

A Review of the Impacts of Changing Land Use on Land Degradation in Anyigba, Nigeria

ETUDE SUR LES IMPACTS DU CHANGMENT DE L'UTILISATION DES TERRES SUR LA DÉGRADATION DE TERRE À ANYIGBA

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Abstract: This study is aimed at having an insight into the changes in land use that has occurred in Anyigba between 2006 and 2009 and their consequent impacts on land degradation in the town. Field observation was used in determining the current situation and also, secondary data was used to update initial data generated some years ago. It was revealed that there was still an increase in the size of vacant land and built up areas, while cultivated land, vegetation, and water body decreased. These changes in land use has resulted into erosion (run-off), blocked drainages, dried grounds becoming marshy (in rainy seasons), deforestation, etc. This is as a result of increase in built-up areas, non-compliance to planning standards, quest for vacant land, as well as indiscriminate waste disposal. Thus, there is need to ensure a general policy implementation through conformity with planning standards, increase enforcement of environmental compliance, as well as encourage community participation in sanitation practices.

Key words: Land use; Land Degradation; Planning; Environmental compliance

Résumé: Cette étude vise à avoir un aperçu des changements dans l'utilisation des terres qui ont eu lieu à Anyigba entre 2006 et 2009 et leurs impacts sur la dégradation de terre dans la ville. L'observation sur le terrain a été utilisée pour déterminer la situation actuelle et des données secondaires ont été utilisées pour mettre à jour les données initiales générées il y a quelques années. Il a été révélé qu'il y avait encore une augmentation de la superficie des terrains vacants et des zones bâties, alors que les terres cultivées, la végétation et les eaux ont diminué. Ces changements de l'utilisation des terres ont eu pour résultat l'érosion (run-off), le drainage bloqué, la transformation de terrain séché en marécage (en saisons des pluies), la déforestation, etc. Ce sont les conséquences de l'augmentation des zones bâties, de la non-conformité aux normes de planification, de la recherche de terrains vacants, ainsi que de l'élimination des déchets sans discernement. Ainsi, il est nécessaire d'assurer une implémentation de politique générale en conformité avec les normes de planification, de renforcer le respect de l'environnement, ainsi que d'encourager la participation communautaire dans les pratiques d'assainissement.

Mots clés: L'utilisation des terres; La dégradation de terre; De planification; Le respect de l'environnement

1. INTRODUCTION

In a developing country like Nigeria, the uncontrolled growth of urban areas in terms of population and area coverage have become a very crucial issue stressing environmental scientist because of the escalating problems of urban congestion,

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poor housing, crowded transportation, lack of basic services, ill health, epidemic, low educational status and high unemployment. As urbanization does not come with its expected economic growth, the complication is increased due to poor urban planning and uncontrolled land use, lack of financial resources and inadequate investment in environmental management, thereby causing more impact on the environment (UNCHS, 1996).

Undoubtedly, urbanization is a process that continuously initiates changes in land use. According to Gove et al (2001), the impervious surfaces which abound in many urban centers degrade the quality of storm water runoff, collect pollutants either dissolved in runoff or associated with sediment, such as nutrients, heavy metals, sediment, oil and grease, pesticides, fertilizers and fecal coliform bacteria. These pollutants are moved and discharged into water bodies by runoff.

2. REVIEW OF RELATED LITERATURE

Land use is the human modification of natural environment or wilderness into built environment such as fields, pastures, and settlements. The major effect of land use on land cover since 1750 has been that of deforestation. More recent significant effects of land use include urban sprawl, soil erosion, soil degradation, salinization, and desertification. Land-use change, together with use of fossil fuels, is the major anthropogenic sources of carbon dioxide, a dominant greenhouse gas. It has also been defined as "the total of arrangements, activities, and inputs that people undertake in a certain land cover type" (FAO, 1997a; FAO/UNEP, 1999).

Also, Kombe and Kreibich (2000) perceived that rapid urban growth would initiate improvement of both living conditions and the quality of environment but it is well understood that the conversion of agricultural, vegetation and wetlands to urban areas and the unattending population growth usually come with a vast increase in impervious surfaces, consumption and utilization of goods, and building on natural drainages (USEPA, 2001; Ifatimehin, 2007).

