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***CHANGING CONSUMPTION PATTERNS IN HUMAN  
SETTLEMENTS***

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## INTRODUCTION

Sustainable human settlements development is a central goal of the Habitat Agenda<sup>1</sup>, which states :

*"Sustainable human settlements development ensures economic development, employment opportunities and social progress, in harmony with the environment. It incorporates, together with the principles of the Rio Declaration, which are equally important, and other outcomes of the United Nations Conference on Environment and Development, the principles of the precautionary approach, pollution prevention, respect for the carrying capacity of ecosystems, and preservation of opportunities for future generations. Production, consumption and transport should be managed in ways that protect and conserve the stock of resources while drawing upon them."*<sup>2</sup>

The concept of sustainable human settlements enunciated by the Habitat Agenda in its goals and principles, as above, is the culmination of a long search for defining the concept of sustainability within the framework of human settlements, and urban development in particular.

Agenda 21 (Chapter 7: Promoting Sustainable Human Settlements Development) made an important contribution to this end by mobilizing a global consensus on the concept of social, economic, and environmental dimensions of sustainability within the framework of human settlements. The Habitat Agenda interprets sustainability in human settlements in more holistic terms, and highlights the interdependence of, and the close relationship between, sustainable consumption and sustainable human settlements development.

The objective of this paper is to provide the 'starting blocks' for an expert-group discussion that will focus on:

What constitutes sustainable consumption from the human settlements perspective?

What are the forces driving consumption in human settlements?

What are the critical areas where current consumption patterns are likely to threaten the sustainability of human settlements?

Who are the principal actors and what need to be done to promote sustainable consumption in human settlements?

What UNCHS (Habitat) and its partners can do to promote sustainable consumption in human settlements?

The paper begins with a brief review of the current debate on what constitutes sustainable consumption and attempts to put it within the framework of human settlements. It then proceeds to review the current trends of consumption, by focusing on four critical areas: (a) energy and transport; (b) water resources; (c) forest-based

and mineral resources; and (d) waste generation linked to consumption. The emerging “danger zones”, where excessive consumption poses imminent threats to sustainability, are then highlighted. The final section addresses the growing challenge to put consumption in human settlements on a sustainable course, and outlines possible strategic interventions to achieve the sustainability goals of the Habitat Agenda.

## **I. SUSTAINABLE CONSUMPTION IN HUMAN SETTLEMENTS**

Current demographic trends point to a growing importance of the role and importance of human settlements in achieving sustainable development. During the period from 1990 to 2030, global populations will grow by about 3.7 billion. Ninety per cent of this increase will take place in developing countries and ninety per cent of it will be urban. The focus of sustainable development must, therefore, be on human settlements, and on urban areas in particular, as that is where most of the world’s population will live and work, where most economic activity will take place - and where most pollution will be generated and most natural resources consumed - with consequent impacts on the environment<sup>3</sup>.

**Box 1: Sustainable Consumption: the expanding policy agenda**

Agenda 21 did not define sustainable consumption patterns but clearly indicated the need to focus policy attention on "the demand for natural resources ... and ... the efficient use of those resources consistent with the goal of minimizing depletion and reducing pollution. The Rio process discussed two key driving forces of unsustainability: population growth, occurring mainly in developing countries, and 'overconsumption' on the part of the industrialized world. Agenda 21 established all countries' common responsibility for sustainability but pointed out that responsibilities were differentiated. The rich world was given lead responsibility for examining its own levels of consumption. The issue of global inequity was introduced by Agenda 21's statement that "Measures to be undertaken at the international level for the protection and enhancement of the environment must take fully into account the current imbalances in the global patterns of consumption and production". Thus, a link between unsustainable consumption patterns and current inequities in global resource use and pollution was established.

