



## Sustainable Infrastructure Upgrade in Slum Settlements of Lagos, Nigeria: The Role of the Architect

**Anthony K. Adebayo, Anthony C.O. Iweka**

*Department of Architecture, Faculty of Environmental Sciences, University of Lagos, Akoka-Yaba, Lagos, Nigeria*

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Global attention was drawn to the severe and pervasive effects of urban slums when the United Nations included it in the Millennium Development Goals (MDGs) a few years ago. Urban slums are areas or neighbourhoods that suffer infrastructure deprivation. Infrastructure refers to the physical framework of facilities through which goods and services are delivered to neighbourhood dwellers by the government. A fundamental issue in slum upgrading projects is the provision of adequate infrastructure. In a developing nation like Nigeria, there is a need to examine urban slum upgrading in a wider conceptual and technical context that will be more sustainable than what currently exists in large cities like Lagos. Nigerian architects and other professionals in the built-environment have been trying to grasp key concepts required to comprehend the phenomenon of slum upgrading and therefore be able to address it by sustainable design. The wider conceptual and technical perspectives constitute the main problem addressed in this study. The techniques employed include the review of the literature and review of interviews on slums and slum upgrading in some parts the globe. Observation technique and visits to nine large slum settlements in Lagos were also employed to validate the general information obtained from the literature. This paper discusses a wide range of urban slum characteristics and slum upgrading issues that are applicable to the study area. The paper examines specific aspects where the architect can contribute substantially to infrastructural upgrading of the built-form and spaces in Lagos' slums.

**Key words:** *architecture, infrastructure, slum, slum upgrading, sustainability*

### 1. Introduction

Several studies have drawn attention to the rapid growth in the population of people living in urban slums all over the world (UN-Habitat 1982, Garau et al. 2006, UN-Habitat 2007, Okedele et al. 2008). It is estimated that 17% of the world's 6.1 billion inhabitants live in slums or deprived inner-city neighbourhoods. This figure which amounts to 1.0 billion people also represents 33% of the 3.0 billion residents of urban towns and cities around the world today. By the year 2032, 2.0 billion people are likely to be living in urban slums (Ooni & Phua 2007). The implications for the urban environment are enormous.

UN-Habitat (1982) defines slums as economically depressed neighbourhoods in a town or city whose social components are deprived of the means of

sustaining the socio-economic fabric of the area. Most of them lack basic shelter while their inhabitants generally live under circumstances that are hazardous to life and health (Garau et al. 2006). The severe and pervasive effects of urban slums drew global attention when it became included in the Millennium Development Goals (MDGs), in the year 2000, with a challenge to achieve significant improvement in the lives of at least 100 million slum dwellers by 2020. Slum and squatter upgrading has been identified by the United Nations Centre for Human Settlements (UN - Habitat) as one of the areas that need priority attention. Gradual upgrading of both the environment and infrastructure in urban slum areas is seen as a measure to promote economic recovery. This measure will be of

immense benefit to the 72% of the urban population of Africa who currently live in slums (Ooi & Phua 2007). The figure for Nigeria (taken as a whole) is debatable. This paper, however, dwells largely on Lagos which, according to Falade (2008), is sometimes referred to as a megacity of slums.

Gandy (2006) and Okedele et al. (2008) claim that Lagos megacity contains as many as 200 distinct slums ranging from clusters of shacks around highways to entire districts. However, this assertion tends to be at variance with the official figure of 42 blighted areas adopted by UNDP and the World Bank (Agbola & Agunbiade 2009). Some other researchers estimate the population of slum dwellers in Lagos at 60–70% (Presidential Committee on Redevelopment 2006; Morka 2007; Falade 2008; George 2008). According to Falade (2008), the following neighbourhoods in Lagos have been classified by the World Bank as the nine largest slums: Agege, Amukoko, Badia, Bariga, Ijeshatedo, Ilaje, Itire, Iwaya and Makoko. The Bank has pencilled these communities for upgrading.

A fundamental issue in these areas and other slums within the city is the provision of adequate and sustainable infrastructure. In this paper, infrastructure is understood to mean the physical framework of facilities through which goods and services are made available to neighbourhood dwellers by the government, at highly subsidized cost or at zero cost. The study discusses a wide range of urban slum characteristics, but focuses specifically on infrastructural aspects of the built-form that are most likely to require rigorous input from the architect. The infrastructures in question are the ones the government has a duty to provide in order to enhance a sustainable well being of urban inhabitants. Malthaus (1997) draws a distinction between two types of infrastructure, namely, social infrastructure and technical infrastructure (also called economic infrastructure). Social infrastructure relates to education, health, social services etc; while economic or technical infrastructure produces services to facilitate economic production, or serve as inputs to production. Examples are electricity, roads, ports, telecommunication, railways, water, sanitation and sewerage.

