Global perspectives in sustainable urban environments

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Abstract

Arguably, sustainability is the most commonly used word in the literature today. Every project, plan, action, policy or strategy formulated by government agencies and large organisations must address the issue of sustainability, even if inconsequentially. City councils are at the forefront of urban sustainability movement. Some of their activities have significant and far-reaching effects while others appear good for public relations/propaganda only. The projects usually focus on one or more of the four elements of sustainability: resource conservation, transportation, protection of the environment and public health, or land-use planning and economic development. In this paper, a review is made of a large number of sustainable city projects/plans from around the world. The aspects of sustainability covered by the various projects are discussed.

1 Introduction

A sustainable city is a city meeting its current needs without compromising the ability of future generations to do the same. A sustainable city provides a relatively higher quality of life. The essential components of sustainable cities include environmental integrity, quality of life, economic security and democratic participation.

It is recognized that we live in a period of great environmental crisis. There is an urgent need to create the basis for a more sustainable way of life both locally and globally through the safeguarding and enhancing of resources and by preventing harm to the natural environment and human health. It must be resolved that our impact on the natural environment will not jeopardize the prospects of future generations. White [1] argues that it may be impossible to realise the “misleading optimism” of sustainable urban living. It certainly will
not be easy. The theory of sustainable living is incomplete, the technology is still at the design stage, and the political will to meet the challenge is still very feeble.

1.1 Measures contributing to urban sustainability

Programs or strategies aimed at sustainability of urban environments must safeguard and enhance resources (resource conservation), prevent harm to the human health and the natural environment (public health protection and pollution prevention), and/or sustain and benefit the community and local economy (community and economic development). The negative impacts of the global urbanisation trends on the living environment must be controlled and solutions found for the ever-increasing magnitude of these problems. Sustainability projects usually contribute to a higher quality of life through one or more of the following outcomes.

1.1.1 Resource conservation
This includes reduction in the consumption of non-renewable resources through reducing water and energy use, minimising waste generation and landfill requirements, and encouraging recycling.

1.1.2 Transportation
The sustainability of urban transportation systems can be enhanced through projects that would result in reduction in solo driver mode, reduction in car use, increase in use of public transport, increase in cycling and walking trips (increased use of non-motorised modes), using cleaner fuels, and improving traffic flow.

1.1.3 Effective protection of the environment
Waste management programs include those aimed at reduction in hazard waste generation, wastewater flows and the treatment of stormwater and wastewater. Conserving fragile ecosystem and local natural biodiversity are also essential for the protection of the environment.

1.1.4 Land-use planning and economic development
Some of the local level community programs include affordable housing, sustainable schools programs, public open space, trees in public spaces and community gardens (parkland area). Quality of life is improved through employment growth and economic development.

1.2 Indicators of sustainability

Indicators are numerical tools that are used to measure a variety of economic, social, environmental, and political trends. Indicators show how things change over time. Sustainability indicators for a community are used to give an overall indication of that community's economic, environmental and social conditions.
with respect to sustainability - taken as a whole they tell whether these systems can likely be maintained over the long term or if they are being degraded. Since we cannot actually assess when a community has become truly "sustainable", sustainability indicators cannot tell us how far we have to go but they can let us know if we are moving in the right direction (Santa Monica web page [2]).

Indicators of sustainability must be statistically meaningful (something fundamental to the long-term economic, environmental or social health of the community), measurable (existing data or practical method of data collection), and controllable (influenced by community or government actions). These indicators must be used to monitor the contribution of any project/plan to the sustainability of the local area and beyond. Unfortunately, not all plans come with a quantitative specification of the targets to be achieved.

2 Sustainability at the local level

Cities are the most important players in the sustainability game. In response to the United Nations Agenda 21, many cities all over the world have developed their local Agenda 21. Some of these are very comprehensive while others may have one or two isolated programs.

