

URBAN GOVERNANCE & SUSTAINABILITY - ENVIRONMENTAL MANAGEMENT SYSTEMS FOR CITIES

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ABSTRACT

Human activities damage the environment. They deplete natural resources, generate pollution and wastes, accelerate the loss of forests and biological diversity, as well as threaten the water supply. As populations increase, these problems are exacerbated. Cities bear the brunt of increased human activities on limited land space with limited resources. It is therefore essential that cities adopt a system of environmental governance that will help ensure sustainability. As each city has its own mix of geographic, social, economic, political and environmental problems, it would be simplistic to suggest that there is a formula for sustainability that would fit every city. What is clear is that every city needs an effective environmental management system to manage its many activities, to ensure that development is controlled, environmental damage is minimized, natural areas are preserved and its citizens have an enhanced quality of life. This paper examines the ingredients for sound environmental management in cities, particularly cities in the developing world. It submits that a sound EMS for a city must first start with sound environmental policies and land use planning. It looks at ISO 14001 certification, in the context of a city. It concludes that environmental management systems in their current context, focus largely on resolving problems of pollution. There is a clear lack of ecological dimensions in environmental management systems as exemplified by the ISO 14000 series. This paper submits that environmental stewardship and ecological sustainability is at the heart of sustainable development, and the integration of the natural environment within the city has been largely overlooked. It advocates bringing the natural environment back to our cities and the incorporation of this dimension into environmental management systems, and introduces the Singapore Index to Cities' Biodiversity which was endorsed at the 10th meeting of the parties to the Convention on Biodiversity in Nagoya.

I. INTRODUCTION: Sustainable Development and Sustainable Cities

The issue of the sustainability of cities is complex, as few can agree on what 'sustainability' means, and how is it measured, in the context of a city.¹ Although there

¹ David Satterthwaite, "Sustainable Cities or Cities that Contribute to Sustainable Development?" Chapter 5, The Earthscan Reader in *Sustainable Cities*, David Satterthwaite, Ed. 1999; Peter Hall, *Cities of Tomorrow* (Oxford: Blackwell, 1996, p. 412); David Satterthwaite "The Role of Cities in Sustainable Development", <http://www.bu.edu/pardee/files/2010/04/UNsdpk004fsingle.pdf>. See also Jorge E Hardoy,

is no agreed definition on the terms “sustainable cities”, or “sustainable human settlements” it is clear that a city encompasses many dimensions, including environmental, economic, social, political, legal, demographic, institutional and cultural dimensions.

Fundamentally, cities that strive to be ‘sustainable’ face the tensions between economic development and environmental stewardship. This issue of environmental stewardship traverses beyond the confines of the city limits, as cities draw on resources beyond their boundaries for sustenance. This is particularly true of wealthy cities in the developed world, which almost invariably depend on well-developed global transport and communication systems to bring resources from afar for consumption by its citizens, thereby enlarging its ecological footprints far beyond its city boundaries.² In 2010, the top 10 countries with the biggest Ecological Footprint per person in 2010 were the United Arab Emirates, Qatar, Denmark, Belgium, United States, Estonia, Canada, Australia, Kuwait and Ireland.³

The Brundtland Commission’s definition of ‘sustainable development’ is familiar to most - “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.⁴ The juxtaposition of the word ‘development’ with ‘sustainable’ highlights the dilemma that faces all urban environments. As cities are almost invariably the engines of growth that fuel the economy of a nation, they are constantly in the forefront of myriad challenges that arise from the need to find shelter, employment, transportation, health care and other essential services for an ever-growing population. How then, can a city ensure that its activities are sustainable?

Diana Mitlin, David Satterthwaite, “Sustainable Development and Cities”, Chapter 6 in *Environmental Problems in Third World Countries*, Earthscan Publications, London, 1992; Genevieve Dubois-Taine, “Introduction” *Cities of the Pacific Rim – Diversity and Sustainability*, Genevieve Dubois-Taine and Christain Henriot, Editors, Pacific Economic Cooperation Council Sustainable Cities Taskforce; *Habitat Debate* - United Nations Human Settlements Program – UN-Habitat <http://www.unhabitat.org/HD/>

² The ecological footprint is the corresponding area of productive land and aquatic ecosystems required to produce the resources used, and to assimilate the wastes produced, by a defined population at a specified material standard of living, wherever on Earth that land may be located – per William E. Rees, Professor of Community and Regional Planning at the University of British Columbia, <http://www.global-vision.org/city/footprint.html>. Rees also states that that the “so-called “advanced” economies are running massive, unaccounted ecological deficits with the rest of the planet... Even if their land area were twice as productive as world averages, many European countries would still run a deficit more than three times larger than domestic natural income.” William Rees, “Revisiting Carrying Capacity: Area-Based Indicators of Sustainability “ in *Population and Environment: a Journal of Interdisciplinary Studies*, Volume 17, Number 2, January 1996, Copyright © 1996 Human Sciences Press Inc.).

³ WWW Living Planet Report, 2010. See the list of sustainable cities in the Sustainable Cities Network maintained by the University of Melbourne - <http://www.sustainablecitiesnet.com/list-of-sustainable-cities/> and the top 10 emerging sustainable cities to watch in the future - <http://www.triplepundit.com/2012/01/top-10-sustainable-cities-2012/>

⁴ *Our Common Future - Report of The World Commission on Environment and Development*, Gro Harlem Brundtland, Chair (1987).

It should also be noted that the concentration of people, enterprises and motor vehicles in a city while often viewed as a problem, can also bring certain advantages, such as lower costs per household and per enterprise for the provision of the infrastructure and services that minimize environmental hazards, such as sewage treatment systems and systems for the removal of domestic and industrial wastes.⁵ The concentration of industries in a city also bring savings in the enforcement of environmental legislation, reducing the length of journeys required for inspections by the authorities. Cities with well-managed transport facilities also reduce the stress on the natural environment, as a good public transport system will minimize the use of motor vehicles. However, cities will continue to face the problems of increasing populations as on-going migrations from rural to urban environments bring increasingly acute strains on existing resources.⁶

How then, do we measure the environmental performance of a city? Are the considerations similar between cities in developed and developing economies? Is it a matter of governance? If so, what are the ingredients required in sound environmental governance?

II. STRATEGIES FOR URBAN ENVIRONMENTAL MANAGEMENT

The comparison of environmental performance between diverse urban centers is fraught with difficulties.⁷ But it may generally be said that a city must ensure that its citizens are provided with a safe supply of food, water and essential services. It must control infectious and parasitic diseases through improvements in water quality, sanitation, drainage and garbage collection. The use of and disposal of toxic substances must also be controlled. It must provide good roads and an efficient and affordable public transportation system. It must provide good communication facilities, which will, in turn reduce the need to travel, thereby reducing the impacts on the environment. A city must provide decent and affordable housing to all sectors of the population.⁸ It must also provide a good quality of life through the provision of parks, open spaces, playgrounds and recreational areas. In this process, a city should strive to minimize ecological destruction. It must protect its natural and cultural heritage through sound land use planning, ensuring the sustenance of existing ecological systems. These processes should be ideally, be transparent and involve the participation of the people. And finally, a city should ensure that its consumption of natural resources is sustainable – that the goods and services required to meet the needs of the population are delivered “without undermining the environmental capital of nations and the world.”⁹

Efforts to manage the environment in any city or country must stem from policies that can only be determined after a thorough examination of its particular problems. Urban

⁵ “Cities as Solutions in an Urbanizing World”, UN Centre for Human Settlements, chapter 3, *The Earthscan Reader in Sustainable Cities*, David Satterthwaite, Ed.; reprinted from chapter 13 (pp 417-421) of UNCHS (Habitat), *An Urbanizing World: Global Report on Human Settlements, 1996*.

