INDICATORS OF URBAN SUSTAINABILITY IN THE UNITED STATES: A FRAMEWORK FOR MEASURING PROGRESS

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Keywords: Community indicator programs; measuring sustainability; sustainability indicators; integrative and strategic indicators; program evaluation

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Summary

The proportion of the global population already living in cities may have passed 50% in 2001, so securing a stable global environment rests to a considerable degree on good management of our urban centers. Environmental monitoring is manifested in many countries as state of the environment (SOE) reports. They have often been legislated in western countries but in the USA action to monitor community condition is mainly voluntary. It has gained momentum in the USA in recent years and there are many towns and cities using suites of indicators in an attempt to monitor economic and environmental trends and social well-being. The majority is monitoring quality of life and livability. A few cities have proclaimed themselves as a "sustainable city", implying

an attempt to reach a special level of environmental responsibility in managing the urban ecosystem. Are self-declared sustainability initiatives realistic or are they just "good planning" measures? Are the indicators monitoring such programs used to modify policy to achieve sustainable outcomes?

To explore answers to these questions an evaluative framework was constructed and tested using a community indicator program (CIP) for Santa Monica, California. Santa Monica has one of the more respected indicator programs in the USA as gauged by frequency of reference on a list-serv connected with CIPs. The CIP is goal-based with objectives and targets so that performance can be readily measured.

There has been an abundance of advice on how to construct CIPs but no systematic investigation of the structure, internal logic, and general nature of an existing program. This research is groundbreaking in its application of program evaluation techniques to examining the structure and plausibility of indicator programs. It pioneers the construction of a framework for evaluating sustainability principles and indicators and, lastly, offers a testing mechanism for establishing the effectiveness of a CIP.

The test process firstly examines the relationship between the goals and the sustainability principles. Second it evaluates the adequacy of the principles themselves using a weak sustainability definition and criteria established through the literature review. Third, the indicators are tested against a set of criteria for their sustainability attributes. The results suggest that the CIP is primarily a conventional program so a second question is asked: "Is the program an effective one?" The question assumes that sustainability and effectiveness are not the same creature. A second series of criteria are established through the program evaluation and urban planning literature to test this question. The answer is a resounding affirmative.

1. Introduction

In 1987 the World Commission on the Environment (WCED) published "The Bruntland Report". It formalized the concept of sustainable development which was expanded at the Rio Earth Summit in 1992 into a manifesto of principles. They embraced equity and environmental sensitivity and led to national action plans known as *Agenda 21*. The national agendas have been detailed by local communities, especially cities, into a local *Agenda 21*. The local *Agenda 21* framework is designed to facilitate sustainability by generating information and using urban monitoring systems to encourage sounder decision-making. Since the proportion of the global population living in cities may have reached 50% already, securing a stable global environment rests to a considerable degree on reaching a state of sustainability in our urban centers.

Environmental monitoring has been manifested in many countries as state of the environment (SOE) reports. They have often been legislated in western countries but in the USA prescription and legislation has not followed *Agenda 21*. Nevertheless, voluntary action at community level to monitor community condition has gained momentum in recent years and there are now some 250 towns and cities using community indicator programs (CIPs) to monitor economic and environmental trends and social well-being. A few of these cities have proclaimed the goal of "sustainable

city", implying an attempt to reach a special level of environmental responsibility in managing change in the urban ecosystem. Do sustainability programs represent a significant step forward in community management? Can the indicators used in these CIPs steer cities along the path towards sustainability?

To explore answers to these questions, program evaluation (PE) techniques were applied to the CIP operated by Santa Monica, California. Santa Monica is one of few cities in the US that have declared a goal of "sustainable city". Santa Monica has perhaps the most respected indicator program in the USA as gauged by frequency of reference on a list-serv connected with indicator programs. The list-serv is operated by Redefining Progress and is accessed through the internet. The Santa Monica sustainability goal led to the view that the CIP must be a model program; that the city council was taking its constituency along the road to a state of sustainability; and that the intangible nature of the concept had been overcome by operationalizing its key elements. These factors suggested that the Santa Monica CIP would be an excellent candidate for research on urban sustainability indicators.

