Abstract
A creative city will be made up of many distinct characteristics within the five domains of sustainability: environmental qualities, socio-cultural conditions, technological applications, economic patterns and vitalities, and supportive, democratic public policies. All of these characteristics are dependent upon sustainable design, sustainable planning and responsible urban administration for the creative and sustainable human habitat. Each key characteristic within these five domains is potentially a sustainability indicator that can be designed, planned, and tracked over time for urban sustainability efficiency and effectiveness.

This paper will examine essential characteristics of a creative city and present a paradigm and a tool for guiding the designer, planner, or administrator through a lifetime of conservation-based, sustainable practices. The EcoSTEP℠ methodology for assessments and the use of sustainability indicators is a service-marked process created by the Joslyn Institute for Sustainable Communities (JISC). The paper will describe the theory of the EcoSTEP℠ process and how the methodology can be applied to any scale of the fabric of a creative city.

Key words: EcoSTEP℠, sustainable design, sustainable planning, sustainable urban administration, five domains of sustainability
1. Introduction

Today, the need for coordinated, holistic, visionary and sustainable management of the cities of the world has never been more critical. In the midst of runaway consumption in most of the developed world, and poverty-stricken people in most of the developing world, in spite of ever growing new science and technologies, the quality of the environment and the quality of life for current and future residents, in both the north and the south is at risk. Balanced and interdependent urban growth management and planning and design for sustainability have become the major challenges of the 21st Century for managers, planners, designers, and civic officials.

It is estimated that by 2050 there will be more than 30 cities of 10 million residents. (In 1950 there were only eight cities in the world with more than 5.0 million people.) Some metropolitan regions in Asia are expected to reach 30-40 million inhabitants (The Worldwatch Institute, 2007). The cities have been identified as the major sources of air pollution (leading to climate change); of water contamination and depletion of supply (endangering the lives of millions of people and causing global conflicts); of excessive fossil fuel consumption (principally because of carbon-based electric power generation and the growth in personal automobiles); of the consumption of materials made from non-renewable resources; and, of the depletion of agricultural land through low density sprawl and expansive waste management. Even the projected depletion of forests and the endangerment of the oceans’ coral reefs can be traced to the excessive consumption of building materials and food preferences in many of the cities of the world.

As the communities get larger – both in population and land coverage – the expenses of development and maintenance increase disproportionately. The financial support of new growth, and its sources, becomes more and more difficult to manage – while the new growth at the edges on greenfields drains resources for maintenance and rehabilitation from the older city sections. There are growing economic inequities and social exclusions, internal to the cities, amid dramatic influences from external migrations and informal, illegal settlements – especially in the developing nations. Conversely, it seems that the greater the economic success of a city/region, the greater the pressures become for social equity – in all forms: health, housing, human services, security, employment, income distribution, education, environmental justice – in general, a decent, quality of life for all citizens of the urban environment is difficult to achieve. Communities with extreme disparities are not sustainable. Balanced strategies for sustainable urban design and development are essential (Steward and Kuska, 2007).
The principles of sustainable urban design, when practiced, help to generate cities that are ecologically sustainable (by reducing energy consumption, emphasizing infill and reconstruction, eschewing greenfield development), and also socially sustainable (by promoting the individual’s social, mental and physical health and the community’s cultural, economic and social well-being) (University of California - Berkeley, 2007).

Creative cities will be learning cities – communities of leaders and participating citizens who learn from all sources of sustainable urban design and development, and from their experiences, and from other sources of best practices. A creative city will be a collective of distinctive, culturally related special places, each with regenerative qualities for the human spirit. The world needs a system of regular communications about the innovations and transferability of new and historic “best practices” for urban sustainability – for applications in all cultures and nations, both developing and developed.

