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MINNA, NIGER STATE, NIGERIA

SCHOOL OF ENVIRONMENTAL TECHNOLOGY
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CONFERENCE Proceedings

CONTEMPORARY ISSUES AND SUSTAINABLE PRACTICES IN THE BUILT ENVIRONMENT

EDITORS:
Asimiyu M. JUNAID
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Richard A. JIMOH
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School of Environmental Technology International Conference (SETIC) 2018

10-12 APRIL 2018

Federal University of Technology Minna, Niger State, Nigeria

CONFERENCE PROCEEDINGS

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10th – 12th APRIL 2018
School of Environmental Technology,
Federal University of Technology, Minna, Niger State, Nigeria.

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FOREWORD

The organising committee of the 2nd School of Environmental Technology International Conference is pleased to welcome you to Federal University of Technology Minna, Niger State Nigeria.

The conference provides an international forum for researchers and professionals in the built and allied professions to address fundamental problems, challenges and prospects that affect the Built Environment as it relates to Contemporary Issues and Sustainable Practices in the Built Environment. The conference is a platform where recognised best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. The scope and papers are quite broad but have been organised around the sub-themes listed below:

- Architectural Education and ICT
- Building Information Modeling
- Construction Ethics
- Energy efficiency and Conservation
- Environmental Conservation
- Facility Management
- Green Construction and Efficiency
- Health and Safety Issues
- Information Technology and Building Maintenance
- Information Technology and Construction
- Information Technology and Design
- Innovative Infrastructure Development
- Resilient Housing Development
- Smart Cities Development
- Social Integration in Cities
- Sustainable Building Materials Development
- Sustainable City Growth
- Sustainable Cost Management
- Sustainable Property Taxation
- Sustainable Architectural Design
- Sustainable Urban Transportation Systems
- Theory and Practices for Cost Effectiveness in Construction Industry
- Urban Ecology Management
- Urban Land Access
- Disasters, Resilient Cities and Business Continuity

We hope you enjoy your time at our conference, and that you have the opportunities to exchange ideas and share knowledge, as well as participate in productive discussions with the like-minded researchers and practitioners in the built environment and academia.

Local Organising Committee
School of Environmental Technology International Conference (SETIC) 2018
APRIL 2018

ACKNOWLEDGEMENTS

We have tried to build on the success of the maiden of SETIC held in 2016 which came with good feedbacks and memories. The success of the 2nd School of Environmental Technology International Conference holding at the Main Campus of the Federal University of Technology Minna, Nigeria is predicated on the support and goodwill from Vice-Chancellor of Federal University of Technology, Dean School of Environmental Technology and many other highly motivated people.

I sincerely wish to appreciate you for attending this Second edition of SETIC and to warmly welcome you to the city of Minna the capital of the *POWER STATE.* It is a great honour to have you in the beautiful campus of Federal University of Technology Minna, Nigeria. I am aware of the great sacrifices made by many of you to be present in this occasion and I will definitely not overlook the long distances some of you have had to cover to get to the conference venue. We genuinely appreciate all your efforts. It is our singular hope and desire that this 2nd edition of the conference (SETIC 2018) meets your expectations and gives you unquantifiable experience and tremendous developmental networking opportunities for a life fulfilling career.

We are grateful for the presence of the Vice Chancellor of the Federal University of Technology Minna Professor Abdullahi Bala whose leadership and distinguished academic career has served as inspiration and encouragement to many academics within and outside Nigeria. His desire to continue on the path of greatness for this Humble University of ours has seen the University become a destination for International conferences, Public lectures, Book Development, Presentations and Seminars that meet International standards. We are happy to have you as the Chief host to declare the conference open and deliver the welcome address.

We are grateful to the former Dean of School of Environmental Technology, Federal University of Technology Prof A.M. Junaid and the Ag. Dean of School of Environmental Technology Prof. S.N. Zubairu for providing the healthy platform, academic backing, management and guidance for the organisation of the conference. You increased the level of challenge from 2016 and provided the required resources, direction, energy and strategies for achieving its success, it is a great honour of having the opportunity to work closely with you and learning never to give up.

