set of 25 indicators that can be used to compare different municipalities (Kommunförbundet, 2000). They include both measurements relating to the municipality as a geographical entity and to the organisation of the municipality as such—covering resource consumption, environmental work and status of the environment—and are hence oriented towards environmental dimensions alone. The focus of the SALA project has been on the profile of the indicators (what they measure) rather than their role or use (how and why). Parallel to this, there has been a similar project for indicators aimed at measuring social welfare and public health which SALA initiated in 1996 together with the Federation of Swedish County Councils and the National Institute of Public Health.

It is within these national contexts that Sundsvall and Stockholm municipalities have developed and implemented their different systems of local sustainability indicators and it is now time to look further into the practice of these two municipalities.

Two Case Studies of Local Implementation: Stockholm and Sundsvall

Stockholm

Stockholm has a fairly long experience of local environmental policy and a well-established and quite advanced LA21. In total, four different types of indicators are connected to its municipal environmental work. First, there are the 17 Agenda 21 indicators, developed through a participatory process in which citizens had a major influence. Roundtable discussions with invited citizens along with voting campaigns in the subway, where people could vote for certain indicators, were two of several participatory initiatives in the process of defining the Agenda indicators (the process started in 1997). These indicators were

formally decided upon by the municipal council in 1999 as part of the local sustainability strategy. Second, there are the indicators contained in the Environmental Programme from 2002, which are characterised by environmental protection concerns and are linked to the NEQOs. The policy-making process surrounding this programme has been more confined to politicians and administrators, and almost no citizen participation took place. Third, the European Common Indicators (ECI) initiated by the Commission and the European Environmental Agency in 1999 have been part of Stockholm's work with sustainability since 1999. The ambition has been to link the ECIs to LA21. Recently, a citizen survey was carried out as part of LA21, and the ECIs were included in the questionnaire.[5] Fourth, there is an indicator system for the internal administrative management. However, since our study focuses on indicators that are more directly linked to sustainability, these internal indicators will not be examined further.

The set-up of public administration in Stockholm differs somewhat from that of other municipalities in Sweden, since it is divided into 18 district councils with the same responsibility and authority as the city's other committees and boards. Each district council has an environmental unit but the overall work is coordinated from the local environmental department, which in turn is divided into five subunits. One of them is the Environmental Monitoring Unit, which is responsible for the Agenda 21 indicators, the Environmental Programme and the work with the ECIs.

Sundsvall

As a result of its industrial heritage, Sundsvall has experienced a range of environmental problems like industrial emissions into air and water, industrial waste and heavy air pollution and indeed had come to be labelled as the 'dirty man' of Sweden. By the end of the 1980s, however, the local politicians decided to change this picture and from the 1990s onwards there has been a strong prioritisation of the environment. One of the most significant projects in this direction was the Sundsvall-Timrå Environmental Project from 1989, initiated by the national government with the aim of substantially improving the state of the local environment within ten years. According to interviews with public officials, this project provided a very substantial impetus to environmental initiatives in Sundsvall. Hence, the local administrative context in Sundsvall is greatly influenced by its history of environmental problems but also by a strong determination to solve them. The local environmental work is coordinated by the municipal executive board, although the everyday responsibility for LA21, public health and the work with indicators has been delegated to the planning division.

The municipality has prioritised the issue of public health ever since the World Conference on Health took place in Sundsvall in 1991. During these ten years public health indicators have been developed according to themes like social capital, good physical environment and working life conditions, but although they are now in use they are not politically supported. In 2000 it was decided that an assessment of the health and welfare status in Sundsvall should