⁶ Louis Lebel, et al, Eds, *Critical States: Environmental Challenges to Development in Monsoon Southeast Asia, Strategic Information and Research Development Centre*, 2009

⁷ David Satterthwaite, *Sustainable Cities*, op cit n.1 at p. 83;

⁸ The issue of housing will not be discussed in any detail as it is beyond the scope of this paper.

⁹ Rees, op cit. note. 3 at p. 84.

environmental problems differ with the stage of evolution of each city and therefore the priorities as well as the solutions will differ.¹⁰ For cities that are poor, the main concern will be public health – securing a system of access to clean water and sanitation facilities, setting up a system for the collection of waste and the prevention of organic pollution of water bodies. As cities start to industrialize, the main problems would be air pollution through higher levels of sulfur dioxides (SO_x) and particulates, water pollution from organic sources as well as from industrial effluent (heavy metals), and land contamination from solid and hazardous wastes. There should also be concerns for the health and safety of workers in these industries. As cities continue to industrialize, with increased affluence and sophistication, there will be increased consumption, increased waste, increased motor vehicles and increased numbers of industries leading to CO₂ emissions, NO_x concentrations and dioxins. There will also be increased noise levels as well as loss of natural areas, leading to losses in biodiversity.

The solutions will differ depending on the resources and policies of each city and its special circumstances. Thus, in regard to waste management, one country may decide on incineration instead of landfills (as in the case of Singapore which has insufficient land for landfills but can afford the substantial cost of incinerators); while another country may vigorously oppose incinerators, (as in the case of the Philippines, where the law virtually prohibits all forms of incineration of waste). But both Singapore and the Philippines, and indeed, all cities must strive for waste minimization and resource conservation, and seek the best solutions for its environmental problems.

This paper focuses on the problems of cities in the developing world. To what extent can cities in the developing world achieve sustainability, where most are facing problems of poverty, mass migrations from rural areas, a poorly educated workforce and political corruption? To what extent can an environmental management system help a city in achieving sustainability?

III. ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS) FOR CITIES

A sound Environmental Management System (EMS) for a city starts with sound environmental management policies. These must then be implemented through institutional, administrative, legal and physical infrastructures. It is submitted that a sound EMS for a city should comprise the following:

1. Sound institutional and administrative structures
2. Comprehensive land use planning laws and policies
3. Effective environmental laws and enforcement

¹⁰ See the analysis of the transformation of cities as they move from poverty to rapid industrialization to relative affluence, and the environmental problems faced at each stage - David Sattethwaite, 1997 "Environmental transformations in cities as they get larger, wealthier and better managed", *The Geographical Journal* 163, no.2:216-24. See also the analysis of the stages of evolution of the urban environment in East Asia - Xuemei Bai and Hideo Imura, "A Comparative Study of Urban Environment in East Asia: Stage Model of Urban Environmental Evolution", *International Review for Environmental Strategies*, Vol. 1 No. 1 pp. 135-158, 2000, IGES

4. Physical infrastructure for the provision of essential services such as clean water, electricity, transport and communications
5. Physical infrastructure for pollution control, including facilities for the treatment of sewage, collection of garbage, management of hazardous substances, and control of air emissions.

It should be emphasized that there must be coherence in the various policies and in their implementation among the various institutions, and this must be integrated into local, regional and national policy frameworks.

i. Institutional and Administrative Structures

(a) A dedicated Ministry for the Environment?

The administrative structure for each country, and each city, will differ and not all will have a dedicated ministry that focuses entirely on the environment. Is it essential that there be a dedicated environmental authority here?

Prior to the Stockholm Summit on the Human Environment in 1972, a dedicated Ministry for the Environment was quite unheard of for most countries. Environmental issues were hitherto regarded as health matters and were the province of the Ministry of Health. It was only after 1972 that countries started to institute a separate Environment Ministry. Even so, not all countries today have a separate ministry for the environment. For many years, Thailand and Vietnam subsumed the environmental portfolio under their Ministry of Science, Technology and the Environment (MOSTE). It was only in 2002 that Thailand established a new Ministry for Natural Resources and the Environment (MNRE). Power previously exercised by agencies such as the Ministry of Agriculture and Fisheries are now transferred to the new MNRE, but there is great uncertainty about how extensive the powers of the MNRE will be, as against the existing sectoral ministries. There are also concerns as to how the new MNRE can assert its influence against the National Environment Board, a high-level body constituted by the Prime Minister.¹¹

Similarly in Vietnam, a new Ministry of Natural Resources and Environment was created in 2002, to perform the functions previously exercised by the National Environment Agency, which was constituted under the Ministry of Science, Technology and Environment (MOSTE). This new Ministry will initially take charge only of terrestrial environmental issues. Other natural resources such as fisheries, agriculture, oil and gas continue to be managed by the Ministry of Fisheries, the Ministry of Agriculture and Rural Development, and the Vietnam Oil and Gas Corporation respectively. It is expected that power will gradually be devolved to the new MNRE, but there are concerns that the new ministry will remain poorly funded and relatively weak as compared to other more powerful agencies such as the Ministry of Planning and Investment (MPI) and the

¹¹ Alan K J Tan, "Recent Institutional Developments on the Environment in South-east Asia - A Report Card on the Region", [2002] 2 Singapore Journal of International and Comparative Law,

Ministry of Agriculture and Rural Development (MARD).¹² These changes are translated to the provincial governments where functions previously exercised by the Departments of Science, Technology and Environment (DOSTE, the local branch of MOSTE) are transferred to the Departments of Natural Resources and Environment (DNRE).

In contrast, the Philippines has a comprehensive body, the Department of Environment and Natural Resources (DENR) that is responsible for all facets of the environment. However, there are a host of other agencies, such as the Department of Agriculture (DA), Department of Agrarian Reform (DAR), Department of Energy (DA), Department of Education (DepEd), Department of Science and Technology (DOST), Department of Health (DOH), Department of the Interior and Local Government (DILG), Department of Public Works and Highways (DPWH), Department of Justice (DOJ), Department of Tourism (DOT), Department of Trade and Industry (DTI), Department of Transportation and Communications (DOTC), National Economic and Development Authority (NEDA) and the Department of Budget and Management (DBM). These are translated at the local level to local government units. What is important in terms of environmental management is whether these agencies work well together. The reality in most countries is that they do not.

In Singapore, the Ministry of the Environment and Water Resources (MEWR) is only concerned with pollution and water resources,¹³ while nature conservation is the province of the Ministry of National Development's National Parks Board.

Which of these countries has the most effective system? What organizational structure achieves optimal effects? This must also be examined in the context of a city, which may have its own administrative structure.

