ENVIRONMENTAL PLANNING FOR SUSTAINABLE URBAN DEVELOPMENT

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1. INTRODUCTION

1.1 Urbanization

In the Caribbean and other developing regions, urban areas and populations are growing. Cities are both engines for growth and sources of concentrated environmental problems. People flock to urban areas to seek employment, entertainment, shopping, and a generally higher standard of living. At the same time environmental infrastructure of works and services are inadequate to serve the resulting increases in population and population densities. The inevitable congestion causes environmental hazards and degradation until strategies for reversing environmental deterioration can be implemented.

The magnitude of urban population growth in developing countries is a direct indicator of the degree of spatial concentration of people, industries, commerce, vehicles, energy consumption, water use, waste generation, and other environmental stresses. Generally, most countries seek to

generate increasing economic development which tend to exacerbate such problems which may exceed both the preventive and solution capacity of the government as well as the assimilative capacity of nature.

Another determinant of the severity of environmental conditions within and around urban areas is their regional ecosystem type, such as: coastal, humid-tropical, mountainous, riverine, …etc. These urban ecological types are also critical factors in determining optimum environmental strategies and plans for specific and sustainable urban development.

An important goal in the new millennium is to make existing and new urban areas more self-sufficient, sustainable, and enjoyable places to live.

1.2 Physical Planning

Land-use planning is a complex process involving development of a land-use to include a statement of land-use issues, goals, and objectives; summary of data collection and analysis; land-classification map; and report describing and indicating appropriate development in areas of special environmental concern.

Because land use decisions are critical determinants of environmental quality it is imperative that land use controls be effectively practiced to combat such problems as pollution, the occupation of hazard-prone areas, the degradation of wetlands and other coastal resources, and the bss of open space and other cultural resources. The ways to accomplish these are:

· Land Use and Maintenance: Ecological land-use planning, building/area restoration, open space preservation, tree planting, community gardens, ..etc.

· Energy Efficiency: Energy efficient buildings and energy conservation in general

· Water: Water conservation, and wastewater reuse. · Food: Increased food growing using less synthetic chemicals.

· Pollution Control: Recycling of food and other solid wastes, reduction of industrial wastes, enforcing air/noise pollution control.

· Economic Development: Increases in investment and social services in rural areas to reduce the move into urban areas.

· Population Growth: Reduction in national population growth rate.

1.3 Environmental Health Management

Environmental health engineering is a main feature of environmental health management and is normally defined as "the branch of engineering that is concerned with protecting the environment from the potentially deleterious effects of human activity, protecting human populations from the

effects of adverse environmental factors, and improving environmental quality for human health and well-being." An inventory of such engineering responsibilities would include:

- Environmental planning of infrastructural works and services;

- Resource pollution/degradation prevention (Air, Water, Land, Energy)

- Waste management (liquid and solid)

- Public health aspects (food safety, vector control)

- Housing, institutions and the built environment

- Environmental emergencies (natural and man-made)

Thirteen features of modern environmental health engineering are at Box 1. Also included are the synergistic demands of cross-sectoral activities.

The environmental health engineer adapts the principles of natural physical, chemical and biological systems to engineered systems for water supply, waste disposal, pollution control,..etc. His unique role is to utilize modern engineering techniques in copying the self-cleansing mechanisms of nature while accommodating the constraints and limitations. The goal of this engineering sub-discipline (of civil engineering) is to harmonize the powers of technology with the potentialities of natural processes.

BOX 1 MODERN ENVIRONMENTAL HEALTH ENGINEERING

1.	Public Water Supply	8.	Energy Development
2.	Wastewater Disposal	9.	Environmental Planning
3.	Solid Waste Management	10.	Institutional Sanitation
4.	Air Pollution Control	11.	Noise Pollution Control
5.	Housing and the Built Environment	12.	Vector Control
6.	Recreation Facilities	13.	Emergency Management
7.	Food Protection Program		

1.4 Sustainable Development

Development is about improving the well-being of people. Raising living standards and improving education, health, and equality of opportunity are all desirable and are essential

components of economic development, which were fully practised in Trinidad and Tobago in the sixties after independence was won - 31, August 1962. But 5-year development programmes and the establishment of industrial development institutions (e.g. Industrial Development Corporation) helped to promote economic growth which led to environmental deterioration in the absence of an effective national environmental management programme. Also, such growth took little notice of the social aspects of development, urban or otherwise; and the neglect of human welfare was felt at all levels of society.

Sustainable development, on the other hand, is development that lasts, because in addition to an economic component, there are social and environmental components. So that sustainable development must be a pro-active strategy to develop sustainability. As it was proposed initially by the World Commission on Environment and Development (1987) sustainable development must meet "the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development requires mobilizing governments, the private sector, and the general public toward sustainable communities. And "sustainable urban development is ultimately a cultural statement about ourselves, how we want to live, and our ability to manage our needs, desires, and dreams in ways that are effective and caring." (See the key Environmental Issues of the UN Conference on Environment and Development, Rio de Janeiro, June 1992)

BOX 2 KEY ENVIRONMENTAL ISSUES OF UNCED 92

Rio de Janeiro 1992

1. Environment and development
2. Protecting the atmosphere
3. Protecting the oceans
4. Waste management
5. Land resources
6. Biological diversity
7. Freshwater resources
8. Biotechnology

2. HUMAN SETTLEMENTS AND SUSTAINABILITY

2.1 Communities and Their Environment

2.1.1 Environmental Needs and Impacts

The most critical urban environmental needs by people in developing countries include:

· Provision of healthful housing and other built environments (e.g. schools, workplaces…etc.)

· Access to environmental infrastructure systems and services (e.g. water supply, sewerage, solid waste management, storm drainage, urban transport,…etc.)

· Availability of open spaces in terms of properly designed community parks and other green areas.

· Environmental surveillance and cleaning services for public buildings and outdoor areas.

The most important adverse impacts on the urban environment affecting people and caused by man and nature are:

· Water pollution and depletion

· Energy use and wastage

· Air pollution:

- Outdoor, by industrialization and motorization emissions, and

- indoor, from household and occupational sources

· Solid waste, especially hazardous waste, when improperly discharged by households and industries.

· Resource Losses:

- Groundwater contamination and depletion

- Land and ecosystem degradation

- Degradation of historic structures and cultural resources

· Environmental hazards:

- Natural disasters (e.g. hurricane, earthquake, volcano, flooding,..etc.)