The first Oslo Symposium on Sustainable Consumption restated the biological basis of consumption patterns: "Current material flows induce pollution, resource depletion, energy consumption and biodiversity and landscape destruction (which) appear unsustainable by any standard". However, the working definition of sustainable consumption proposed at the Symposium also emphasised inter-generational equity and introduced the notion of quality of life, presumably as a pragmatic response to the infeasibility of policy measures which might appear to threaten western consumers with a reduced standard of living: "[Sustainable consumption is] the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of future generations"<sup>4</sup>.

The burgeoning policy agenda was confirmed at the second Oslo meeting where the key working document stated that "sustainable consumption is an umbrella term that brings together a number of key issues, such as meeting needs, enhancing the quality of life, improving resource efficiency, minimizing waste, taking a life cycle perspective and taking into account the equity dimension. Integrating these component parts is the central question of how to provide the same or better services to meet the basic requirements of life and the aspirations for improvement for both current and future generations"<sup>5</sup>.

The Habitat Agenda highlights the interdependence of sustainable consumption and sustainable human settlements development. It enjoins on all parties to manage consumption in ways that would protect and conserve the stock of resources while drawing upon them<sup>6</sup>.

**Source: CSD, OECD & UNCHS Sources**

Consumption is a *sine qua non* for human settlements. In industrialized countries, consumption will continue, mainly, in the pursuit of a better quality of life, while in the expanding settlements in the developing world, consumption will be primarily driven by the need to meet basic needs, to increase economic growth and to sustain the development process. The ongoing debate on sustainable development in general, and on sustainable consumption in particular, (see box 1) tend to indicate that clear boundary conditions for sustainable consumption are yet to emerge. Nevertheless, if one focuses on the areas where broad consensus have already emerged, then a hypothesis can be put forward that if *consumption in human settlements* is to contribute to sustainable human settlements development (as enunciated by Agenda 21, and expanded further by the Habitat Agenda), then it must meet the following *minimum* criteria:

Meet the basic needs of populations, particularly, the urban and rural poor, and contribute to raising the quality of life;

Will not irreversibly degrade or deplete the stock of natural resources; and

Will not lead to irreversible degradation of the environment through the accumulation of emissions and wastes.

The first of these criteria (basic needs and quality of life) essentially addresses the equity issue or the social dimension of sustainability. In the developing world, where the basic needs of shelter and infrastructure services still remain largely unmet, sustainable consumption could thus mean accelerating investment in such areas. In the same way, investments in combatting poverty, a critical element of sustainability, could also be viewed as contributing to sustainable consumption.

The second criterion (resource management) addresses the need for utilising resources more efficiently, and taking a life cycle perspective. In the human settlements context, a growing challenge for natural resource management comes from the burgeoning cities which draw upon the carrying capacity of distant ecosystems. The issues here remain essentially the same both in the industrialized and the developing world. The concept of resource conservation also brings in the issue of intergenerational equity.

The environmental consideration addressed by the third criterion becomes an important issue from the human settlements perspective, as increasing volumes of waste are generated by urban areas. The focus here is on minimization of waste, recycling and reuse, in other words, in closed loop systems. Environmentally sound disposal is another important issue here.

Reconciling the seemingly conflicting goals of sustaining the pace of development in human settlements on the one hand, and conserving the natural resource base and arresting the attendant degradation of the environment on the other, is a challenge to the policy makers and managers in both the developed and the developing world.

In the following sections, the paper uses these criteria to analyze the current consumption trends in human settlements, and explores possible interventions to put consumption on a sustainable course.

## **II. CONSUMPTION TRENDS: LOOKING BACK, LOOKING TO THE FUTURE**

The following review of the current conditions and trends of natural resources consumption in human settlements focus on four critical areas: (a) energy and transport (b) water, (c) forest-based and mineral resources and (d) waste generation linked to resource consumption.

### ***A. Energy & Transport***

The global primary energy consumption is rising by more than 3 per cent annually, and most of this consumption takes place in human settlements (e.g.,

lighting, cooking, heating and transportation). There are, however, wide variations in per capita energy use in different regions of the world; on average, the energy used by a person in developed countries is about nine times that in developing countries. Large disparities also exist among developing countries, for example, annual per capita consumption of modern forms of energy in sub-Saharan Africa is less than half the average of developed countries. Similar disparity exists within the developing countries, between the rural and urban poor and the higher income groups.

