BIO-SOCIOTOPE MAPPING – EXPLORING PUBLIC OPEN SPACE AND ITS MULTIPLE USE VALUES IN URBAN AREA USING GIS AND REMOTE SENSING TECHNIQUE.

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ABSTRACT

The City of Lagos State, the most developing metropolitan area in Nigeria have over the last approximate eight (8) years been changing the faces of planning green space within its environs and have also resulted in encouraging landscape design..

This report defines sociotope map in Lefebvre's teams which describes it as a user perception of space, while the focus is on the direct environmental economic use of open space. The paper investigates opportunities and challenges of implementing a purposeful strategic bio-sociotope use of existing open spaces within Lagos Mainland with consideration of both user perception and environmental economic importance.

Lagos Mainland have been characterised as a socio-entertaining environs with night life and sporting activities, these have resulted into increases in urban density and pressure on the existing open green spaces and potential green area.

This research aims to address the importance of Lefebrve teams of representation of space as perceived user space and the contribution of Stahle (2006) argument that sociotope is a representation of collective (common) perception of open space, its use values rather than its actual uses. In this context, the paper applies remote sensing and GIS techniques in a purposeful strategic mapping and bio-social user values in a multifunctional cultural community of Lagos Mainland

Keywords:
Open space, urban area, geographic information systems, remote sensing, user perception, economic importance.

Introduction

Most of the present problems faced by managing urbanization and the need to inculcate urban green space practices in planning built-up environment in emerging mega city such as Lagos State lie in the interface between user perception and environmental economic importance.

However, sustainable management of the environment can only be achieved if pluralistic land uses under the umbrella of long-term social, economic, and ecological values are appreciated and taken into account in landuse planning process (Luz, 2000; Potschin & Hanise-Young 2006; Raquez & Lambin 2006). Therefore, these compliment Lefebvre's concept of space; social space which gives the understanding of the '*true space'* management. Thus, Lefebvre was able to identify the major problem of urban planning of open space, values, and apparent dangers of reducing '*true space'* using suggested concepts ("Perceived" , "Conceived" and "lived") to differentiate. He stated:

In its most extreme form, reductionism entails the reduction of time to space, the reduction of use value to exchange value, the reduction of objects to signs, and the reduction of "reality" to the semiosphere; it also means the movement of dialectic is reduced to a logic, and social space to a purely formal mental space (Lefebvre 1991, p.296).

As Certeau (1984) indicated, Stockholm sociotope map is aimed at the foremost representation of collective values of open space as it's of importance to people everyday life, i.e the open space use value. As a reflective practitioner, Stahel (2006) defines sociotope as *the commonly perceived direct use values of a place by a specific culture or group.* While Lefebvre simply say user space is lived, perceived, and not represented, therefore explaining the opens spaces value as user perception. Soini (2001) also see a collective spatial data of an open spaces as the perception and experience of the community. Hong et al., (2005) defines biotope as distinct space which is endowed with specific environmental conditions and a suitable for particular flora and fauna In view of various research works, Lefebvre ideology of sociotope is seen as the most suitable concept for these research.

The need for socio infrastructure in urban area have continued to be a major factor for loss of open space / green area, thus increasing densification and un friendly environmental conditions. Nevertheless, the greatest process of achieving a sustainable bio-sociotope city irrespective of the high demand for housing lies in the technique of spatial mapping analysis which implement both the user perception and urban structure needs in both open spaces and existing planned green area within the mainland community.

This paper focus on exploring the use value of open space and the environmental economic importance using spatial dataset mapped from available open green spaces and potential bio sociotope planning area. It is achieved by using GIS mapping tools to identify existing green area, open space with user value use and the integration of social economic importance of these spaces.

Brief over view of visibility study

With the growing populations, need for infrastructure and an ongoing mandate to make Lagos State a sustainable mega city while maintain a healthy environment. The State Government is facing increasing challenges in meeting their civic obligation of providing basic infrastructure and maintaining urban green culture. The Lagos State Government in the administration of His Excellence Babatunde Raji Fashola, SAN identified the ecological and social importance of returning the business city of Lagos to its foremost coastal ecological and social friendly environment of the 1960's and 1970's where urban green infrastructure was major part of urban planning. In other to achieve these laudable idea, he established an agency Lagos State Parks and Gardens Agency (LASPARK) with the responsibility of identifying, defining future priorities of open spaces, and landscaping in Lagos state.

