URBAN ENVIRONMENTAL SUSTAINABILITY: A CHALLENGE TO EFFECTIVE LANDSCAPING IN NIGERIA

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ABSTRACT

The poor quality of the Nigerian urban environment has been attributed partly to the inadequate, misuse and mis-management of the urban open spaces. This, according to various researchers, has exerted a major strain on the physical outlook of the environment and a negative effect on the welfare and productivity of the residents. This has called for the need to identify and analyze the open spaces in the urban environment and assess the implications of their landscape planning on the status of the city and the development of a healthy and sustainable environment. This study therefore discusses the concept of sustainability, particularly within the built environment. It looks into the principles and indicators for sustainability of the environment and the resulting problems. Furthermore, a case study of Akure urban core was carried out to assess the uses and landscape status of the open spaces. The results when statistically analysed showed the inadequacies in the provision and management of the open spaces in the study area. It therefore recommends attainable policies for the effective sustainability of the environment.

Keywords: urban environment, sustainability, landscaping.

INTRODUCTION

The environment is an interactive, indispensable medium, within and through which man's life performance is carried out. Man's life in his present nature is unimaginable without the environment to supply him with his needs such as air (to breathe), water (to drink and wash with), food (to eat), and solid materials for fashioning weapons, building shelters and clothing (Atolagbe 2002). Furthermore man's areas of exploitation of the environment is limitless and include those he does unconsciously and others that are still a mystery to him like procreation, cell division, differentiation and growth. Others are the operative methods of energy supplying devices such as the sun, moon and stars. This exploitation of environmental resources for his needs was initially considered inconsequential, but has changed over time. This is in the face of evidence of uncontrolled urban growth, leading to environmental degradation, deformation and depletion of man-supportive resources and increase in man-antagonistic ones. So also is the realisation that its reckless exploitation may spell doom or outright annihilation for plants and animals including man.

Environmental Cost of Technology

With advance in Technology, nations changed from simple agrarian living to complex industrial ones. In the building industry, practice changed from the use of friendly, easily recyclable, naturally occurring materials (earth, wood, stone, organic materials etc) to less recyclable, energy-intensive ones like steel, concrete, glass, plastic, asbestos products and chemical finishing with their consequent degrading effect on the environment (Atolagbe 2002).

The growth of industry, automobiles and chemicals encouraged population growth and economic prosperity in the urban centers. This in turn led to increase in housing production. Each succeeding generation and government demanded and budgeted for better products of technology, items of convenience and a wider variety of goods and services. Agriculture and industries responded by drawing on increasingly sophisticated technology using fuel and depleting natural resources at a fast rate.

In all these processes, wastes are generated leading to pollution and a frightening degradation of air, water, soil, nay, the entire environment. Thus, man and the nations 'prospered' at a cost, at an alarming distortion to environmental equilibrium (Anozie 1994). Hence, today we relish in technological development on all fronts but contend dangerously with its undesirable by–products, dwindling natural resources and increasingly denatured living environment, as enumerated below.

ENVIRONMENTAL DEGRADATION

The development of human skills in using natural resources to serve human purposes gradually challenged the natural environment at the local level and then at the global level. However, such challenges did not reach a catastrophic level until the late 1960s, when concern over the deteriorating quality of air, water, land and forests gave rise to

increasing awareness and the need to stem pollution and degradation to all components of the environment. This brought about the most profound environmental problems been faced today which according to Tairu (1998) include the following.

Environmental pollution

Most countries of the world according to Tairu are seriously concerned about the problems of environmental pollution. This he defined as the contamination of air, land and water by industrial and human wastes and effluents resulting from unintended consequences of their production activities as enumerated below.

Noise pollution

One of man's seemingly harmless habits that lend to environmental devaluation and the impairment of his health is noise. This is an undesirable sound from the viewpoint of others, except perhaps, the maker(s). The effects of noise on the environment is negatively manifested in the health of man and include; hearing impairment or loss, stress, high blood pressure, sleep loss, discomfort, and loss of productivity. People in noisy environments, especially children can develop reading deficiencies.