Several factors contribute to this disparity in energy consumption, notable among them being the level of urbanization, economic activity and living standards. With rapid urbanization in low and middle - income countries, this scenario is, however, changing fast. A recent World Bank study estimates that the energy demand in these countries is expected to rise from the current level of one-third of OECD countries to parity with OECD demand by the year 2015. The study concludes that the main factors contributing to this increase in demand will be urbanization, and motorization - a linked urban phenomenon.<sup>7</sup>

The rapid growth in demand in the energy sector in developing countries is taking place amid grossly inefficient energy-use in the transport sector, in households and in construction which, together, account for most of the energy use in human settlements. The transport sector is the largest single consumer of commercial energy in human settlements, accounting for nearly half of all petroleum consumption. In sub-Saharan Africa, it accounts for nearly 80 per cent of all commercial energy used. The key factors which contribute to inefficient energy-use in the transport sector are the growing road congestion in urban areas, increasing dependence on cars, and low fuel-efficient vehicles coupled with poor vehicle and road maintenance in developing countries.

In households, considerable scope exists for efficiency improvements in common cooking, lighting and appliance technologies. Vast amounts of energy are wasted in traditional cookstoves (with fuel efficiency as low as 10-18 per cent) still in common use in rural areas of the developing world. The technology is already available for energy-efficient stoves, fridges and lighting appliances such as compact fluorescent lamps, and in building insulation, which can reduce energy use by three-fourths, but their diffusion is slow, mainly because of higher initial cost to the consumer.<sup>8</sup>

Energy production and use, in almost every form, generates varying degrees of environmental externalities that affect human health, ecological stability, and economic development. The wide-scale use of fuelwood in Africa is contributing to deforestation and soil erosion. Also the extensive use of biomass in traditional stoves expose the users, mainly women and children, to high levels of indoor pollution (Smith 1987). Transport related air pollution is already threatening the health of some 300-400 million city dwellers in developing country cities. If current trends continue, by the year 2000, transport related air pollution in many large cities of the developing world will be much worse than projected levels for major cities in industrialized countries with much higher level of motorization<sup>9</sup>.

## ***B. Water resources***

Freshwater is a finite resource which has to meet the ever increasing demands from competing users: agriculture, industry and the domestic sector. The availability of freshwater is decreasing in many parts of the world notably in the Middle East and North Africa, the Sahel and Kalahari-Namib regions of Sub-Saharan Africa, Central Asia, Northern China, South western United States and many small-island states. Some 80 countries with about 40 per cent of the world's population are facing acute to chronic water scarcity. The worst affected in the middle East and North Africa still see their per capita annual renewable freshwater supplies decrease by about 80% between 1960 and 2025 - all in a single lifetime.<sup>10</sup>

With rapid urbanization, many cities are also facing water scarcity. In China alone, more than 300 cities face water shortage with 100 in acute distress -at an estimated cost of US\$14 billion in lost economic output each year.<sup>11</sup> Ensuring adequate water supply to megacities like Los Angeles and Mexico City has meant that the water authorities have had to tap ever more distant watersheds, sometimes with considerable ecological damage. Excessive ground water extraction in many cities in Asia, Europe and Latin America has caused saline intrusion and ground subsidence.

In developing countries, close to 85% of water is allocated to agriculture, 10% to industry and only about 5% for domestic use. Yet it is known that less than 45% of the water for agriculture actually reaches the crops. In addition developing country cities are losing between 30 and 60 per cent of water, produced and treated at high cost for domestic use, through leakage from poorly maintained water supply systems before it reaches the intended consumers. There is also the need to put in place measures to promote more efficient use of water resources, reduce losses and wasteful use, and ensure equitable distribution among different uses and users for the present and future generations.