The primary research goal of this paper is to construct a framework which can determine if such claims do indeed operationalize sustainability. The adequacy of the principles and the indicators are tested using a "sensible" sustainability set of criteria, established through the literature. The relationship between the goals and the sustainability principles is also examined (see Figure 1). The research suggests that the present generation of sustainability CIPs in the USA are not yet sophisticated enough to grapple meaningfully with the concept. The paper considers how indicators might be upgraded to a caliber that might reflect the needs of sustainability. Finally, the research investigates the effectiveness of the Santa Monica CIP. It concludes that indicator programs operated by proactive city councils that seek sustainability not only produce excellent urban management but also serve as a pathway to the concept.

2. The Santa Monica Indicator Program

In 1994 the City Council formally adopted the Santa Monica Sustainable City Program (SMSCP) consisting of eight sustainability principles and 10 goals. The SMSCP was developed by the city's Task Force on the Environment, a core team of city staff and a few citizens. The task force's purpose was to create a basis for a more sustainable way of life by safeguarding resources and preventing harm to the environment and human health. Implementation included a monitoring system, known as the Santa Monica Sustainable City Progress Report, referred to here as a CIP.

The CIP is goals- and objectives-based, Figure 1 illustrating the hierarchical relationship between principles, goals, objectives, indicators and the data sets. Most objectives have targets so that performance can be readily measured. The program's goals are resident in the CIP, not the city's general plan. Existing general plan goals are revised in accordance with CIP program goals as each element of the plan is updated. The indicator program has very strong support from elected representatives and the CIP drives management of the city as much as the general plan does. This degree of commitment has brought striking policy initiatives designed to counter what are perceived as adverse trends in the community.
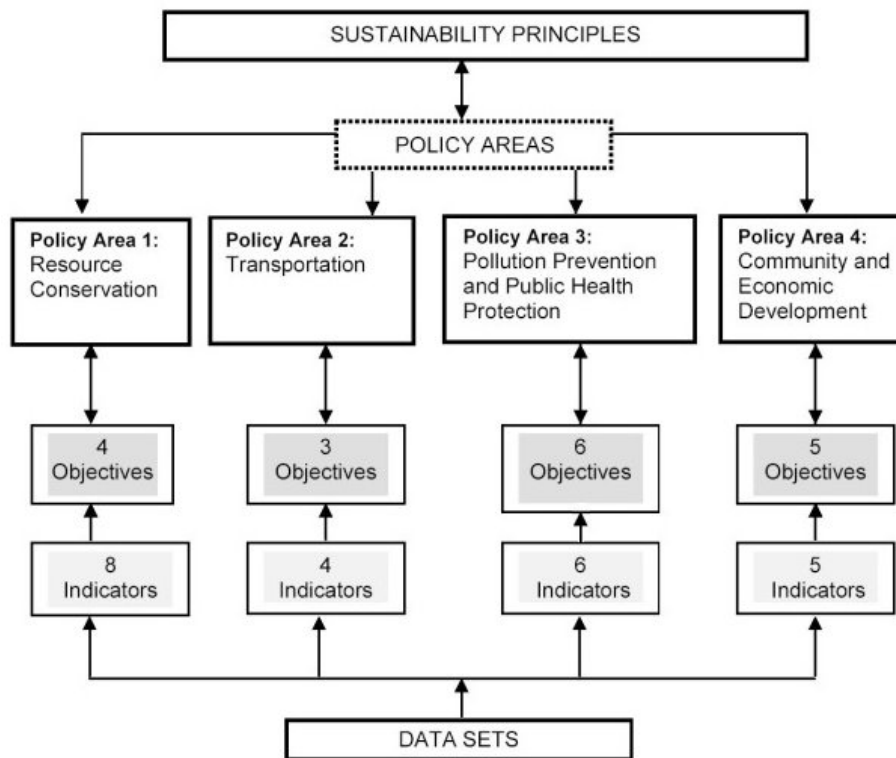
Figure 1. Relationships between components of the Santa Monica CIP

3. Review of the Literature

Most cities in the USA have adopted comprehensive plans aimed at securing the health, safety and welfare of their communities. Conventional land use plans have usually defined community goals but meaningful tracking is difficult when goals are intangible and it implied considerable cost and effort even to monitor the simpler issues. Thus performance has never been closely examined. However, indicators can highlight community performance. They are "a window into the complexities of modern life" according to the organization Redefining Progress, and an increasing number of cities are starting to use indicators to measure community outcomes. CIPs often measure goals associated with comprehensive plans but some cities are operating CIPs which are driven by their own set of goals. Lastly, a small number of cities are operating sustainability-based programs like Tucson, Arizona and Olympia, Washington, as well as Santa Monica. Adopting sustainability principles implies a quantum leap in environmental sensitivities and recognition of the need for close performance monitoring. If sustainability principles are in place indicator programs must inevitably be present. CIPs of this nature are explicitly goal oriented and policy-based and they have significant potential to re-shape the way we live in our cities and towns.