TABLE 2. The different types of indicators in Stockholm and Sundsvall

Stockholm			Sundsvall	
Agenda 21[a]	Environmental Programme[b]	European Common Indicators[c]	Environmental Balance Sheet[d]	Welfare and public health[e]
Environment	Environmental effective transport	*Compulsory*	Air emission in the city centre	Develop good growing up conditions,
Energy consumption per capita	Safe goods	Citizens' satisfaction with the local community	Nature	e.g. parental leave among fathers
Number of days with satisfactory air quality	Sustainable energy use	Local contribution to global climatic change	Provisions	Strengthen social capital
Proportion of journeys made by public transport	Ecological planning	Local mobility and passenger transportation	Bathing water quality	e. g. Participation in the election
Economy	Environmental effective waste management	Availability of local public green areas	Communications and Transports	Improve working life conditions
Level of employment	Sound indoor environment	Quality of local outdoor air	Waste water	Create a good physical environment
Level of education		*Voluntary*	Drinking water	Stimulate further improvements in habits of life
Sales of eco-labelled foodstuffs			Waste	
			Energy in distant heating production	

Social issues	Children's journeys to and from school
Proportion of population who fear violence	Sustainable management of the authority and business
Time children spend with adults as they grow up	Noise pollution
Proportion of population with asthma	Sustainable land use
Democracy	Products promoting sustainability
Proportion of people involved in voluntary organisations	
Election turnout among first-time voters	

[a] The table shows 11 of the total number of 17 Agenda 21 indicators that build on the four cornerstones; environment, economics, social development and democracy.
[b] In the Environmental Programme the 15 national Environmental Quality Objectives are embedded in the six headings presented in the table. More than 90 indicators in total can be found under the headings.
[c] The ten ECIs are divided into five compulsory and five voluntary indicators for the municipalities to implement.
[d] In the Environmental Balance Sheet nine headings links the local work to the national Environmental Quality Objectives and several indicators can be found under each heading.
[e] The welfare and public health indicators are summarised under the five headings that are presented in the table.

be made; hence at the end of 2001 a document entitled *Health—Equally Distributed?* was launched and disseminated.

In the local Environmental Balance Sheet from 2002, three types of indicators are presented: the environmental indicators, some of the welfare indicators and some of the public health indicators. There are no indicators directly tied to LA21 even though the health and welfare issues are indirectly linked, since they are seen as guidelines for the LA21 work. As in Stockholm there are specific indicators linked to environmental management systems for each sector within the administration (see Table 2).

The empirical analysis will follow the logic of the typology, thus beginning with examining the profiles of the indicator systems, thereafter their function and finally the context surrounding them. We present the cases in the order of Stockholm first and Sundsvall second. In the conclusions part, we compare the cases and the different systems.

Profile(s) of the Indicators

Stockholm

When it comes to what the indicators measure as well as grasping the concept of sustainable development the three sets of indicators in Stockholm clearly differ, as seen in Table 2.

The Agenda 21 indicators—the first set of indicators—are associated with the four themes of environment, economy, social issues and democracy. In total, they include 17 different indicators that relate to those themes in various ways. Since they were defined according to what the local citizens found most relevant to gauge, they might reflect other questions than those the politicians would have prioritised. For example, some of the social indicators, like 'time children spend with adults as they grow up', were strongly emphasised by the citizens even though the local authority did not have tools or methods to measure them. The LA21 indicators cover most of the key commitments to sustainability. For example, 'environmental and economic integration' has been adopted by linking individual consumption patterns to environmental issues such as energy use and sales of eco-labelled food products. The commitment to environmental protection such as the waste issue, air quality and CO_2 emissions is captured by several of the LA21 indicators. The equity dimension is represented in the 'democracy' indicators that measure aspects of both representative democracy and involvement in voluntary organisations. However, inter-generational dimensions of the welfare of future generations are not really perceptible among the indicators.

Several of our respondents emphasised the link between quality of life values and the LA21 indicators. The best example might be the indicators of both the proportion of the population who fear violence and the time children spend with adults as they grow up. The concept of quality of life is often mentioned in our interviews when speaking of Agenda 21 in general and the LA21 indicators in particular. Finally, the pledge to participation is obvious in the entire process of developing the Agenda 21 indicators. The fact that roundtable discussions with

the public as well as other invited actors took place during the development process of the indicators along with the voting campaign in the subway and on the internet shows the strong intention to involve citizens in the process.