The provision of infrastructure is generally regarded as a core responsibility for Federal, State or Local Governments. In Nigeria, government's attention on infrastructural development is highly skewed in favour of technical infrastructure. This assertion is clearly evident from the seven point agenda of the Federal Government, which highlights transportation, power and energy as critical areas. Apart from education, other social infrastructures in the areas of housing and health were silent in the government's action plan for development. This may have accounted for the subjugation of certain critical aspects of urban growth phenomenon, such as slum upgrading. This becomes worrisome against the backdrop that more than 36% of the country's population lives in urban areas, a huge jump from the 19% recorded in 1963 (National

Population Commission 1998). In this study emphasis is on identifying the various aspects of the built-form and spaces in which the contributions of the architect can promote the actualisation of slum infrastructural upgrading projects in Lagos, Nigeria.

The paper begins with an overview of the basic profile or characteristics of slum communities. The elements of architecture in upgrading of slum infrastructure are then discussed, along with the major areas of strategic intervention where the architect can contribute to slum infrastructural upgrading in the study area. Finally, conclusion and recommendations are made.

## 2. Methodology

The focus of this study been to identify key conceptual approaches that the architect can adopt to ensure that the current slum upgrading exercises in Lagos are sustainable. The research method adopted was case study approach involving nine out of the 42 slums identified by UNDP (Agbola & Agunbiade, 2009). These are Agege, Amukoko, Badia, Bariga, Ijeshatedo, Ilaje, Itire, Iwaya and Makoko. The basis for selecting them is that the World Bank has picked them for its counterpart funding of urban upgrading in Lagos. One of the criteria used by the World Bank was that the selected settlements are among the largest slums in Lagos. The project is currently going on. The techniques employed include a review of the literature relating to slums in the study area. The review of relevant literature revealed the slum environment indicators reflecting the engineering infrastructure. Visits were made to the selected slum settlements to validate the prevalence of the indicators using observation technique. A qualitative approach was used to interpret how the architect could be relevant in ensuring that acceptable conditions were realized.

## 3. Basic Characteristics of Urban Slum Communities in Lagos

The use of population in classifying what constitutes an urban community is accepted across different nations. However, there is no consensus concerning the size of population that makes up such an urban community. For example, while Angola, Argentina and Ethiopia consider all communities with 2,000 residents as urban, Nigeria and Benin use 20,000 and 10,000 inhabitants respectively (Cohen 2006). It is only in the definition of megacities as urban agglomerations with the population of 10.0 million and above that this controversy does not exist. The choice of Lagos megacity for this study is intended to reduce such perceptual differentiations. In the same way the population and size of what constitutes a slum are debatable. However, there seems to be some degree of

consistency about the fundamental characteristics of urban slum neighbourhoods and slum households (Table 1).

Table 1. Indicators and thresholds for defining slum households

Indicator	Definition	Features of acceptable conditions
Access to improved water	A household is considered to have access to improved drinking water if it has at least 20 litres/person/day for family use, at an affordable price of less than 10% of total household income	<ul style="list-style-type: none"> <li>• Piped connection to house or plot;</li> <li>• Public stand pipe serving no more than 5 households;</li> <li>• Bore hole;</li> <li>• Protected dug well;</li> <li>• Protected spring water;</li> <li>• Rain water collection.</li> </ul>
Access to improved sanitation	A household is considered to have access to improved sanitation if an excreta disposal system, either in the form of a private toilet or public toilet, is shared with a reasonable of people, is available to the household	<ul style="list-style-type: none"> <li>• Direct connection to public sewer;</li> <li>• Direct connection to septic tank;</li> <li>• Pour flush latrine;</li> <li>• Ventilated improved pit latrine (with slab).</li> </ul>
Structural quality/durability of housing	A house is considered durable if it is built on a non-hazardous location and has a permanent structure adequate enough to protect its occupants from extremes of climatic conditions such as rain, heat, cold and humidity	<ul style="list-style-type: none"> <li>• Permanent building materials are used for walls, roof and floor;</li> <li>• Compliance with building codes;</li> <li>• Dwelling is not in a dilapidated state;</li> <li>• Dwelling is not in need of major repairs;</li> <li>• Dwelling is not located no or near toxic waste;</li> <li>• Dwelling is not located on flood plain;</li> <li>• Dwelling is not located on steep slope;</li> <li>• Dwelling is not located on in a dangerous right of way (railway, highway, power line, airport etc.).</li> </ul>
Sufficient living space (not overcrowded)	A dwelling unit is considered to provide sufficient living area for household members if there are fewer than three persons per habitable room	<ul style="list-style-type: none"> <li>• Not more than two persons per room;</li> <li>• The alternative is to set a minimum standard for floor area per person (e.g. 5 square metres).</li> </ul>
Security of tenure	Security of tenure is the right of all individuals and groups to effective protection by the state against arbitrary unlawful evictions	<p>Evidence of documentation that can be used as proof of secure tenure status, as indicated by:</p> <ul style="list-style-type: none"> <li>• Households with formal title deeds to both land and residence;</li> <li>• Households with formal title deeds to either land or residence;</li> <li>• Households with enforceable agreements or any document as proof of a tenure arrangement De facto or perceived protection from forced evictions.</li> </ul>