There is also an important equity issue associated with water use, particularly in the urban areas. The urban poor in developing countries almost always have to rely on private water vendors and end up paying a very high price for their water, often several times more than other affluent neighbours who have water piped in to their homes. Thus the poor, in effect, subsidize water services for the more affluent and continue to suffer water scarcity and a heavy burden of healthcare. Inequitable pricing of water also leads to profligate use and wastage of this precious resource by the domestic sector.

### ***C. Forest-based and mineral resources***

Forests, which covered 40 per cent of the earth's surface some 40 years ago, now cover 27 per cent. Globally, the loss of forests has mainly occurred in tropical and sub-tropical regions, caused by the logging of hardwoods, clearance of forests for cropland, and collection of firewood.

Africa has suffered the worst deforestation with the forest cover reduced to 8 per cent. For Asia/Pacific and Latin America & the Caribbean, the corresponding figures are 19 and 48 per cent respectively. The per capita availability of forests in developing countries is now about half of that in industrialized countries.<sup>12</sup>

Firewood accounts for more than half of the world's demand for wood. In African countries, biomass is the key source of energy, accounting for 50 to 90 per cent of the total national energy supply.<sup>13</sup> In Sudan, between 1962 and 1980, woodfuel consumption contributed to 92 per cent of the 34,000 square kilometres of deforested areas. Zimbabwe's forests are being reduced by 1.5 per cent per year, with a growing fuelwood deficit and implications for women who gather fuelwood. In India, the livelihood of some 40 million of the country's indigenous/rural people, many of them women, depends on access to fuelwood.<sup>14</sup>

Despite widespread deforestation in large parts of the developing world, the forests-products industry continues to thrive well with a global annual turnover of US\$330 billion.<sup>15</sup> The annual demand for industrial wood is estimated to increase from 1.6 billion cubic metres to 1.9 billion by 2010, driven by increases in population and rising living standards. Industrial logging has played an important role in the destruction of primary rain forests in Central Africa and South-east Asia.<sup>16</sup>

The timber importing countries are finally taking action to foster sustainability in forestry management. These include: imposition of import charges on timber; introduction of labelling schemes to identify sources of timber; complete bans on the use of tropical hardwoods; and debt for nature swaps to support conservation. In the United Kingdom, sixty big buyers of timber products have pledged not to buy uncertified products after 1999.<sup>17</sup>

In the case of mineral resources, the main demand comes from the construction sector in human settlements. Several metals (such as lead, zinc and copper) with limited known reserves are extensively used as building materials in construction. For some, technological substitutes are already available while for others, search for new reserves as well as technological substitutes must continue.

Mining operations for the extraction of mineral resources also lead to the loss of valuable agricultural lands. It is estimated that conversion of land through quarrying for building materials represents about 20 per cent of the total land loss through urbanization. Serious environmental degradation also occurs due to the extraction of mineral resources. Mining moves an estimated 28 billion tonnes of soil and rock per year, causing erosion, siltation of water ways and metal contamination. Mining sites are also extremely expensive to clean up.<sup>18</sup>

#### ***D. Waste generation linked to resource consumption***

Waste generation, both domestic and industrial, continues to increase world-wide in tandem with growth in consumption. In developed countries, per capita waste generation increased nearly three-fold over the last two decades, reaching a level five to six times higher than that in developing countries. With increases in populations and living standards, waste generation in developing countries is also increasing rapidly, and may double in volume in the current decade. If current trends continue, according to some estimates, the world may see a five-fold increase in waste generation by the year 2025.<sup>19</sup>

Urban areas not only concentrate consumption of resources but also generate much of the domestic waste. Most city governments are facing mounting problems with the collection and disposal of wastes. In high-income countries, the problems usually centre on the difficulties of disposing of the large quantities of solid wastes generated by households and businesses. Landfilling, the most widely practiced disposal method in these countries, is becoming increasingly costly due to land scarcity and rising transportation costs. In developing countries, many city authorities are unable to collect and transport more than a third of the solid waste generated due to limited municipal budgets.