Air pollution

The introduction of gases and particles into the atmosphere affects negatively, the atmosphere and the entire environment. There is the resultant change in the chemical composition of the environment; altering the oxygen/carbon dioxide ratio in favour of the latter. Increase in the content of atmospheric CO_2 causes a phenomenon referred to as global warming or a high environmental temperature. Incidences like this ultimately result in a rise in the sea level, a situation that may spell doom for those living in coastal cities of the world: in the event of floods, loss of home, lives and farmlands.

Water pollution

Man's access to water supply includes surface water (streams, rivers, lakes, and oceans) and subterranean sources (as wells, boreholes etc). Various kinds of chemical discharges manage to get into water bodies (streams, oceans and wells) from industries and offshore activities. In the oil-producing areas of Nigeria, for instance waters and farmlands are inundated with oil from spills and leakage. While these farmlands become largely depleted, and unsupportive to cropping, water bodies and their contents (fish, prawns, and snails) are poisoned and both water and contents rendered unsuitable for human consumption.

Land pollution

The major causes of land pollution include burning of bushes and the discharge of industrial wastes, which destroy useful organisms and distort important biological and ecological life cycles. Such cycles include that of carbon, nitrogen and oxygen, all of which play specific roles in the ecological balance. Distortion in any of these cycles affects, notably, the unique balance in the environment.

Human Systems and Environmental Problems

Langford et al (1999) further noted the followings as the most profound environmental problems being faced today by the world urban centers in their bid to cope with the expected human systems.

Forest depletion

Logging and burning according to him are among the major causes of deforestation, which results in unpredictable ecological and thus environmental distortion. Indiscriminate burning of bushes, felling of trees, destruction of plant cover all add to deforestation and in extreme causes, desertification. The latter is one of the most insubordinate environmental disasters that can visit a community.

Soil erosion

Erosion is the gradual weathering of rock, thus producing the fine-grained material, of soil that are washed away by wind and water, and deposited whenever the moving force ceases. About one third of the world arable land is being degraded largely due to poor management of the world cropland. In spite of this world agricultural production is still increasing.

Population growth

The world population has been growing so rapidly for the last two centuries and is now over 5 billion people, which could double again in 35 years. Unlike early population increase in the developed countries, the current increase is mostly in developing countries. Thus, rates of population increase, current levels of resource consumption and the existing infrastructure are not in a coherent relationship. This will be particularly problematic in meeting the need of the additional population.

Since, human behaviour according to Gellar (1975) has contributed significantly to the enumerated degradation of the environment; certain changes in human behaviour, can on the other hand contribute significantly to the environmental protection and sustenance. It is therefore imperative to examine how the open spaces surrounding the individual buildings are ordered and put to use. Hence, the importance of a systematic study of sustenance of the environment, taking congnisance of the relationship between the target behaviour (communities), environmental variable (open spaces) and events (landscaping).

SUSTAINING THE BUILT ENVIRONMENT

World Commission On Environment And Development, in 1987 provided the most commonly used definition of Sustainable Development as the development that meet the needs of the present without compromising the ability of the future generation to meet their own needs. Smith (1997) also defined it as a way of maintaining and enhancing the quality of human life by protecting the health of the biosphere and husbanding the key resources of the air, water, land and minerals. He further emphasized the need to look into the issue in two perspectives, which include the protection of the resources in form of a natural and ecological centered approach and the call of human centered approach oriented around the public realm. The impulse of which is to achieve a balance between an increased need of more self-sufficient ecosystem and the formulation of a planning and design approach oriented towards several key dimensions of environmentally responsive design.

However, to achieve the equitable and sustainable futures, quite different methods of achieving high quality life style will be needed. This will lead to new approach of different buildings, built environments and agro-urban relationships, thereby serving as the central challenge for design and designers of the built environment while sustainability and sustainable features will be available only through a purposeful design. Since the built environment does not end at the city edge, therefore every fence is a bit of the built environment. Every physical structure, likewise becomes a device through which spaces are organized and then in turn conditions the space around it in the same way that a wall intervenes in space and produce different environmental condition on each side.

