

# **Team Eta – Sustainable city initiatives**

## **Literature review**

Will Odom, David Roedl, Sindhia Thirumaran  
School of Informatics, Indiana University

### **1) Concepts of Sustainability**

The notion of sustainability remains an evolving concept in terms of its definition as well as the varying and diverse ways of interpreting its implications. In [1.3] the authors suggest that sustainability should be understood in comparison to the ways of talking that preceded its popular usage. In this light, sustainability is characterized as generally (i) separating environmental from socio-economic issues, (ii) viewing the environment as external to the economy and (iii) seeing environmental problems as primarily local. In contrast, the traditional, awe encompassing concept of sustainability is systemic in nature, integrating socio-economic issues along with a concern for global ecological limits and global social justice.

Additionally, in [1.3] the authors point out that there has been considerable debate about what goals and means are included in the concept of sustainable development. They classify the various positions according to the degree of radical change that is perceived as necessary and label them *Status Quo*, *Reform*, and *Transformational*. Both [1.1] and [1.2] argue that sustainability fundamentally requires a cultural paradigm shift in the way that people view the world and make decisions. On the extreme end of the debate, many have argued that sustainability is entirely inconsistent with the current economic and social structure. However, [1.3] claims that a large majority of people, especially politicians, use the term to merely justify the status quo, without contemplating the inherent contradictions of phrases such as “sustainable growth.”

### **2) Strategic Planning**

Strategic planning is imperative to ensuring long-term, enduring success of sustainable initiative. Among other things, strategic planning provides tools and techniques for incorporating sustainability into high level, long-term decision-making of an organization or government. The Natural Step framework, as described in [2.1], provides a concise, accessible, and scientifically grounded definition of the system conditions necessary for sustainability. Having such a definition is important to establishing a common vocabulary and vision required for setting concrete goals. In addition, the framework provides some tools and exercises for determining goals and prioritizing actions for moving forward.

Taking a broader scope, [2.2] analyzes the dynamics of four societal forces that are involved in moving from sustainable to unsustainable development [2.3], which include getting more specific, identifying various components of a strategic urban plan, including visioning process, indicators, policy frameworks, political coalitions, and public education.

### **3) Community and Cultural Change**

Instituting wide spread community and cultural change involves a deep understanding of philosophical [3.1], social [3.5], and psychological [3.6] foundations for promoting sustainability. These disparate areas provide an epistemological grounding, while leveraging practical knowledge central to fostering widespread behavioral change. According to Tony Fry, unsustainability is caused by humans' anthropocentrism, a deep-seated cultural and structural condition that must be "recognized, learnt about, and then negotiated" [3.1]. A central portion of this task is to reveal how human-centered values are designed into objects and practices. Promoting the internalization of more ethically responsible values, cognitive and motivational theories such as the self-determination theory can be utilized when designing campaigns [3.6]. Additionally, the insights of ecological science can be spread through education [3.3] and marketing efforts [3.7]. Working at the community level, encouraging civic involvement and building 'social capital' are both essential to creating a sustainable city [3.5]. The aforementioned considerations paired with local use of ICT's, as means of connecting people, can be instrumental to achieving goals of community and cultural change [3.2, 3.4].

### **4) Economic Development**

A central component to instituting and promoting sustainability is through economic development in both public and private sectors. Businesses containing a vision of sustainability will be ready to take advantage of the opportunities presented by the need for a sustainable global economy. To understand the impact of business on ecology we must recognize that the economy and ecology go hand in hand. Furthermore, it is necessary to acknowledge the global economy's dependence upon the earth and restructure this reliance to resemble a sustainable relationship [4.1, 4.5]. The challenge remains developing a sustainable global economy—an economy that the planet is capable of supporting indefinitely. Although we may be approaching ecological recovery in the developed world, the planet as a whole remains on an holistically unsustainable course [4.3]. As noted in the following section, urban development in particular poses unsustainable environmental consequences [4.2]. Additionally, socioeconomic disparity

between urban and rural environments presents an increasing set of challenges to instituting widespread sustainable practice [4.6]. In some sense, sustainability remains an insufficient goal, implying an end or balance point, rather than acknowledging our relationship to nature as a dynamic process [4.4]. Essentially, maintaining long lasting sustainable solutions requires a paradigm shift away from the dominant myth centered upon economic wealth and constant growth towards a new economic model recognizing natural limits and entropy [4.7].