Mainland is a community well-known for its supports for social and cultural values practices. The area have a total of twelve (12) sociotope open space as describe by Stahle (2005) as user perceived space for social activities and one (1) biotope space as defined by Hong et al, (2005). However, providing accurate justification of these open spaces to be used for a strategic bio-sociotope environment has a traditional challenge which is due to lack of standardized method which should have entailed considering user perception and economic viability of the green open spaces project been implemented by LASPARKS.

Mapping landcover / landuse pattern and spatial distribution of features have been quite effective in the use of spatial dataset. With GIS analytical tools, the ability to integrate several information associated with urban landscape, location of building and social economic data have produced an increased understand of the dynamics of urban changes in recent years.

This case study explores the possibilities of integrating user perception values and environmental social economic importance on existing open green space using GIS techniques for mapping and geographical analysis of how to achieve a bio sociotope environment.

Case study

The Lagos Mainland area is located in the central area of the state it's bounded on the north with fast grown settlement Alimosho local government area and to west the Lagos lagoon and to the east is the Muritala Mohammed International Airport.

Data source and analytical procedures

The mapping and analysis of perceived user values and environmental economic viability of each green space and open space in the study area where considered to ensure the return of a purposeful strategic implementation of a bio-sociotope approach in planning process in Lagos state. In the course of this study, a primary approach of literature analysis was done by

reviewing of journals, web-based sources, and books in order to get theoretical knowledge of implement a bio sociotope in planning built-up urban area.

The project was achieved by integrating spatial dataset of social value (perceived use value) which is a commonly direct use value of open space in mainland city and urban densification dataset into GIS. Therefore, the analytical procedure was evaluated by the following steps (1) identify existing green space / open space (2) identify perceived use value (3) identify potential treat (4) identify designated existing sociotope and biotope space (5) propose strategic bio sociotope facility.

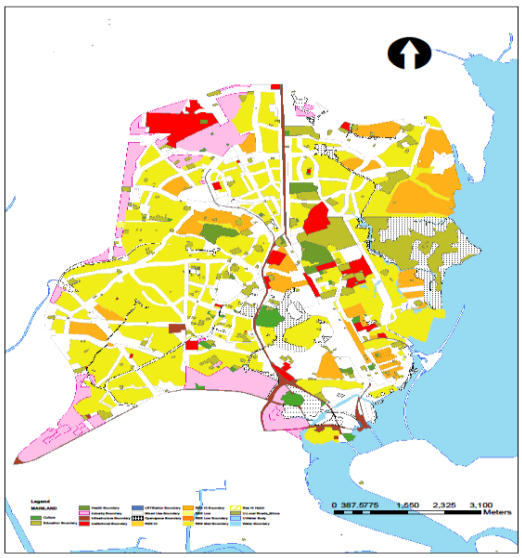


Figure 1: Vector map of Mainland City of Lagos

Figure 2: Raster map of Mainland City of Lagos

The social value dataset was a general common direct use of people within mainland. The spectral dataset where from the recent geo-referenced orthophoto (2010 0.8m pixel size), which were obtained from the Department of Geoinformation, Lagos State Ministry of Physical Planning and Urban Development. Orthotophotos have been found to be reliable and useful dataset in urban planning mapping, it is a resourceful dataset with the opportunities of providing dynamic information to managers on how to manage both natural changes and human induced changes.