- Man-made hazards (e.g. chemical spills and other industrial accidents)

2.1.2 Aggravating Factors

Factors aggravating urban environmental degradation or perpetuating the lack of appropriate preventive and curative environmental actions, are:

- Lack of public and political awareness

- Need for public pressure and political will

- Lack of effective public education and participation

- Inadequate governance (e.g. Weak institutional capacity, Poor inter-sectoral coordination, Lack of effective public accountability, Inadequate regulatory policies, Unclear property rights, Inefficient economic policies, Insufficient knowledge and information, Shortage of environmental professionals).

2.2 Improving the Urban Environment

Efforts at improving the urban environment include the following:

(a) Focus on cost-effective approaches

- Seeking "win-win" situations when environmental and economic goals are complementary.

- Cost-effective approaches to carrying out environmental reforms

- Stressing economic efficiency and cost recovery through user charges, property business taxes, and fuel taxes.

(b) Mobilizing Public Support and Participation

- Raising awareness by formal/informal education on environmental options, solutions, enforcement and monitoring.

- Building constituencies of urban poor for upgrading of environmental services.

- Involving NGOs and the informal sector in championing local environmental concerns.

(c) Improving Governance

- Building local capacity to provide adequate operational management of urban services.

- Skills and capabilities - managerial, technical, regulatory and financial.

- Capacity building for key actors in the public and private sectors, as well as NGOs.

- Tools for capacity building include training, technical assistance, private sector technology, public information and outreach programmes.

- Improving the operation of urban services, such as water supply, sewerage, drainage, solid waste management, transport, land management, ..etc.

- Establishing public-private partnerships to deliver environmental services, stimulate technological innovation and adaptation, and develop land.

2.3 Policy Issues and Instruments

For communities to move effectively toward sustainability, several issues should be identified, as follows:

- Infrastructure that results in environmentally respectful use of resources;

- Minimization of waste and proper management of residues;

- Energy-efficient transportation;

- Compact land-use patterns;

- Integrated transportation and land-use planning;

- Local environmental assessments and audits;

- Cooperation with non-governmental organizations in the implementation of environmental programmes;

- Reducing economic and social polarization; and

- Integration of marginalized people into efforts towards sustainable development.

Out of these general concerns some broad policy goals might include the following:

- Reducing per capita water consumption;

- Reducing per capita car use;

- Increasing the percentage of local land contained in parks; and

- Improving cycling and pedestrian infrastructure; ..etc.

To achieve these specific policy objectives the following policy instruments can be employed:

(a) Traditional regulations, such as laws, licenses, permits, standards,..etc.

(b) Voluntary mechanisms, such as community information and education, NGOs, volunteer groups, and technical assistance.

(c) Expenditure, through the use of public funds for contracting, monitoring, investment, procurement, enterprise, and public-private partnerships.

(d) Financial incentives, an attractive alternative to traditional regulatory instruments and includes pricing, taxes, charges, subsidies, grants, loans, rebates, …etc.

3. SUSTAINABLE DEVELOPMENT

3.1 Development and Sustainability

Economic development pursued in the independence movement in the sixties and later in the Caribbean has shown up certain environmental and social weaknesses that are the very basis for sustainability. It became clear that economic development could only lead to sustainability if it is decentralized, carefully planned, environmentally sensitive, locally-based, and focused on creating jobs and improving quality of life in all island-communities. Development benefits must be maximized beyond industrial estates and business centers, while the adverse impacts of development must be minimized in our residential areas and our parks and beaches.

A comprehensive, integrated, and strategic approach which combines the local government role as a service provider, its regulatory and legislative powers, and its internal economic policies can have a remarkably positive effect on moving economic activities and development toward improving socio-economic quality and achieving sustainability. This is why it is said that the three core elements of sustainable development are:

· Environmental considerations must be entrenched in economic policy-making. (See Box 3 on Environmental Technology in Sustainable Development)

· Sustainable development must incorporate an inescapable commitment to social equity.

· "Development" must not simply mean "growth". It must imply qualitative as well as quantitative improvement.

In sum sustainable development must be different from economic development of the past. It must be a pro-active strategy to develop sustainability. And its benefits must last well into the next generation, and beyond.

BOX 3

ENVIRONMENTAL TECHNOLOGY IN SUSTAINABLE DEVELOPMENT

DEVELOPMENT SCENARIOS	ENVIRONMENTAL FACTORS	SUSTAINABLE TECHNOLOGY
1. Human Settlements	Building Infrastructure Land Use	Adequacy (size/design) Water/waste Systems Land Management
2. Industry	Workplace Impact Energy Use	Optimum Environment Impact Minimization Energy Conservation
3. Agriculture	Irrigation/Drainage Food Production Animal Waste Agro-chemical Use	Soil/water Conservation Food Safety Waste Management Chemical Control
4. Tourism	Hotel Construction Swimming Pool Marina Development	Water/waste Systems Sanitary Design/operation Pollution Control
5. Zonal Development	Coastal Zone Urban Development River Basin	Environmental Planning Environmental Management Environmental Infrastructure
6. Human Resource Development	Environmental Health Personnel Non-environmental Health Personnel	Training of Environmental Health Engineer/Officer Training of others in Environmental Health

3.2 Greening the City

Greening the city refers to strategies and techniques that protect and restore ecology within urban communities. It means "combining urbanism and nature to create healthy, civilizing, and enriching places to live." It means a living area governed more by nature than legislature; and a sustainable human settlement based on "ecological balance, community self-reliance, and participatory democracy."

Urban ecology strives to create, preserve and restore green and open spaces sustainably. It provides many environmental benefits: it reduces the urban heat island effect, minimizes our use of pesticides, conserves energy, cleans urban air, and absorbs carbon dioxide from the atmosphere. But urban ecology also offers a practical day-to-day understanding and linkage between urbanites and nature. Environmental awareness and activism should also be encouraged to focus on issues inside the city.

Creating sustainable green spaces can begin with community parks, as they offer a host of ways to reduce the environmental impact of cities. The restoration and preservation of open spaces is

another target for sustainable green initiatives, as is the desire to incorporate greening into private outdoor spaces. Some urban neighbourhoods, with their asphalt roads, concrete sidewalks, and concrete-block property boundaries, need more greenery in their street-level aesthetics; while other neighbourhoods may have adequate green spaces without benefiting from their multi-functional use and realizing their socio-environmental potential. Additionally, sustainability in urban green space is not only desirable, but profitable too.