3.1. Sustainability Criteria for Testing Purposes

The term sustainability is derived from the Latin *sustinere,* meaning to maintain or keep going, the implication being that there may be constraints or limits ahead. The concept's use in connection with the resources of the planet has a surprisingly long pedigree,

having been mooted by eminent people such as Thomas Jefferson in 1795 and J. S. Mill in 1858. Perhaps the first use of the word came in the landmark publication *Limits to Growth*. Subsequently, the document *Our Common Future* also known as "The Brundtland Report" popularized the term through a definition staggering in its ramifications:

"Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs"

Since the Bruntland report there has been a veritable flood of publications on sustainability, its meaning, and the implications for society in relation to global growth paths. The rhetoric of sustainability has generated widespread and often polarized debate for there are no commonly held norms on what constitutes sustainability or its indicators. A key argument is how strictly current lifestyles need to be modified and what strength of medicine must be applied to counteract undesirable trends. Discussion of intensity has given rise to the notion of a scale of sustainability ranging at the extremes from technocentrism (cornucopian sub-set) to ecocentrism (deep ecology sub-set). The former is essentially business as usual. The viewpoint denies the finiteness of the world's resources and sinks and assumes that humankind will solve current and future problems through market-based technical progress. Ecocentrism sees the natural world as the dominant paradigm and in the deep ecology sub-set, humans as subservient to it. Neither technocentrism nor ecocentrism are tenable concepts, the former because there are too many individuals preaching caution as well as segments of government and even elements of the business sector. At the other extremity, ecocentrism is politically unrealistic. In addition, the ideology tends to suffer from the "Cassandra Syndrome". The name Cassandra is a reference to the daughter of Priam, the last king of Troy. Apollo bestowed a special gift on the beautiful Cassandra, the ability to see the future. But she refused Apollo's favors and he twisted the gift with a curse—that no one would believe her prophecies.

The central construct of sustainability holds the notion that capital stock must not be depleted if human welfare is to be maintained in present and future generations. However, capital stock includes both human-made capital as well as the natural capital of the environment. Thus arises the concepts of *weak* and *strong* sustainability, indirectly related to technocentrism and ecocentrism respectively. Weak sustainability requires that total capital stock be maintained. It allows complete substitution between human-made and natural components but it is indifferent to the form in which it is passed on. For example, soil erosion does not threaten long term food supplies if hydroponics can be used instead. A special place for the environment is not needed in this scenario. Nevertheless, weak sustainability would still require investment efforts to provide substitutes for non-renewable resources.

The notion of strong sustainability denies the degree of substitutability that weak sustainability assumes. There are much more restrictive conditions on capital interchangeability which implies difficulty in achieving sustainability and growth simultaneously. The construct is by no means as extreme as ecocentrism but it hints at distinct slowing of material throughput in the economy, perhaps near-zero economic growth, some social dislocation, and perhaps some decline in western living standards.

It became clear from preliminary examination of the program documents that applying the strong sustainability test to the Santa Monica CIP would not be a fruitful exercise and it was abandoned as premature. A compromise between weak and strong sustainability is more appropriate. It encourages technological innovation yet is conscious of ecological limits. For example, optimists suggest that Factor 4 and Factor 10 efficiency gains linked with whole system design will reduce throughput of resources dramatically, our consequent call on virgin resources, and vastly diminish the amount of waste and pollution generated. Factor 4 indicates a 75% throughput reduction while maintaining at least current production levels. Factor 10 refers to a 90% reduction in resource use. Economic planners in Europe are seriously discussing such reductions at national scale and several individual corporations in Europe and the USA claim to have already attained a Factor 4 condition.