Methodology

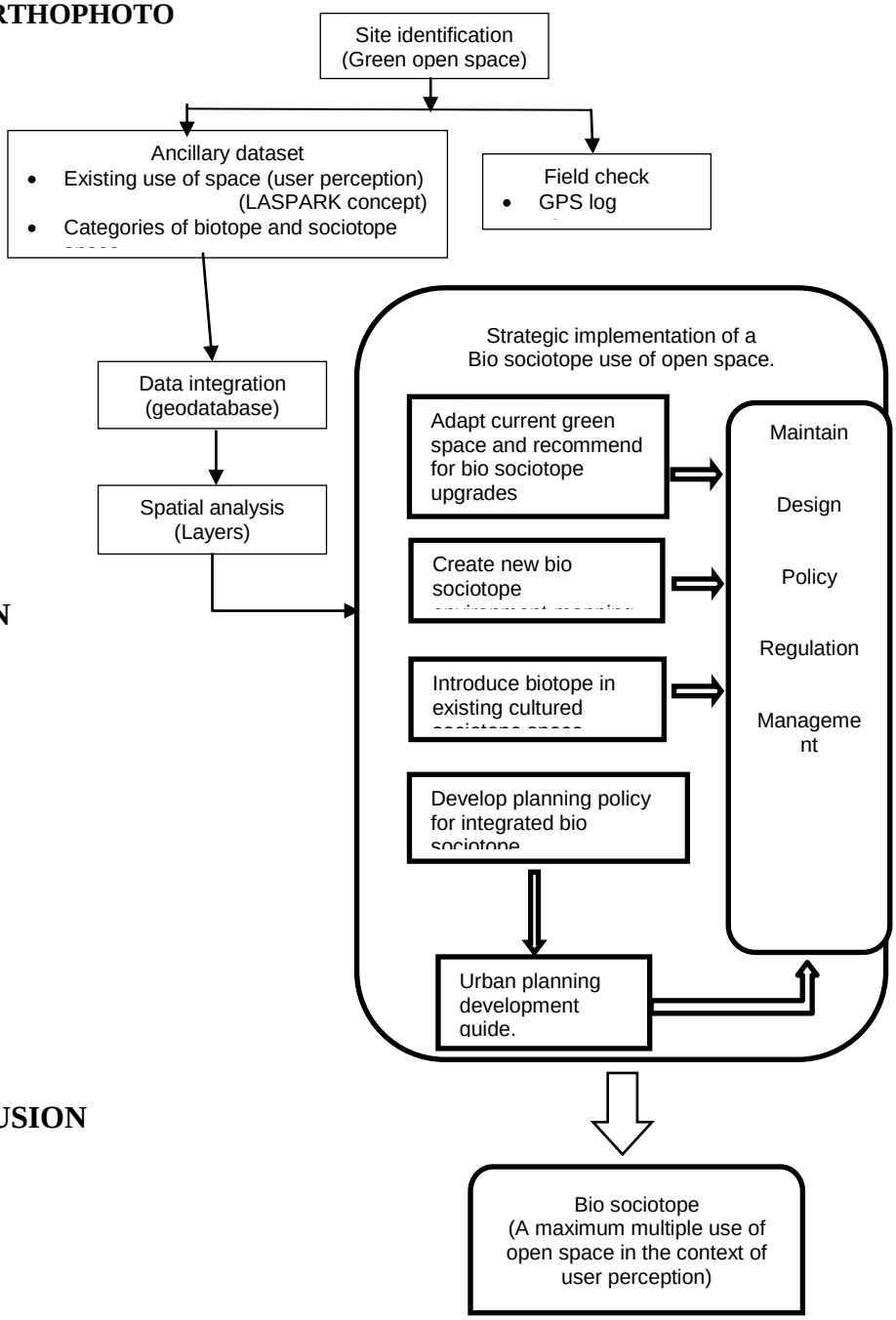
The methodology adopted for this study is the geo processing and classification techniques for generating the final bio sociotope map and identifying environmental economic features that contributes to planning processes. These procedure was carried out using GIS spatial analysis of geographic features, community socio-cultural values, and urban housing needs.

MAPPING FROM ORTHOPHOTO

GEOPROCESSING

INTERPRETATION / ANALYSIS

RESULT / CONCLUSION



Result / Conclusion

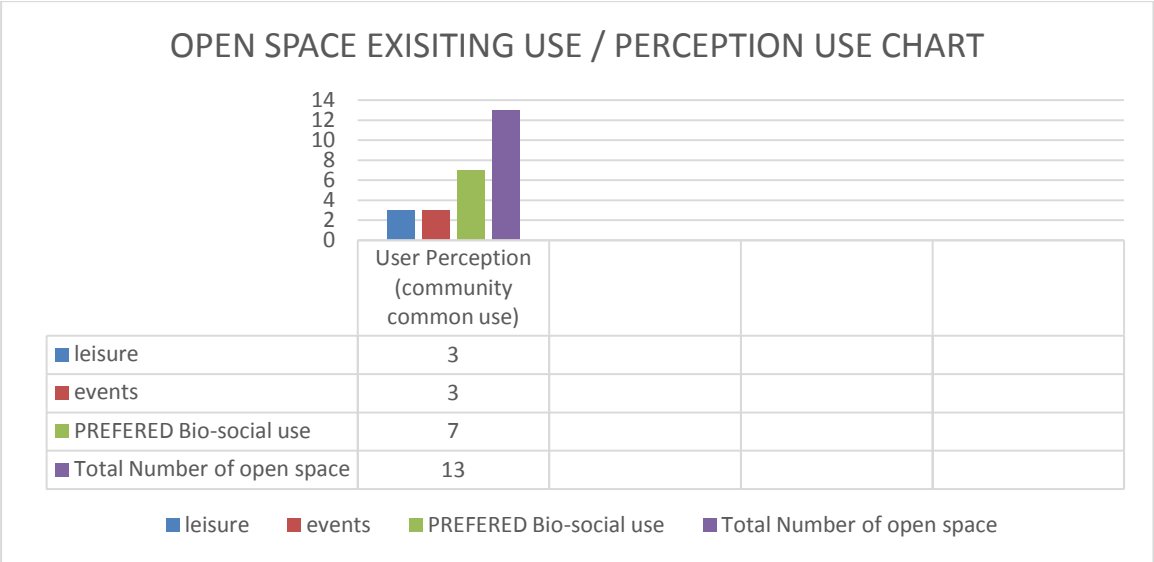
The relative distribution of green / open spaces and the user values, across mainland city present an illustration of potential bio sociotope infrastructure which would improve environmental quality of fauna and flora. We have explored two major indicators namely user perception and LASPARK concepts (Table 1), these indicators helped in creating a strategic bio sociotope infrastructure which is of environmental economic importance.