Another feature of greening the city is the development of urban agriculture. Food, for instance, is a basic human need; and a just and sustainable food system:

- protects the land which produces food,

- supports the local economy through local production,

- empowers communities through self-reliance, and gives them increase food system security

- enhances community well-being through improved health and nutritional conditions;

- increases sense of community; and

- increases environmental health because of reduced transportation of food.

Another greening-the-city circumstance is the presence and use of urban aquatic areas -streams, swamps and beaches - are often neglected or manipulated beyond recognition. Protection and restoration of such aquatic systems can revitalize neighbourhoods and commercial areas. Indeed, there are many examples in North America where seafront, lakefront, and riverfront areas of big cities have become special development zones of shopping and entertainment.

3.3 Healthy Communities, Healthy Island

In the Caribbean healthy communities mean healthy islands, for a healthy community reflects the health of its citizens. Health is now viewed by the World Health Organization as more than the absence of disease or infirmity but our physical, mental and social well-being; and the Ottawa Charter for Health Promotion (WHO1986) recognized that "the fundamental conditions and resources for health are: peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity." Local governments play a big role in all these areas.

The worldwide Healthy Cities movement (WHO1984) has led to Healthy Communities, Healthy Hotels and Healthy Islands approach, all based on four main ideas:

· **Wide community participation**: People from all walks of life working together toward a healthier community.

· **Multi- or inter-sectoral involvement**: Residents join various sectors of the community to form a common vision of a healthy community, each finding ways to contribute toward this goal.

· **Local government commitment**: Each government department focuses on the same vision of a healthy community and applies it in their jurisdiction.

· **Healthy public policy**: The key to promote health in its broadest sense is often changing strategy instead of policy, and promoting more public participation rather than government services.

Some of the tools and initiatives in the healthy-community programme includes: Programme office and management, health and fitness campaign, anti-smoking bylaws, safety audits, community police and patrol, organic food supplies, community kitchens, environmental justice advocacy programmes, neighbourhood-building, publicity, awards for community contributions,..etc.

3.4 Sustainable Communities

In applying the concept of sustainable development to Caribbean communities there must be an unprecedented and simultaneous emphasis on:

- the efficient planned use of urban space,

- minimizing the consumption of essential natural capital, and

- multiplying social capital

Crucial to coordinating and balancing these ends is the mobilization of citizens and their governments. Also, the basic problem of communities in the developed countries is that they are unsustainable, while in the developing countries they are underdeveloped, especially in terms of environmental works and services.

(a) Urban Space: The best use of urban space must be proactively planned and controlled, rather than result from an adhoc response of the land use/management authority to the development proposals that emanate from corporate citizens and groups from time to time. Certainly, most urban areas have fairly well established patterns of growth - residential and commercial. And such development understandably links residential areas to schools and workplaces by day, as well as nightly entertainment and weekend sports and recreation. It is also clear that the physical and social environments and their evolution can play a major role in how urban space is utilized on a priority and cost-beneficial way.

(b) Natural Capital : "Natural Capital refers to any stock of natural assets that yields a flow of valuable goods and services into the future." The total stock of environmental assets which comprise this natural capital may be divided usefully into three categories:

- non-renewable resources, such as minerals and fossil fuels;

- the finite capacity of natural systems to produce "renewable resources" (e.g. food not overexploited; and

- the capacity of natural systems to absorb man's emissions and pollutants without side effects, which imply heavy costs passed onto future generations.

Another view of natural capital through its sustainability (strong or weak) and the concept of economic "trade-offs", leads to the understanding that natural capital stock should not be destroyed. The "ecological bottom line" is that we must learn to live on the "interest" generated by our remaining stocks of living natural capital, and not deplete those stocks. And so, to minimize consumption of natural capital has profound implications for urban life, but we have no choice to shift to more sustainable patterns of resource use and development.

(c) Social Capital: Human capital is the acquired knowledge and skills individuals bring to productive capacity; and it is formed through training, education and experience. And social capital is the shared knowledge, understandings, and patterns of interactions that a group of people bring to any productive activity. It contributes to stronger community fabric, and, often as a by-product of other activities, builds bonds of information, trust, and inter-personal solidarity. It is the stuff that sustainable communities are made of.

Beyond understanding the basic nature of social capital, one needs to know how to multiply social capital for sustainable community development. The critical resources for this are trust, imagination, courage, commitment, the relations between individuals and groups, and time. Many of the social issues that people relate to most intimately - family, neighbourhood, community, decompression from work, recreation, culture, …etc. - depend on these resources. It is clear that we must aim to nurture and multiply social capital in order not only to preserve our stock of natural capital but also to improve our socio-economic well-being.

4. URBAN ENVIRONMENTAL MANAGEMENT STRATEGIES

4.1 Urban Environmental Management

4.1.1. Environmental Problems

The nature and severity of environmental problems as well as the character of potential intervention strategies in any one city will depend on the following factors: ·

The unique natural features of urban areas; whether coastal or inland, mountainous or flat, arid or humid, temperate or tropical, or some combination of these features.

· Population size and rate of growth; which affects the spatial concentration of people, industry, commerce, vehicles, energy consumption, water use, waste generation, ..etc.

· The level of income and economic development; where higher levels suffer from industrial and energy-related pollution while lower levels experience inadequate basic services and depleted forestry resources.

· The diverse spatial dimensions of problems; which determine who is affected and how, the severity of impact, appropriate level of responsibility, ..etc.

· The roles of local actors; whose interactions have an important effect on environmental problems and their solutions.

Not to be underrated is the linkage between poverty, economic development, and the environment; which linkage raises issues of equity, and of the changing nature of environmental problems and services.

4.1.2. Policy Messages

Experience throughout the world recommends that an effective approach for confronting urban environmental issues is to formulate an urban environmental management programme complete with policies, strategies and action plan. This approach is based on participation, building commitment, and choosing effective policy interventions. The key policy messages recommended are as follows:

· Mobilizing public support and participation; especially in low income areas where increased awareness can bring about necessary political commitment and the implementation of affordable solutions.

· Improving policy interventions - making strategic choices; which can include such tools as economic and regulatory instruments, property rights, land management instruments, and information/education.

· Building institutional capacity; through upgrading local technical and management capabilities with the accent on operational management.

· Strengthening service delivery; which involves the upgrading of the management of local environmental infrastructure and services (e.g. water supply, sanitation, drainage, solid waste management, ..etc.)