In evaluating whether a city has an effective EMS, it is essential to first examine the effectiveness of the roles of the Environment Ministry and other supporting government ministries, such as the Ministry of Agriculture, Ministry of Industry and the Ministry of Development, to see if there are synergies in policies and administration, to see if there are portfolio conflicts, and to ascertain whether the Environment Ministry has adequate powers to decide on policies as well as to implement them.

It is also essential to examine the effectiveness of the authorities that are in charge of the city's economic activities and trade, as well as the planning & development authorities, the land authorities, the marine authorities, and the authorities that are in charge of labor. Each sector has important roles to play in the development of the city. An effective EMS requires communication between the various authorities and third parties including the private sector, NGOs and citizens. This helps to ensure that before any project is approved or new industry is allowed to set up operations, its environmental impacts are

¹² Alan K J Tan, op cit, n. 9.

¹³ Singapore established the National Environment Agency (NEA) under the Ministry of the Environment (ENV) on 1 July 2002 to focus on the implementation of environmental policies. Under the NEA, the divisions of Environmental Protection, Environmental Public Health, and Meteorological Services work together. See Code of Practice on Pollution Control, http://www.nea.gov.sg/cms/pcd/coppc_2002.pdf

carefully evaluated, and measures are adopted to ensure that its operations will not have an adverse impact on the environment. Indeed, this process, if properly planned, will ensure that industries that are highly pollutive will be denied a license to operate. If allowed into the city, they must be appropriately located where they do not pose unmanageable health and safety hazards and pollution problems. A good EMS will ensure that the industry is sited where there can be synergies with other industries eg. the waste from one factory can be used as the raw materials for another, an example of 'industrial ecology'.¹⁴

In most developing countries, however, it is not uncommon for highly pollutive industries to be allowed in without consultation with the Environment Ministry or with the planning authorities. There may not be any controls on where they may be located - they may be sited near residential or commercial sites, which lack the necessary infrastructure to deal with the wastes and other forms of pollution that ensue. Such cities lack an EMS. A sound EMS acknowledges that environmental problems can be anticipated and prevented through policies on land use planning and the imposition of appropriate controls. An integrated approach is essential and is part of good environmental governance.

The city-state of Singapore is an example of a city with an effective EMS in place. It may be said that Singapore's EMS starts with the identification of the types of industries that can be allowed into the city-state. The Ministry of Environment and Water Resources (MEWR)¹⁵ works closely with the Economic Development Board (EDB) and the Ministry of Trade and Industry (MTI) to decide what kinds of industries are needed for the economic development of the city-state. As the EDB identifies the kinds of industries that Singapore would like to attract, discussions are held with other ministries and organizations to ascertain if there are problems in accommodating these industries.¹⁶ In particular, discussions are held with MEWR's National Environment Agency (NEA) to see if the pollution that ensues can be controlled; with planners from the Ministry of National Development to establish the possible sites for these industries; with the Jurong Town Corporation, the largest landlord of industrial premises, to discuss the physical logistics of location for these factories; and with the Ministry of Manpower to ascertain the impacts on the workforce.

MEWR's National Environment Agency adopts an integrated approach in the planning control of new developments, so as to ensure that environmental considerations are incorporated at the land use planning, development control and building control stages. While in the past, highly pollutive low-technology and 'sweatshop' industries were

¹⁴ *Industrial Ecology*, T.E. Graedel and B.R. Allenby, second edition (Upper Saddle River, NJ: Prentice Hall, 2003); <http://www.indigodev.com/DefineIE.html>

¹⁵ This Ministry started as the Ministry of Environment but was renamed the Ministry of Environment and Water Resources (MEWR) as from 1 September 2004 when it added water management to its portfolio. See www.mewr.gov.sg. See also the website of its agency, the National Environment Agency (NEA) – www.nea.gov.sg

¹⁶ The EDB was established soon after Singapore's independence, to spearhead industrialization, promote investments, develop and manage industrial estates and provide medium and long-term industrial financing. See *Heart Work – Stories of How EDB Steered the Singapore Economy from 1961 to the 21st Century*, 2002, Singapore EDB and EDB Society.

allowed, today the emphasis is on 'high-tech' industries such as electronics, chemicals, petro-chemicals and pharmaceuticals. Many of these are highly pollutive but planners from the Ministry of National Development's Urban Redevelopment Authority (URA) check with the Pollution Control Department (PCD) of NEA on the siting requirements for these new development projects and their compatibility with the surrounding land use.¹⁷ This is part of the planning process, to ensure that industries are located in specially designated areas such as "eco-industrial parks" with measures to control, manage and minimize pollution as well as to maximize industrial and technological synergies.¹⁸ In particular, PCD will examine measures to control air, water and noise pollution, the management of hazardous substances, and the treatment and disposal of toxic wastes.

To guide land use planning and help industrialists in the selection of suitable industrial premises, industries are classified into 4 categories, namely, clean, light, general and special industries, based on the impact of residual emissions of fumes, dust, and noise on surrounding land use. Buffer distances are imposed between pollutive industries and the nearest residential areas. Industrial premises that are located close to residential areas and within the water catchment areas may only be occupied by clean or light industries.

Before a proposed development can be constructed under the Building Control Act, the developer is required to submit Building Plans of the proposed works to the Building Plan and Management Division of the Building and Construction Authority (BCA) for approval. These Building Plans must also be submitted to and approved by various authorities, including the Fire Safety Bureau, the National Parks Board and MEWR. Within MEWR, the Central Building Plan Unit (CBPU) of the PCD examines all building plans to ensure they comply with sewerage, drainage, environmental health and pollution control requirements. In particular, CBPU will screen prospective industries to ensure that they:

- Are sited in designated industrial estates, and compatible with the surrounding land use (industries are classified into the said 4 categories depending on their capacity to pollute)
- Adopt clean technology to minimize the use of hazardous chemicals and the generation of wastes
- Adopt processes which facilitate the recycling, reuse and recovery of wastes
- Do not pose unmanageable health and safety hazards and pollution problems

¹⁷ Today, these industries are located in Jurong Island, an amalgamation of several smaller islands just off the main island, forming a petro-chemical complex with a well planned emergency system involving the participation of all parties. See <http://www.jurongisland.com/>

¹⁸ Lye Lin-Heng, "Singapore: Long Term Environmental Policies" in *Cities of the Pacific Rim – Diversity & Sustainability*, PECC Sustainable Cities Taskforce, Genevieve Dubois-Taine, Christian Henriot, Eds., 2001 PUCA, p. 155-168. See also Lye Lin-Heng, "A Fine City in a Garden - Environmental Law, Governance and Management in Singapore". (2008) *Singapore Journal of Legal Studies*, 68-117; and Lye Lin-Heng "Land Use Planning, Environmental Management and the Garden City as an Urban Development Approach in Singapore" Chapter 21, *Land Use for Sustainable Development Series: IUCN Academy of Environmental Law Research Studies*, vol.2, Nathalie Chalifour, John Nolon, Lye Lin-Heng; Patricia Kameri Mbote, eds., (New York:Cambridge University Press, 2007) pp 374-396.