At the fourth Regional Conference of the Campaign "Strategies for Sustainable Cities" [3], which took place in The Hague (Netherland), an international jury composed of the partners of the Campaign awarded the European Sustainable City Award 1999 for outstanding progress in the development and implementation of integrated strategies towards sustainability made by Stadt München, Germany, Diputació de Barcelona, Spain, City of Tampere, Finland, and Norwich City Council, United Kingdom. A Special Award for Central and Eastern Europe was awarded to the Municipality of Gdansk, Poland.

Geneva recently announced its Local Agenda 21. Global Vision, an NGO [4], has produced an international educational media campaign to promote the concept of sustainability as a global goal and recommended that Geneva should (i) engage all stakeholders in the process of defining the community vision of the future, (ii) create a research centre to monitor the metabolism and ecological footprint of Geneva as a whole system, (iii) introduce education for sustainability into schools' curriculum and provide school kids and students with a way to participate by measuring Geneva's indicators of sustainability.

The working paper on Southampton: the Sustainable City [5], supports four broad objectives defined by the Government. These are (i) social progress recognising needs of everyone, (ii) effective protection of the environment, (iii) prudent use of natural resources, and (iv) maintenance of high and stable levels of economic growth and employment. Southampton has suggested sustainability target scenarios.

Austin (US) has developed programs and provides advice on building and construction, health, energy, air quality, landscaping, transportation, waste
reduction, and local economy [6]. Knox (Australia) Council has developed the Knox 2001/2010 – Sustainable City Plan [7]. This has involved extensive consultation with the Knox community. The programs include water-sensitive urban design, stormwater management, large-scale recycling, waste reduction, protection of biodiversity, etc. All of the Parramatta (Australia) City Council’s strategic outcomes seek to combine to achieve a sustainable city that will have an improving quality of life now and for future generations, according to the Council’s Management Plan 2001/02 – 2004/05. An exhaustive list of organizations and entities involved in the promotion and facilitation of ecologically sustainable development in Wellington (New Zealand) is shown in Sustainable Wellington Net [8].

3 Resource conservation programs

Almost all cities have strategies for conserving resources in their sustainability agenda. These agendas, in some cases, include the definition of indicators and targets to be achieved. For example, Cambridge (UK) has included the following indicators for resource conservation programs [9]:

- Proportion of homes with an energy rating of 6 and above
- Material collected for recycling as a % of total solid waste from households
- Domestic waste production per person per year

Santa Monica (US) has set targets for reduction of resource consumption through the following indicators of sustainability:

- Landfilled solid waste (citywide) (tons per year)
- Water usage (citywide) (million gallons per day)
- Energy usage (citywide) (million m BTUs per year)
- Average recycled/tree-free content of City Office paper purchases

San Jose (US) has participated in the Sustainable City Project from 1990 [10] and has developed natural resource management strategies. By designing and implementing an energy management program, the city is already saving $7 million annually on its energy bill. It has reduced carbon dioxide emissions by 50,000 tons per year, recycling has tripled, and garbage sent to landfills has been reduced by 45%. Other resource conservation programs include banning building materials containing ozone-depleting agents and mandatory recycling of refrigerants used in air-conditioning.

Other cities cited in this paper whose sustainability programs are directed towards resource conservation include Knox and Parramatta (Australia), Southampton (UK), Austin (US) and Geneva (Switzerland). Resource conservation programs are among the most common sustainability programs in the Local Agenda 21 developed by most cities around the world.

4 Transportation Solutions

Sustainability of urban transport systems is linked to the patronage of non-motorised and efficient public transport modes in the city. Other measures and indicators of sustainable transportation systems include transport fuel use, use of...
cleaner fuels, vehicular emissions, noise levels, congestion, and accidents. Santa Monica (US) has set targets for

- Annual ridership on Municipal Bus Line (including shuttles) in million
- Average Vehicle Ridership (AVR) of employers with over 50 employees
- Per cent of city fleet vehicles using reduced-emission fuels

Without sustainable urban transport system, no city can achieve sustainable environment or offer good quality of life [11]. It is acknowledged that no single city offers the perfect solution to traffic problems. However, it is interesting to show examples from a few places to give an idea of how transportation issues are addressed in different settings. Bicycle lanes, paved shoulders, wide kerb lanes for bicycles; mass transit service to all activity centres; greenway network promoting multi-modal transportation opportunities are some of the solutions towards transportation sustainability.