· Closing the knowledge gap; by emphasizing routine collection, assessment, use, and dissemination of critical data.

· Planning strategically; by focusing on essential interventions that can be implemented quickly and effectively, have a high chance of success, pave the way for future environmental control, ..etc.

4.1.3. Strategies

The environmental planning approach recommended attempts to blend careful analysis with consensus-building and the participation of a diverse cast of actors. A planning strategy should involve several activities:

· Informed consultation during which rapid assessments are conducted and environmental issues are clarified;

· The formulation of an integrated urban environmental management strategy that embodies issues-oriented strategies and actor-specific action plans.

· Follow-up and consolidation during which agreed programmes and projects are initiated, policy reforms and institutional arrangements are solidified, and monitoring and evaluation procedures are put in place.

To work, any urban environmental strategy must reconcile three overriding tensions in environmental management as follows:

· Integrated versus sector-specific approaches, although agreed actions can only be carried out effectively through designated agencies.

· Analysis versus process, while closing the gap between careful analysis and the interests of various constituencies.

· Decentralized versus centralized approaches, depending on the merits of municipal/regional action or the power of the relevant national agency.

To formulate and implement urban environmental strategies and action plans, cities will need to integrate environmental considerations into urban life and initiate new environmental management programmes which will require stronger institutions, better facilities and equipment, and incentives for improved institutional performance.

4.2 Eco-city Planning Initiatives

4.2.1. Conventional Planning

Conventional urban planning rests on a faith in growth and utilizes a mechanistic approach. "It assumes that expansion of economic activity, population, infrastructure, ..etc. is inherently beneficial and that any negative aspects can be minimized well enough through marginal adjustments." Many consider that governments' existing decision-making processes for land-use, planning and approvals are too fragmented, expensive, and time consuming; insufficiently sensitive to environmental and social factors; excessively rigid and rule-bound; too slow, reactive, and arbitrary; and apparently unable to ensure, even to promise, attractive, vibrant, and sustainable settlements.

Town planning was made into a "science" of plot ratios, setbacks, percentages of open space, standardized road patterns and building forms, and endless other mechanisms for controlling land development by both governments and developers. Nature is restricted to a bit of required open space, very often a degraded piece of leftover land that is not leveled, drained, or furnished as a park for human use and enjoyment by all age groups. It has been said (Catholic News, 30 July 2000) that "Planners nowadays, especially when working in the third world countries, set

little store on the talents of local people. This is the root cause why countless grandiose projects have failed dismally over the year."

There are three important ideas that seem to require rediscovery as part of town planning:

- The positive qualities of density in walking-based centres and sub-centres linked by transit;

- The positive qualities of mixed land use, as opposed to rigid and separated zoning; and

- The positive qualities of natural processes and localized community processes in the city.

The paradigm shift from economic development to sustainable development requires that cities be built on a more respectful interrelationship of economic, social and environmental well-being. Conventional planning is about nudging and accommodating prevailing trends, but ecosystem planning is about choosing and pursuing a desirable future.

4.2.2. Ecosystem Planning

It is clear that a new way of addressing urban problems is needed and that it will have to be more efficiently integrated, more sensitive to ecology and community, more respectful of uncertainties, and more open to citizen involvement than what now prevails. This has led to an ecosystem approach to planning: "an approach that begins with an ecologically-bounded area, stresses the integration of social, economic, and environmental factors, and seeks to involve all the relevant interests and power-holders in identifying desirable futures, evaluating alternative pathways and implementing preferred solutions."

A number of basic principles reflect the characteristics of ecosystem planning, as follows:

· Base planning units on natural boundaries, reflecting ecological functions while replacing a politically-oriented hierarchy of units.

· Design with nature, and respect human activity and its effect on the environment as well as the limits of resource availability and ecosystem resilience.

· Consider global and cumulative effects, because a much broader and longer perspective must be considered, like attention to off-site, cross-boundary, inter-generational, and cumulative effects.

· Encourage inter-jurisdictional decision-making, and overcome the present fragmentation and isolation with integrated planning and implementation.

· Ensure consultation and facilitate cooperation and partnering, involving the widest range of stakeholders effectively and openly in the planning process.

· Initiate long term monitoring, feedback, and adaptation of plans, to assess what happens to communities and ecosystems as plan implementation unfolds.

· Adopt an interdisciplinary approach to information, by greater information gathering (e.g. ecological capacity and functions), more integration of information, and greater cooperation among information providers.

· Adopt a precautionary but positive approach to development, that aims not just to avoid further damage but also to reduce stresses and enhance the integrity of ecosystems and communities.

· Ensure that land-use planning integrates environmental, social, and economic objectives, but this depends on the planning body having a firm base of established institutional power to foster multi-interest cooperation and implementation.

· Link ecosystem planning with other aspects of democratic change, social learning, community building, and environmental enlightenment.

4.2.3. Valuing Urban Environmental Problems

The challenge of environmental planning is to value the effects of and rank urban environmental problems in terms of health effects, productivity, amenity, ecological values, and other key indicators. By categorizing impacts in this way, emphasis can be placed in the following areas:

· Health and Safety: In examining health and safety effects, assessment criteria include health care costs, lost working days, and higher mortality rates.

· Productivity: Any assessment should judge the extent of losses in urban productivity, which results from poorly operated infrastructural systems and mismanaged environmental surveillance services.

· Equity: Issues of equity are of critical importance because the negative effects of urban environmental degradation fall disproportionately on the poor: A priority in urban improvement programs is increased attention to such low income areas.

· Ecology: Ecological effects can be judged on the availability and costs of water and land resources, the vulnerability to natural disasters, and the loss of biological diversity.

· Amenity: Effects on amenity include air and water quality, noise levels, scenic beauty, and the presence of parks and clean open-spaces.

Efforts to establish environmental priorities may be by:

- Conducting rapid assessments (and issue-specific action plans) using environmental checklist/profile, and a consultation process;

- Building a typology divided into externalities and impacts including those arising from inadequate environmental health situations, congestion of urban systems, and from degradation of natural support systems.

4.3 Sustainable Community Building Blocks

In order to move citizens and their governments toward sustainable cities and other urban areas one needs to examine and understand the "building blocks" to support such a move; and such a foundation comprises planning tools, practical initiatives, and associated resources. These blocks are:

a) Parks

Open space in urban areas is a vital feature of sustainable green initiatives, especially properly located, designed, furnished and maintained community parks. Parks are not "ornaments". They are required to serve all age levels in the community. The larger they are the more multi-functional they should be, while smaller parks require security control to limit the extent of allowable sports and games by active sporting youth in the proximity of aging strollers and baby prams.