## **5) Urban Design**

Design (of buildings, technology, environments, etc.) is the main source of our unsustainable practices. To begin reversing the effects of unsustainable design, designers must begin with a consideration of the "defuturing" consequences of decisions [5.6]. To design a sustainable human environment, economic, social and environmental concerns must all be integrated [5.5, 5.12]. Urban landscapes in particular produce increasingly greater socioeconomic and environmental consequences. A key constituent to overcoming these tribulations is incorporating sustainability early within the urban design process. Urban design is fundamentally distinctive to each specific context it is implemented within and must be fostered from the bottom up, with local communities and sustainable initiatives in mind [5.4]. It is essential to incorporate guiding principles within the iterative urban design process to define and actualize the concept of sustainable development [5.13]. As described in [5.3], principles such as *Harmony with nature*, *Livable built environments*, *Place-based economy*, *Equity*, *Polluters pay*, and *Responsible regionalism* explicitly incorporate critical sustainable development concepts to guide comprehensive development plans. Study and understanding of the local ecosystem is imperative to its protection [5.2] and through observation of natural systems, we can develop techniques to create more efficient, stable, and benign artificial systems [5.1, 5.7]. Although urban design plans are diverse among cities, examining successful case studies of sustainable urban environments, such as [5.9, 5.10, 5.12], provide important insight into the nature of designing, developing, and implementing sustainable urban design plans. Energy-efficiency is a key to sustainable practice and can be improved through proper linkages and relative locations among the elements of a system [5.7, 5.11]. Additionally, implementing key changes within architectural structures, such as forming and transforming natural and artificial streaming structures, can significantly the living environment for city dwellers and improve urban sustainability [5.8].

## **6) Assessment**

Societies are struggling with the question of how to introduce sustainable development in practice. Communities taking up sustainability initiatives can begin by evaluating and assessing their environment with the help of sustainability indicators. The objective of the assessment of urban sustainability is to provide clear signals to the communities and government officials as to how urban patterns are affecting the environment and the natural resource base [6.1].

A city can start by understanding and using any one of the different conceptual frameworks available for choosing and reporting a set of indicators, and subsequently proceed with the evaluation of these indicators to see if they satisfy the requirements of the framework [6.7]. A step based approach to assess sustainability is implemented through analysis of three main policy scenarios, decentralization, sectoral and regional promotion and environmental protection, which a city or community can choose to model. The scenarios are then systematically evaluated with a hybrid blend of critical threshold value and the colored flag approach for clear understanding [6.8]. Another additional perspective on assessing indicators is to view evaluation in terms of qualitative and quantitative analysis of data, or with a triangulation method, which hits a balance between the other two methods [6.9]. Ecological Footprint Analysis can be utilized to indicate sustainability at scales ranging from nations to cities to companies to households as well as to evaluate them in their natural context [6.2]. A final approach is instituting a cross-community comparative analysis, which can help communities understand if real progress is taking place by investigating neighborhood indicators and evaluation schemes [6.10].

Thus, an important role of sustainability indicators and assessment, other than aiding in government policy planning, is to regularly broadcast concise explanations to the public to aim in crafting a general understanding of factors contributing to the conditions and trends that the indicators portray. Consistent, regular reporting of sustainability indicators and their evaluation can contribute to a better, more widely shared understanding of the concept of sustainability and of the general causal relationships that affect its achievement [6.11].

## References

### 1) Concepts of sustainability

1.1 Chiotinis, N. (2006). The request of sustainability and architecture as cultural paradigm. *Management of Environmental Quality*, 17(5), 593. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=1143423581&sid=5&Fmt=2&clientId=12010&RQT=309&VName=PQD>

1.2 Edwards, A.R., & Orr, D.W. (2005). *The Sustainability Revolution: Portrait of a Paradigm Shift*. New Society Publishers.

1.3 Hopwood, B., Mellor & G. O'Brien, 2005. *Sustainable Development: Mapping Different Approaches*. *Sustainable Development*, 38-52.

### 2) Strategic Planning

2.1 Cook, David. 2004. *The Natural Step: Towards a Sustainable Society*. Green books for the Schumacher Society.

2.2 Gandhi, N.M.D., Selladurai, V., & Santhi, P. (2006). Unsustainable development to sustainable development: a conceptual model. *Management of Environmental Quality*, 17(6), 654. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=1143423991&sid=4&Fmt=2&clientId=12010&RQT=309&VName=PQD>

2.3 Wheeler, S.M. (2000). Planning for Metropolitan Sustainability. *Journal of Planning Education and Research*. Volume: 20 Pages: 133-145. Retrieved on March 6th from <http://jpe.sagepub.com/cgi/reprint/20/2/133%7C3>

### 3) Community and Cultural change

3.1 Fry, T. (2002) *Know Your Enemy: The History of Unsustainability*, Paper presented at Shaping the Sustainable Millenium Conference at QUT, Brisbane July, 2000

3.2 Gurstein, M. (2000). *Community Informatics: Enabling Communities with Information and Communications Technologies*. Idea Group Publishing.