The rising cost of landfilling and the need to conserve resources have prompted most industrial countries to focus increasingly on recycling and reuse of both municipal and industrial wastes. Currently 22 - 40 per cent of waste aluminium, 27 - 51 per cent of waste paper and 10 - 53 per cent of glass are recovered through recycling and reuse in these countries. Several countries are also taxing wastes deposited in landfills. The revenues from this tax are earmarked for promoting community recycling programmes.<sup>20</sup>

In developing countries, on the other hand, recycling is driven by the need for low-cost materials for industry, high levels of underemployment and the low purchasing power of large segments of population. Many developing country cities, particularly in Asia have developed “extensive waste economies, structured through itinerant waste buyers, waste pickers, small waste shops, second hand markets, dealers, transporters, and a range of recycling industries”.<sup>21</sup>

In both the developed and developing world, increasing uses of agro-chemicals in intensive farming practices have contaminated potable water resources to a level hazardous to health. In one region of France the service provider (a private company) has been forced by law to revert to the use of specialized treatment and stand-pipe distribution for a domestic water supply in rural area due to groundwater contamination from agro-chemicals.

Poor solid waste disposal affects all three environmental media. Air pollution from combustion products, illegally dumped hazardous wastes and other gaseous products of waste decomposition have a significant effect, not only on the local environment but also on a global scale, contributing to the greenhouse effect and causing acidification of the environment. The pollution of water courses, both surface and sub-surface by decomposing wastes, is also a problem, especially where it is ultimately used as a potable supply by communities.

### **III. EMERGING THREATS TO SUSTAINABILITY: ANALYSIS OF TRENDS**

The rapidly growing consumption of natural resources in human settlements, outlined in the previous section, is driven primarily by two key socio-economic factors: global increases in population and economic growth with attendant rise in income levels. A related factor is the rising level of urbanization, particularly in the developing countries. Since 1950s, the world's population has more than doubled and

transformed itself from a predominantly rural to an increasingly urbanized society. The global economy has also enjoyed a five-fold increase in output in this period with rapid changes in life-styles and rising aspirations for a better quality of life. All these factors have increased pressures on the natural resource base and the carrying capacity of the global ecosystems.<sup>22</sup>

#### *A. Ecological footprint of cities*

In the human settlements context, the urbanization process perhaps provides the best integrated picture of the interplay of forces driving unsustainable consumption. The phenomenal urban growth since 1950s has far outpaced the overall rate of increase in population; The average population of the world's 100 largest cities has grown from 2.1 million in 1950 to 5 million in 1990.<sup>23</sup> Urban areas have also become the engine of growth for the developing countries, currently contributing to more than half of the gross domestic product. Driven by an ever increasing population and economic activity, cities are consuming resources and generating waste at a pace much higher than the national average.

It is also in the cities that the income disparities and poverty stand out in sharp contrast between wealthy neighbourhoods and squatter settlements, exacerbating unsustainable consumption patterns and attendant environmental degradation. This is because, "people at either end of the income spectrum are far more likely than those in the middle to damage the earth's ecological health - the rich because of their high consumption of energy, raw materials and manufactured goods, and the poor because they must often cut trees, grow crops, or graze cattle in ways harmful to the earth merely to survive from one day to the next".<sup>24</sup> Thus, it is not surprising that the highest levels of resource use and waste generation tend to occur in the wealthiest cities, and among the wealthier groups within cities.<sup>25</sup>

The most far-reaching consequence of resource consumption in cities, however, comes from its rapidly expanding ecological footprints. All cities draw on natural resources produced on land outside their built-up areas. The total area of land required to sustain a city could be, typically, ten times or more than the land area of the city itself. Such imports often far exceed the ecological surpluses in the distant exporting regions, depleting their natural resource base. Expanding ecological footprints of cities pose a special risk in that city habitants have no idea of the environmental damage they are responsible for in distant lands and, therefore, they lack the motivation to spur actions to reduce it.<sup>26</sup>

Sustainable development in a rapidly urbanizing world will depend to a large extent on the ability and ingenuity of urban communities and urban managers to lead the change in current consumption patterns, bringing it in step with the carrying capacity of the ecosystems they draw upon. There are some encouraging signs that this is already beginning to happen. (See box 2)

### **Box 2: Reducing ecological footprint of cities**

Urban agriculture and urban forestry can combine environmental goals such as reducing the ecological footprint of cities and utilizing city wastes with broader economic and social goals. Both generate jobs and contribute significantly to the food and fuel needed by the urban poor.