- Install pollution control equipment to comply with discharge or emission standards

When the factory building is completed, inspectors from the BCA as well as the CBPU will inspect the premises to check if the structure has been built in compliance with pollution control requirements. Only when this is approved will the factory be given a license to operate. Industries that are highly pollutive will need special permission from the Director of Pollution Control – these are listed in the Schedule to the Environmental Protection and Management Act.¹⁹

(b) Coordination among government authorities

It is also important that government agencies work with each other, and that the administration of foreign aid be properly coordinated so as to achieve the greatest efficacy. One example is the drafting of new environmental laws by international legal consultants. The new laws should take into account the technical capacity of the country in implementation. The passing of new laws prescribing trade effluent standards should therefore be coordinated with the building of the necessary physical infrastructure to test effluent samples. This coordination among different institutional agencies is, however, often lacking in developing countries, resulting in laws that are much stricter than industries can comply with, and which cannot be enforced. Again, industries that are highly pollutive whose wastes, emissions or effluent cannot be adequately treated should not be allowed in until the infrastructure exists to manage such wastes. This can be a matter for negotiation between the government authorities and the industry that seeks to locate in a particular area, and it should also involve consultation with the people, in the spirit of Agenda 21. Win-win solutions can be found if sound EMS principles are applied.

(c) Building technical capacity

It is also important for developing countries to build technical capacity. Many international agencies and institutions today help build institutional capacity by providing short-term training programs for government personnel. The World Bank and the Asian Development Bank (ADB), as well as aid agencies like SIDA, AusAid (the Australian government's overseas aid program) and DANIDA (Danish International Development Agency), run training programs for developing countries. Governments of developed countries also conduct run special environmental and technical training programs.²⁰ These programs should be properly coordinated and the right persons selected for

¹⁹ Laws administered by NEA including subsidiary laws can be found in their website at <http://app2.nea.gov.sg/legislation.aspx>. See also the Code of Practice on Pollution Control - <http://app2.nea.gov.sg/TemSub.aspx?pagesid=20080630407061690386&pagemode=live> Singapore's primary laws can be found at <http://statutes.agc.gov.sg/aol/home.w3p>

²⁰ The Singapore Ministry of the Environment regularly conducts training programs on various aspects of environmental management for government officers from neighboring countries. The IUCN Commission on Environmental Law, the ADB, UNU (United Nations University) and the Asia-Pacific Centre for Environmental Law (APCEL) ran two intensive capacity-training programs on environmental law for law professors from the Asia-Pacific region in 1997 and 1998.

training. Persons trained should be made to return to their home countries to, in turn, train their fellowmen. Again, this requires a system to ensure that the best and brightest are sent abroad for higher education, and that they are contractually bound to return home to share what they have learnt. The system should be transparent so that the right persons are sent for training, and not those who are politically connected or who have already attended such training. Aid agencies that conduct such training should have a say in the selection of the participants to ensure that the greatest benefit ensues and is multiplied.

ii. **Land Use Planning Laws and Policies**

Planning theorists have defined urban sustainability as comprising economic, social and environmental dimensions, and emphasized that these must be integrated and interlinked, and guided by the proposals contained in Agenda 21, which contain concrete planning strategies.²¹

The conflict between development and conservation is particularly marked in an urban setting. Thus, it is especially important that environmental considerations are incorporated in the early stages of development planning so that appropriate measures can be undertaken to balance the pressures to develop land and the need to protect the natural environment. Environmentally sensitive land-use planning provides the opportunity to institute proper measures and controls at an early stage in the development process. Chapter 10 of Agenda 21 emphasizes the importance of an integrated approach to the planning and management of natural resources.

The purpose of urban planning is to reconcile competing claims for the use of limited land, so as to provide a consistent, balanced and orderly management of land use to provide a good physical environment for the promotion of a healthy life and provide the physical basis for a better urban community life.²² While concern for human well-being

²¹ See Kahn, M (1995). Concepts, definitions and key issues in sustainability development: the outlook for the future, *Proceedings of the 1995 International Sustainable Development Research Conference, Manchester, England, Mar27-28, 1995*, Keynote paper, 2-13, discussed by A D Basiago in "Economic, social and environmental sustainability in development theory and urban planning practice", *The Environmentalist* 19, 145-161 (1999), at p. 150. See also the Singapore experience in urban planning - http://en.wikipedia.org/wiki/Urban_planning_in_Singapore; Singapore's Urban Planning Framework - http://infopedia.nl.sg/articles/SIP_1565_2009-09-09.html; the website of Singapore's Urban Redevelopment Authority at www.ura.gov.sg; Lye Lin-Heng, "Land Use Planning, Environmental Management and the Garden City as an Urban Development Approach in Singapore" Chapter 21, *Land Use for Sustainable Development Series: IUCN Academy of Environmental Law Research Studies*, vol.2, Nathalie Chalifour, John Nolon, Lye Lin-Heng; Patricia Kameri Mbote, eds., (New York:Cambridge University Press, 2007) pp 374-396.

²² Foley, D, "British Town Planning: One Ideology or three?" *British Journal of Sociology*, Vol. 2 (1960). One planner sees the issues as a triangle where planners have to reconcile "not two, but at least three conflicting interests: to 'grow' the economy, to distribute this growth fairly, and in the process, not degrade the eco-system – thus the triangle points are the Economy, the Environment and Equity - also Scott Campbell, "Planning: Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of

is a major focus in planning, the conservation of the earth's natural capital (including both natural resources and eco-systems) is also of primary importance, although it may not always be a major concern in practice. Strategic planning is important as it enables the identification of areas of key environmental concern at the outset and can pre-empt potential difficulties.

It is clear that a city that is well-planned will not have as many environmental problems. Its industries will be located in areas where facilities exist that can deal with the wastes generated by manufacturing processes. Highly pollutive industries will be located away from residential and commercial areas. And where economic conditions permit, proper land use planning in a city will ensure that it is provided with:

- efficient public transport facilities, which will reduce the need for individual commutes via motorized vehicles;
- efficient telecommunications which will reduce the need to travel to work;
- piped water supplies at an affordable rate for the poor
- drainage and sanitation facilities;
- a system for the collection, disposal and recycle of various wastes.
- adequate housing for the people,
- schools, shops, markets, commercial and recreational areas and amenities nearby.

All of these require careful strategic land use planning,²³ and is part of a good environmental management system.

In the development of a city, land use plans must anticipate the city's future needs within a specific time frame. In particular, it should have regard to the following:-

- Identification of development constraints and major land uses that affect the environment, such as areas for highly pollutive and hazardous industries, airport zones. In the context of the tiny city-state of Singapore, which mandates military conscription for all males at 18 years of age, even live-firing areas for military training have to be planned for;
- Projection of land needs for environmental infrastructure such as sewage treatment plants and refuse disposal facilities (sanitary landfills/dump sites and incinerators);
- Projection of land needs for transportation and communication (such as for future airport expansions, new railway lines, mass rapid transport systems, expressways, satellite receiving and transmitting stations);
- Identification of possible areas for major utility installations and infrastructural needs that are potentially hazardous or pollution-prone,

Sustainable Development" Journal of the American Planning Association, Vol. 62, No. 3, Summer 1996, pp. 296-312,

²³ Malone-Lee L C "Environmental Planning" in *Capacity Building for Environmental Law in the Asian and Pacific Region – Approaches and Resources, Vols. I and II*, Asian Development Bank, Donna Craig, Nicolas A Robinson, Koh Kheng Lian, Eds.2002. p. 606

such as power stations, gasworks, storage facilities for explosives and other hazardous materials;