According to Agboola and Olatubara (1993), land is practically limited and an irreplaceable finite resource. Because of the big role market forces play in the allocation of land to different uses, due care and attention must be given to its planning, so that public interest is ultimately protected and not jeopardized.

2.1 Land Degradation

Land degradation is one of the worst environmental problems experienced globally. Ukpong (1994) stated that the intensification of the use of fragile and marginal ecosystems has led to progressive degradation and continued desertification of marginal agricultural lands even in years of normal rainfall. It is feared that the damage by drought and population pressure may have resulted in the genetic loss of a vast array of valuable plant species. Pressure on the dwindling resources in the arid prone areas has caused a number of devastating socio-political and sectarian conflicts in the country with concomitant death, injury and heavy economic losses.

2.2 Causes of Land Degradation

Some of the general causes of land degradation as noted by Ukpong (1994) include:

- (1) Improper resources management.
- (2) Destructive logging of our forest
- (3) Overgrazing and over – cropping of arable lands
- (4) Flooding and wind erosion menace
- (5) Strip mining in some parts of Nigeria.
- (6) Land degradation with pesticides and fertilizers.
- (7) Some known natural land slides etc.
- (8) Destruction of wetlands and marshes for development.

Ukpong also identified other indirect causes of land degradation to include population growth and population influx, property ownership issues, lack of control, enforcement measures and jurisdictional overlap which are due to lack of authority and the use of inappropriate technology for farming and even for producing manufactured goods.

3. STATEMENT OF PROBLEM

Anyigba town is one of the fastest growing university towns in Nigeria today, as commerce is fast evolving and shaping the town's economy (Ifatimehin and Ufuah, 2006a, Salifu, 2008) and the landscape (Kennedy, 2008). This growth has been more spontaneous with the location of Kogi State University in the town, has initiated various levels of land use

transformation. Based on this, Ifatimehin (2000) stated that agricultural lands are lost on a daily basis to construction of houses and other urbanization processes. Thus, noticeable pressure is exerted on the environment on the land and other resources by the growing population and the continual changing of the various land uses in the town. Having been observed, this forms the research problem in this study.

4. AIM AND OBJECTIVES

As a result of the noticeable changes in land use in Anyigba, this study is aimed at analyzing the impacts of changes in land use on land degradation in the town. This is to achieve the following objectives:

- (1) Have an insight into the past and present pattern of land use in Anyigba.
- (2) Identify the factors responsible for land degradation in the town.
- (3) Highlight and justify the significant consequences of changes in land use on land degradation and the environment at large.

5. SCOPE AND LIMITATION

This study was carried out in Anyigba. Concentration was on particular areas where land degradation is prominent. However, the absence of data for the 3rd year (apart from 1999 and 2006) made it difficult to have a non-hypothetical projection. This is the basis behind the projection that was discussed later, to be termed “hypothetical”. This posed a great limitation to the study.

6. METHODOLOGY

A great deal of field observation was employed in this study. This was to obtain real-situation and data. Secondary data were used to review the earlier study done on this work. This was necessary because data for the third year was generated (as a projection) from the two years (1996 and 2006) earlier worked on. Tables were used to show the trend between 1996-2006, as well as the projection up till 2009.

7. STUDY AREA

Anyigba is located in Dekina Local Government of Kogi State, Nigeria on the Igala Plateau in the northern part of the of the Anambra basin. Its three-dimensional positions are: Latitude 7°15’-7°29’N, longitude 7°11’-7°32’E and an average altitude of 385 meters above sea level (Fig 1). It has a total land mass area of 420 sq. km2 has an estimated population of about 71,323 as at 2006. The study area falls within the tropical wet and dry (Aw) climatic region and the guinea savanna. The annual mean rainfall and temperature are 1250mm and 25oC. Lake Abuja also serves as a source of water to many households. The land use and economy of the area is predominantly agrarian but already changing because of the transformation initiated in the economic landscape by the University (Ifatimehin and Ufuah, 2006b).