Table 1: Indicators and priorities site mapping details

INDICATORS		TOTAL IDENTIFIED	COUNT	CHANGE OF USE	PURPOSE	FACILITIES
LASPARK concept		16	2	-		Park, sitting area
User perceived of space.			13	1	Residential	Football pitch, bare land, basketball court.
	Private green space		1	-	Social events, leisure and bio garden.	Sits, GYM, plants and animals, play pen

Figure 3: Spatial distribution of open spaces within developed urban area

Therefore, the findings were derived using site identification (open space, green open spaces, and bio-socio infrastructure) and perception in the community. The result shows that most open spaces are located within planned residential layout area, these makes it one of the most suitable reason why most residents preferred to have them as green spaces with facilities (Figure 1), rather than what is seen in most enclosed community in mainland city.



LASPARK concept of parks and gardens within major highways in the city have been observed as mere aesthetics value with aims of beautifying the highways and not encouraging leisure facilities nor bio-environment within the park (figure 2 and 3). The parks are mostly quiet and perceived as an [1]unsafe space.

Figure 4- Dr. Beko Ransome Kuti Park
(Antony Bridge Exchange)

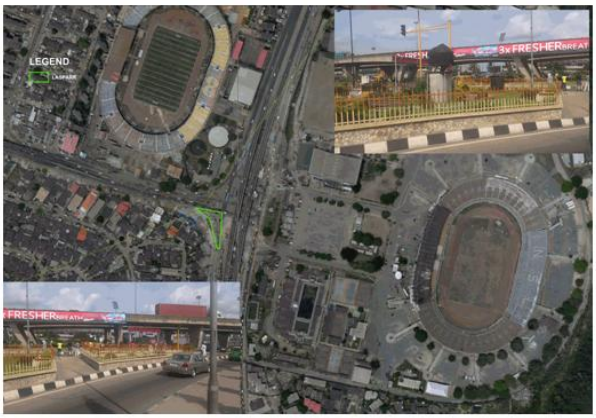


Figure 5- Bola Ahmed Tinubu garden
(opposite National Stadium, Surulere)

The need for housing is also a major challenge competing with preservation of open spaces within the densely populated area such of mainland. The State Government had to build a residential structure in one of the available open spaces within the community in his (Figure 6 and 7).

[1] As described by Lefebvre's two traits of space in urban space safety.

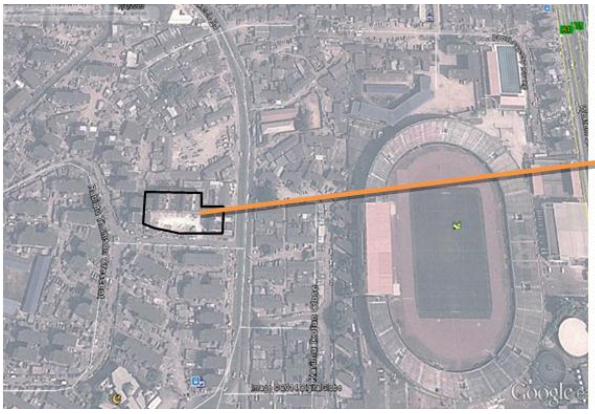


Figure 6: Google imagery of 2013

Figure 7: Orthophoto of 2010

The use of orthophoto and spatial dataset in the mapping process was seen as a vital tool which gives considerable level of accuracy in site selection. The use of multi-temporal dataset for change detection analysis was used for landcover changes over a period of three years. An overall result shows that user perception would promote a purposeful implementation of strategic use of open spaces and existing open green spaces as a save (perceived space) bio-sociotope while also increasing environmental economic importance of these spaces.