Gainesville (US) has provided extensive infrastructure for bicycles. It also provides mass transit service to all activity centres and promotes programs for the university students to reduce traffic congestion. Auto-oriented development patterns such as drive-through facilities and excessive parking are discouraged. Transport policies enable the regional transit system to serve additional users without increasing the cost to the public [12].

4.1 Promoting public transport systems

Budapest can be aptly described as sustainable city in respect of its public transport system. A network of trams, trolley buses, buses, metros, the old underground line (the second to be built after London and the first in continental Europe) criss-cross the city while the suburban railways link Budapest with nearby centres. The frequency of time-tabled services makes it the envy of most large cities. The state support has increased by 400% over the last five years. The major deficiency in the transport system is minimal provision of facilities for cyclists and pedestrians [13].

Adequate measures to improve traffic conditions do not always require high capital investments, but sometimes only ingenious ideas. For instance, in Bayreuth (Denmark), smart route design, high frequency and easy transfers provide efficient public transportation. Strasbourg (France) has adopted similar public transport strategy. Although most public transport is directed towards work, education and shopping trips, in Karlsruhe (Germany), people can comfortably make use of trams for their weekend recreational trips.

The use of buses in the centre of Seattle (US) is free. Calgary (Canada), and Perth (Australia) are other such examples where free public transport is provided for travel within downtown. Many cities are rediscovering a low-budget improvement of city traffic by giving buses absolute right-of-way over other traffic especially private cars.
8  The Sustainable City II

4.2 Discouraging city cars

On account of its exceptionally efficient tramway system, Zürich (CH) is widely respected for its handling of transportation issues. However, the public transportation authorities do not hesitate to use the car as part of their marketing concept: the Zürimobil is a system whereby people can, provided they buy a special annual transportation pass, use a city car in the same way as they would rent a regular car, but at a lower cost. Reducing personal car use is such a high priority for the public transportation company that it is ready to explore all possible alternatives.

Access to the town centre in Groningen (Netherlands) is made difficult for cars, with a combination of measures including pedestrian streets, the division of the city in several "cartight" sectors, and the promotion of bicycle traffic. Venice (Italy) has a few square kilometers of pedestrian streets. Venice has had to live without cars from the start. If people there can survive without cars, they could do elsewhere if the pressure became strong enough.

4.3 Cycling

When car traffic and bicycles share the same space, there are particular problems at traffic lights. Bicycles form long lines beside the cars, with parked cars and turning cars blocking the way. When traffic moves again, the danger of accidents happening is high due to wobbly bicycles setting off so close to cars. A simple trick in Erlangen (Denmark), Nantes (France), and Groningen (Nederland) has solved the problem at minimal cost. The stop line for cars has been set back by about 10m, and the space is used for bicycles to come and wait ahead of the cars. When the light turns green, the bicycles get to go first.

Another low cost solution was adopted Erlangen (Denmark) where a bridge had to be built over a highway for a heating pipe. It was realised that the bridge could also easily serve as a very practical bicycle bridge and cyclists now have a new option.

An important aspect of restoring balance in the streets is to change the right-of-way hierarchy between various types of vehicles. When markings on the pavement indicating crosswalks or bicycle paths do not seem to be enough, some cities have started spelling it out more clearly by raising sections of the road. The cars must now reduce speed to negotiate contentious areas. Notable examples are from Amsterdam (Netherlands) and Vienna (Austria).

4.4 Transport system in a new town

Houten (Nederland) is a new town designed according to new principles. It is characterized by the following aspects:

- Houten is divided in 16 "cartight" sectors (like slices of a pie.)
- Each sector is accessible by car from only one entrance on a ring road.
- Bicycles are not allowed on the ring road.
The train line from nearby Amsterdam goes through the center of town, where the station is located near the city hall.