- Identification of ecologically sensitive areas for nature conservation;
- Protection of water-catchment areas
- Identification of new areas to be opened up for major developments such as new industrial estates, business or science parks and new housing estates or new towns.
- Identification of historical or cultural sites that warrant protection of heritage sites

It should be emphasized that public participation is an important component in this process. It is enshrined in Principle 10 of the Rio Declaration on Environment and Development,²⁴ and Part III of Agenda 21²⁵ details the participation of various sectors of the population and the emergence of new forms of participation. This includes the need of individuals, groups and organizations to participate in environmental impact assessment procedures and to know about and participate in decision-making, particularly those which may potentially affect the communities in which they live and work. Individuals, groups and organizations should have access to information relevant to environment and development held by national authorities, including information on products and activities that have or are likely to have a significant impact on the environment, and information on environmental protection measures.²⁶ This right to know forms an important part of the partnership that should exist between the government and the people, working together towards the goal of sustainable development.

iii. Legal infrastructure

Another requirement for a sound EMS for cities is the establishment of sound legal institutions – judicial, prosecutorial and enforcement agencies; as well as sound laws. Caring for the Earth, the successor to the World Conservation Strategy, spelt out the minimum content of environmental law for sustainability. At a minimum, governments should ensure that their nations are provided with comprehensive environmental laws (hard and soft laws) that cover:

²⁴ Principle 10 states “Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.”

²⁵ Agenda 21 is an Action Plan for the earth, and was launched at the UN Summit on Environment and Development at Rio de Janeiro in 1992. It has to be implemented at the global, national and local levels. See <http://www.un.org/esa/dsd/agenda21/>

²⁶ “Strengthening the Role of Major Groups”, Chapter 23, Agenda 21

- land use planning and development control;
- sustainable use of renewable resources and the judicious use of non-renewable resources;
- prevention of pollution through imposition of standards for emissions, environmental quality, process and product standards designed to safeguard human health and eco-systems;
- efficient use of energy, through the establishment of energy efficient standards for processes, buildings, vehicles and other energy consuming products;
- investments in renewable energy
- control of hazardous substances, including measures to prevent accidents during transportation;
- waste disposal relating to the different types of waste, and including standards for minimization of waste, waste treatment systems, hazardous waste management, and measures to promote recycling; and
- conservation of species and eco-systems, through land-use management, specific laws to safeguard vulnerable species and the establishment of a comprehensive network of protected areas.²⁷

The national legal system should provide for:

- application of the precautionary and the polluter pays principles;
- use of best available technology for the setting of pollution standards;
- use of economic incentives and disincentives based on appropriate taxes, charges and other instruments;
- effective and appropriate penalties for non-compliance;
- environmental impact assessments for all new developments and projects;
- periodic environmental audits for industries as well as government departments and agencies;
- effective monitoring so as to detect infringements and effect changes in the laws where necessary;
- public access to information including to EIAs, environmental audit data and the results of monitoring, as well as information relating to the production, use and disposal of hazardous substances;
- effective law enforcement and the facilitation of public participation and citizen access to courts.
- Environmental or ‘green’ courts with specially trained judiciary

An environmental management system will require that these laws be passed as well as enforced.

On the question of appropriate penalties for breach of the law, this must be carefully assessed. In many developing countries, where the government is less than honest and

²⁷ *Caring for the Earth*, IUCN, UNEP and WWF, at p. 68.

corruption is a way of life, enhancing the quantum of fines may not be the right solution as it may only serve to enrich the pockets of the enforcers. New approaches are needed, such as economic incentives to induce compliance; or the use of the media to praise and reward industries that meet the standards and to shame those that do not, into doing better. One example of an innovative approach is the Proper Prokasih (or Clean Rivers) program introduced in Indonesia in 1989, targeted at BOD (biochemical oxygen demand) effluent from major industrial polluting plants.

This program started with the identification of the major industrial water polluters along the most polluted rivers. Once identified, vice-governors invited the polluter to sign a voluntary, non-legally-binding pollution reduction agreement with the Vice-Governor and the state environment agency, BAPEDAL. Thereafter samples were taken of the plant's effluent to establish a pollution baseline and to assess the degree of compliance with the terms of the agreement. By 1994, 1,400 manufacturing plants had participated. The mean reduction in BOD loads in these plants was 44%. The BOD load per unit of output fell by 55%.

Despite this success, BAPEDAL (the State enforcement agency) faced considerable difficulties including a lack of capacity to reliably monitor air and water quality and lack of authority to inspect and enforce the laws.²⁸ BAPEDAL also lacked the authority to issue permits detailing emissions requirements and the courts refused to grant legal standing to either the new emission standards or to the results of monitoring. Thus other ways had to be found to resolve the pressing industrial pollution problems. BAPEDAL decided to build on the success of the Prokasih program by turning it into an environmental rating and public disclosure system.

The Proper Prokasih program succeeded in increasing the compliance rates substantially within six months.²⁹ It used a system of ratings based on colors (gold, green, blue, red and black in descending order of compliance, where Gold signified compliance to international best-practice standards). No plant received a gold rating but five received a green rating. These were publicly named but plants that received lesser ratings were not publicly named. Instead, these plants were consulted to ensure that the ratings were correct; then they were given six months to improve their performance, after which BAPEDAL made it clear that it would re-rate the plant and announce the results. Six months later, there was a substantial improvement, with the compliance rate increasing from 36% to 41%.³⁰

²⁸ This was because only the Ministry of Industry and the local police had the authority to enter factories to obtain emission samples.

²⁹ Michael T Rock, "Searching for Creative Solution to Pollution in Indonesia", Chapter 4, *Pollution Control in East Asia – Lessons from Newly Industrializing Economies*, 2002, pp. 65-81; Shakeb Asfah and Jeffery R Vincent, "Putting Pressure on Polluters: Indonesia's PROPER Programme"; chapter 8 in *Asia's Clean Revolution – Industry, Growth and the Environment* David P Angel and Michael T Rock, contributing eds 2000. See also <http://www.worldbank.org/nipr/proper/prop-eval.htm>

³⁰ See David Wheeler and Shakeb Afsah "Going Public on Polluters in Indonesia : BAPEDAL's Proper Prokasih programme" - http://siteresources.worldbank.org/INTRES/Resources/469232-1321568702932/Greening_GoingPubliconPollutersinIndonesia.pdf.