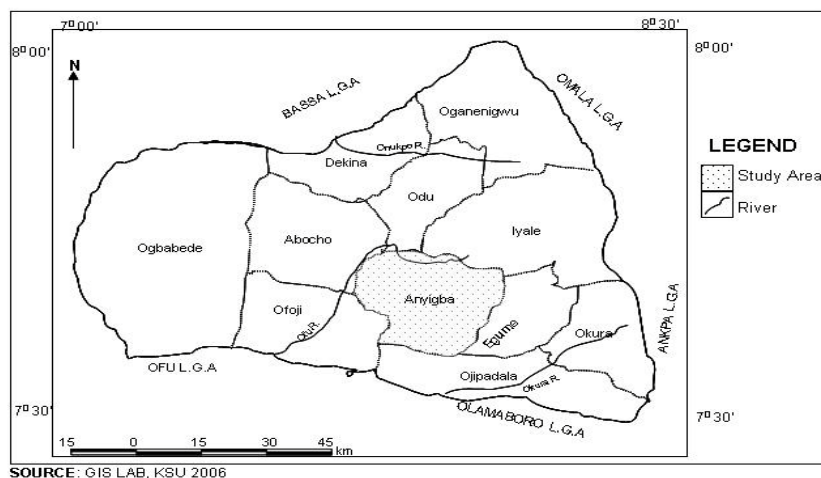


Figure 1: Map of dekina L. GA showing the study area

8. DISCUSSION OF RESULTS

8.1 Land Use Types in Anyigba

The total coverage area of Anyigba measured 4206 hectares in this study. Five categories of land use types were identified (as shown in Table 1).

8.2 The Situation between 1996 and 2006

Table 1 clearly shows the extent of different types of land use between 1995 and 2006 respectively. It is evident that vacant land, built-up area and cultivated area increased by 39.34ha, 940.07ha and 278.45ha respectively. This is quite alarming. On the other hand, vegetation and the water body (stream) that are meant to be existing as resources; reduced by -1023.85 and – 234.31 respectively.

The negative sign is an indication that indeed, changes in land use has caused land degradation. Also, it is noteworthy that built-up areas recorded the highest gain. This is a justification that the establishment of the Kogi State University has really attracted both private and government property developers, who have ventured into building of structures. This ranges from residential, commercial to academic structures.

Table 1: Land Transformation in Anyigba (1995-2006)

Type of Land Use	1995 (ha)	1995 (%)	2006 (ha)	2006 (%)	Difference between 1995 and 2006 (ha)	Difference between 1995 and 2006 (%)
Vacant Land	176	4.19	215.34	5.12	39.34	22.3
Built-up Area	315	7.49	1255.07	29.84	940.07	298.4
Cultivated Land	2056	48.88	2334.75	55.51	278.45	13.5
Vegetation	1325	31.50	301.15	7.16	-1023.85	339.9
Water body (Stream)	334	7.94	99.69	2.37	-234.31	235.0
Total	4206	100	4206	100		

Source: Adapted from Ifatimehin et al, (2008).

8.3 The Situation as at 2009

Table 2 shows the projection of land degradation for year 2009. Vacant land would have increased to 226.06ha, as well as built-up area to 1511.45ha. However, the projection shows that there would have been a reduction in cultivated land to 75.9ha, vegetation to 279.23ha, while water body (stream) is now 63.91ha.

Based on the projection as seen in Table 1, it is obvious that there is a continuous pressure on land (as an environmental resource) in Anyigba. This is even more displayed in the fact that the projection shows that cultivated land, vegetation and water body are shown in negative values in Table 2.

Table 2: Projection of Land Degradation in Anyigba by 2009

Type of Land Use	2009 (ha)	2009 (%)	Difference between 2006 and 2009 (ha)	Difference between 2006 and 2009 (%)
Vacant Land	226.06	5.57	10.72	4.97
Built-up Area	1511.45	37.28	256.38	20.42
Cultivated Land	2258.85	55.71	-75.9	-3.25
Vegetation	21.92	0.54	-279.23	-92.72
Water body (Stream)	35.78	0.88	-63.91	-64.1
Total	4054.06	100		

Source: Field Work, 2010.