The second set of indicators is found in the recently launched 'Stockholm Environmental Programme—on the way to a sustainable development'. This comprehensive programme aims to guide local environmental work for a period of five years (2002–2006). The focus in the programme is on local environmental protection policies that through six broad headings are linked to the 15 NEQOs. The headings are: environmentally effective transport, safe goods, sustainable energy use, ecological planning, environmentally effective waste management and sound indoor environment. The six different themes in the programme each have a number of indicators related to them that in turn are linked to the Driving—Pressure—State—Impact—Response model (DPSIR). The DPSIR model is a framework describing the causal chain of actions of environmental problems and thus legitimates the developed indicators. It was adopted by the European Environmental Agency as an extension of the PSR (Pressure State-Response) model developed by the OECD.

Here, the sustainability focus is clearly on the environmental dimension. When the Environmental Programme was made, a website was created where citizens could follow the work and also give suggestions. Hence, some form of participation took place although not as extensive as the LA21 indicators' process. The environmental protection aspect is comprehensively covered not least because of the direct link to the NEQOs. The other commitments to welfare of future generations, equity, quality-of-life issues and environmental and economic integration are not really distinguishable among the indicators in the Environmental Programme.

Third, the ECI are implemented in Stockholm and to some extent incorporated in the local Agenda 21 work, since they partly measure the same variables as the Agenda 21 indicators. As shown in Table 2, the ECIs are very broad and cover several dimensions of sustainability, albeit not all. Through linking individual consumption patterns to environmental aspects such as the energy use and sales of eco-labelled food, the commitment to integration of environment and economic is present. This is also true for the environmental protection aspect, which is present in one way or another in nearly half of the ECIs. Quality-of-life issues are covered, such as indicators of citizens' satisfaction with the local community and the availability of local public green areas as well as local services, but not really the inter-generational dimension. The participatory dimension is to some extent included, since several municipalities were invited in the process of developing the ECIs and Stockholm chose to participate. The selection of the ten ECIs builds upon consultation with different municipalities across Europe.

To summarise the assessment of indicator profiles in Stockholm, we find that the indicator sets are working on parallel tracks but also to some extent overlap. They measure quite different dimensions of the sustainability concept and thus vary considerably in the way they grasp the content of sustainable development.

Sundsvall

In Sundsvall, there are two systems of sustainability indicators as shown in Table 2. Beginning with the indicators in the Environmental Balance Sheet we find that they measure purely classic environmental issues, like air quality and acidification, linked to the NEQOs. Hence, they primarily reflect environmental protection issues. Examples of how to integrate the environment with the economy are not explicitly made although such integration is implicit in relation to those indicators that deal with effectiveness, for example that of energy production and consumption. Participation, such as an attempt to involve the citizens in the policy-making process, has not been prioritised when developing any of the indicator sets in Sundsvall, even though some of the local industries were invited to share their experiences. A few information campaigns aimed toward citizens have been carried out, but to inform is not the same thing as promoting a dialogue. Several of the public officials who were interviewed stressed that this lack of citizen participation is indeed a problem, but that they do not know how to solve it.

The other indicator system, which contains welfare indicators as well as public health indicators are presented in the municipal report *Health—Equally Distributed?* These indicators naturally measure social aspects like the well-being of citizens. The report states a goal that reads, 'A well-developed welfare that is fairly distributed among the citizens increases the general public health.' Thus, the two concerns of welfare and public health are regarded as strongly linked. Several of the public health and welfare indicators like those related to safety issues and friendship/social networks may well reflect the commitment to quality of life. Equity aspects are apparent and discussed in the introduction of the report but the text and the indicators (as well as the officials) speak only about intra-generational equity. No references are made to the inter-generational dimension, which means that the commitment to provide welfare for future generations is neglected. The commitment to environmental protection is absent in this set of indicators, although there is a reference to the Rio conference and Agenda 21 in the conclusion of the programme. Several of our respondents argued that the work of integrating the welfare and health aspects in the environmental balance sheet is in progress.