I wish to thank also all the special guests particularly leaders of the Industry, Built Environment and Academia.

A special thanks goes to the Bursar of Federal University of Technology, Mrs. Hajara Kuso for the timely responses to all our requests regarding the financial aspects of access to funds for the conference.

SETIC is beginning at the foundation this year and for this I wish to thank all those who have supported us through various forms of participation. Specifically I wish to thank the delegates and the partners for contributing significantly to the conferences. I wish to thank Prof. S.N. Zubairu Prof. A.M. Junaid, Prof. O. O. Morenikeji and Prof. Y.A Sanusi, who all genuinely and consistently monitored the progress of the conference preparations. My desire in 2016 was for SETIC to become a constant feature in the calendar of the University and global conference listings, am a happy person today seeing this desire fulfilled with the SETIC 2018 edition.

Delegates to SETIC 2018 are from different academic and research institutions that are spread across different countries. This offers participants a wonderful opportunity for exchange of cultural, social and academic ideas during the conference periods. It is also an opportunity to create awareness about programmes and events at the participants' individual institutions. I encourage you all to make good use of the networking opportunities that are available.

In this 2nd edition we received 258 abstract submissions because we had a wide distribution outlet as compared to the 1st edition which is an indication of growth. Using a rapid review system we accepted a total of 209 abstracts and the authors were communicated on what issues they were to examine while developing the full papers based on their titles and aim of the paper. Two hundred (200) full papers were received and reviewed. We sent back the reviewed papers and reviewers comments forms to each of the prospective authors to assist

in the preparation of the revised papers. It was after this rigorous and time consuming process that we were able to accept 172 papers for presentation at the conference. It gives me great joy therefore to congratulate all the authors whose papers made it to the conference. It is my sincere believe that the presentation of the different ideas in your paper would go a long way in improving the knowledge of the participants and also generate meaningful discussions over the tea beaks, lunch and beyond.

I wish to express my utmost gratitude to each of the Seventy-three (73) reviewers for a wonderful job done well and for tolerating our deadlines and Oliver Twist syndrome. It is your dedication and expertise that has ensured that the conference is a success.

Special thanks to all our keynote speakers, Arc. Umaru Aliyu, (ficiArb, fnia, ppnia) (*President, Architects Registration Council of Nigeria (ARCON)*, Prof. Stella N. Zubairu (*Former Dean Postgraduate School, Federal University of Technology Minna*), Dr. Julius A. Fapohunda, (*Editor-in-Chief: International Journal of Sustainable Energy Development & Leader: Sustainable Building and Urban Growth Research Unit, Cape Peninsula University of Technology).*

It is important to appreciate the roles and efforts of the following people for their selfless and very significant contributions made towards the successful organization of the conference: Oyetola Stephen, Alonge Olubunmi, Lynda Odine, Adedokun John, Idowu Oqua, Bamidele Eunice and Muhina Lami (for being available to run around at very short notice),

The organisation of this conference would not have been this easy without dedicated individuals offering to serve. My heartfelt gratitude goes to Dr. Taibat Lawanson, Dr. R.A. Jimoh, Dr. L.O. Oyewobi, Dr. N.I. Popoola, Dr. Lekan Sanni, Dr. I.B. Muhammad, Dr. A.A. Shittu and Dr. A. Saka for their unflinching support all through the process.

It is our sincere hope that this conference will serve as a forum for the advancement of research in the urban sphere towards achieving a sustainable environment. It is our sincere believe that academics and professionals in practices will continually participate in this forum.

Worthy thanks goes to the members of the Local Organising Committee for the tireless effort. The success of the conference goes to these wonderful people. You have made SETIC 2018 to ROCK.

Once again I wish to thank you all for creating time out of your busy schedule to attend this conference. Please do enjoy your stay at Federal University of Technology Minna, and the city as a whole. Ensure that you make use of the different fora created throughout the conference to build new relationships for the future and strengthen existing relationships. I look forward to seeing you all in future.