Parks can provide places to gather, rest, meditate, rejuvenate, and if large enough, places to play. They should be well distributed throughout cities and other urban areas. In recent times community gardens have also become popular in some cities, no doubt encouraged by the greening-the-city movement.

b) Water Supply

In some Caribbean cities water resources are limited, wastage from leaks and abuse is high, and water quality is not monitored in accordance with WHO International Guidelines for Drinking Water. Much remains to be done in terms of quantity, quality and financing. True cost financing may be the simplest solution; but faced with population growth and soaring demand, many cities propose to turn to desalination despite its reportedly high cost.

Certainly, efforts at reducing waste and improving water-efficiency are imperative. Water conservation initiatives involving metering and leak detection work by water agencies, as well as customer demand management strategies, must be supported by public education and incentive programmes. The aim should be to maximize the use of available water supplies before attempting to explore and expand new supplies at higher costs.

c) Sewerage

The biggest problems facing sewerage systems in urban and coastal areas in the Caribbean are the high cost of sewer systems and properly designed sewage treatment plants, the lack of appropriate technology, the absence of well trained operation and maintenance personnel, the indifference of the general public to these shortcomings, and the resulting lack of political will.

Not all capital cities in the Caribbean have a communal sewerage system (e.g. St. John's, Antigua), and those that have such systems may lack satisfactory treatment and disposal, not to mention the lack of sewer system extensions to some suburban areas (e.g. Port of Spain, Trinidad). The prolific use of septic tanks and waterless pit privies outside of core systems is a persistent polluter of groundwater supplies in various suburban areas.

d) Solid Waste Management

The generation of solid waste in urban areas continues to grow as a result of urbanization, consumerization and industrialization. Indeed, as communities progress and prosper the percent of "special" wastes (e.g. hazardous waste, derelict cars, ..etc.) also increases and requires special attention for collection and disposal. The solution is generally considered to be prevention rather than clean-up, and the preferred options are the four Rs: reduce, reuse, recycle and recover.

· Reduce: The best way to reduce waste is by not creating it in the first place. First we must re-think our consumer habits and practice source reduction; and two systemic approaches to encourage source reduction are Life Cycle Analysis and Cradle-to-Grave management.

· Reuse: Except for bottle industries (e.g. soft drinks and beer) reuse is an under-used component of the waste hierarchy. In recent years some businesses recognize the potential savings - both financial and environmental - and are starting their own initiatives to reuse products and materials.

· Recycle: Recycle means to pass an object again through a series of changes or treatments with a view to its reuse. The popular categories for recycling are: Paper, Plastics, Glass, and metal. There are many benefits, such as: waste reduction, energy savings, cost savings, reducing the extraction of virgin raw materials, ..etc.

· Recover: Recovery means to adopt a waste object to a new use by extracting energy or utility from it. A popular option is waste-to-energy facilities that burn wastes for fuel to produce heat or power for domestic or industrial use.

e) Energy Efficiency

Energy production is big business, and its consumption fuels the national economy, but at what price to our ecosystems? Environmental impacts of consumptive lifestyles include ozone layer depletion, acid rain, potential climate change and other forms of pollution and environmental degradation. Reducing consumption is usually more cost-effective than expanding supply; and energy efficiency should be encouraged.

Energy efficiency means doing more with less. It implies the use of products that deliver the same service as other units, but with a fraction of the energy or electricity demands. One of the strategies in any energy conservation programme is the use of renewable energy options, such as:

· Photovoltaic (solar electric) power: Such panels produce electricity for independent systems with batteries for storing energy, or supply electricity to the power grid.

· Solar thermal energy: Solar hot-water systems typically provide water for showers and baths; and some solar thermal projects are designed to convert heated water into electricity.

· Wind power: Stand-alone turbines supply electricity for rural homes, farms,..etc. Wind farms - cluster of wind turbines - generate power for the electrical grid in some countries.

· Biomass: Agricultural plants or organic wastes provide fuel - methanol or ethanol - for use as an alternative for most oil or gas needs.

· Micro-hydro: Micro-hydro projects can provide small turbines to use springs or other waterbodies with a minimum of disturbance to generate small electricity supplies.

While energy efficiency and green-power supply options offer many benefits for communities, greater benefits are possible if local governments integrate energy considerations into all planning decisions.

f) Air Quality

The key areas of atmospheric change that concern communities are: local air quality, potential climate change, and ozone layer depletion.

· Local air quality: the release of atmospheric pollutants by human activity results in two local phenomena: smog and acid rain. And the adverse effects on both human health and environmental quality are serious.

· Climate change: One possible consequence of atmospheric change is global warming when the dumping of additional quantities of greenhouse gases into the atmosphere increase its heat retention. This situation poses serious health risks to food production systems and many other key social and ecological functions that human civilization depends upon.

· Ozone layer depletion: In the upper layer of the Earth's atmosphere, the stratosphere is a thin shield of ozone that limits the amount of ultraviolet radiation that can reach the Earth's surface. Depletion of the layer causes an increase in radiation, a higher incidence of skin cancer, damage to crops and plant life, ..etc.

On the question of reducing atmospheric and air emissions a number of economic benefits would arise, including:

- lower energy costs from energy conservation and energy;

- growth of businesses that sell energy-efficient technologies;

- growth of renewable energy businesses;

- reduced repair costs for damage to the environment and human health caused by climate change and other pollutants.

g) Transportation

Each second another new car comes on the world's roads; 100,000 cars a day. In 1950, there were 2.6 billion people on Earth and 50 million cars in the world. In 1998, the human population more than doubled, while the car population has increased ten-fold to 500 million. Our obsession with the automobile is clearly unsustainable; and unsustainable transport systems not only are a major contributor to atmospheric change, but also lead to increasing

congestion, longer commuting times, higher prices due to reduced worker production,..etc. Special studies highlighting the vulnerability of the elderly in a car-dependent city show that the time is right to provide improved urban design options for them.

But there is general agreement that the reduction of our automobile dependency should receive priority attention, such as:

· Land-use objectives: more transit-oriented, higher density, mixed land uses which help to halt the growth in auto-based development;

· Private transport objectives: stabilized or lower car use and less emphasis on infrastructure for cars;

· Public transport objectives: higher quality transit systems which are more competitive than cars;

· Non-motorized mode objectives: greater safety and amenity for walking and cycling, and increased use of these modes.