To summarise the profile assessment for Sundsvall, we have found two indicator sets working alongside each other which measure different dimensions. Neither of the indicator sets grasps the full scope of sustainable development according to the six key commitments. Nevertheless, since the municipality of Sundsvall has engaged for a considerable time with public health and welfare issues, the key commitments to sustainability of equity and quality of life are more apparent than in Stockholm. Participatory approaches have, however, not been encouraged.

Function and Role(s)

When it comes to determining the purpose and target groups of the indicators across and within the two municipalities the different sets show great variety.

Stockholm

In Stockholm, the LA21 indicators are seen as strong communicative tools. Several of the public officials interviewed stressed the importance of clear communication and that sustainability indicators have a role in that respect. One of them also emphasised the democratic aspect of relevant and clear information by claiming that 'anything that can illustrate complicated connections in a simple way so that they can be communicated to the public is important … it is a democratic issue as well, citizens should have the right to understand information.' The LA21 indicators are seen as a complementary system to those indicators already in use within the administration itself (e.g. the indicators for the internal management system), but they have an expanded purpose to serve as the basis for citizens' as well as politicians' standpoints in questions related to sustainable development.

The indicators of the Environmental Programme serve a more instrumental function through providing information about the state of the local environment on a yearly basis. The overall purpose with the Environmental Programme is to contribute to making Stockholm a sustainable city in the long term. To achieve this goal the programme sets out to: crystallise the most important local environmental issues, deliver goals and follow-up strategies, emphasise the responsibility of different actors and spread knowledge. The target group is primarily public administrators, but also citizens and politicians, who are approached by two newly constructed separate websites (one for citizens and one for politicians) that provide up-to-date information and statistics for the indicators in the Environmental Programme.

According to the technical report on ECIs launched by the European Commission in 2000 the aim of the ECIs is to be complementary to other indicators that are already in use among local authorities. Like the LA21 indicators, the ECIs are seen as a tool to help politicians to understand what type of questions a sustainable development might include. Similar to the Environmental Programme indicators, the ECIs are targeted towards public administrators and politicians. Another more implicit purpose with the ECIs is not linked to the indicators themselves but rather to the process of developing them. By letting an invited number of European municipalities be part of the process, the Commission hopes to establish new contacts and collaboration among local authorities that may spur the work towards local and global sustainability.

To sum up, the assessment of indicator functions in Stockholm shows a mixed picture, since they can be seen as monitoring tools as well as communicative tools. The target groups differ depending on the purpose of the system.

Sundsvall

The health report aims to describe the current situation with regard to public health in Sundsvall and to identify problem areas that the local politicians should address. In the report, citizens are mentioned as a target group for communicating the results. One public official mentioned the value of having a public dialogue: 'It is important to show how to measure the state of something and

then have a dialogue with the citizens on how to tackle the problem … and somewhere in this dialogue the indicators have a function.' The next step (which has not yet been taken) in the process of implementing the health and welfare indicators will be to test them on citizens in a few local city districts.

In the Environmental Balance Sheet the purpose of the indicators is stated as to follow and illustrate development towards the sustainable society. The indicators are identified on the one hand as a tool to monitor internal organisational changes according to environmental management principles, and on the other hand as a tool to monitor local activity in relation to the NEQOs. The result is communicated to the local politicians—who are identified as the target group—through a website where the development of the internal organisation is summarised from five different perspectives, including the economic and the citizen perspective. This is meant to help politicians keep updated on the situation and guide them to discover potential problems. However, several of the respondents were not sure whether the politicians really use the website.

Since the target groups in Sundsvall in general are primarily public officials and politicians, the function of the indicators is primarily as a monitoring and information tool with an aim to assess performance rather than to promote dialogue on sustainable development. The communication element is pointed to as an important function of indicators in general, but neither of the two systems explicitly involves citizens in the monitoring process.

The Political and Administrative Context

The political and administrative framework and the actors involved in the process are strongly linked. Which actors are involved might be determined by the surrounding context, but at times the actors may also themselves influence this context. Therefore, it is sometimes difficult to distinguish who influences what. The political leadership, the administrative structure and the forms of cooperation are all important to analyse.