Olatunde Folaranmi ADEDAYO
SETIC 2018 LOC Chairperson
APRIL 2018

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REVIEW PANEL

We wish to express our deepest and sincere gratitude to the following people in no particular order who provided comprehensive scientific reviews and made commendable suggestions towards improving the over 258 abstracts and 182 full papers submitted to SETIC 2018. They provided constructive comments to authors regarding their papers, it is necessary to state that there was no reported case of conflict of interest by any of the reviewers or the authors.

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IMPACT OF PERI URBAN GROWTH ON AGRICULTURAL LAND IN MINNA SUBURB

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Urban growth is seen to present both opportunities and threat to agriculture land. It was on this basis that this work sets out to assess the effect urban growth has on agricultural land uses in the peri-urban area of Minna, Niger State. Both primary and secondary data were collected in order to effectively achieve this. Simple random sampling was adopted in drawing samples from the study population. Two sets of satellite imageries obtained were used; that is, the Enhance Thematic Mapper (ETM) 2006 and the Enhance Thematic Mapper (2016). Three (3) spatial growth dynamics (Built-up, Agricultural land, Vegetation) were evaluated within the study areas between 2006 and 2016. Results obtained revealed that development has encroached into agricultural land uses with resultants environmental and socio-economic impacts on farmers. Though farmers had to relocate to the fringe for agricultural practices to give space for other competitive uses; results revealed significant improvements in their economic wellbeing due to increase in value of farm produce. The study recommends policy actions on the part of development control agency to produce a workable land use policy so as to curtail conflicting land uses, controls the pattern of development and prevents continuous encroachment into agricultural land in order to ensure food security in the Nigerian cities.

Keywords: Agricultural land, Land use, Peri-urban, Urban Growth, Built up Area

INTRODUCTION

The increasing population of the urban dwellers and demand for urban land has resulted to outward expansion of cities, leading to changes in land use at the city regions. Most prime agricultural lands at the peri-urban regions are bought up for other competitive uses such as residential, commercial, recreational and institutional uses amongst others (Antrop, 2000; Gallant *et al*., 2004; Musa *et al*., 2013). This increasing demand for land uses at the peri-urban region may have effect on the productivity of land, land prices, maintenance of biological diversity, landscapes and commuting patterns (Houston, 2005).

Fasakin and Ogunmakin (2006) observed increasing competitions amongst various land uses in the peri-urban areas in Nigeria, resulting to volatility in land prices. This is base on the fact that many peri-urban areas are undergoing a form of gentrification based on promotion of lifestyle and good living and can compete favourably with some land within the city (Argent, 2002). These peri-urban areas also play significant roles in food production and provision for urban dwellers (Etim and Edet, 2009). However, the challenge is that most peri-urban lands lacks elements of physical planning and so, characterized by fast and unplanned physical growth and development (Amoateng *et al*., 2013).

Development and competitive land uses at the peri-urban areas presents both opportunities and threats. It is on this note that this study set out to assess the effect of urban growth on agricultural land uses in the peri-urban area of Minna, Niger State with the view to assessing its socio-economic and environmental impact on farmers and livelihoods.

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Morenikeji, et al., (2018). **IMPACT OF PERI URBAN GROWTH ON AGRICULTURAL LAND IN MINNA SUBURB.** Contemporary Issues and Sustainable Practices in the Built Environment. School of Environmental Technology Conference, SETIC, 2018

REVIEW OF LITERATURE

One of the major problems threatening cities and towns of the third world countries today is that of population explosion leading to uncontrolled urban growth. Musa *et al*., (2013) assessed the impact of expansion of Minna, along the Minna-Bida road on agricultural land. The result of the study revealed that the quantity of farm produce been evacuated from the communities to Minna has been on a steady decline owing to the selling of agricultural land by the natives. The result also confirmed that the development activities now taking place in the study areas are not guided by any policy guideline.