Table 3: Summary of Changes in Land Use as at 1995, 2006 and 2009.

Type of Land Use	1995 (ha)	2006 (ha)	2009 (ha)
Vacant Land	176	215.34	226.06
Built-up Area	315	1255.07	1511.45
Cultivated Land	2056	2334.75	2258.85
Vegetation	1325	301.15	21.92
Water body (Stream)	334	99.69	35.78

Source: Field Work, 2010.

8.4 Reasons for the Subsequent Increase and Decrease in Values as at 2009

The increase in value (in ha) for both vacant land and built-up area can be attributed to the fact that more land is cleared almost on daily basis in the town. This is for the purpose of building more houses and shops, creating more open spaces for recreational purposes (e.g. football pitch, open-space bars) and also due to construction (opening up) of new access roads. This can also be said of the reduction in vegetation. Obviously, this has resulted into a general increase in temperature in the town.

On the other hand, the decrease in expanse of cultivated land shows that lands upon which cultivation was initially done, has been taken over by buildings or abandoned by the people cultivating on them before. This is an indicator of the fact that more people are leaving agricultural practices for other job opportunities. Also, the end-result of clearing of vegetation, which increases built-up areas; has led to the gradual reduction of the expanse of land occupied by the stream in the town.

9. SOME INDICATORS OF LAND DEGRADATION DUE TO IMPACTS OF CHANGING LAND USE IN ANYIGBA

As a fast urbanizing town, Anyigba is undergoing changes in land use. Consequently, this has resulted in various indicators of land degradation. This include the following:

9.1 Erosion (Run-off)

Soil erosion is the process whereby top layer of the earth crust or land surface is carried away by various erosive agents – especially water and wind. Ordinarily, soil erosion may be beneficial to man but when it is accelerated, agriculture suffers setback, important rivers are choked and become prone to flood and far less navigable (Peter, 2002). In Anyigba, sheet type of erosion is more common. This occurs generally over areas with slopes and where vegetation is sparse.

9.1.1 Causes

Abegunde et al (1999) ascertained that a number of factors determine the occurrence and severity of soil erosion. These include nature of the soil, nature of the land surface, climatic characteristics, nature of vegetation cover and also human action.

In Anyigba, the continuous crave for sand due to large-scale building/construction activities, bush fire, poor agricultural management, and also increase in cultivated area has resulted into the washing away of the top layer of soil in most parts of the town. As a result of this, a lot of grounds have been '*peeled and opened up*', which results to erosion (run off) and direct insolation.

9.1.2 Impacts

One serious consequence of soil erosion is that it leads to infertility and weakening of soil structure, which in turn; causes depletion of plant nutrients and loss of top soil layer. It can also cause severe damage to roads, irrigation canals and erected buildings and infrastructural facilities. Other impacts include exposure to direct insolation, leaching and general loss of soil nutrients.



Plate 1: Erosion site in Anyigba, Nigeria

In Anyigba, sheet erosion is common along main roads that the loose soil encroaches into the road, thereby making smooth flow of traffic difficult.

9.2 Blocked Drainage Channels

A drainage channel is a facility built for the flow of water or sewage away from a place. Especially in built-up areas, most drainage channels in Anyigba are either blocked or absent totally. This has turned dry grounds into very marshy grounds during rainy season.

9.2.1 Causes

This is mainly as a result of blockage or absence of drainage channels improper waste disposal, as well as poor sanitation by residents. Many residential, commercial and administrative structures are built without provisions for means of proper solid waste disposal.

9.2.2 Impacts of Blockage or Absence of Drainage Channels

Drainage channels are supposed to be free-flowing and devoid of blockages. Hence, any blockage can lead to spilling of deposited substances on roads and pathways. In Anyigba, it is a common eye-sore to see pure water sachets, cellophane bags, and even sand deposits beside filled up drainage channels and even on the road. Where drainage channels are absent, dry grounds turn into very marshy grounds during rainy season. This is a serious obstacle to flow of transportation, as most roads become inaccessible.