A slum settlement has services and infrastructure far below the adequate or minimum tolerable levels. Housing conditions in such residential neighbourhoods are substandard and deteriorated to the extent that it is unwholesome and a threat to the health, safety, morality and welfare of the inhabitants (Karaman 2006). This is a pattern that is applicable to Lagos megacity and also prevalent in urban areas throughout the length and breadth of sub-Saharan Africa. Health conditions in slums can be viewed at the level of physical building, for example, sanitary (toilet) installations, natural ventilation and illumination. Health conditions can equally be evaluated from what happens at the neighbourhood levels. Water supply, sewage and garbage disposal fall into this category.

Karaman (2006) describes the major features of poor housing as overcrowding and lack of basic sanitation; while Garau et al. (2006) describe substandard neighbourhoods as often lacking several of the conditions described in Table 1.

Health conditions are particularly poor in the nine slums selected for this study. This is evident from the absence of government-operated primary health care facilities. Habitat studies show that households living in housing that is overcrowded, poorly ventilated, lacking adequate sanitation and safe water are constantly susceptible to infection (Habitat 2007). Untreated human excrement and household waste water find their ways into rivers, gullies, streams and ditches thereby constituting major public health hazards.

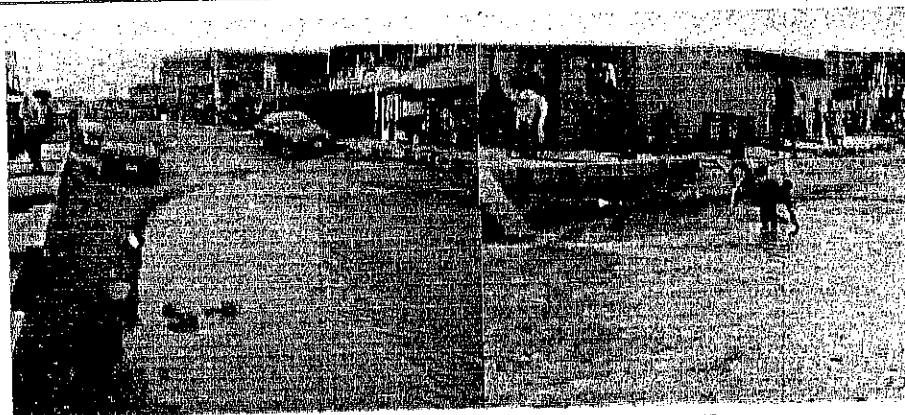


Fig. 1. Road/drainage upgrading works in Agege area of Lagos

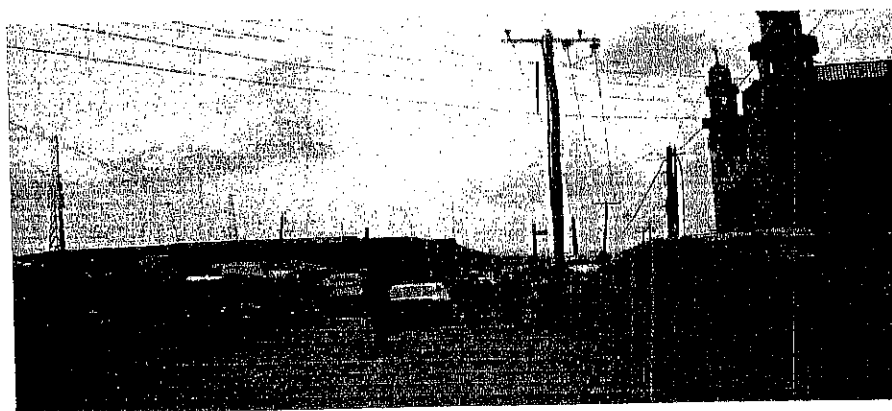


Fig. 2. Section of road upgrading in Ilire area of Lagos

The leading causes of deaths among slum dwellers include diarrhoea, typhoid, cholera, malaria, tuberculosis and other enteric and ophthalmic diseases. UN-Habitat (2007) paints a grim picture of mortality rate for children less than five years of age in Nigeria and other developing countries of the world. Studies conducted in Brazil, Egypt and Ethiopia put under five mortality rates at 34.4%, 61.6% and 180.0% respectively. The situation is not different for pregnant mothers in the slums of Kenya, Uganda, Mali and Rwanda, where studies indicate that 80-90% of them do not receive any formal medical attention during child birth.

Visits to slum locations selected for this study have revealed that the current infrastructural upgrade is skewed in favour of road and drainage provisions, to the neglect of other social infrastructure (Figures 1 & 2). The high concentration of people in the areas being upgraded has no library facilities. Also, the number of nursery/primary schools operated by the government is generally less than what is needed to support such neighbourhoods. Failure to include these components in the upgrading agenda will further perpetrate illiteracy and ignorance in these areas. Furthermore, the nine slum

settlements in Lagos selected for this study have long been associated with lack of employment opportunities, crime, social disorder and other environmental problems.