2. The Essential Characteristics of Creative Cities

A creative city will be made up of many distinct characteristics within the five domains of sustainability: environmental qualities, socio-cultural conditions, technological applications, economic patterns and vitalities, and supportive, democratic public policies. Within the environmental domain, it will be essential to insure that the habitat has adequate and clean air, water, and sanitation, and that there is an abundance of environmentally protected, accessible green spaces and recreational areas, as well as goods and services that are free of pollutants and greenhouse gases. Within the socio-cultural domain there must be an atmosphere of respect for cultural and ethnic diversity, safe and affordable housing, healthcare, and exceptional educational programs and facilities to accommodate life-long creative endeavors. Within the technologies domain there must be applications of appropriate and affordable technologies: carbon-free and efficient energy systems, convenient and efficient mass transit, functioning and sustainable buildings and infrastructures, and ubiquitous communications systems. Within the economics domain there must be a dynamic atmosphere of locally owned enterprises with both local and export market goals; there must be a balanced and definitive connection to all of the other domains. And finally, in the public policy domain the rules and regulations for developing, operating and sustaining a creative city must be designed and administered in open, transparent, and participatory ways to support the balance and coordinated effectiveness of all five of the domains.
2.1 The Five Domains\* of Sustainable Development: A paradigm for Design, Planning, and Urban Management \((\text{"Domain" in this context is used to mean: “…a field of human activity, with similar features, information or concerns.”})\)

If we are to have a reasonable chance of managing the growth of the urban habitat, and at the same time achieve a balance of economic development with the conservation of the earth’s natural systems, we must expand our definition of the principles of sustainability. We must see the problems in a whole-systems context, rather than in a one-dimensional, single-issue context.

During the first official recognition of the concept of Sustainable Development by the United Nations’ Bruntland Commission (World Commission on Environment and Development, 1987), it was stated that a principle of sustainable development was necessary to protect the natural systems of the earth, and that the principle should “…ensure that development meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Since the beginning of the concept and the subsequent studies on implementation, sustainable development has consistently been represented as having three domains – the environment, economics, and the social context – and, that they must be treated interdependently for a sustainable balance to occur. Many business and governmental leaders have been skeptical about placing any domain on a par with economics. Even those who, sooner or later, will adopt the values of living in balance with nature often find the tools and the reach within these three domains to be limited.

The limitations in achieving real sustainability exist whether the scale of the development is at the micro level (such as an individual building or neighborhood), or at the macro scale of habitat (such as a city or a region of urban and community habitats). The designer, the planner, the developer, the civic official, or the NGO leader who is genuinely interested in facilitating a sustainable solution in the urban context will not find all the networks or ingredients, or all the information, or all the tools and alternatives for solutions within only these three domains.

Consider, for example, a proposed new development which has all the finance necessary, a good environmental plan which protects and restores critical natural ecosystems, and it enhances and improves scores of lives of prospective occupants; but, under new economic and energy limitations on automobile use, it provides no dependable means of affordable transportation to places of employment for the residents. The three domains of economics, environment and social criteria have been treated, but a fourth domain – the technology of
transportation – is missing. In another hypothetical scenario, consider the same development successfully constructed, with adequate transportation technology and successfully inhabited and operated for some years; suddenly, a polluting industrial development is authorized for construction on an adjacent site, resulting in health hazards to the residents of the development. In this case, the fifth missing domain is public policy, or, the regulatory context of the habitat that would have prohibited the conflicting land use.

Within these two additional domains – technologies and policy – there are numerous examples of human invention and/or intervention that can be noted to have either facilitated or retarded community progress toward sustainability. Two extreme, and debatable, examples are the automobile (technology) and the consequences of its use resulting in threats to the natural systems, and the principle of humans “owning” land (policy) and the consequential effect of economic speculation on the earth’s natural systems. Whether we individually value these conditions, or not, is not the key consideration. A fact of modern life is that technologies exist, that they are influential and have been historically important, and that they will continue to accelerate through human ingenuity. So too, will the rules and regulations for relations among us, and our access to the bounties of the earth. Both domains are pervasive and affective. The cause and effect relationships to the other three domains are inseparable from them.

A further limitation in the classic three-domain definition of sustainability is the often limiting, or limited, view of the “social” domain. In the context of globalized economics it is often the case that cultures, cultural histories, and/or public aspirations for maintenance of cultural distinctions are either accidentally or intentionally overlooked. From the beginning of the 20th Century, and continuing today at an accelerated pace, global cultures have become more homogenous and less distinct, nation to nation, than in any previous era of history. Architectural expressions have become more similar and “westernized”, and less respectful of distinct, historical cultures. Telecommunications and computer technologies have provided instantaneous exchanges of information among cultures, and the multitude of technologies fueling the engines of global economics have provided almost instantaneous access to goods and materials regardless of their place of origin or manufacture. Cultural images and symbols can now be instantly mixed, matched, modified and reformatted into virtual images that may or may not convey valuable, or lasting cultural information. But, the images nevertheless are highly influential. Not only have these systems of instant availability overwhelmed many indigenous cultural patterns, but they are also, in unintended consequential ways, overwhelming the natural systems of the earth (The Worldwatch Institute, 2007).
The social domain must always provide for a reminder – and the tools for analysis – of not only the quality of life of people, but also their cultural heritages, aspirations, and symbols. Thus the proposed, modified “socio-cultural” domain.