Sustainability therefore is very complicated, and primarily concerns environmental issues. Research into sustainability is mainly to access the environ-mental impact of human activities and to search options, which could have least negative impact on natural environment. Therefore, the study of urban environment involves both the sustainability of natural and human environments, created by building activities. The sustainability of the natural environment includes less depletion of natural resources, pollution and consumption of energy .The sustainability of human environment aims to achieve a stable and comfortable indoor and outdoor environments by providing adequate functional spaces and services.

Since there is no single strategy for environ-mental sustainability, the strategy to be used, depend on the objectives and level of sustainability under consideration. This paper addresses the problems of urban environment and the implications on the sustainability of the urban open spaces. It also appraises the landscape status of the existing open spaces in the urban core of Akure to enumerate the environmental qualities. The results were analyzed and necessary recommendations proffered.

URBAN LANDSCAPE AND OPEN SPACE CONCEPT

Landscaping denotes the process of shaping, modifying and creating an outdoor scene ordered to effectively express the functional and supportive attribute of the public domains within the urban environment. Public domain here means the collec-tive shared spaces within which most of the day-to-day experiences occur in an urban environment and include parks, streets, markets, playground and other open spaces among others. The elements of importance noted include plant materials such as trees, shrubs, ground covers and grasses. They are used in different areas in the design according to the required functions like accent, softening, screening, framing and shading. Structural materials, which are man made elements, are used for enclosure, surfacing and transmission or circulation within and between spaces provided. However, the essential principles for their effective use include the knowledge of the inherent characteristics and properties of the materials (Elmond, 1975).

On the other hand, urban open spaces are regarded as landed areas not built upon and ranged considerably from natural landscapes to definitely cultural, artificially designed areas and from huge green areas to almost entirely enclosed small outdoor rooms. At the macro level, they are meant to serve as urban parks or as green belts to limit development and to act as buffer zones between urbanized areas or elements. While at the micro level where town

houses and apartments are grouped together, much of the land left, are open spaces meant for recreation and aesthetic purposes. The possibility for the sustainable landscaping of the urban open spaces in Nigeria to achieve these stated goals, is currently far from being realized. It seems that the outdoor environment had been forgotten as a space that needs to be consciously organized for social relationships for the city inhabitants.

Many studies carried out in some urban centers confirmed the influence of the people on the maintenance and conservation of the environment. For instance, Olokesusi (1994) in Lagos, Anozie (1994) in Imo and Fadamiro (2000) carried out studies in Ondo States. The results emphasized that the rapid growth of urban centers generated management problems, such as encroachment of open spaces, inadequate solid waste management, water supply, housing and water pollution. Thus urbanization according to Osiyi (1989) has resulted in uncontrolled use and development of land thus creating chaos and blighted conditions in the city. A problem attributable to the lack of pursuit of landscape planning, design, and management in promoting land use development.

The role of landscape planning in the improvement and sustainability of the existing urban open spaces is fundamental to this study. In establishing a working relationship between landscaping and open space management; Falade (1998) emphasized deeply the need for adequate knowledge of the concept of open spaces and its super imposition on other concepts such as garden, parks and landscaping in general.

This research therefore seeks to investigate and analyze the landscape planning, design and environmental management of Akure urban core. This in effect is to promote the conservation, rehabilitation and maintenance of open spaces, landscapes and settlement pattern in the city. It is also expected to serve as an appropriate and adaptable community based solutions emanating from researches within the community.

A CASE STUDY OF AKURE

Akure the study area is one of the second generation State capitals and a rapidly growing medium sized urban center in Nigeria. It is located around latitude 7° 15^1 North of the equator and 5° 14^1 East, at an approximate altitude of 370m above sea level (Fig. 1). It has a population of 190.000 (1991 census) and rose from a rural town to one of the country's medium urban centers with an estimated population of 241,000 by 2003 using 2% yearly

increase. The rapidity of its development within the last twenty-five years stemmed from the political status of the town which was initially a provisional headquarter and later a state capital thus serving as the seat of both the local and State Governments since 1976. This accounted for the influx of people to the city for employment and other related activities. It is thus expected that the environmental situation would be critical in terms of the ability to meet up with the sporadic developments devoid of adequate planning and monitoring.