According to the Economist (1996) "Four forces are at work to influence the choice of fuel for the future: oil depletion, global warming, urban pollution, and urban congestion."

(h) Land Use

Land use permeates virtually every aspect of sustainable communities. Sustainable land use can help invigorate communities, and provide considerable environmental, economic, social, and cultural benefits. And "sustainable community planning can recognize and respond to the diversity of interest and desires in any community by encouraging land uses that cater to a range of incomes, ages, physical abilities, and cultural backgrounds."

Transportation and land use are inextricably related. In the absence of comprehensive planning in some Caribbean cities, transportation has, almost by default, guided land use. Instead, land-use planning should guide transportation, and transportation should be designed to accommodate and support planned growth, inducing the needed changes in urban form. Also, the dispersed land-use patterns are typified by the low density suburb in which there are many social and environmental weaknesses.

A special study on "sprawl" (defined as an inefficient, extensive use of land for urban activities) concluded that it is "the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption, and many types of personal costs." Increasingly, the social benefits of compact urban development are being promoted although the removal of conflicting incentives (e.g. artificially low gas prices) is a conditionality.

i) Housing and Community Development

Perhaps the greatest environmental influence on people is the home and community environment, especially for the young. Improving livability and fostering neighbourhood infrastructure is imperative for the well being of people and the survival of humanity. Despite

myriad opportunities for social interaction, cities and towns are lonely places of isolation for many people, especially those without family in the area.

Various types of codes related to housing are:

· Housing code: This has to do with houses as dwellings. It deals with such matters as lighting, ventilation, sanitation, room arrangement, protection against fire,…etc.

· Building code: This has to do with houses as buildings. It deals with materials, equipment, structural safety,…etc.

· Sanitary code: This deals with the unsanitary conditions throughout the community.

· Zoning code: This has to do with the development and use of private property throughout the community; permitted uses for various zones or districts.

In some countries there is also a Plumbing Code to regulate plumbing practice; and an environmental survey of a neighbourhood would include the following:

- Land crowding

- Nonresidential land uses

- Hazards and nuisances

- From Transportation system

- From Natural causes

- Inadequate utilities and sanitation

- Inadequate basic community facilities

The 30 basic principles of healthful housing include:

- Fundamental physiological needs (e.g. thermal environment, atmospheric purity, illumination, direct sunlight, noise, exercise)

- Fundamental psychological needs (e.g. privacy, normal family life, normal community life, facilities for maintenance, aesthetic satisfaction, social standards)

- Protection against contagion (e.g. water supply, water system protection, toilet facilities, sewage contamination, unsanitary conditions, vermin control, food safety)

- Protection against accidents (e.g. accident prevention, fire prevention, fire escape, electrical protection, protection against gas, mechanical injuries, automobile hazards).

j) Economic Development

Community economic development is not just about business creation; its about creating self-sustaining communities. It places greater emphasis on sustainability, including social equity and environmental responsibility; and its citizens and their governments choose economic development that provides opportunities for people of different incomes and skills, promotes a better quality of life, and protects the environment.

Community Economic Development has been defined as "a process by which communities can initiate and generate their own solutions to their common economic problems and thereby build long-term community capacity and foster the integration of economic, social, and environmental objectives." The main goal of Community Economic Development is individual and community self-reliance through collaborative action, capacity building, and returning control of business enterprises, capital, labour, and other resources from the global marketplace to communities.

Local self-reliance means diversification of local economics to support local needs, encourage cohesiveness, reduce waste and enable more sustainable trade practices with other communities. The goal of a self-reliant community is to enhance local wealth, and the basic tools that communities can use to generate local wealth are:

- less; by maximizing use of existing resources Making more with

- Making money go round; by circulating dollars within a community.

- Making things ourselves; to replace imports.

- Making something new; by creating a new product.

Economic development must be rethought, and its emphasis must shift from growth to sustainability. By re-evaluating their needs and wants, some people are realizing that there are alternative ways to satisfy their true demands for comfort, security, health and happiness.

Stakeholder Participation

In recent years an important strategy in achieving urban environmental management is stakeholder participation which requires the efforts of a wide range of institutions, organizations and individuals. The pace and complexity of change is such that isolated actions cannot suffice. A major contributing factor to the existing backlog of urban development problems is the lack of synergy of action between different stakeholders and actors. Elimination of this backlog requires a principle intention of working in unison towards a common goal, thus making the whole of the effort greater than the sum of its parts.

No doubt, collaboration among stakeholders is the way to greater synergy. It involves more than information exchange, or even collective decision-making. It involves partnerships, mutual trust and understanding. Such collaboration must be seen as a principle that needs conscious practice

to optimize resources and actions, forming a basis for mutual support, and avoiding duplication, gaps and conflict.

At a meeting at Bellagio, Italy, from 1-4 February 2000, an expert group brought together by the Environmental Sanitation Working Group of the Water Supply and Sanitation Collaborative Council agreed that one of the new approaches needed should be… "In line with good governance principles, decision-making should involve participation of all stakeholders, especially the consumers and providers of services."

The reasons for stakeholder participation are:

(a) Strategy

- Governments now face more complex development issues.

- Laws and regulations will only work with willing compliance

- Resource allocation, protection and sustainability are more difficult.

- Community groups must understand each other's interests.

- Social and economic equity in resource management must be evident.

(b) Opportunity

- For information exchange.

- Demanded by interest groups

- Desired by decision-makers

- Generates solutions to problems

- Required by law and/or policy

- Obtains consent or support

- Facilities implementation

- Joint analysis often resolves conflicts

Additionally, there must be genuine stakeholder participation at all stages of development from Defining the Problem (Stage 1) to Approval and Implementation (Stage 6). This staged effort is detailed at Box 4.