Six reasons have been advanced for the success of this program:

1. BAPEDAL, the Indonesian management agency for EIAs had obtained high-level political support for the program, including support from the President;
2. BAPEDAL had reached out to manufacturing facilities, environmental NGOs, community leaders, and the media to demonstrate how the ratings worked, thus inspiring confidence in the program among all these actors;
3. The program was focused on widely acknowledged and accepted national BOD emission standards;
4. The new Proper Prokasih ratings program was grafted on to the well known and successful Prokasih program;
5. They built on what they learnt in the first Prokasih program,
6. They kept the rating system “simple, credible, transparent and honest.”³¹

The success of the Proper Prokasih program in Indonesia is an example of the workings of an environmental management system for water pollution. This included:

- the setting up of an appropriate institution (BAPEDAL);
- the identification of the problems by BAPEDAL (major polluters, limited resources);
- the identification of possible solutions, which included:
 - (a) formation of a local Prokasih team headed by the vice-governors and the enforcement agency Bapedal (State Ministry for Population and the Environment) as well as local public officials and representatives from the environmental study centers at Indonesian universities and testing laboratories;
 - (b) identification of the most polluted rivers or the most polluted section of rivers within a province, and the major industrial water polluters along those rivers;
 - (c) invitations by vice-governors to the major polluters to sign the voluntary but non-legally binding agreements;
 - (d) repeated sampling of a plant’s effluent to establish a pollution baseline and to assess the degree to which the plant was meeting the terms of the agreement
 - (e) identification of funding for the project (funded by the implementing agency and the provincial governments)
 - (f) following the creation of BAPEDAL in 1990, the setting of effluent and emission standards by BAPEDAL for water for 14 industries identified as major pollutant sources (these standards were set after discussion with industry associations, gathering evidence on best practice technologies used in Asia and reaching agreement with these associations and other government ministries);
 - (g) increasing the staff members of the implementing agency, BAPEDAL;

³¹ Above, note 14 at p. 74.

- (h) coordinating with international aid agencies to assist in the purchase of pollution control equipment³² as well as assistance in gathering and analyzing pollution data, drafting of laws, and the exploration of the improvement in institutional capacity such as the feasibility of establishing local (provincial) environmental impact agencies (BAPEDALDA).

However, these developments did not last, due to economic and political changes, leading one writer to conclude that “lasting, sustainable industrial pollution control programs...most assuredly depend on creating tough command-and-control environmental agencies that can weather political change.”³³ In particular, decentralization policies exacerbated these problems, as the governments in Jakarta could not control the increased contamination of the water sources upstream, which were the province of the local governments. This led to a shortage of water in the city, as the new management of water resources raised charges for water which cities downstream were unable to afford.³⁴ There is no easy solution here, as the increased contamination raise the costs for water treatment, making it difficult even for the private operator of water supplies.³⁵

A typical example of a non-functioning system in a developing country is that of the city of Bangalore in India in 2000,³⁶ where the rule of law was found to be wanting due to:

- corruption
- improper exercise of bureaucratic discretion leading to failure to enforce the laws
- interference of politics in bureaucratic decision-making³⁷
- inadequate laws – woefully inadequate fines and penalties
- ignorance of the law
- inadequate allocation of jurisdiction between government institutions - actions taken are fragmented as each activity is the responsibility of a separate agency

³² The Japanese provided soft loans for the purchase of pollution control equipment; the World Bank financed several capacity-building projects in BAPEDAL

³³ Ibid, n. 14 at p. 78-79. See also the papers and discussion on Jakarta’s Water Supply in *Sustainable Urban Services – HongKong Seminar*, PECC Sustainable Cities Taskforce, 23-24 November 2001. Genevieve Dubois-Taine, Ed., p. 21-72.

³⁴ Lye Lin Heng, “The Environmental Dimension of Urban Services”, in *Sustainable Urban Services, PECC Sustainable Cities Taskforce*, Santiago de Chile Seminar, 10-11 July 2002 p. 165- 170

³⁵ See the 25 year contract with Ondeo to supply water to West Jakarta, in *Sustainable Urban Services, ECC Sustainable Cities Taskforce*, HongKong Seminar 23-24 November 2001, Report on Jakarta’s Water Supply p. 21-72. For the latest on the Proper Prokasih program, see See also Shakeb Afsah, Jorge H García and Thomas Sterner “The Institutional History of Indonesia’s Environmental Rating and Public Disclosure Program (Proper) May 2011, <http://erb.umich.edu/News-and-Events/news-events-docs/11-12/eco-labels2011/JorgeGarciaLopez.pdf>

³⁶ Amanda Perry “Sustainable Legal Mechanisms for the Protection of the Urban Environment”, chapter 3, *Sustainable Cities in Developing Countries*, Cedric Pugh, Ed. Earthscan, 2000.

³⁷ “One judge said that “the order of decisions is all wrong. Politicians decide on projects and then scientists simply concur. It should be the other way around, but no one has the guts to make an independent decision”., per Amanda Perry op cit at p. 58.

- lack of power and resources
- lack of qualified lawyers
- inefficient legal system leading to long delays and high costs
- power imbalance between the government and the individual, leading to difficulties in obtaining information, difficulties in proceedings against the government.³⁸

An environmental management system will clearly need to address these issues but it has not yet been implemented, as the city continues to be highly polluted.³⁹

iv. Building the Physical Infrastructure

The building of the physical infrastructure for environmental management is crucial to a sustainable city. The best laws will not work if there is no piped water supply to the urban population; if there are no facilities to deal with sewage and trade effluents, and if there is no system to deal with the different kinds of wastes generated. There is a need for sewage treatment facilities, trade effluent treatment plants, properly constructed sanitary dumpsites/landfills for wastes, as well as incinerators for hazardous and bio-hazardous wastes. Each city has to carefully consider what are the most viable solutions to these problems in the context of its political, social and economic situation. Some basic factors remain. The best laws prescribing trade effluent standards (for example), will not work if there are no laboratories to test samples from particular factories or to monitor the water quality from rivers, lakes and the sea. And even with the building of the physical infrastructure, there must be a system put in place to ensure the collection of waste, and the separation of different types of waste for recycling or for special treatment.

How can cities in developing countries find the financial resources to build the environmental infrastructure? Where governments lack the financial resources to fund such projects, loans may be obtained from multilateral agencies such as the World Bank, or the Asian Development Bank, which have accrued significant experience in a range of sectors including electricity, water and sanitation, and telecommunication.⁴⁰ This may also be facilitated through partnerships with the private sector. Public-Private Partnerships (or PPP) work in a variety of ways, such as where the private operator builds, operates and owns (BOO) or builds, operates and transfers (BOT) possession of the facility to the city or state.⁴¹ Funding can come from the private sector or through the multilateral agencies. However, serious issues of governance can hinder such

³⁸ See also the case of Shanghai – Peter Abelson, “Economic and Environmental Sustainability in Shanghai”, op. cit. n. 28, chapter 9.

³⁹ It does not appear that a good EMS has been implemented with the passing years – the city continues to be highly polluted. See “Bangalore : Pollution Levels at All-time High” <http://www.rediff.com/news/2008/feb/07level.htm>.

⁴⁰ Plummer, Janelle (2002) *Focusing Partnerships: A Sourcebook for Municipal Capacity Building in Public-Private Partnerships*, London:Earthscan Publications.; Cambessus, M and Winpenny J (2003) *Report of the World Panel on Financing Water Infrastructure: Financing Water For All*, World Water Council, 3rd World Water Forum, Global Water Partnership

⁴¹ See “Public-Private Partnerships for the Urban Environment”, UNDP <http://www.undp.org/ppp/>

partnerships and need to be resolved by the state or the city itself. In the case of the water sector, the following have been identified:

- The apparent low priority that central governments give to these issues
- Confusion of social, environmental and commercial aims;
- Political interference;
- Poor management structures and imprecise objectives
- Inadequate legal frameworks – weak, absent or inconsistent regulations
- Lack of transparency in the awarding of contracts
- Non-existent or weak and inexperienced regulators
- Resistance to cost-recovery tariffs⁴²

There are also issues of foreign exchange risks, contractual risks (projects of long duration entered into with poor initial formation) and country risks – this includes the credit worthiness of the country as well as its respect for the rule of law and its reputation for honoring contracts made. The private sector will have to do its own due diligence assessments, and in particular, work on the risk factors.⁴³ What is clear is that a country or city with good governance and respect for the rule of law will find it much easier to obtain financing and assistance. Thus, the building of a sound legal framework is fundamental.

