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URBAN FORESTRY: SUSTAINABLE OPTION FOR ENVIRONMENTAL CONSERVATION IN NIGERIA

By

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Abstract

This paper examined the roles of trees/forests in urban environmental conservation. Environmental benefits were highlighted. they encompass landscape enhancement, recreation, education and general well-being, a habitat for wildlife; climatic modification, air and noise pollution control, erosion control, catchment area protection for urban water supply and the productive use or safe disposal of urban wastes. prerequisite determinants of sustainable urban forestry development were also identified to include technical, financial, human and institutional resources. The need to integrate ecological principles into the physical and social fabrics of urban landscape planning was stressed vis-a-vis Nigeria where low economic and technological development limit the provision and enforcement of environmental conservation measures.

Key Words

Urban forestry environmental conservation, urban landscape planning, sustainable development

Introduction

The urban environment in general tends to have a lion share of global environmental crisis because of the peculiarity of its characteristics. An average urban environment is typified by impervious surfaces, availability of highly reflective and radiating materials like concrete, asphalt and metal. This is in addition to presence of heavy industrial and economic activities, such as heating, cooking and transportation. These put together, have inherent capacities to emit heat, smoke and dust which severally and collectively degrade the urban environment. Such degradations often manifest in pervasive flood disasters, higher temperatures, drier air and emission induced haze or fog blocked sunlight, which are inimical to urban residents' health and safety (Ajewole 2000).

Therefore, major environmental problems plaguing urban centres can be summarised to consist of (i) air, land and noise pollution, (ii) harsh or non-conducive micro climatic condition, and (iii) stressful social living condition, informed inadequate, dilapidated and overstretched infrastructures.

Urbanisation which is occurring rapidly in developing countries (Carter 1994) is causing major social and economic changes, carrying along with it increasing demand for basic needs as fuelwood, low-cost construction materials, drinking water, and water for household use. These are not without huge environmental problems, in many urban areas of the developing world. Yet, meeting these needs are largely constrained by no less important need to maintain and improve the urban environment.

However, urban forestry offers variety of potential benefits including providing the urban poor with some forestry products, mitigating the ecological effects of urban sprawl and improving the living environment in urban areas.

Specially, material benefits consists of fuelwood; food; timber and poles; spices; fibres, medicines and other non-timber forest products. These may fulfil subsistence needs or be used as means of income generation particularly for the urban poor. Furthermore, environmental benefits to be gained from urban trees/forest in developing country include landscape enhancement, recreation, education and general well-being; habitat for wildlife; climatic modification; the control of air and noise pollution; erosion control; the protection of catchment areas for urban water supplies and the productive use or safe disposal of urban water supplies and the productive use or safe disposal of urban wastes (Carter, 1993). Bradley (1995) nonetheless viewed urban heat island effects, and very personal in so far as they answer the human need for exposure to green spaces in order to maintain a sense of well-being. He argued that the soothing and setting psychological and physiological effects that green experiences have on human beings provide a renewed sense of well-being. Opportunities for reflection, undistracted thought and invigorating discovery have an individual refreshed and renewed for daily activities. Concluding, Bradley (1995) iterates that green spaces contribute substantially to the physical, biological and psychological well-being of individuals and communities.

Urban Forestry and Environmental Conservation

There are ample empirical works that show the several and diverse roles of urban forestry in environmental conservation of urban centres. For instance Webb (1998) highlighted how urban forestry policies over thirty (30) years and sustainable urban greening programme, transformed Singapore to a green tropical city of excellence and attracted both high technology industries and financial services to the city.

In a related study, Mcpherson *et al* (1997), brought astounding insight into the economic importance of the environmental services of the urban forest in Chicago. They found out that these forests removed 5,575 tonnes of air pollutants, estimated to worth \$9.2 million as cleaning cost. These urban forests were also reported to sequester an estimated 315,800 tonnes of carbon. Mcpherson *et al* (opp.

cit.) further postulated that increasing tree cover by 10% or planting about three trees per building lot will save annual heating and cooling costs by an estimated \$50-\$90 per dwelling unit, because of increased shade, lower summertime air temperature and reduced neighbourhood wind speeds, once the trees mature. Moreover, the net present value (NPV) of the services trees provide was estimated at \$402 per planted tree, and present value of long term benefits exceeds twice the present value of costs. Laverne and Lewis (1996) also looked at the effect of vegetation on residential energy use from which computer models revealed that proper placement of trees around climate controlled buildings can significantly contribute to energy conservation by lowering cooling requirements in summer and heating requirements in winter.