Some cities are already transforming themselves from being only consumers of natural resources into important resource-conserving, health-improving, sustainable generators of resources. A study by the Mazingira Institute in Kenya shows that almost two-thirds of 1,500 households questioned in six Kenyan towns produced part of their food and fuel. In Lusaka, Zambia's capital and largest city, vacant, derelict plots next to shelters provide vital food supplement through urban agriculture practiced by more than half of all the households in the surveyed low-income areas. In New York, one estimate suggests that 1,200 vacant lots have been reclaimed for community gardens.

In Calcutta, a third of the city's sewage ending up in marshes to the east of the city is processed in a most ingenious way. A little over 7,500 acres is taken up by sewage-fed fish ponds or *bheris*. Each year these fisheries produce 7,500 tons of fish. While some of the sewage goes straight to the *bheris*, some is held for use by the "garbage farms." Every day, Calcutta gets 150 tons of vegetables from these garbage farms. The effluent from the fishponds is also used, mostly in paddy fields which are dotted around the outer reaches of the marshes.

Source: UNCHS, Global Report on Human Settlements 1996 and other sources

### ***B. Fragile ecozones: small island states, coastal areas***

High population growth, rapid growth of tourism, and associated changing lifestyles are posing a serious threat to fragile ecosystems such as small island states, coastal areas etc. which survive on the borderline of sustainability. The small island ecosystems are typically characterized by limited land area, harsh soils, poor freshwater reserves and scarce natural resources for construction. Blasting of reef beds for boulders, and mining the lagoon for sand, can have long term impact on the fragile ecology of these islands. In Mauritius, the Government is currently involved in attempts to protect the island's natural beaches against indiscriminate exploitation by sand-extraction companies.<sup>27</sup>

Nearly half of the world's coastal ecosystems, including wetlands, tidal flats, saltwater marshes and mangrove swamps, are also threatened by land conversion associated with both urbanization and tourism. Shoreline development often intensify coastal erosion, alter the hydrology of estuaries and disrupt natural processes. 80 per cent of the coastal marshes that originally fringed San Francisco Bay, the most highly urbanized estuary in the United States, has been lost to development over the years.<sup>28</sup> In India, restrictions on the extraction of coral and shells for the production of building lime have met with varying degrees of success.<sup>29</sup>

### ***C. Resource-deficit countries***

Population growth, economic development as well as the other forces driving consumption particularly affect the countries with low per capita availability (compared to the world average) of natural resources. For example, countries in the

Middle East and North Africa, where per capita availability of freshwater is one of the lowest in the World, face an acute water crisis that threatens all development efforts. As noted in the previous section, many countries in sub-Saharan Africa and central Asia face somewhat similar situation.

The depletion of natural resources base such as forestry has led to loss of output and jobs as well as decline in exports in many countries like Cote d'Ivoire and Nigeria.<sup>30</sup> The Worldwatch Institute traces the recent tragedy in Rwanda to tensions which had built up over the years from the deterioration of the relationship between the people and their natural systems, caused by growing populations coupled with land and water scarcity.<sup>31</sup>

New challenges to sustainable resource management are also coming to countries which have so far managed their development efforts successfully with their limited resource base, supplemented by imports. But soon they will find it increasingly difficult as population increases, economic development, and associated lifestyle changes put consumption to a higher gear. This is particularly true for countries with large populations like China and India where the gap between the growing demand for and the shrinking availability of natural resources could pose serious threats to sustainable development.<sup>32</sup>

#### **IV. BALANCING SUPPLY AND DEMAND: THE SUSTAINABILITY CHALLENGE**

The current consumption of natural resources in human settlements is, clearly, over-exploiting the natural resource base and stretching the carrying capacity of ecosystems that provide us with renewable resources to a point that they could well collapse long before the world runs out of non-renewable resources. Meanwhile, the forces driving consumption do not show any sign of abatement.