The medium sized urban centers like the city under study need to be investigated to collect existing data and make appropriate resolutions. This can be used to avert the future eruption of the non-habitability and environmental problems being suffered by bigger cities like Lagos, Ibadan and Kano; and caused by the inadequate planning at the inception of their growth and development. This becomes imminent now that the political and economic statuses, with the accompanying population influx are influencing the development of Akure with little or no regard to planning regulations. Hence the outcome of its choice as a study area, not only for the applicability to other cities in Nigeria but also to those in the developing countries.

RESEARCH METHODOLOGY

The data for the study were extracted from a larger research work covering a wide range of issues on landscaping in the Akure city center. Research assistants were initially sent to the field to visit all the neighbourhoods in the core of the city and locate all the existing open spaces within 3km radius to the king's palace where the study was carried out. Fig. 2. The choice of the area was influenced by the need to ensure an area that is fully developed, so as to avoid as much as possible such undeveloped spaces that could be wrongly taken as open spaces.

The research assistants that administered the checklist for the data collected, for the study were selected because of their exposure and adequate knowledge of the subject matter. However, about 150 copies of the checklist were effected on the residents living around the open spaces, 43(92%) copies were retrieved from the field and this is sufficient for valid assessment.

DATA ANALYSIS AND DISCUSSIONS

The following are the findings and statistical analyses of the parameters investigated in the study.

Uses of Open Spaces

The responses on the uses of the open spaces include relaxation 31 (20%), swampy and undeveloped area 40 (25.8%), and set back provisions 42 (27.1%). While the remaining spaces were used as refuse dump 14(9.0%), commercial activities 12(7.7%), uncompleted building sites 8(5.2%) and traditional fetish stands 7(4.5%), thus showing the basic activities going on in the open spaces.

Landscape Element Provided in The Spaces

The study further revealed that 71(45.8%) residents responded that the open spaces were not treated with landscape elements. While 31(20%) respondents opined that plant and structural materials were sparingly utilized in the spaces. This could be traced to the lack of awareness and interest of the people in landscaping their environment as well as the inability of the government, in encouraging the landscaping of the open spaces in the city centre. The intervention of the 'city beautification programmes' carried out by the state government years back was not sustained because of the lack of effective provisions of maintenance and policy backup for the decisions.

Evaluation of The Landscape Qualities of The Spaces

The plant and structural landscape materials which include: groundcovers and flowers, tangible and intangible enrichment items and artificial state of the spaces were investigated and evaluated with the four points scale to ascertain the qualities and uses of the spaces. The study revealed in table 1 that all the parameters were either inadequately provided or not in existence in the open spaces in the study area. This is confirmed by the uses that the spaces are put, which include informal relaxation, left over spaces and set backs without any specific landscape consideration but covered with plant materials usually unorganized and with poor maintenance. The surroundings are left bared in most cases, forming a garden with laterite earth surface or sometimes with litter accumulation and poor landscape quality, thus adding to the impression of the spaces, being wastelands.

Test of hypothesis

The hypotheses put forward in the study are; that the sizes of the open spaces have no significant relationship with the space characteristics and the effective provision of landscape elements has no significant relationship with the environmental status of the urban open spaces. The statistical measure of relationship used to test the hypotheses is the chi-square test of independence and the decision rule is to reject the null hypothesis where the calculated value of X^2 is greater than the tabulated value.

The statistical analysis in table 2 has shown that the sizes of open spaces have no significant relationship with the status of the spaces, by the acceptance of the hypothesis at 99.9% degree of significance. This is expected since all the various sizes of the spaces could be landscaped to enhance the taste and quality of the environment. However the sizes of the spaces have high degree of relationship with the element that could be provided, and the uses to be made of the open spaces by the rejection of the hypothesis.