Some successful models of public-private partnerships can be found in the water sector, such as in Santiago, Chile which privatized its water supply, sanitation and water treatment facilities.⁴⁴ Other examples include the reforms to improve the water and basic sanitation services in Cartagena de Indias, Colombia⁴⁵, and the innovative water management system of Adelaide, Australia which outsourced water and waste water services to United Water, a consortium of Vivendi Water, Thames Water and Kinhill in January 1996, with the assets remaining the property of the State through SA Water.⁴⁶ Nearer home we applaud the city of Phnom Penh's remarkable success with its water supply system, winning the Stockholm Water Prize in 2010.⁴⁷

⁴² Report of the World Panel on Financing Water Infrastructure (op. cit) at p. 176.

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⁴⁴ See “Santiago de Chile, Water Supply, Sanitation and Water Treatment in Santiago de Chile: A fully privatized system”, *Sustainable Urban Services, Santiago de Chile Seminar Report*, Pacific Economic Cooperation Council Sustainable Cities Taskforce, July 2002, Genevieve Dubois-Taine, Ed.; pp. 161-228

⁴⁵ Above, at pp. 39-100.

⁴⁶ This partnership has “brought together the public and private sector, combining world class expertise in water and waste water management with local knowledge and appropriate contractual arrangements to achieve the effective delivery of sustainable water services.” Per Philippe Laval, Manager Director, United Water “The Adelaide Contract: The Contribution of Outsourcing to Sustainability”, *Sustainable Urban Services – Shanghai Seminar, April 2003 Report*, Pacific Economic Cooperation Council Sustainable Cities Taskforce, Genevieve Dubois-Taine, Editor, pp. 33-68

⁴⁷ “Phnom Penh Water Authority wins Stockholm Industry Water Award, 2010” - <http://washnames.wordpress.com/2010/06/11/phnom-penh-water-supply-authority-wins-stockholm-industry-water-award-2010/>. See also “Water Supply of Phnom Penh: An Example

IV. ISO 14001 and Environmental Management for Cities

ISO 14000 is a series of voluntary international standards setting out the requirements for an environmental management system, developed by the International Organization for Standardization (ISO) based in Geneva, Switzerland. These international standards serve as tools to manage environmental programs and provide an internationally recognized framework to measure, evaluate and audit these programs.

At its core is ISO 14001 which provides a framework for the development of an environmental management system, encompassing environmental auditing, environmental labeling, environmental performance evaluation and life cycle assessment. Compliance with the series is certified by a third party. Other standards in the series relate to:

- Guidance on the development and implementation of an EMS (ISO 14004)
- General principles of environmental auditing (ISO 14010, now superseded by ISO 19011);
- Specific principles on environmental auditing (ISO 14011, now replaced by ISO 19011);
- Qualification criteria for environmental auditors and lead auditors (ISO 14012, now superseded by ISO 19011)
- Audit program review and assessment materials (ISO 14013/5)
- Environmental labeling (ISO 14020+)
- Performance targets and monitoring within an EMS (ISO 14030+)
- Life cycle assessment (ISO 14040)

These standards provide organizations with a structured management system which assists them in protecting the environment while carrying out their activities. The implementation of ISO 14001 first requires the development of a clear and comprehensive environmental policy. For its implementation, it requires a planning process, a procedure for audits and checks to ensure compliance, corrective action where necessary, emergency planning procedures, and regular reviews from the management. ISO 14000 sets out voluntary standards to be implemented by the organization, which is then subject to external verification and evaluation.

The system brings many benefits to the organization, including:-

- Compliance with environmental laws
- A defense of due diligence should there be an accident or incident
- Cost savings through cleaner production, resource conservation and waste minimization

- Cost savings through reduced insurance premiums
- Improvement of industry-government relations
- Enhancement of public image, and
- Opening of more markets that look for ‘green’ production

In other words, an EMS will help a company improve its cost performance by reducing wastage, reducing its environmental risks and potential liabilities and finally, by enhancing its public image. The ISO 14000 series was initially targeted at corporations in the production chain but it can apply to any organization, including service organizations and even schools and institutions. In recent years, ISO 14001 has been applied to local governments and cities, particularly to Japanese cities.⁴⁸ In 2003 UNEP-IETC (International Environmental Technology Centre) developed a toolkit entitled “Environmental Management Systems and ISO 14001 for Cities”, using Tokyo as illustration for EMS for cities. It must be emphasized that the series is entirely voluntary and much depends on the goals or objectives of the organization, be it an industrial manufacturer, a service provider, a local government or a city.

i. The Implementation of ISO 14001 in Cities

A number of cities and prefectures in Japan have obtained ISO 14001 certification. They include Shirai city, Itabashi ward of Tokyo, the Tokyo Metropolitan Government, and Gifu Prefecture. The ISO 14000 system was also implemented in Suzhou Industrial Park,⁴⁹ and a number of US and Canadian cities are also ISO 14001 certified – these include Denver, Dallas, Seattle, Charlottesville, Toronto, and Edmonton.⁵⁰ The benefits of certification in this context have been identified as comprising internal and external components. Internally, it creates a structured management as well as information system from which a cycle of continuous improvements can be established, leading to savings in resources as well as costs. Externally, it demonstrates a city’s ‘green face’ to its citizens and helps to emphasize the need for greater action on the part of urban stakeholders, as well as serves as a model for emulation by other urban governments as well as other stakeholders, particularly private sector businesses and industries.⁵¹

ii. Beyond ISO 14001

While obtaining ISO 14001 certification is an indication that a city has an environmental management system in place it is submitted that ISO 14001 is lacking in that it is pollution centered and does not take a holistic look at the environment, particularly the ecological processes and systems. In the context of sustainable cities, while the management of pollution is of great importance, so too, is the need to sustain the natural

⁴⁸ “ISO and Japanese Cities – The ISO 14001 Initiatives of Public Authorities in Japan”, which examines four case studies - Shiroy Town, Tokyo’s Itabashi ward, Tokyo Metropolitan Government and Gifu Prefecture. <http://gdrc.org/uem/observatory/iso-cover.html> . See also

⁴⁹ <http://www.chinacp.org.cn/eng/cpcasestudies/suzhou14.html>

⁵⁰ <http://www.denvergov.org/es/EnvironmentalManagementSystem/tabid/427949/Default.aspx>

⁵¹ Hari Srinivas and Makiko Yashiro, “Cities, Environmental Management Systems and ISO 14001: A View from Japan”, <http://www.gdrc.org/uem/observatory/iso-cover.html>

components of the environment. The preservation of nature improves the quality of life for the people, reducing the harshness of the urban environment, and providing a refuge from the stresses of urban living. It also assists in the preservation of natural resources and plays an important role in achieving sustainability.