Stockholm

The political leadership has changed in the two last elections from being in 1994 a coalition of the Social Democratic Party together with the Left and the Greens to, in 1998, a Liberal/Conservative coalition. In the election of September 2002 the Social Democrats together with the Left and the Greens came back into power. In terms of resources and support for the local work on sustainability, there seem to have been very small changes and differences between the coalitions. Still, since the individual politicians in charge have changed with each election in the past decade, this has slowed down the working process and to some extent made it ineffective. As explained by one public official, 'It is difficult to have continuity in the work when working with different people at the political level.' To make it even more complicated for the public officials working with sustainable development in Stockholm, the administration is divided into different levels and so is the responsibility for different issues. As explained earlier, the local authority in Stockholm includes the 18 district

councils to which the Agenda 21 work is decentralised, among other issues. Above the district councils there is the local environmental department, with its internal division of environmental sectors, which is responsible for coordinating the district-level work including that with sustainability indicators. This administrative division means that there are sometimes different political agendas and priorities at different levels. This clearly influences the policy-making processes. With this short background we will examine the contexts in which the indicator systems in Stockholm operate as well as the actors involved in the processes.

The coordination of the Local Agenda 21 work has been carried out from the local environmental department while the actual work has been done at district level. The process of developing the LA21 indicators was initiated from the local environmental department but there seem to be divergent opinions on how well the project was anchored at the district level. The fact that the administrators in Stockholm have at least one more political and administrative level to consider when implementing policies than most other cities in Sweden influences the working process in several ways. For instance, there are more actors involved in the process and as a result progress might take a longer time.

In the LA21 indicators process, external actors were invited from the very beginning. Already in 1997 collaboration with the Department of Industrial Ecology at the Royal Institute of Technology (KTH)[6] in Stockholm was established. The Royal Institute of Technology was seen as an influential sounding board for the public officials in charge of the indicator programme, but most importantly its input gave the whole process scientific legitimacy. The contribution from the researchers at KTH was primarily the PICABUE method, which is a framework for constructing sustainability indicators. 'PICABUE' is derived from the seven principal steps used when designing sustainability indicators: Principles, Issues, Construct, Augment, Boundary, Uncertainty and Evaluate. The method was originally developed at the School of Geography at the University of Leeds, UK (Mitchell *et al*., 1995).

This method served as a base for conducting the indicator development process; hence the importance of KTH as an external actor in the procedure of the Agenda 21 indicators should not be neglected. The network thinking becomes even more obvious in the participatory methods of the LA21 indicators. A voting campaign in the subway resulted in more than 10 000 suggestions from citizens of how to make Stockholm a more sustainable city. Together with roundtable discussions, more than 11 000 citizens made their voices heard in the process. Through their voting the public had defined the sustainability themes. Moreover, they had the opportunity to interact in further discussion through the web.

As for the Environmental Programme, which is carried out at the local environmental department level, some external actors such as the KTH and a few private companies have been present in the process but no citizen involvement as with the LA21 indicators. This is despite its explicit targeting towards external actors like businesses, schools, non-government organisations and citizens. Nevertheless, it was possible for the public to follow the process of making the programme through the web and also to give suggestions for the work. The programme managed to involve different stakeholders within the city

administration as well as some external ones. Thus, the political and administrative context might be characterised as somewhat in between a new governance approach to policy making and more formal and traditional policy making. Some of the public officials feel that they should try to increase the politicians' interest in the programme and its indicators, since the political interest has so far been rather low. The programme was initiated primarily by the administration and not by the politicians.

In addition to the ECI, the city of Stockholm has been, and is still, involved in several other EU-related projects on sustainability and related indicators. 'Making News for Monitoring Progress'[7] was a project on sustainability indicators initiated by the Commission in 1999 and linked to its LIFE funding programme (The Financial Instrument for the Environment), engaging ten cities around Europe, including Stockholm. This project appears to be have been a little ahead of its time for Stockholm, since the city's own work with indicators at that time was still in its infancy. Stockholm is no longer a part of that project. The well-developed link to the international level (in particular the EU), which is strongly politically supported, is an important factor when framing the political and administrative context in Stockholm.