The study further revealed in table 3 that the provision of groundcovers and land use patterns in the spaces has no significant relationship with the spaces' status, hence the acceptance of the hypothesis at (95%) degree of significance. This is a reflection of the apparent unconcerned attitude and lack of enlightenment of the people towards the use and need of such elements in the open spaces around them. The test also revealed that the null hypothesis has been rejected for other variables, which include trees, shrubs, structural materials, and enrichment items used in the spaces. This implies that there exists a significant relationship between these landscape elements and the determination of the status and quality of the spaces.

The trees and shrubs usually express the environmental greening of the urban landscape, thus emphasizing the importance of the plant materials in the climatic modification and visual quality of the environment. However, on close look at the trees, apart from the few ones scattered in some open spaces within the neighbourhood for recreational, traditional and other purposes; others are the common growths along the watershed and the streams passing through the city. Since the locations of these plants have not been properly planned or designed and monitored, they have not contributed to the quality of the environment except visually.

The structural materials and enrichment items tend to add to the status of the environment where they are well designed and implemented. However, the study has shown that these items are scantly utilized in the study area and has therefore not added to the quality of the city center because where they were utilized, the people have encroached on them with commercial stalls and other kinds of misuse.

The correlation analysis is also used to examine the relationship between the variables and to give the strength and direction of their associations. The analysis in table 4 has shown that all the variables (landscape elements) negatively and poorly correlated with the quality and status of the open spaces. This implies that the observed uses of the landscape elements in the study area were highly inadequate or almost nil and thus gives a very low and unsatisfactory status of the open spaces.

SUMMARY AND RECOMMENDATIONS

The checklist administered on the field was used to identify and investigate the landscape characteristics of the open spaces in Akure city core. This has revealed the uses of the available open spaces and the status of the landscape elements in the spaces. The extent and appropriateness of the elements used and the quality of the spaces were further enumerated to ascertain the possibility of any relationship between the open spaces and landscaping.

The observed outcome of the variables used in the study has shown that the provision and management of open spaces is linked with the landscape quality of the environment and this is embedded in the structure of the land use pattern and planning in Nigeria. However, the inadequacy in the provision and management of the spaces is very evident in the study area. It is therefore essential that the following suggestions should be thoroughly effected for the improvement and sustenance of the spaces by all the stakeholders.

Enactment of Legislation

Policies should be enacted on environmental care, with an integrated organization for their effective implementations. The Federal and State Governments in the bid to address this situation have established the Ministries of Environment. So also is the National Environmental Council which was established to co-ordinate the environmental policies and programmes at the various governmental levels in the country. The council should liase with all the stakeholders of the environment to develop a suitable, regulatory policy framework for the resolution of existing and envisaged future environmental problems. This can be carried out in the six geo-political regions established by the Federal Government, with their different physical and climatic characteristics, which are the chief, environmental design and management assets of the country.

Physical Planning Intensification

The local planning authority should be well funded to enable it co-ordinate effectively the land use policies and their implementation at the local level. This is imperative since they were created purposely for such services to the local people and environment. The establishment of a department of landscape development or parks and garden unit as an arm of the planning authorities in the municipal local government council is expedient for an efficient urban management and a proper grassroot development in the city.

Environmental Awareness and Education

Education supports sustainable development at any level and should be favourably considered at all the government and people's activities. In essence, there should be adequate and continuous training of relevant manpower in the field of landscape design and management to take up the administration of the policies enacted to propagate the quality expected of the environment. Nigerian higher institutions should set up informal study programmes to complement the existing courses offered in such relevant disciplines to enlighten the general public on the importance of landscaping to city development. Furthermore, participation in researches into environmental problems should be encouraged taking into cognisance the communities and the results made public through formal and informal channels.

Participatory Policy Implementation

Appropriate authorities should involve the available local associations and non-governmental organizations (NGO) in all their environmental programmes; from the planning and design, through the implementation to management stages. The human resources or job provision programmes created by the Federal Government like; the National Youth Service corps (NYSC); National Directorate of Employment (NDE) and Poverty Alleviation programme (PAP) should be engaged to manage the establishment and maintenance of the environmental programmes according to the local requirements and priorities.