Therefore, on the basis of these and other examples of our continuing and widening gulf of separation between human systems and natural systems, the Joslyn Institute has developed project evidence that the Five Domains of Sustainability, for humanity, bio/eco-systems, communities, and the earth are:

- Environmental (natural and man-built),
- Socio-cultural (history, conditions, and contexts),
- Technological (appropriate, sustainable),
- Economics (the production of goods and services within a sustainable context, and the financial resources to support the production, trade, operations, and maintenance),
- Public Policy (government, or public rules/regulations) (see Figure 1) (JISC, 2003-6)

*Figure 1 – The Five Domains of Sustainability*
Further, in the city of the future these domains should be the organizing principles for urban administration, urban design and planning, urban growth management, and regional and urban sustainable development. The domains, and all the information contained within them, are interdependent, interactive, and affective, one in turn upon each of the other four. A systematic analysis of their interdependencies, in any developmental or operational situation, will reduce the potential of unintended, unanticipated consequences, at any scale of development.

3. Sustainability Indicators and the EcoSTEP\textsuperscript{SM} Tool

Measuring or projecting the improvement or decline of various quality of life factors over time is clarified using the EcoSTEP\textsuperscript{SM} tool. Symbolizing the cyclical quality and interconnectivity of all living systems, EcoSTEP\textsuperscript{SM} is an effective tool for plotting various sustainability indicators in three term, or time, ranges – short-term (S), medium-term (M), and long-term (L) – each divided into ten time frames that can be defined by criteria that the user may choose (i.e. one year, ten years, etc.). (Figure 2)

![Figure 2 – The EcoSTEP\textsuperscript{SM} Tool for Measuring Sustainability](image)

In an ideal world, an indicator (for example, water quality), plotted near the outermost ring of each term scale would be considered, or judged to be approaching the best possible outcome or condition for sustainability.

In this example, short-term conditions appear to be approaching optimal, yet the relative immediacy of medium- and long-term measures indicate water quality challenges that lie
ahead. For further detail, the dots plotted on the scale can be color-coded and sized according to the urgency or scale of the challenge of that particular indicator.

The EcoSTEP tool allows any user to assess hypothetical yet real life situations, or real conditions of design or planning intent, to assess the assumptions for consequences and trade-offs, and to communicate those situations to stakeholders and leadership. By incorporating all five domains the tool is effective both in gauging progress and in revealing the various and complex trade-offs that will occur between indicators.

This graphic representation of issues and conditions makes EcoSTEP an ideal tool for collaborative planning as well as for communicating to leaders and the public a region’s progress toward a sustainable vision and quality of life goals. The Joslyn Institute has applied the tool to a diverse range and scales of built-environment projects, including individual buildings, neighborhood contexts, small communities, districts within cities, and to large regions.

By way of Examples of the variety of applications of the tool, a September 2006 charrette brought together 150 architects, planners and regional stakeholders to identify growth challenges and opportunities and to envision a sustainable future for a rapidly growing metropolex region. The charrette participants were divided into six groups, examining six environments, simultaneously, in the Metropolex region:

- I-80 Interstate Highway Corridor Environ: Examination of growth challenges and opportunities at various sites along the Interstate 80 Corridor between Lincoln and Omaha/Council Bluffs.
- Communities in the Path of Growth: The impacts/opportunities of growth in a small commuter town between Lincoln and Omaha.
- Suburban Conservation Community: Proposal for a conservation community near Bennington (exurban Omaha).
- Transformation of a Regional Shopping Mall: Outdated suburban retail area in a mid-sized Metropolex community.
- Near Urban Core Neighborhood: Continuing the revitalization of the Drake Court district near downtown Omaha, based on other JISC recent studies and improvements in this historic neighborhood.
- Urban Core Center: An examination of opportunities for revitalization in downtown Lincoln associated with the Downtown Master Plan, Antelope Valley Project, and other work and studies. (JISC, 2006) (Figure 3)
These distinct environments are models for the many types of rural and urban communities that require evaluations and design/planning for new conditions of sustainability. Challenges and solutions identified in this report are readily transferable to any community facing growth and change.