The efficiency of an urban surrounding forest belt of Fhshun City, China, in controlling air pollution (SO₂, Nox and TSP - Total Suspended Particle) was examined by Xie *et al* (1998). They found out that the average concentration of these pollutants were reduced by 13.3%, 16% and 43.2% respectively inside the forest belt. Also the Sulphur content of leaves of one of the species in the belt - *Robinia pseudoacacia* are less in the periphery of forests, and least inside the forest. This implies a higher concentration of sulphur pollutants in cities. Similarly, Freer Smith and Broadmeadow's (1996) model estimating pollution uptake by urban woodlands in the Greenwood community forest, Nottingham, predicted that the current 10% woodland cover may reduce air pollutant concentration by 4-5%.

In similar studies probing the environmental conservation roles of green belts, Oigirigi (1986) recorded a wind speed reduction of as much as 30-50% in shelterbelt areas of Northern Nigeria. While Olembo and De Rham (1987) reported that green belts of just about 50-100 metres wide, had significant effect of reducing temperature by 3.5°C, with an increase in the relative humidity by 5% in Frankfurt, Germany.

Gusmailinass (1996) further corroborates the salient role several urban forest plants in the mitigation of emission in the air. He discovered that trees can be effectively used in the absorption and absorption of lead (Pb), emitted into the atmosphere through the increased motorized vehicles. *Cinnamomum* sp was identified as the most effective Pb absorbing tree, closely followed by *Agathus loranthifolia*, (*A dammara*), *paraserianthus falataria* and then *Sivietenia macrophyla*. Meanwhile, the greatest absorption was by *Agathus dammara*. Glimmerveen (1996) also highlighted the advantages of using trees to reclaim contaminated industrial sites, to include cheapness, erosion reduction, waste stabilization, soil development and improvement of visual appearance of the site. He cited *Betula* (birch), *Pinus* (pine), *Alnus* (alder) and *Salix* (willow), as species that have been identified to be metal tolerant and suitable for this purpose, while *Salix* (willow) has the advantage of combining fast growth with metal tolerance.

There also exists ample empirical works on the role of the urban forests in reducing noise pollution. Reethof (1976) discovered that a truck noise of 93dBA measured 15.2 metres from the source will be attenuated to 73dBA after passing through a 61.1 metre deep forest, typical of the North-eastern United States. Cook and Van Haverbeke (1971), also found out that a belt of tree and shrubs that is 19 to 30 metres wide at least 12 metres tall can produce attenuation of between 5 and 10 dBA, if one edge of two begins within 15 to 14 metres of the noise source. In comparing attenuation caused by such belts with attenuation over hard pavement surfaces; they noted an 8 to 15 dBA reduction in noise level. Cook and Van Haverbeke (1973) also discovered that 37m high berms used in conjunction with these vegetation belts increased their attenuation capabilities to 10 to 15 dBA. Van Haverbeke and Cook (1972) suggested that in urban situations, noise reduction plantings should be 6.1 to 15.2 metres wide, and the edge of the belt should be within same 6.1 to 15.2 metres of the noise source. Furthermore, Xie *et al* (1998) also investigated the noise reduction ability of the forest belt of Fushun city, China. They observed this to be in the range of 1-4KHz depending on the distance from the forest belt and tree spp, with *Pinus tabulaformis* greater than that of *Larix gmelinii* and that equally greater than *Robinia pseudoacacida*.

Requirements for Development of Sustainable Urban Forestry Initiatives

Sustainable urban forests have been defined by Clark *et al* (1997) as the naturally occurring and planted trees in cities which are managed to provide the inhabitant with a continuing level of economic, social, environmental and ecological benefits today and into the future. This calls for development of appropriate strategies and integration of urban forestry initiatives into over-all urban planning. In essence, technical needs as well as the financial, human, and institutional resources required must be recognised, while means of involving local people and forging links between the private, public and academic sectors must be identified.

Technical Requirement

Core technical requirements will consider answers to the following major inter-related points.

- (i) What functions is/are the trees to perform?
- (ii) Who is going to make the decision and use the tree(s)?
- (iii) Where is/are the tree(s) to be planted?
- (iv) What future management will be required?
- (v) What species/provenances can be made available?