A network of bicycle paths and walkways allows access to all parts of town. The city has one of the lowest rate of car-bicycle accidents/inhabitant in Europe.

4.5 High-tech transport solutions

Intelligent transport systems (ITS) are technologically advanced, high cost solutions to urban transportation problems but have not become wide-spread as yet. The city of Bologna, greatly concerned with traffic issues, experimented with a system that automatically monitored vehicles entering the city centre. The video monitors checked license plates to see whether vehicles were allowed to enter the city centre. This potentially useful system was quickly abandoned, not on technical grounds, but because there were fears about invasion of privacy, which resulted in political pressure to suspend it. The city of Zürich (Switzerland) is considered as a pioneer in the domain of capital-intensive, computer-driven traffic light control, with right of way for trams. Melbourne (Australia) has introduced many ITS features on its City Link project.

5 Protection of the environment and public health

The effective protection of the environment includes pollution prevention, maintaining water quality in rivers/streams, conserving eco-systems and natural biodiversity, etc. Santa Monica has set targets in their sustainability agenda:

- Reduction in citywide use of hazardous materials
- Known underground storage tank sites requiring cleanup
- Dry weather storm drain discharges to the ocean (gallons per day)
- Wastewater flows (citywide) (million gallons per day)

San Jose has adopted a goal of reducing wastewater flows by 12 m gallons/day by installing ultra-low-flow toilets in new construction and offering financial incentives to install low-flow fixtures. The integrated waste management program also includes kerbside pickup for twelve types of recyclables.

Most cities cited in this paper have sustainability programs dealing with the protection of environment and public health.

6 Land-use planning and economic development

Employment and the basic economic needs must take priority along with the need for healthy environment, nature protection, minimising pollution etc. Santa Monica has established the following targets:

- Create and implement sustainable schools program
- Deed-restricted affordable housing units
- Public open space (acres)
- Number of community gardens
- Trees in public spaces
Chattanooga (US) has started on sustainable development by business, community and government leaders acting in unison. It has stopped the chip mill permit, is cleaning-up waterways, preserving the beauty and diversity of the Tennesse River gorge for public access, and active in job creation [14].

There is a strong and sustained innovative planning effort in Gainesville (US) since 1970. The program has included infill and redevelopment, avoiding strip development, and restricting new school construction to existing developed areas. Activity centres integrate commercial, employment, housing and recreational opportunities. High-density housing is clustered around commercial nodes and major corridors make the area attractive to residents and businesses.

In Budapest, the sustainability projects include the restoration of city’s two architectural jewels – The New York Palace, and Gresham Palace, and creation of jobs. Parramatta (Australia) is planning to adopt more sustainable long-term approaches to planning and services that meet the needs of the whole community. It aims to embrace the holistic approach of how the environment ties in with urban infrastructure and economic development.

Aachen (Germany) is an old city. However, an effort is currently being made to improve the downtown area. For instance, an old factory very close to the centre has been converted into a low-cost housing area with a car-free core. In Netherland, the "ABC" zoning system is being tried. The zones are based on how easily and by what means the location can be accessed. Certain activities are not permitted in certain zones. This concept can help transposing efficient methods to reduce use of private cars in the whole country.

7 Discussion and Conclusions

Local councils in many cities in the world have developed Local Agenda 21 and have announced sustainability programs aimed at improving the urban quality of life. It is uncommon to visit the web site of any city council that has no "sustainability" plan. Most programs are aimed at conserving resources and reducing pollution. The aim of most communities is to enjoy the highest quality of life in the best possible environment. However, many programs are modest and targets are not set. For the sustainability move to have any significant effect, it is imperative that local authorities define indicators and targets to be achieved. Periodic monitoring of indicators is essential.

Sustainability is not just a government plan, it's not a few individuals, it's not just the schools or the businesses... it's everyone. We must look at the long-term impact of our daily choices so we can help our children inherit a healthy world. In many cases, low-tech, low-cost ideas make a difference.

References