3.3 Hale, Monica. (1995) *Ecology in Education*. Cambridge University Press.

3.4 Nardi, B. and Vick O'Day (1999). *Information Ecologies: Using Technology with Heart*. MIT Press, Cambridge Massachusetts.

3.5 O'Hara, S.U. (1999). Community based urban development: a strategy for improving social sustainability. *International Journal of*, 26(10/11), 1327. Retrieved March 6, 2007, from <http://proquest.umi.com/pqdweb?did=116352684&sid=17&Fmt=2&clientId=12010&RQT=309&VName=PQD>

3.6 Schmuck, P, and WP Schultz. 2002. *Psychology of Sustainable Development*. Kluwer Academic Publishers.

3.7 Whiteman, G. 1999. Sustainability for the planet: a marketing perspective. *Conservation Ecology* 3(1): 13. (<http://www.consecol.org/vol3/iss1/art13/>)

#### **4) Economic Development**

4.1 Brown, L. (2003). *Eco-Economy: Building an Economy for the Earth*. Earthscan Publications.

4.2 Camagni,R., Capello, R. & Nijkamp,P. (1998). Towards sustainable city policy: an economy-environment technology nexus, *Ecological Economics*, Volume 24, Issue 1, January 1998, Pages 103-118. <http://www.sciencedirect.com/science/article/B6VDY-3T8365G-7/2/152fcea4750f6650f45bbcd4c7536eb1>

4.3 Hart, S. (1997). *Beyond Greening: Strategies for a Sustainable World*. Harvard Business Review, 75(1), 66-76.

4.4 Hawken,P., Lovins,L., & Lovins,A. (1999). *Natural Capitalism*. Backbay Books.

4.5 Foster, J. (2006). *Ecology Against Capitalism*.

4.6 Asefa, Sisay (2005). The Economics of Sustainable Development. Upjohn Institute for Employment Research.

4.7 Stead, W. (1994). Can Humankind Change the Economic Myth? Paradigm Shifts Necessary for Ecologically Sustainable Business. W. Edward Stead, Jean Garner Stead The Authors. Journal of Organizational Change Management, 7(4), 15-31.

## **5) Sustainable Urban Design**

5.1 Alexander, C. (2004). The Process of Creating Life: Nature of Order, Book 2: An Essay on the Art of Building and the Nature of the Universe (The Nature of Order). Center for Environmental Structure. --> Sustainable Architecture and design

5.2 Bailey, Robert G. Ecoregion-Based Design for Sustainability --> Landscape design

5.3 Berke, P.R., & Conroy, M.M. (2000). Are we planning for sustainable development? American Planning Association. Journal of the American Planning Association, 66(1), 21. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=47925335&sid=1&Fmt=2&clientId=12010&RQT=309&VName=PQD>

5.4 Boyko, C.T., Cooper, R., Davey, C.L., & Wootton, A.B. (2006). Addressing sustainability early in the urban design process. Management of Environmental Quality, 17(6), 689. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=1143423981&sid=2&Fmt=2&clientId=12010&RQT=309&VName=PQD>

5.5 Frey, H. (1999). Designing the City: Towards a More Sustainable Urban Form. Spon Press. --> Urban design

5.6 Fry, T. (1999). A New Design Philosophy: An Introduction to Defuturing. New South Wales Univ Pr Ltd. --> Design philosophy

5.7 Holmgren, D. (2002). Permaculture: Principles and Pathways Beyond Sustainability. Holmgren Design Services. --> Sustainable Systems Design

5.8 Kurbatova, A.S., & Bashkin, V.N. (2006). Urban landscapes and streaming structures as a basis of urban construction planning. Management of Environmental Quality, 17(2),

184. Retrieved March 6, 2007, from

<http://proquest.umi.com/pqdweb?did=1029234701&sid=14&Fmt=2&clientId=12010&RQT=309&VName=PQD>

5.9 Kyvelou, S., & Filho, W.L. (2006). Sustainable management and urban space quality in the Mediterranean; Challenges and perspectives. *Management of Environmental*, 17(5), 611. Retrieved March 5, 2007, from

<http://proquest.umi.com/pqdweb?did=1143423611&sid=12&Fmt=2&clientId=12010&RQT=309&VName=PQD>