Financial Requirement

A major requirement for the sustainable urban forestry programme is considerable sum of money. Hence possible sources of funds should be identified. Possible sources include Bi-lateral and Multi-lateral donor agencies, Multi-nation, National and Local business organisations as well as local community contributions.

Human Requirement

Another salient requirement in the development of sustainable urban forestry initiative, is public involvement. Such initiative must ensure equitable involvement of individuals and local groups of residents which may be associated with schools, local churches or mosques, environmental groups, harvesters of tree products or local neighbourhoods in the systematic and integrated management of urban forestry. Furthermore, individual urban dwellers may be particularly involved in urban forestry through such activities as planting of trees or volunteering to become tree wardens in towns and cities where such programme exist.

Institutional Requirements

Institutional resources are the pivot around which virtually all the other requirements revolve. Institutional factors governing sustainable urban forestry programmes include: administrative, traditional, legal, academic, and political.

Administrative issues relate to the existing and potential government mechanisms that can facilitate sustainable development of urban forestry. Such mechanisms will consist of state departments, parastatals and agencies like Forestry, Horticulture, Agriculture, Environment, Water resources/irrigation, Highways/roads FEPA etc. In this regard, the effect of the vertical and horizontal functional relationships among the three tiers of government on urban forestry programme, have to be examined.

Traditional issues on the other hand will relate to how the existing and potential roles of traditional mechanisms like local belief, customs and governance, can facilitate the development of urban forestry. For instance, the preservation of sacred grooves within or at the periphery of urban areas.

Academic issues in sustainable urban forestry development relates to the existing tertiary and research institutions that can facilitate the development of urban forestry professionals through training and research in all aspects of urban forestry.

Political aspects of urban forestry will have to do with the development of supporters or an enthusiastic constituency that will garner resources, do the work and maintain urban forest landscapes. Many environmental non governmental organisations and professional bodies have displayed laudable roles in sustainable development of urban forestry. Such NGOs include Tree people, and American

Peace Corps (U.S.A). Environmental Conservation Organisation (Republic of Ireland) while professional organisations include: American Forests, and International Society of Arboriculture (U. S. A.), as well as Arboricultural Association (U.K.) to mention just a few.

Conclusion

The apparently degraded environment of most Nigerian metropolitan centres, and the rapidly diminishing open/green spaces in many parts of Nigeria, call for urgent attention and drastic environmental conservation measures. All too often, our developed landscape is biologically sterile and aesthetically depressing, having driven nature out of the metropolis. Ornamental planting which is unduly sparse because of its cost or its inability to establish itself in difficult conditions, have paradoxically become the dominant of the negligible relics of nature in Nigerian cities.

Environmental conservation strategies are several and diverse, especially in developed nations. These have been summarily grouped as technical, preventive, and social/institutional. However their expected success is grossly marred by technical limitations, as well as political and economic drawbacks even in the developed nations. Besides, it has been found out that technical procedures merely tend to transform air pollutants into solid wastes, sludges or water borne wastes, which still require further handling.

In this regard, ecological principles can be woven into the physical and social fabrics of our urban landscape planning. If such principles are understood and applied, then our cities and towns will become better places to work and live in. If the natural factors inherent in the urban landscape are recognised and respected, and nature in the form of vegetation and wildlife, soil and water, exist in significant quantities and in close relationships with homes and work places of urban man, then not only will the environment become more diverse and satisfying and secure psychologically but the city as an ecosystem will become better enhanced in all aspects.

Interestingly, nature is potentially abundant and exuberant even in the most desolate city environments, and its establishment with man's assistance can often be quite rapid. Moreover, the capital and management costs can be reasonably cheap when compared to conventional landscaping.

Urban forestry development becomes highly imperative as an environmental conservation strategy, in a less developed nations like Nigeria where the provision and enforcement of environmental conservation measures are grossly hindered by the level of technological and economic development.

Urban forestry development in Nigeria presents an example and unique opportunity for Nigerian Foresters to showcase on the very doorstep of the urban dweller, the nature of traditional forestry as a sustainable multi-benefit land use. More importantly, it affords great opportunity for foresters to become prominent key players in urban environment management in Nigeria. It also increases job opportunities for

upcoming foresters. It then becomes crucially important for Nigerian foresters at different levels of public and private sectors as well as the forestry apex professional body to put all hands on deck to see to the development of sustainable urban forestry initiatives in Nigeria's major cities.

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