Another impact is that blocked drainage channels ooze out odours, which is offensive to human beings. This is aside the fact that they eventually amass into stagnant pools of water, which become unnecessary breeding grounds for mosquitoes, thereby causing malaria. Infact, it is dangerous for drainage channels to be blocked because it is a cause of accident for both pedestrians and okada riders that are not aware that it is a 'false ground'; and may end up falling into them.



Plate 2: Blocked Drainage Along Old Egume Road

Source: Field Work, 2010.

9.3 Deforestation

This is the process by which trees are removed from an area of land. According to FAO (2005), deforestation is not only the conversion of forested area to non-forest; it also includes the degradation that reduces forest quality (in terms of density and structure of trees, ecological services supplied, biomass of plants/animals, as well as species and genetic diversity).

9.3.1 Causes

Continuously, trees are felled in Anyigba almost on a daily basis. This is as a result of the need for vacant land (especially for agricultural purpose), commercial logging, fuel wood cutting, paved grounds and construction activities (roads, shops, residential homes). Other reasons include rural unemployment which leads to exploitation of forest resources and weak forest policies.

9.3.2 Impacts of Deforestation

Deforestation can lead to soil erosion, reduction of soil cohesion, biodiversity loss and desertification. In extreme cases, landslides and even drought occur. Increase in global warming is another devastating impact of deforestation. In Anyigba, a noticeable impact is that daily temperature has increased.



Plate 3: Cutting of Trees for Building Purpose

Source: Field Work, 2010.

10. RECOMMENDATIONS

It is no exaggeration that the establishment of Kogi State University in Anyigba has really brought about rapid changes in land use. Ifatimehin et al (2008) observed that the past one decade in the town has been characterized with radical changes in its pattern of land use, as well as in the consumption and utilization of resources. This calls for urgent steps to be taken, in order to curb and mitigate negative implications on the environment. Therefore, the following recommendations will go a long way in averting these environmental problems.

11. THE NEED FOR GENERAL POLICY IMPLEMENTATION

There is a need to seriously carry out a general policy implementation. This can be achieved through the following:

11.1 Development Control Measures

This could be achieved by complying with a comprehensive land use planning. Proper allocation and building on residential and commercial layouts, as well as cultivated land should be done in accordance with the master plan. This means a well developed Master Plan should be implemented. Additionally, utilities (like drainages and potential waste dumps) should be well sited and maintained on regular basis. Residents should be particularly discouraged from dumping refuse in drainage channels. Also, stakeholders from all the neighborhoods that make up Anyigba should be involved in the implementation of development control measures.

11.2 Environmental Sanitation Measures

Another step to be taken is that environmental policies should be enforced without bias. This is necessary, more especially to increase environmental sanitation practice and encourage proper waste disposal. The Environmental Task Force in the town needs to be more efficient in carrying out its duties. Generally, intensive environmental awareness is essential to carry out this feat. Appropriate legislation should also be put in place to penalize environmental defaulters, especially as regards indiscriminate disposal of refuse.

11.3 Conservation and Restoration of Natural Habitats

Also, development control measures should promote increase in the environmental and aesthetic quality of the town. One of these is by embarking on "Urban Afforestation", which involves the conservation of existing vegetation and restoration of lost ones. One approach that can be adopted is by raising the economic value of standing forests/grasslands by improving markets for sustainably harvested, high value products from those areas or by paying land managers directly for their conservation value. Another approach is by securing local tenure rights for communal forests and grasslands so

that local people can have an incentive to manage these resources sustainably and protect them from outside threats (such as illegal commercial logging or land grabs for building/agricultural purpose).

11.4 Community-Government Participation

All the steps mentioned above can also be achieved through joint participatory efforts, otherwise known as Community-Government participation. This will also involve stakeholders on the part of the government (Environmental Task Force, Town Planning Authority) and the residents at large. Indigenous knowledge should be well utilized in carrying out implementation processes. This will aid government intervention and legislation. Heaps of refuse can be cleared jointly as a community, with the government providing necessary equipment, areas prone to forming stagnant pools of water can be filled, and other joint participatory activities.

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