The context in Stockholm is clearly shaped by new ideas of policy making such as letting external actors be part of the process. Several of the public officials suggest that the linkage to the international level has also served as a catalyst for the local work itself. It has put Stockholm on the international map as a good example of a municipality with great environmental concern and advanced local work on sustainability. This has undoubtedly spurred on the process.

Sundsvall

In Sundsvall the political leadership has for a long time been dominated by the Social Democrats together with the Left (and sometimes the Greens). Thus, Sundsvall has not been exposed to major political changes, which might explain why the work with indicators is clearly initiated by the politicians and anchored within the municipality. On several occasions there have been discussions on questions related to sustainability indicators in the municipal council, which also points to the presence of a true interest among the politicians. In addition, there is continuous dialogue between the politicians and the administrators on how to refine the two indicator systems further.

There has been, and still are, several links and collaborative efforts across different units within the local administration on projects concerning the local environment. In the process of defining the environmental indicators in the Environmental Balance Sheet, cooperation between units within the local administration took place. The work was coordinated by the Municipal Executive Board, which in turn used the competence primarily of the environmental unit, but also of the planning and statistics unit. A small group of people have been in charge of the process. Unlike the Stockholm situation, there has been very little consultation with external actors except for some of the local industries who were partly involved. The municipal administration expressed a desire to communicate the local work on environment and sustainability to the citizens.

They did arrange some exhibitions, small campaigns, etc., but citizens were not involved in the policy-making processes of the indicators.

Collaborative efforts are also visible in the welfare and public health work, since the county council and the environmental unit cooperate closely, and their work is also linked to the indicators of the National Institute of Public Health. In the local process, the Karolinska Institutet (KI)—a highly renowned medical university in Stockholm—was invited and played an important role. Experts from the KI held seminars, acted as sounding boards and gave the process academic legitimacy. In recent years, the issue of public health has become more integrated with local environmental work, since it is incorporated in the yearly published Environmental Balance Sheet.

Sundsvall has not related its work with indicators to the EU nor to any other international programmes, at least not explicitly. However, the work at national level has obviously served as an important yardstick and source of inspiration. This is most evident in the role that the NEQOs are given in the Environmental Balance Sheet but also in the strong influence from the national public health indicators upon local health and welfare work. Compared with Stockholm the administration in Sundsvall is not very complex in terms of relevant political levels to take into consideration; there is no division into district councils. Hence, the political and administrative context in Sundsvall is to a lesser extent characterised as 'governance influenced' but more of a traditional 'government process' compared with the situation in Stockholm. The political stability in Sundsvall has probably contributed to this less complicated political and administrative context, but probably so too have the smaller size of the city and the fewer connections to the EU level.

Conclusions

The first conclusion from the analysis above is that local sustainability indicators indeed play very different roles. Inspired by various systems developed at international and national level, they can be used as a tool for communication, for monitoring and evaluation, for comparison across time or space—or with other municipalities nationally or internationally, for follow-up of internal work, or as a way to identify problems and assess performance more widely within the local territory. In the two municipalities of Stockholm and Sundsvall, and with the five different sustainability indicator sets that were examined in this study, several of these roles and functions can be discerned. We have chosen to analyse the indicators' profile, function and in which political/administrative context they serve in order to better understand what roles the indicators could play in the local policy processes. This we have further developed as a typology in which we distinguish between on the one hand citizen-oriented and on the other expert-oriented systems for the local sustainability indicators. In Table 3, we summarise the findings according to the three aspects contained in our typology.