Another visible aspect of the current upgrading activity in the slum areas selected for this study is the inadequate attention to the provision of community centres. The lack of community centres in these nine settlements that are being upgraded may eventually lead to decay of such communities. Community centres are public locations where people can gather for group activities, recreation and other purposes. In places where they exist, community centres are the focus of socially sustainable communities.

The collaboration between the World Bank and government in upgrading infrastructure in these slum locations is therefore fundamental to providing sustainable and healthy living conditions in urban neighbourhoods. This study argues that health, education, recreation and other social infrastructure have a direct or indirect impact on the quality of life of urban slum residents. Improvement in the fixed physical facilities that provide these services bears a direct

relationship to architecture. It should also be seen as a central task of urban housing delivery in the study area.

#### **4. Elements of Architecture in Infrastructure Upgrading of Lagos' Slum Settlements**

The current slum upgrading (or slum improvement) exercise in the nine settlements selected for this study can be regarded as a package to improve basic infrastructural services. It is generally accepted that different upgrading initiatives like provision of water supply, sanitation, solid waste management, drainage system, electricity etc contribute towards improving the living conditions in urban slums. However, there are indications that elements of architecture are necessary in order to bring overall sustainability to these communities. Attention of relevant stakeholders should therefore be drawn to the provision of complementary facilities that can substantially contribute to a sustainable slum eradication exercise. As already highlighted, some of these include educational facilities like libraries/schools, primary health centres, community centres and fire fighting stations. The architect's professional input will greatly enhance the overall quality of these complementary facilities. In discussing the relationship between architecture and infrastructural upgrading, this paper shifts away from the traditional issues of design details to more fundamental aspects that relate built-form and public space to the well-being of the population. Some of these issues include siting and site planning, imageability, valued spaces and urban meeting places and morphology. These concepts and principles are discussed below, as they relate to the nine slum settlements chosen for this study.

**Siting and Site Planning.** Siting or location refers to both the actual location of the physical elements and the relative location of the physical elements such as orientation and distance from one another. The concept of location within the scope of this study can be expressed as an area within which the relationship between the existing and the proposed can be confronted and resolved. If correctly located, the building becomes an integral part of the urban texture and contributes to the solution of slum upgrading.

**Imageability.** This refers to the quality in an environment or in a physical object which gives it a high probability of evoking a strong image in the residents and other users who observe such an environment or object. Such mental images can be enhanced by shape, colour or arrangement of special features of environments or objects.