5.10 Lau, S.S., Garcia, R., Ou, Y., Kwok, M., & al, E. (2005). Sustainable design in its simplest form: Lessons from the living villages of Fujian rammed earth houses. *Structural Survey*, 23(5), 371. Retrieved March 5, 2007, from

<http://proquest.umi.com/pqdweb?did=975374881&sid=6&Fmt=2&clientId=12010&RQT=309&VName=PQD>

5.11 Papanek, V. (1985). *Design for the Real World: Human Ecology and Social Change*. Academy Chicago Publishers.

5.12 Rabinovitch, J. (1992). Curitiba: towards sustainable urban development. *Environment and Urbanization*, 4(2), 62. --> Urban Planning

5.13 Register, R. 2002. *Ecocities: Building Cities in Balance with Nature*. Berkeley Hills Books. <--Sustainable Urban Design

## **6) Assessment**

6.1 Browne, D., O'Regan, B., & Moles, R. (2005). A comparative analysis of the application of sustainability metric tools using Tipperary Town, Ireland, as a case study. *Management of Environmental Quality*, 16(1), 37. Retrieved March 5, 2007, from

<http://proquest.umi.com/pqdweb?did=798935781&sid=7&Fmt=2&clientId=12010&RQT=309&VName=PQD>

6.2 Chambers, N.; Simmons, C. ; Wackernagel, M. (2000). *Sharing Nature's Interest: Ecological Footprints as an Indicator of Sustainability*

6.3 Costanza, R.; Erickson, J.; Fligger, K.; Adams, A.; Altschuler, B. ; Balter, S. ; Fisher, B. ; Kerr, T. ; McCauley, M. ; Montone, K. ; Rauch, M. ; Schmiedeskamp, K. ; Saxton,

D. ; Sparacino, L. ; Tusinski, W. ; Williams, L. (2003). Estimates of the Genuine Progress Indicator (GPI) for Vermont, Chittenden County, and Burlington, from 1950 to 2000, A report to the Burlington Legacy Project and the Champlain Initiative. Retrieved March 6th from <http://scholar.google.com/scholar?hl=en&lr=&q=cache:hAZPMPAnk3kJ:www.uvm.edu/giee/GPI/GPI.pdf+Estimates+of+the+Genuine+Progress+Indicator+%28GPI%29+for+Vermont,+Chittenden+County,+and+Burlington,+from+1950+to+2000,+A+report+t%7C>

6.4 Devuyt, Dimitri.(1999). Sustainability Assessment: The Application of a Methodological Framework. Journal of Environmental Assessment Policy & Management; Dec1999, Vol. 1 Issue 4, p459, 29p. Retrieved March 5, 2007, from <http://web.ebscohost.com/ehost/detail?vid=1&hid=8&sid=1e215274-3e04-4fd1-9bce-0b84adc97c10%40SRCSM1%7C>

6.5 Fricker, A. 1998. Measuring up to sustainability. Futures 30 (4): 367-375.

6.6 Lindsey, G. (2003). Sustainability and urban greenways: Indicators in Indianapolis. American Planning Association. Journal of the American Planning Association, 69(2), 165. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=330320181&sid=1&Fmt=2&clientId=12010&RQT=309&VName=PQD>

6.7 Maclaren, Virginia W. (1996). Urban sustainability reporting. American Planning Association. Journal of the American Planning Association, 62(2), 184. Retrieved March 5, 2007, from <http://proquest.umi.com/pqdweb?did=9373698&sid=1&Fmt=2&clientId=12010&RQT=309&VName=PQD>

6.8 Nijkamp, Peter VreekaerR. (2000). Sustainability assessment of development scenarios: methodology and application to Thailand. Ecological Economics, Volume 33, Number 1, April 2000, pp. 7-27(21) Retrieved March 5, 2007, from <http://www.ingentaconnect.com/content/els/09218009/2000/00000033/00000001/art00135>

6.9 Seasons, M. (2003). Monitoring and evaluation in municipal planning. American Planning Association. Journal of the American Planning Association, 69(4), 430. Retrieved March 5, 2007, from

<http://proquest.umi.com/pqdweb?did=443653761&sid=1&Fmt=2&clientId=12010&RQT=309&VName=PQD>

6.10 Sawicki, D.S. ; Flynn, P. (1996). Neighborhood indicators: A review of the literature and an assessment of conceptual and methodological issues. Journal of the American Planning Association Vol 62. Issue 2. Pg 165-183. Retrieved March 6th from <http://www.questia.com/PM.qst?a=o&se=gglsc&d=5000343822>

6.11 Heintz, Theodore, JR. (2000). The Roles and Importance of Sustainability Indicators