Addressing this challenge must begin with a fresh look at natural resources. Natural resources can no longer be viewed as free goods, as many countries continue to do in their national accounts.<sup>33</sup> The first step will be to re-establish the 'lost' link between resource scarcity and resource prices. One way of achieving this will be to take into account the full value of the natural resources capital by internalizing their environmental and social costs. A range of economic and regulatory options are already available to translate this into practical action, using the *User Pays Principle* and the *Polluter Pays Principle*. In the longer term, by developing *natural resource accounts* and suitable indicators, countries could effectively monitor the exploitation and consumption of natural resources at national and sub-national level.

It will be equally important to identify strategic entry points for intervention. In the human settlements context, cities provide a clear focus for management interventions. As market economies and distinct administrative units, cities offer excellent opportunities for market-oriented policy actions and regulatory interventions. Urban consumption indicators, which monitor the intensity of resource use, could immensely help in the design of effective interventions, ultimately influencing lifestyle choices.

Forging broad-based partnerships of all interested parties of the civil society will be particularly crucial to successfully managing the use of natural resources in human settlements. There are many instances of ongoing, innovative initiatives by the private sector (both formal and informal), and community groups, for efficient resource use as well as recycling and reuse of wastes in human settlements. These need to be supported by governments at all levels with suitable incentives, and replicated where ever possible. Opportunities should be sought, in particular, for those 'win-win' options which combine resource conservation with employment and additional income generation for the poor and the disadvantaged in society.

A great range of opportunities already exist for natural resource management in human settlements in both developed and developing countries. For purposes of discussion, they may be broadly divided into (a) supply-side approaches, and (b) demand-side measures, as follows:

#### *A. Supply-side approaches*

There is growing recognition over the last two decades that efficiency improvements in resource use could be an important strategy for resource conservation. For example, by investing in energy efficiency, countries can stretch the energy services from existing supply capacities, free up capital for needed investments, and reduce harmful emissions. Efficiency improvements in water use could also avert current water crisis in many developing country cities. Raising the efficiency of forest-products manufacturing could reduce timber needs by about a fourth.<sup>34</sup>

Together with improving the productivity of energy and material resources, there is an urgent necessity to reduce the generation of waste in human settlements by promoting recycling and reuse. Cities provide excellent opportunities for the use of organic waste as compost, waste water in urban agriculture, and inorganic waste in the secondary material economy, that thrives in most developing country cities. This is the broad agenda of 'eco-efficiency',<sup>35</sup> which can bring additional employment to cities, improve the living environment and reduce cities' ecological footprints.

Improving the eco-efficiency of cities and other settlements will also call for a fresh look at current technological approaches to resource management. Technology will be an important ally in bringing about efficiency improvements. But the concept of 'appropriate technology' may have to be redefined, giving preference to those that promote 'eco-efficiency', over others which are more resource-intensive.

In some countries, the industry has already set targets for efficiency improvements. Local governments could set similar targets for their cities. Governments at all levels should also promote waste recycling and reuse by supporting not only the industry but also community initiatives and the informal sector, particularly, women's groups. Governments could also act as 'role models' by implementing in-house efficiency programmes ('greening of government'). The international community can help by standard setting, monitoring and by promoting eco-efficient technologies.

**Box 3: Energy Savings in buildings**

*Walls and roof:* Improved insulation can reduce heating and cooling load by 25 per cent. Many utility companies in the United States promote the use of wall and roof insulation in buildings to profit from increased energy efficiency.

*Windows:* Improved multi-pane windows can reduce heating load significantly. They save for households in the United States some US\$5 billion in energy bills each year.