3.1 Applying Sustainability Indicators to the EcoSTEP™ Model

We have selected one of the Envisioning Regional Design Charrettes, the revitalization of an urban commercial district, i.e. the Drake Court District in Omaha, Nebraska, as a case study to illustrate the use and conditions of the sustainability indicators. The fifteen indicators (three for each of the five domains) were selected by the JISC staff, following the charrette team’s completion of their design and planning recommendations. As noted above, each team, with the assistance of a professional facilitator worked through the five domains to identify strengths, weaknesses, opportunities, and threats to the existing urban district. The discussions and the body of text, drawings, and illustrations produced by the charrette team served as the foundation for indicators:

1. Environment
   • Increase green and public open spaces/increase green streetscapes
   • Enhance conditions for walkability and bikeability/connectivity to adjacent districts and pedestrian destinations
• Upgrade the building stock/give the district a distinct visual and socio-cultural identity

2. Socio-cultural
• Develop new mixed uses/create a character of an “urban village”/emphasize mixed-income housing, with commercial facilities to accommodate daily needs
• Create safe streets and public gathering places/create a new downtown Civic Plaza for Omaha
• Emphasize and accommodate public facilities/extend the Arts Corridor along 20th Street

3. Technologies
• Begin planning for a new multi-modal transit and transportation system for the district and downtown
• Make WIFI electronic access available throughout the district
• Develop feasibility plans for a “district” energy and utilities system

4. Economics
• Create city government incentives for the development of infill and new development for the district
• Emphasize the economics of affordable and low-income housing/connected to development incentives for daily needs shops and stores
• Give priority to developments with locally owned businesses

5. Public Policies
• Incorporate a new “Sub-area Plan” for the district into the City’s Comprehensive Plan
• Develop an overlay plan for the district designating the district as a “Green by Design District”
• Create a district “Citizen’s Development Coalition” with members from property owners, stakeholders, businesses, institutions, and residents in the district

Selecting relevant and measurable indicators from each of the five domains is the key to the metrics of sustainability. Wherever possible each indicator should have a data set and a topology of information by which the condition, event, or circumstance can be described, and, the source of the data and information should be available for comparative purposes over time.
The EcoSTEPSM graphic illustrations (Figures 4 and 5) show the fifteen indicators and our assessment of existing/near-term, medium-term, and long-term prospects of contributing to a more sustainable condition for each of the fifteen indicators over the three time scales.

Figure 4 – Metrics of Sustainability Indicators – Drake Court, Omaha, Nebraska
4. Conclusion

Cities are not built in a day, nor are they constructed of whole cloth. Urban development is dynamic, incremental and evolutionary. The “creative city” will be an amalgam of connected, interdependent – but distinctive, high quality – and culturally diverse places. More often than not traditional developer-driven planning, design and administration loses sight of long-term sustainability and the essential interdependencies and connections that are so necessary to creative cities. The EcoSTEP℠ tool is a means to long-term, coordinated urban development. Within this recommended methodology for designers, planners and urban administrators it is imperative that the user adopt the Five Domains Principles of Sustainability. This cognitive framework will prompt the user to consider a more thorough brief on the limitations, information and interdependent opportunities for the goal of creating sustainable products, places, and habitats.
Viewed aggregately and measured annually (or on any regular time cycle), the EcoSTEP™ tool can be used: a) in design/planning for the district by professionals, b) as an organizing mechanism for an interdisciplinary team, c) as an information vehicle between city administration and the district stakeholders, d) as a public information vehicle for annual progress reports, and e) as a post-occupancy evaluation instrument for specific projects and developments as they are completed in the district.

Our society’s objective for the life styles of future generations should not necessarily be the reduction of consumption, but the reduction of the consumption of non-renewable resources. However, this goal requires a new conservation-based ethic and new practice methodologies for the way we make goods, places and products. A pervasive EcoSTEP™ strategy for Sustainable Design, Planning, and Urban Administration can result in a balance of the five domains, and thus real sustainability.

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