BOX 4 STAGES IN STAKEHILDER PARTICIPATION *

Stage 1 : Defining problem and participants

- Who should be involved and why?
- Choosing the stakeholders
- Stakeholder issues
- Positions taken on issues
- Importance of underlying interest

Stage 2 : Designing the process

- Extent of stakeholder involvement
- Meeting stakeholder participants
- Participation agreement

Stage 3 : Convening the process

- Finalizing and agreeing on ground rules
- Harmony and unity
- Disharmony and division

Stage 4 : Gathering and examining information

- Technical, Procedural and Relationship
- Methods of formal stakeholder participation
- Roles and role clarity

Stage 5 : Building agreement

- Dispute solving
- The one-step rule
- Nailing down the details

Stage 6 : Approval, Ratification and Implementation

- Ratification and Implementation
- Workplace plans and agreements
- Post-approval disputes

5. MOVILIZING SUSTAINABILITY IN URBAN AREAS

5.1 The Role of Governance

Mobilizing sustainability in urban areas requires the social and political will to re-order the priorities of our societies and communities, to shift our values, and to aspire to higher objectives than economic growth and short term consumer happiness. It is clear that the implications for government and governance are profound, in at least six areas of interest:

(a) The purpose of Government: The main purpose of Government is human development. Economic activity, as is currently practiced, is merely the means; and if the means threatens the end, we must change the means and not the end.

(b) The approach to Government: The approach to government and governance must be a holistic one. We have to work intersectorally and collaboratively to achieve our common purpose. The "round table" mechanism has worked well in North America, as well as "stakeholder participation."

(c) The level at which Government occurs: Today, there are opposing forces supporting the following: regionalism, nationalism bioregionalism, and parochialism. The question is: At what level are the best decisions made to positively affect the well-being of people and the quality of their life? Actually, present trends are toward decentralization.

(d) The style of Government: To attain healthy and sustainable communities a new management style must emerge. It is a style that emphasizes negotiation rather than directives, process rather than structure, collegiality rather than hierarchy, collaboration rather than competition, and a holistic rather than a sectoral approach.

(e) The structure of Government: The present system of government is based on the 19th century models of disciplinarity in separate sectors (e.g. Health, Public Works,…etc.) while most of the issues we face in the new millennium cut across these ancient departments. It is clear that new structures of government must be created to respond to the new challenges of development.

(f) The democratic process of Governance: The new emphasis on greater community involvement in creating a healthier city or a more sustainable community is essentially an exercise in democracy. And democracy can be enhanced by more stakeholder participation, social partnerships, and community involvement.

Government actors in mobilizing sustainability in developing urban areas include:

- Politicians, at the local and national levels;

- Environmental management agencies;

- Environmental health services;

- Physical planning agencies;

- Water and waste management agencies;

- Other infrastructural and sectoral agencies.

Non-Government Inputs

5.2.1. Private Sector Involvement

Two outstanding occasions of the private sector (e.g. business and industry) getting together to propose corporate efforts at environmental responsibility, were:

(a) The Coalition for Environmentally Responsible Economies (CERES) set forth in September 1989 the Valdez Principles as broad standards for evaluating corporate activities that directly or indirectly affect the biosphere. They include: eliminization or minimization of pollution, sustainable use of natural resources, reduction and safe disposal of wastes, energy conservation, environmental risk reduction, selection of environmental directors and managers, and annual environmental audits,…etc.

(b) The International Chamber of Commerce (ICC) Executive Board on 27 November 1990 adopted a "Business Charter for Sustainable Development: Principles for Environmental Management. (See Box 5). The 16 Principles for the environmental component of sustainable development includes the following: corporate priority, integrated management, process of improvement, employee education, prior assessment, products and services, consumer advice, facilities and operations, research, precautionary approach, contractors and suppliers, emergency preparedness, transfer of technology, contributing to the common effort, openness to concerns, compliance and reporting.

In more recent years the field of Corporate Environmental Management (CEM) or Environmental Business Management (MDS No. 30 of ILO) has been developing throughout the private sector, even in the Caribbean, probably buoyed up by the ISO Standard (14000) on Environmental Management. EBM was described by ILO as "the integration of environmental protection into all managerial functions with the aim of reaching an optimum between economic and ecological performance of a company."

It has been clearly established that there are myriad ways to improve the environmental performance of industry and commerce, as follows:

· Employ "end of the pipe" strategies to reduce waste and pollution

· Employ "front of the pipe" strategies to avoid waste, pollution, and environmentally harmful materials and processes.

· Conserve water, optimize energy efficiency, and/or use renewable energies such as wind power.

· Employ strategies to protect or enhance the environment, preserve biodiversity, and protect the ecosystem.

· Target environmental issues for business activities. “Environmental businesses” help to improve environmental quality.

Forming partnerhips with the public sector and NGOs is a very pragmatic way to go for the private sector.

5.2.2. Non-Government Organizations (NGOs)

Non-Government Organizations (NGOs) can be very effective agents for building public awareness at the local level, for mobilizing community action, and for voicing local concerns. Often, however, environmental NGOs are focused exclusively on natural resource matters and global issues, and pay insufficient attention to improper waste disposal and other environmental health problems.

Community-based Organizations (CBOs) tend to be aware of the impacts of environmental problems at the household and neighbourhood level. However, such a group often lacks the expertise and interest in the preparation of urban infrastructure or industrial projects that affect them.

A new non-profit organization that fits into this category is the Technical-based Organization which includes the professionals and sub-professionals working in a specific discipline such as water supply and/or waste disposal. Membership would include engineers, administrators and even support personnel with different grades of employment in the public and private sectors. Some international agencies do not consider such an organization to be an NGO, and therefore it may not qualify for international assistance, financial or otherwise.

5.2.3. Other Participants

Other participants who would also be included in a listing of urban development stakeholders would be:

· The scientific and engineering community, who play a pioneering role in shaping the environment-and-development agenda. This group is often involved in environmental studies and research, and should ensure that the relevant data are communicated simply to the wider audience of stakeholders.

· The news media who report concerns about the adverse impact on the environment by the various developmental activities of man. Unfortunately, their role needs to be more positive, informative and educational.

· Neighbourhood organizations are by nature geographically based, volunteer driven, problem solving, empowering, multi-purpose and flexible. In short, such organizations fight crime, develop the required open space, plant community gardens, and organize recreation programs. However, some level of government needs to identify barriers to greater citizen involvement in decision-making and develop strategies to overcome them.

· Programmes and projects initiated by government agencies (e.g. highway beautification) or by the private sector (e.g. environmental health improvements in coastal hotels) can also play an important role in mobilizing sustainability in urban development.

5.3 Tools for Community Sustainability

5.3.1. Community Tools

Several community planning tools are useful for awareness building, problem diagnosis, and dialogue and participation in decision-making. Such tools include brainstorming, community meetings, field trips, media campaigns, open houses, public hearings, public meetings, role playing, vision building, and workshops.