The development needs of the city must be balanced with the needs of the natural environment, and, as far as possible, nature should be preserved within a city. This can take many forms, such as the preservation of nature reserves, of natural open spaces such as mangroves and wooded areas, the reservation of green areas as parks and gardens, the provision of green corridors connecting parks, gardens and recreational areas and providing a refuge for wildlife in an urban environment. It should extend to the planting of trees and shrubs in the city, along roads, on balconies of houses and even on rooftops. It should also extend to the waterways. The city should be landscaped, and this should extend to industrial, commercial and residential premises. The right species of trees and shrubs should be planted, species that are indigenous to the country and which will provide food for the birds, insects, animals and other life-forms. This should be facilitated by the planning process, and by the passing of laws which should make it an offence to cut down trees and plants, and make restoration of the natural environment mandatory.⁵²

iii. The Singapore Index on Cities' Biodiversity

Singapore Index on Cities' Biodiversity, measures biodiversity in cities and highlights how biodiversity conservation efforts can be improved. The Index was formulated by the National Parks Board of Singapore (NParks), in cooperation with the United Nations and a task force of international experts. The index was officially endorsed at the Nagoya COP in October 2010 as a self-assessment monitoring tool, and is the only index of its kind catering specifically to cities. The City Biodiversity Index aims to serve as a self-assessment monitoring tool to promote better management of resources and conservation of biodiversity internationally. The index also serves as a platform through which cities can share solutions for conserving biodiversity, overcoming the problems of increased urbanisation, the challenges of climate change and integrating nature conservation with city planning and management.⁵³

V. THE ASEAN FRAMEWORK FOR ENVIRONMENTALLY SUSTAINABLE CITIES

The cities of ASEAN (Association of Southeast Asian Nations)⁵⁴ have sought to develop a framework for sustainable cities. The first workshop for “Environmentally Sustainable

⁵² Koh Kheng Lian, “Fashioning Landscape for the ‘Garden City’”, *Landscape Conservation Law – Present Trends and Perspectives in International and Comparative Law*, IUCN Environmental Policy and Law Paper No. 39, (2000), p. 39-47.

⁵³ See http://infopedia.nl.sg/articles/SIP_1765_2011-02-11.html; see also <http://www.cbd.int/authorities/gettinginvolved/cbi.shtml>

⁵⁴ The Association of Southeast Asian Nations (ASEAN) comprise Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

Cities in ASEAN” held in Singapore in 2003.⁵⁵ All ten nations of ASEAN identified three major environmental problems as priority areas. These are:

- (1) air pollution from industries and motor vehicles;
- (2) lack of infrastructure for sewerage and drainage, and
- (3) lack of management for solid waste.

These translate to the challenges of providing Clean Air, Clean Water, and Clean Land. The workshop drew up a strategy for specific achievements within these three goals, taking the view that these ‘brown’ issues must first be addressed, and that the ‘green’ and ‘blue’ issues can be addressed later.⁵⁶ This was followed in 2004 by a conference on Environmentally Sustainable Cities in ASEAN, also held in Singapore, and in 2005, by a workshop in Jakarta, Workshop on the Development of Key Indicators for Clean Air, Clean Water and Clean Land; & Award/s to Promote Environmental Sustainability in ASEAN Cities.⁵⁷

It is submitted that for a sound EMS in the context of ISO 14001, the environment should be tackled as a whole and ecological considerations should be integrated into the environmental management plans at the outset. Additionally, these efforts should be integrated with a national sustainable development strategy aimed at eradicating poverty, and linked with an eco-system approach.⁵⁸

VI. CONCLUSION

The issue of the sustainability of cities is highly complex and dependent on many factors. This paper has attempted to lay down the basic requirements for an Environmental Management System in the context of a city. Whether an EMS can be effectively implemented depends on many factors, particularly the political, social and economic contexts of that city. An effective environmental management system is a step towards sustainability, and is indeed, a very considerable step. It is part of good governance. Good governance requires an honest and capable government, with political will. How can this be found, in developing economies which are mired in poverty with a poorly educated populace? Are particular forms of government more effective in managing the environment? These issues, though pertinent, are beyond the scope of this paper. What is clear that the effective management of a city is a matter of considerable complexity.

What has not been mentioned so far, is the need for a strong ethical foundation. Thus it is timely that each individual, corporation and government agency is reminded of the

⁵⁵ *Framework for Environmentally Sustainable Cities in ASEAN*, ASEAN Working Group on Environmentally Sustainable Cities in ASEAN, December 2003, Singapore

⁵⁶ Paragraph 5, NEA Workshop Information Paper.

⁵⁷ http://www.aseansec.org/network_activities.htm#Workshop on the Development of Key Indicators for Clean Air, Clean Water and Clean Land; & Award/s to Promote Environmental Sustainability in ASEAN Cities

⁵⁸ Anantha K Duraiappah *Exploring the Links – Human Well-being, Poverty and Eco-system Services*, UNEP’s Institute for Sustainable Development, www.iisd.org/publications

aspirations contained in the Earth Charter, which lays down strong ethical foundations of environmental stewardship, as an inspiration and guide towards sustainability.⁵⁹

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⁵⁹ The Earth Charter is “a declaration of fundamental principles for building a just, sustainable, and peaceful global society in the 21st century. It seeks to inspire in all peoples a new sense of global interdependence and shared responsibility for the well-being of the human family and the larger living world. It is an expression of hope and a call to help create a global partnership at a critical juncture in history.” <http://www.earthcharter.org/files/charter/charter.pdf>

References

Strategies Towards Sustainable Development (full reference?)

The Earthscan Reader in Sustainable Cities, David Satterthwaite Editor, Earthscan 1999

Asia's Clean Revolution – Industry, Growth and the Environment, David P Angel and Michael T Rock, Contributing Editors, Greenleaf Publishing 2000

Sustainable Cities in Developing Countries, Cedric Pugh Editor, Earthscan 2000

Environmental Strategies for Sustainable Development in Urban Areas – Lessons from Africa and Latin America, Edesio Fernandes, Editor, Studies in Green Research 1998

UNEP Environmental Law Training Manual, 1997 UNEP

Transport and Communications for Urban Development – Report of the Habitat II Global Workshop, 1995 UNCHS (Habitat), 1997

Genevieve Dubois-Taine, Pacific Economic Cooperation Council Sustainable Cities Taskforce Coordinator, Reports from Seminars on Sustainable Urban Services held in Bangkok, Hongkong, Santiago (Chile), Noumea, Shanghai and Adelaide (2002 to 2004).

International Review for Environmental Strategies – Inaugural Issue, IGES, Summer 2000

Richard Rogers, *Cities for a Small Planet*, London, Faber & Faber 1997

Model Cities – Urban Best Practices, Vols. I and II, Ooi Giok Ling, Ed. 1999

Jorge E Hardoy, Diana Mitlin, David Satterthwaite, *Environmental Problems in Third World Cities*, Earthscan Publications, 1992

Environmental Strategies for Sustainable Development in Urban Areas – Lessons from Africa and Latin America, Edesio Fernandes, Ed. 1998

Empowering Squatter Citizen – Local Government, Civil Society and Urban Poverty Reduction, Diana Mitlin, David Satterthwaite, Eds. Earthscan, 2004

Capacity Building for Environmental Law in the Asian and Pacific Region – Approaches and Resources, Vols. I and II, Asian Development Bank, Donna Craig, Nicolas A Robinson, Koh Kheng Lian, Eds.2002