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References

ADENIYI, P. O. (1998). Land Information Systems for Land Resources Planning and Management in some African Countries. *Commissioned Study Report for United Nations Economic Commission for Africa (UNECA),Vol I*

AGYEPONG, G. T. (1995). Review of Landuse and Landcover Mapping in Ghana. *Report on seminar on Landuse and Landcover Mapping in Ghana ,26th September 1995.*

ALFREDSSON, B., AND WIMAN, J. (1997). Planning in Sweden. In Guinchard, C.G (ed.), *Swedish planning, Towards sustainable development. The Swedish society and country planning*. 11-18.

APDP/UNDP/UNCHS (HABITAT) (1991). Strategic Plan for the Greater Accra Metropolitan Area. Ministry of Local Government and Development of Town and Country Planning. Vol 1 context Report.

ANDERSON, S. (1978). International Journal of Geographic Information Systems, *Volume I, Number 3, - The Swedish Land Data Bank, July – September, 1978.*

ANDRESSON, R. AND OSTLAND, L. (2004). Spatial patterns, density changes and implications on biodiversity for old trees in boreal landscape of Northern Sweden. *Biological conservation* 118: 443-453.

BALRAM, S., DRAGICEVIC, S. AND MEREDITH, T (2004). A collaborative GIS method

for integrating local and technical knowledge in establishing biodiversity conservation priorities. *Biodiversity and Conservation* 13: 1195 -1208

BROWN, G (2005). Mapping spatial attributes in survey research for natural resource management: methods and applications. *Society & Natural Resources* 18: 1, 17-39.

BROWN, G & C. RAYMOND. (2007). The relationship between place attachment and landscape values: towards mapping place attachment. *Applied Geography* 27: 2, 89 -111

CERTEAU, M (1984). The Practice of Everyday Life, University of California Press, Berkeley

GRAHN P, STIGSDOTTER UK. (2010). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning* 94(3-4):264-75

HONG,K., SONG,J., BYUN,B., YOO, S. & NAKAGOSHI, N(2005).: Applications of Biotope Mapping for Spatial Environmental Planning and Policy: Case Studies in Urban Ecosystems in Korea. Landscape Ecological Engineering, Vol. 1, pp.101-112.

LEFEBVRE, H. 1991 (1974). The Production of Space, Basil Blackwell, Oxford

LUZ F (2000). Participatory Landscape ecology- a basis for acceptance and implementation. *Landscape and Urban Planning* 50: 1-3, 157 -1 66.

MCCALL, M. (2006). Precision for whom? Mapping ambiguity and preciseness in (participatory) GIS. *Participatory Learning and Action* 54, 114 -119.

OLAFSSON, A.S. (2012). GIS-based Recreation Experience Mapping: Development, Validation and Implementation. Forest & Landscape Research. No 56-2012. Forest & Landscape Denmark, Frederiksberg 226pp.

POTSCHIN M & R.HAINES-YOUNG. (2006). "Rio+10," sustainability science and landscape ecology. *Landscape and Urban Planning* 75: 3-4, 162-174.

RAQUEZ, P & EF LAMBIN (2006). Conditions for a sustainable land use: case study evidence. *Journal of Land Use Science* 1:2, 109 -125.

RABLEY, P. (2008). Ghana Project Leverages GIS Based Title Registration and Microfinance to Alleviate Poverty. *ArcNews Fall Edition.* p 28- 29

SOINI, K. (2001). Exploring human dimensions of multifunction landscape through mapping and map-making. *Landscape and Urban Planning* 57, 225-239.

SHAHLE, A. (2006). Sociotope Mapping – exploring Public Open Space and its multiple use values in Urban and Landscape Planning Practice. *Nordic Journal of Architectural Research, Vol 19, No 4.* Pp 13

SHAHLE, A. (2005). Urban Planning for a Quality Dense Green Structure, Stockholm Sociotope Map, and Park Program. *Report of COST ACTION C11-Green structure and Urban Planning.*

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