Adequate Funding of Programmes

Landscape development has been observed as an expensive and gainful venture. As a viable solution to some urban problems, it is necessary to find suitable strategies to source fund for the developments, from the private sectors and non-

governmental organizations (NGO) by way of public cum private partnership.

Encouragement of Appropriate Local Solutions to Problems

The study also recommends the reclamation of the unused open spaces occurring from the generous planning regulations for setbacks and air spaces. The spaces are presently neglected, deteriorating and should be re-designed to function effectively with natural and artificial landscape elements, such as decorative circulation pavements, continuous walkways, cycle and pedestrian paths, parks, playgrounds, plaza and spaces for community gatherings.

CONCLUSION

The study has documented the theoretical and conceptual frameworks of environmental sustainability and their relationship with urban open spaces. It also enumerated the essence of space provision and utilization in the determination of the environmental quality of any particular environment. Since open spaces exist either by deliberate design or as left over spaces, their competitive uses and classifications serve as alternatives to the buildings and as link between buildings, and thus unavoidably important in the creation and management of the urban environment.

It revealed that the relationships between the urban open space planning and landscaping had not been remarkably effective in the city. It further noted that the government's approach to the relationship, by the promulgation of the environmental sanitation decree had not been very successful because it was an ad-hoc solution rather than the required sustainable policies. The paper therefore recommends the total adherence to the suggested policies for the effective management and sustenance of the urban environment through landscape provisions.

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Table 1. Evaluation of Landscape Qualities of Akure Urban Open Spaces

S/n	Items n = 155	Very adequate	Adequate	Inadequate	Nil
1	Prevention of erosion by plants	4.5	11.0	28.4	56.1
2	Ornamental /aesthetic purpose	1.3	5.2	26.5	67.3
3	Screening for privacy by plants	0.6	3.2	28.4	67.8
4	Pedestrian concrete paving	0.6	3.9	11.6	83.9

Source: Field Survey 2000

Table 2. Sizes of The Spaces and Their Characteristics

	Factors	D.F	Calculated X^2 Value	Tab X^2 Value @ 0.05	Tab X^2 Value @ 0.01	Tab X^2 Value @0.001	Remark
i	Status of the space	48	79.58	61.66	69.95	80.08	Accepted at 0.001
ii	Landscape elements provided	42	62.73	55.76	63.69	73.40	Rejected at 0.05
iii	Uses of the spaces	42	96.44	55.76	63.69	73.40	Rejected

Source: Field Survey 2000

Table 3. Status of Open Space and Landscape Elements

	Factors	D.F	Calculated X^2 Value	Tab X^2 Value @ 0.05	Tab X^2 Value @ 0.01	Tab X^2 Value @ 0.001	Remark
i	Plant-materials (Trees/shrubs)	128	180.68	124.34	135.81	149.45	Rejected
ii	Ground covers/flowers	56	76.95	73.31	82.29	93.17	Accepted at 0.05
iii	Structural materials	80	164.88	101.88	112.33	124.84	Rejected
iv	Intangible enrichment items	56	123.01	73.31	82.29	93.17	Rejected
v	Tangible enrichment items	40	78.92	55.76	63.69	73.40	Rejected
vi	Land-use patterns	56	73.47	73.31	82.29	93.17	Accepted at 0.05

Source: Field Survey, 2000

Table 4. Correlation Between The Landscape Elements and Status of The Spaces

	Factor/Landscape Elements	Status of the Space Correlation Coefficients
1.	Plant materials (Trees & Shrubs)	-0.1788
2.	Ground Cover and Flowers	-0.2369*
3.	Structural Materials	-0.1294
4.	Intangible enrichment items	-0.1882*
5.	Tangible enrichment items	-0.1221
6.	Land use patterns	-0.3147**

*Significant at 0.01 ** Significant at 0.001   Source: Field survey 2000