Turning to the criteria for the testing operation, many authorities have prepared lists of criteria for establishing indicators. Most are mechanical, covering matters like data reliability, time sensitivity, and validity in relation to goals. Thus most performance evaluation indicators are less about looking forward and more about assessing past efforts of a community. Quality of life indicators, for instance, ignore the complexity behind the phenomena being monitored and the existence of relationships in a system. They are less about linkage and more about single-dimensional counts or viewpoints.

Sustainability is a holistic concept so indicators have to be more than an extension of traditional measures. They need to be more strategic in nature. They need to be integrative, that is, forge links between sectors and the three domains of sustainability (social, economic and environmental)" and attempt to identify cause and effect in these relationships. They will need to be directly linked to objectives and be nested in goals which are motivated by sustainability. Sustainability indicators must be policy relevant, portray the long term view, and be future-oriented as well as retrospective. They must point to solutions as well as highlight problems, and they must embrace equity, a principle underlying the entire notion of sustainability.

Two examples will explain what is meant by a strategic or integrative indicator. The first is related to our management of the physical environment, e.g. "the number of building permits issued in an LGA". Tracing construction that uses existing structures, new buildings on old sites, durable materials, or uses ecological or "green" building techniques would be much more meaningful to sustainability. A second example is impermeable surface cover. It serves as a proxy for several urbanization impacts. It is multi-dimensional, drawing together the threads of natural resource planning, site design, and the post-development minimization of environmental impacts. The indicator also implies causal relationships between impervious surface cover and, for example, water quality. Proof of causality is often lacking though inferences may be strong.

The criteria used to evaluate the sustainability principles and indicators cover awareness of global issues and the connection with local actions; inter- and intra-generational equity; pollution; resource conservation; intra-urban distributional equity; balance between community, economy, and environment, humankind's three key domains; and regionalism. These criteria are explained in the following two tables. It is noticeable that all the criteria are underpinned by the notion of equity. Even "balance" and

"regionalism" are indirectly attached to the concept. Resource conservation is included as a component of inter-generational equity.

There are many other criteria that could be used for the tests. Some are radical (e.g. reducing materialism). Some are particularly detailed and do not appear to have been articulated in current CIPs or indeed, in city plans in the USA (e.g. ecological, regenerative, and metabolic design for community and economy). Some are philosophical and abstract in scale (e.g. ecological stability and the ability of urban and rural systems to reproduce over the long term). Some have a national dimension which an individual LGA could not be expected to adopt (e.g. ecological depletion taxes; more honest economics such as a new accounting system for natural capital loss; or zero population growth by way of transferable birth licenses). Most of these criteria would do justice to the strong sustainability paradigm and are not used here.

4. Methods

The caliber of the CIP is assessed by asking two basic questions. The first examines if the CIP is a sustainability instrument. The second asks if the CIP is an effective one. The former analysis is conducted exclusively by the researcher and the latter was carried out with the program manager's assistance. The two evaluations were preceded by a program plausibility assessment which determined that the internal logic and structure of the CIP was capable of measuring what the program purports to measure.

Rating program attributes uses a numerical scale of 0-5 (a Likert scale) to produce an indication of intensity. The scale nomenclature varies according to the nature of the test but the adjective describing intensity is identical. For example the program effectiveness tests use the terms "completely effective, very effective, quite effective, slightly effective, and ineffective". The steps are equal throughout the tests and the same principle applies to both research questions. This degree of consistency means that the scores in each test series can be aggregated. The test results were validated by three scholars at Arizona State University and reviewed by the program manager. The review gives a strong degree of credibility to the evaluative framework.

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Biographical Sketch

John Blair has an honours degree in Geography from Durham University, UK, a Master of Environmental Planning degree from Arizona State University, USA (December 1994), and a PhD in Environmental Design and Planning, also from ASU (January, 2002). He is currently a research associate with the Centre for a Sustainable Built Environment at the University of New South Wales in Sydney, Australia. He is currently working on a project examining housing affordability in relation to sustainability and whether pursuing sustainability impedes or helps the affordability goal. John has worked on sustainability in a practical way including a team-based project designing two sustainable neighborhoods in Phoenix, Arizona. He has worked with state of the environment reports and community indicator programs (CIPs), in the latter case compiling new performance measuring systems as well as evaluating their ability to measure sustainability and their effectiveness in urban governance. John has had considerable experience as an urban and environmental planner with government agencies in New South Wales and with several planning consultants in Arizona, USA.