**Valued Spaces and Urban Meeting Places.** A community can provide support for its inhabitants in different ways, particularly, by increasing the access to and use of community facilities. Gruetner (1998) identifies such community facilities to include museums, libraries and parks. Habitat (2007) also draws

attention to neighbourhood centres, walkways and recreational areas as environments which encourage and promote active living for all age groups. The necessity of an urban meeting place is particularly noteworthy for the youths. The creation of youth clubs, for example, is regarded as a crime prevention and community building strategy. The idea that such centres represent places where local youths can be meaningfully engaged has been in vogue ever since the Chicago Area Project from the 1930s (Habitat 2007).

These postulations are contextually relevant in the current slum upgrading activities within the study area. The social infrastructure comprising educational facilities, health facilities and so on identified in this study are traditionally acknowledged as elements of architecture that can enhance the living standards, well-being and status of communities.

**Morphology.** Urban morphology can be seen from a variety of disciplines such as architecture, geography, history, and planning. Buildings, gardens, parks and monuments are among the main elements of urban morphology that have a direct bearing on architecture. The components also include; building height, width, size and shape. The importance of morphology in this study can be seen in the way these components are expressed to invoke meanings that have relevance to the cultures of the host community.

#### **5. Other Areas of Concern for the Architect in Lagos' Slum Upgrading Projects**

The proliferation of slums in Lagos and other burgeoning cities all over Nigeria are indications of the inaction of past governments and their failure to fully harness the input of the architect and some other relevant professionals in the city growth process. In this paper, the architect is interpreted to include the landscape architect and the urban designer. To a large extent, the task of the architect is therefore discussed with the understanding that the scope is beyond that of a building complex. By training, the architect is in a position to resolve a number of issues that may occur in the current slum upgrading projects in the study area. For the architect's contribution to be significant, two critical areas of concern should be addressed. These are: environmental sustainability and socio-cultural/heritage issues.

**Environmental and Sustainability Concerns.** The current emphasis on sustainable architecture, otherwise called *Green architecture* helps draw attention to a holistic approach to aspects of slum upgrading that are concerned with development of the built environment, particularly, the buildings. The key principles of green architecture are healthful interior environment, energy efficiency, use of ecologically benign materials and built forms that relate to the site and climate (Igwe 2008). In this case, the goal is on how to achieve a balance between basic and social needs of the

population on one hand, and protection of the integrity of the environment on the other hand. This is in line with the famous Brandtland report which defines sustainable development as development that accomplishes the needs of the present generation while ensuring that the needs of future generation are not compromised. (Igwe 2008, Okedele 2008). It can therefore be argued that in addition to the usual focus on cost, performance and quality objectives of slum upgrading projects, the architect should be concerned with minimisation of environmental degradation and creating a healthy built environment (Okedele & Adebayo 2008). In the case of Lagos slums, the architect should specify alternative methods and materials that are recyclable, renewable and eco-friendly.

*Socio-cultural & Heritage Issues.* In this aspect the focus is on preservation and identity. Some of the slums selected for the present study grew from erstwhile traditional settlements that have historic relevance. These include Agege, Bariga, Badia, Ijeshatedo Itire and Iwaya. Some existing buildings and open spaces in these areas have acquired symbolic meanings and give the inhabitants a sense of cultural identity. Under such circumstances, the architect should ensure that the relationship with the past is not endangered or obliterated as a consequence of urban clearance. The architect's contribution should be paramount in specific cases where the historic significance of identified buildings that serves communal functions is considered invaluable. This approach was used to preserve forty historic buildings in Binhai Jingqu area of Yantai, China in 2001. An adaptive upgrading strategy was employed to ensure that the styles and forms of the buildings were preserved, while adapting them to different uses. Being sensitive to culture and identity concepts, the architect engages in slum upgrading that is not inimical to existing social structure or distinctive character of the region. It is necessary to conclude that the historical background and cultural elements of the social infrastructure in slum upgrading sites selected for this study must be respected. Achievement of this objective can be facilitated by the roles which the architect plays in enhancing the quality of life in upgraded slum sites.

## 6. Implications

- a. Infrastructural upgrading, particularly in the nine slum settlements in Lagos identified by the World Bank should be seen as a holistic endeavour. However, the aspects of infrastructure that relate to built-form and spaces are more traditionally associated with architecture. Hence, architects and urban designers should be engaged to participate in the design and execution of the slum upgrading projects, to ensure sustainability.

- b. City administrators engaged in slum upgrading projects within the study area should seek the architects' expert advice on areas of social infrastructure, such as imageability, location and community facilities.
- c. In this age of conservation and preservation, it is opportune for slum upgrading programmes in the study area to be packaged in line with the principles of green architecture and historical heritage of the region. Architects who are competent in these special areas should be engaged to improve the output of the upgrading programmes.