The profile of the indicator systems may shape local sustainability policies, since they can both operationalise and define sustainable development. Those dimensions that are not measured will most likely not be discussed and therefore

TABLE 3. Characteristics of the five local sustainability indicator systems according to the three dimensions of the typology

	Stockholm			Sundsvall	
	Agenda 21 indicators	Environmental Programme	European Common Indicators	Environmental Balance Sheet	Welfare and public health
Profile	Multi-dimensional and participatory	One dimensional, environmental protection in a broad spectrum	Multi-dimensional	One-dimensional environmental protection with some health and welfare aspects	Focus on the social dimension of sustainable development
Function	Communic-ation tool that is targeted to the public	Provide updated information to primarily the municipal agency	Provide locally objective data for European comparison	Monitoring tool, primarily for the administrators and politicians	Provide up-dated information to primarily the administrators and politicians
Political-adminis-trative context	Several actors involved, network influenced	Internal network thinking with few external actors	Some external actors involved-no citizens	Internal networks with very few external actors	Cooperation with the county council, internal networks, city district based

will not influence decisions made in the local community. By contrast, those dimensions that are covered in the indicator set will remind local actors of the importance of the corresponding variables. As seen from the above summary, the five indicator sets vary in how they 'grasp sustainability', i.e. their scope differs along the environment, economy and social dimensions of sustainable development and in relation to the six key commitments as defined by Jacobs (1996). Although two of the Stockholm systems—the Agenda 21 indicators and the ECIs—are multi-dimensional in this respect, the other three systems can be classified as one-dimensional with an emphasis on the environment. However, in Sundsvall the welfare and public health indicators are focused primarily on the social dimension of sustainability.

The spirit of the time when the different systems were developed is important to point out, since this explains part of the variation. Sundsvall has a longer

record of more than ten years with local indicators compared with Stockholm, which started in 1997. From the beginning, the indicator systems were largely expert driven. We find traces of environmental management and audit systems that have been developed and used almost solely by experts. The Rio Summit and Agenda 21 inspired a widening of the sustainability concept, and introduced more participatory approaches as well as inputs from politicians. Still, both the Environmental Programme in Stockholm and the Environmental Balance Sheet in Sundsvall were adopted as late as 2002 and neither of them could be labelled as participatory. Both of these are directly connected with the NEQOs and are thus quite similar according to our typology. Finally, the welfare and public health indicators in Sundsvall were inspired by the late 1990s, when these issues were brought into the sustainability agenda. While the citizen-oriented systems tend to measure issues that can be linked to individual behaviour, the expert-oriented systems monitor changes on a more aggregated level. In this respect, three of the systems are citizen oriented, namely Agenda 21 and ECI in Stockholm and welfare and public health in Sundsvall. The remaining two are expert-oriented systems with an environmental focus.

A similar picture can be drawn from the analysis of the main function, i.e. the purpose and target group, of the indicators. The five systems fall into the same two main categories of citizen versus expert oriented. Nevertheless, the function of the Agenda 21 indicators in Stockholm differs quite substantially from that of the ECIs, in that the international comparison is vital to the latter system. In practice, however, the two systems are merged, since the standardised ECIs can well be supplemented with locally developed Agenda 21 indicators. Hence they may serve both functions when combined. In Sundsvall, both systems in use are to a large extent targeted at politicians (along with public officials and administrators), but in Stockholm the politicians do not seem to be as heavily involved. This has to do with the local political and administrative context, to which we shall now turn.

As already indicated, the five systems differ in how they relate to local political and administrative processes. Generally, there is more of a governance approach to the development of indicator systems in Stockholm while the two systems in Sundsvall follow more traditional lines of government. It is clear that using networks and different types of cooperative management with several internal as well as external actors shapes the work on sustainability indicators in Stockholm. Thus, policy making in this case is no longer seen as a monopoly for public officials but as a process in which even citizens can influence the outcome. In Sundsvall policies are still made in a traditional manner, since citizen participation is absent. Only the Agenda 21 indicators in Stockholm have been specifically targeted towards citizens and have involved them in the formulation process. It may be noted, however, that the welfare and public health indicators in Sundsvall are indeed oriented towards citizens albeit without participatory opportunities.