Two other planning tools are worth mentioning:

· Popular Education: The tools of theater, story-telling …etc. are popular techniques that engage the community in the identification and critical analysis of issues, relevant information gathering, problem solving, and decision-making.

· Search Conferences: These are 2-day or 3-day strategic community planning conferences designed to engage stakeholders in planning and managing the future. The conference elements are: Review of past and current trends, analysis of external and internal forces, creation of a future vision, and development of an action plan.

Assessment tools are used for figuring out where the programme is, and for monitoring and evaluating where the programme is going. Community assessment tools include: risk assessment, focus groups, periodic monitoring reports, ranking, and surveys. Other assessment tools include: community case studies, community environmental assessment, community interviews, Geographic Information Systems (GIS),…etc.

5.3.2 Technical Tools

The following technical planning tools are used to establish environmental-capacity limits and human impacts on them, and to guide policy:

· Ecological Footprint Analysis: This tool estimates the land area required by any human activity, both directly and indirectly. The degree to which the "footprint" exceeds the total productive areas is a measure of unsustainability.

· Environmental Space: The maximum sustainable rates of human use of key resources are estimated, and then the resources are divided evenly among the world's population to give each individual's entitlement.

· Community-based State-of-the-Environment Reporting: The intention is to develop broad perceptions of ecosystems and our relationships with them, and to identify ecological approaches to planning and designing urban areas on which residents and governments can ponder and act.

· Other tools include "Sustainability Reporting" and "Environmental Budgeting."

Assessment tools include the following:

· Socio-environmental Impact Assessment: These comprehensive tools integrate social and environmental considerations into project planning, development and implementation. To be effective, assessment must be a decision-making tool.

· Environmental Audit: Such an (annual) audit is based on a regular assessment of the environmental impacts of a government's policies and practices.

· Other tools include: "Sustainability Appraisal", "Environmental Action Planning and Management," "Eco-Management and Audit System," "Social Auditing" and "Sustainability Indicators".

5.3.3. Tools in Action

A Local Agenda - 21 is a sustainable development action plan for the 21st century for any urban or local community area. Such a campaign can be any participatory, local effort to establish a comprehensive action strategy for sustainable development; and the proposed planning framework is based on the following four elements:

· Community consultation processes, such as roundtables, to achieve input and participation from every sector;

· Sustainable development auditing, to provide sound information about current conditions;

· Setting sustainable development targets, both near and long-term, for quality of life, environmental quality, resource consumption, and human development; and

· Development and use of indicators, to inform the community about the impact of its programmes and investments upon the sustainable development of the community.

The steps involved in developing sustainability indicators are:

· Clarify goals: the aim of the evaluation and the type of desired outcome;

· Determine who will lead the process;

· Invite participants: the process of evaluation may be as valuable as the eventual application of the indicators themselves;

· Decide how to choose indicators;

· Collect data by which to measure the indicators;

· Report on the indicators; and

· Update and revise the indicators

BOX 5 International Chamber of Commerce "Business Charter for Sustainable Development" : Principles for Environmental Management

1.	Corporate Priority	9.	Research
2.	Integrated Management	10.	Precautionary Approach
3.	Process of Improvement	11.	Contractors and Suppliers
4.	Employee Education	12.	Emergency Preparedness
5.	Prior Assessment	13.	Transfer of Technology
6.	Products and Services	14.	Contributing to the Common Effort
7.	Consumer Advice	15.	Openness to Concerns
8.	Facilities and Operations	16.	Compliance and Reporting

6. CONCLUSIONS AND RECOMMENDATIONS

After all the eager promises made by national leaders at UNCED in Rio in 1992, it is obvious that few of those promises were kept in the last 8 years. The road to sustainable development is paved with failed efforts to integrate the social and environmental factors into the economic framework of national development, not to mention the day-to-day decision-making at the community level.

Of course, one example of purported progress is the recent development of environmental authorities in the larger CARICOM countries (e.g. Jamaica, Guyana, Trinidad & Tobago) as well as Solid Waste Management authorities in OECS countries. Yet the old complaints still exist: Inadequate funding, uncertainty and delay in program administration, lack of social and political will, inadequate manpower resources and appropriate technology, ..etc. And these are still major impediments to adequate local responses to environmental problem-solving.

But the real failing is the reluctance of governments to make the paradigm shift from economic development to sustainable development, from quantity of life to quality of life, and from material possessions to psychological satisfaction. Some key features of any sustainable development policy are:

· Sustainable development requires sustainable communities; and more financial resources are needed to correct deteriorating urban infrastructural works and services.

· Rules can and must be changed to facilitate the restructuring of urban living.

· Sustainability means doing development differently to achieve long-term rather than instant benefits.

· Polluters should pay for the cost of remediation, but it is even more important to prevent pollution and the waste of resources in the first place.

· Social equity is not only desirable but essential. Inequities undermine sustainable development.

· Public participation is itself a sustainable development strategy. National decision-makers cannot continue to deny public "input" thereby failing to tap the local well of human ingenuity.

Finally, the development challenge ahead is to explore and understand the implications of a sustainable future and to adopt a new set of guiding principles and practices suited for it. Sustainable communities are the next steps in suggesting an alternative vision for a better life in a still unsustainable region. For if we do not succeed in creating cities that are environmentally and socially sustainable, the prospects for human development in the Caribbean are grim.

Appendix I

INCREASING ACCESS TO WATER AND SANITATION SERVICES

IN POOR URBAN AREAS THROUGH PRIVATE INVESTMENT *

The El Alto Project, La Paz, Bolivia

In many cities the "peri-urban" areas are inhabited by people with low incomes, poor health and high population growth rates. While they are very crowded and lack basic services, these areas tend to receive low priority in urban planning. While making water and sanitation available to 10,000 families, the project is developing a model for private sector participation, in collaboration with local stakeholders.

Stakeholder Collaboration

The project began by establishing a consultative process among its various stakeholders - governmental, international and residential. A Participatory Rapid Urban Assessment was used to assess demographics and conditions.

Key Project Elements

- Condominial sanitation investments

- Community mobilization and sanitation education

- Micro-credit services

Results of Activities

- Private investment to increase services

- "Market" growth for the utility

- Practical experience in appropriate technologies

Other Benefits to Stakeholders

- Three thousand families already gain access to services

- National Government obtained policy and strategy recommendations

- Local Government has increased awareness of water and sanitation problems and solutions.

- Water and Sanitation Program has tested a private participation model for low-income urban areas.

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