## 7. Conclusion

Like in many other locations across the globe, slum settlements in Lagos, Nigeria are characterised by services and infrastructure that are substandard and a threat to the health, safety, morality and welfare of the inhabitants. Infrastructural upgrading in the nine large slum settlements selected for this study has been hailed as an attempt to improve the living standards of people who reside in these areas. However, the bulk of the upgrading activity focuses mainly on roads and drainages.

This study found that adequate attention was not given to the integration of the built-form and spaces as key success factors in the entire process. Consequently, the input of architects in the exercise is either omitted or ignored. This raises doubts about the sustainability of the exercise. The findings suggest that architects involved in the current infrastructural upgrading in the study area can enhance the performance of fixed physical facilities. This can be achieved by employing concepts like location, imageability, morphology and valued spaces. By training, the architect is in a position to resolve a number of issues that are involved in slum upgrading projects particularly in the areas of sustainability, preservation and identity.

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**PhD Anthony C.O. Iweka** – lecturer at the department of Architecture, Faculty of Environmental Sciences, University of Lagos.

Main research area: Housing, Human Settlements, and Project Management.

Address: Department of Architecture, Faculty of Environmental Sciences, University of Lagos, Akoka-Yaba, Lagos, Nigeria

Tel.: +234 (0) 803-323-8111

E-mail: [tonyiweka@yahoo.com](mailto:tonyiweka@yahoo.com)

**PhD Anthony K. Adebayo** – lecturer at the department of Architecture, Faculty of Environmental Sciences, University of Lagos.

Main research area: Innovative design and construction, Housing, and Healthcare infrastructure.

Address: Department of Architecture, Faculty of Environmental Sciences, University of Lagos, Akoka-Yaba, Lagos, Nigeria

Tel.: +234 (0) 802-387-7638

E-mail: [akay.adebayo@yahoo.com](mailto:akay.adebayo@yahoo.com)

## **Darni infrastruktūros plėtra ir lūšnynų gyvenvietės Lagose, Nigerijoje: architekto vaidmuo**

**Anthony K. Adebayo ir Anthony C. O. Iweka**

*Architektūros katedra, Aplinkos mokslų fakultetas, Lagoso universitetas, Lagosas, Nigerija*

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Miesto lūšnynų keliamu rimtu ir sparčiai progresuojančiu poveikiu visame pasaulyje itin susidomėta dar visai neseniai, t. y. tada, kai Jungtinės Tautos įtraukė šias teritorijas į Tūkstantmečio vystymosi tikslus (TVT). Miesto lūšnynai – tai miesto sritys ar rajonai, kurie ypač kenčia dėl netinkamos ir skurdžios infrastruktūros. *Infrastruktūros* sąvoka apima fizinę įrenginių sistemą, kurią naudojant viešosios prekės ir paslaugos yra tiekiamos rajonų gyventojams. Esminis iššūkis rengiant lūšnynų modernizavimo projektus yra tinkamos infrastruktūros parinkimas. Besivystančiose šalyse, tokiose kaip Nigerija, svarbu nagrinėti miesto lūšnynus platesniu, ne vien techniniu, kontekstu, apimančiam darniosios plėtros principus. Tai svarbu ypač dideliems miestams, tokiems kaip Lagosas. Nigerijos architektai ir kitų aplinkos plėtros specialistai jau kuris laikas stengiasi suvokti esmines darniosios regionų plėtros kontekste. Šiame tyrime pagrindinis sprendžiamas klausimas yra platesnės konceptualios ir techninės tokių regionų perspektyvos. Taikomas tyrimo metodas apima literatūros apžvalgą, taip pat interviu su lūšnynų ir besivystančių lūšnynų gyventojais skirtinguose rajonuose analizę. Stebėjimo metodika ir vizitai į devynias didžiųjų lūšnynų gyvenvietes Lagose taip pat prisidėjo prie bendros informacijos, gautos apžvelgiant literatūrą, patikimumo. Straipsnyje aptariamas platus spektras charakteristikų, apibūdinančių miestų lūšnynus ir lūšnynų modernizavimo ypatybes, kurios yra taikomos tiriamajai studijai sričiai. Straipsnyje nagrinėjami konkretūs aspektai, kuriuos architektai gali iš esmės formuoti ir taip prisidėti prie infrastruktūros modernizavimo Lagoso lūšnynuose.