*Lighting:* New compact fluorescent lamps require less than a quarter of the electricity consumed by conventional light bulbs. These have already replaced 80 per cent of home fixtures in Japan and captured significant market share in Europe and North America.

*Building materials:* A range of energy efficient, low-waste and cleaner technologies are now available for the production of building materials including cement, bricks and blocks and roofing tiles.

Source: UNCHS, Global Report on Human Settlements 1996 and other sources

***B. Demand management measures***

While eco-efficiency will buy time for some countries by slowing down the depletion of the natural resource base, there is a growing consensus that a fundamental change is required in the current unsustainable patterns of demand that is closely linked to life-style patterns of the consumer-driven society. The post-war transformation of settlement patterns and consumer behaviour (e.g, in purchasing *functions* such as mobility) indicates that human settlement management could provide a good opportunity for reshaping such demand and in putting it on a sustainable track. Three key elements of the demand management strategy can be identified as: (a) opinion forming, (b) planning and regulations, and (c) use of economic instruments.

**Box 4: Rising incomes and increasing motorization**

Japan is an example of a country where rising incomes do not mean increasing motorization. The bulk of Japan's post-World War II transport infrastructure investment has gone into heavy rail. Today, more than 53% of the population in Tokyo as a whole and 91.6% of passengers in downtown Tokyo commute by rail. In addition, more than 15% of Japanese citizens commute to work by bicycle at the national level and overall bicycle usage is increasing faster than kilometers travelled by automobile. While rates of auto ownership are high, how cars are used is strictly regulated and is a matter of public policy. By applying demand-management measures for travel by automobile, Japanese cities are considered among the most liveable in the world.

Source: Economic Instruments and Regulatory Measures for the Demand Management of Urban Transport, UNCHS, 1995

Beside economic development, values, aspirations and 'role models' tend to shape life styles and consumption patterns. By providing information on alternative product and life style choices and their benefits, opinion forming measures can play an important role in encouraging sustainable consumption patterns. The media, advertising and entertainment industry, educational institutions, community groups, particularly women's groups, can be important partners of the government in changing excessive demands for consumption.

Planning and development control activities can play an important role in reshaping current land-use patterns that promote excessive consumption of natural resources. Such measures can be particularly effective in controlling excessive demand for urban mobility and in protecting delicate ecosystems in coastal areas and small island states. Greater use of environmental impact assessments (EIAs) should be considered in settlements development, particularly in eco-sensitive areas. EIA techniques should also take into account the ecological footprints of cities.

Pricing and economic incentives, as policy instruments for demand management, are gaining gradual acceptance in developed countries in recent years. They can reduce excessive reliance on regulation and can lower the investment burdens of governments on resource conservation measures. A range of economic instruments have already been tried such as depletion charges on resource use, product and emission charges on pollution, and deposit-refund schemes to promote recycling and reuse. The experience of these measures need to be reviewed and disseminated for wider public and political acceptance.

### **Box 5: Who could do what to save the natural resources base?**

#### *Governments could:*

- Introduce natural resource accounting;
- Monitor depletion of natural resource base;
- Encourage industry to improve efficiency of resource use;
- Promote sustainable consumption through pricing, incentives, eco-labelling schemes;

#### *City authorities could:*

- Manage demand through opinion forming, planning and development control;
- Promote minimization of wastes, recycling and reuse;
- Promote urban agriculture and urban forestry;
- Support initiatives of community groups and informal sector;
- Formulate and implement Local Agenda 21;

#### *Industry could:*

- Lead the drive to achieving eco-efficiency: improving efficiency in material and energy use; minimizing waste in production processes; recycling solid wastes, waste water;
- Increase R&D investment for low-waste and cleaner technologies;

#### *International community could:*

- Promote energy/material efficiency standards, international product standards;
- Assist developing countries in sourcing and acquiring eco-efficient technologies;
- Support exchange of information on indicators and best practices;

*Source:* Compiled from United Nations Commission on Sustainable Development and OECD sources.

## **NOTES**

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2. See para 29, Chapter II, Goals and Principles, Habitat Agenda

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