It is also relevant to analyse to what extent the political leadership influences the administrative context. According to the public officials who were interviewed in Stockholm, the colour of the political leadership is of less relevance than the bureaucracy itself. The fact that the administrative structure is extremely

'sectorised' and shaped by traditional hierarchies, independent of what the politicians may prefer, tends to impede cross-sectoral work like the indicators. Another important impediment for those officials working with sustainability indicators might be the fact that environmental and technical aspects of sustainability (in relation to economic and social) still dominate the political discourse. Nevertheless, the politicians in the two municipalities do play different roles in support of the processes. In Sundsvall the work with indicators is clearly politically driven, and thus more politically anchored, compared with Stockholm, where the administrators are initiators as well as implementors. Furthermore, we find differences in how various municipal sectors have become engaged. Sundsvall seems to be more open to cross-sectoral communication and collaboration than is the case in Stockholm. The degree of political stability might have contributed to this situation.

In this study we have begun to problematise how local sustainability indicators are used in the municipal policy processes and what can be learned from those experiences. So far, we have delineated the variation across different systems in use, and showed that several systems are working alongside each other with quite different profiles and functions. Despite commitments to further 'democratisation' in the two municipalities, there are few signs of true engagement and dialogue beyond the process of developing the set of indicators. As the trust in expertise in general is high, the citizens are to a high degree left outside the process, except in the case of Local Agenda 21 indicators in Stockholm. Even though the municipalities display various governing styles in their approaches to sustainability indicators, it seems like the gap between policy makers and citizens is hard to bridge. This fact reflects, to some extent, how sustainable development is understood in the two local authorities. Our study confirms that the endeavour to put sustainable development into practice by developing indicators is a difficult task in terms of citizen participation.

Notes

[1] We want to acknowledge comments by Andreas Hagnell, the Swedish Association for Local Authorities (SALA), Stockholm, on an earlier version of this paper. It was presented and discussed at a workshop arranged by SALA with representatives from five Swedish municipalities (including Stockholm and Sundsvall) on 30 September 2002, which provided further inputs to the analysis.

[2] The research began in 2001 through finance from the Swedish Environmental Protection Agency, but has thereafter been transferred to FORMAS (Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning). The research project runs over three years. We gratefully acknowledge this support.

[3] The 15 National Environmental Quality Objectives were adopted by Parliament in 2001. They are: reduced climate impact, clean air, natural acidification only, a non-toxic environment, a protective ozone layer, a safe radiation environment, zero eutrophication, flourishing lakes and streams, good-quality ground water, a balanced marine environment, flourishing coastal areas and archipelagos, thriving wetlands, sustainable forests, a varied agricultural landscape, a magnificent mountain landscape, a good built environment.

[4] The Environmental Advisory Council (EAC) is directly subordinated to Cabinet and the Minister of Environment. They proposed a set of such indicators in 1998 (SOU 1998:15), which was discussed in roundtable meetings and further developed in 1999 (SOU 1999:127) when it became adopted by Parliament.

[5] The results are not yet published and can therefore not be taken into account in our analysis.
[6] The Swedish name of the Royal Institute of Technology is Kungliga Tekniska Högskolan (KTH).
[7] For further information see < www.environ.org.uk < /nn

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Interviews

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Jon Möller, Agenda 21 coordinater, city of Stockholm, 6 March 2001 and 7 May 2002.
Lars-Erik Wretblad, investigator of strategic environmental issues, Planning and Building Section, 3 May 2002.
Björn Sigurdsson, Agenda 21 coordinator, östermalm district council, 3 May 2002.
Urban Jonsson, head of Environmental Monitoring Unit, 8 May 2002.
Per-Owe Molander, investigator, Environment Department, 7 May 2002.
Micael Hagman, secretary of the National Committee for Agenda 21 and Habitat, Ministry of Environment, 8 May 2002.
Elisabet Söderström, head of Environment Department, 6 May 2002 and 30 September 2002.

Sundsvall

Marie-Louise Henriksson, Agenda 21 coordinator, 11 April 2001 and 30 September 2002.
Carina Sandgren, assistant head of Environment Section, 24 April 2002 and 30 September 2002.
Solgun Lundgren, coordinator of Public Health, 24 April 2002.
Per Hansson, environment inspector, 24 April 2002.
Nils Eriksson, planner, 23 April 2002.
Ylva Jacobsson, investigator, 23 April 2002.