Morenikeji *et al*, (2015) studied the dynamics of land use in Minna using Remote Sensing and Geographic Information System application (1986-2011). Results revealed increasing growth rates in built-up areas over the study period (The rate of growth of built-up area between 1986, 1996, and 2011 are 0.81%, 2.93%, and 4.06% respectively). The study observed that urban expansion and increasing land use changes in Minna is a function of increase in population and recommends city wide infrastructure such as water, roads and drainages that will cater for the increasing population and demand for land use in the area.

Popoola *et al*, (2016) examined spatial development of peri-urban areas in Minna, Nigeria between 1986 and 2012. The study attributed spatial development of the peri-urban areas in Minna to the challenges confronting cities in the area of housing, infrastructure provision and unemployment. Results obtained from the study revealed vividly, the emerging role of peri-urban in city expansion. Proper planning of bare surfaces, investment in mass housing projects and preservation of agricultural land for easy integration of the peri-urban into the city fabrics were recommended for proper management of the peri urban land.

It is therefore necessary to examine the socio-economic and environmental impacts of the peri-urban development in order to establish its effects on the immediate environment and livelihood of the peri-urban dwellers.

METHODOLOGY

Since the study wants to assess the effect urban growth has on agricultural land use in the peri-urban area of Minna, Niger State. Simple random sampling technique was used for the selection of respondents for the study, both primary and secondary method of data collection were used for the study and the use of geospatial techniques in determining the growth trend of the study area. Two different years were considered for the study (2006 and 2016) and two satellite imageries were obtained for the aforementioned years that is, Thematic Mapper 2006 and Thematic Mapper 2016. All the imageries were gotten from the National Centre for Remote Sensing Jos.

Table 1: Feature Classes considered during image classification.

S/N	Classification	Description
1	Built-up area	Comprises all residential, commercial and industrial areas, village settlement and transportation routes which reveal evidence of development.
2	Disturbed vegetation	Vegetation affected by human activities and comprises of all agricultural land and other vegetation such as trees, shrubs, palms, mixed forest and herbs.
3	Undisturbed Vegetation	Comprises of land affected by minimal human activities of which the forest canopy is still maintained
4	Water body	This comprises of river, permanent open water, lakes, ponds, streams, canals and reservoirs.

RESULT AND DISCUSSION

Figure 1a and 1b shows the development of Gidan kwano axis in 2006; the red colour represents Built-up areas which covered 0.36km^2 (7.42%). Disturbed vegetation (Agricultural land) represented in yellow colour was 3.19km^2 (66.64%). Vegetation represented with green colour had a total area of 1.24km^2 (25.94%).

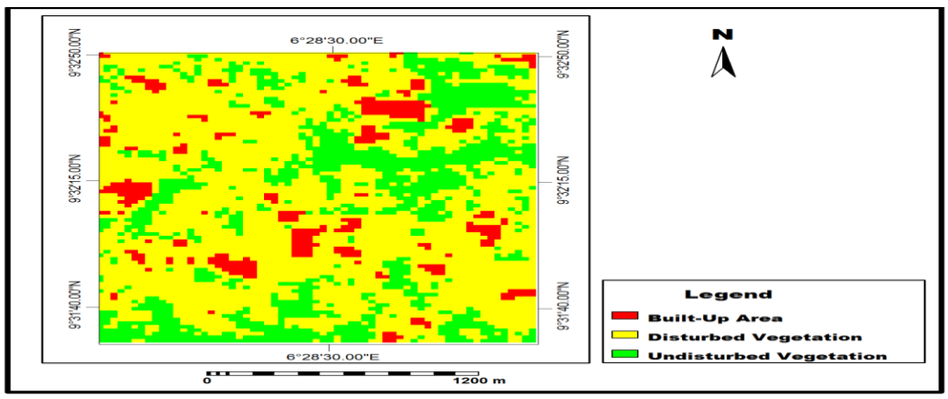

Figure 1a: Gidan kwano satellite image of 2006

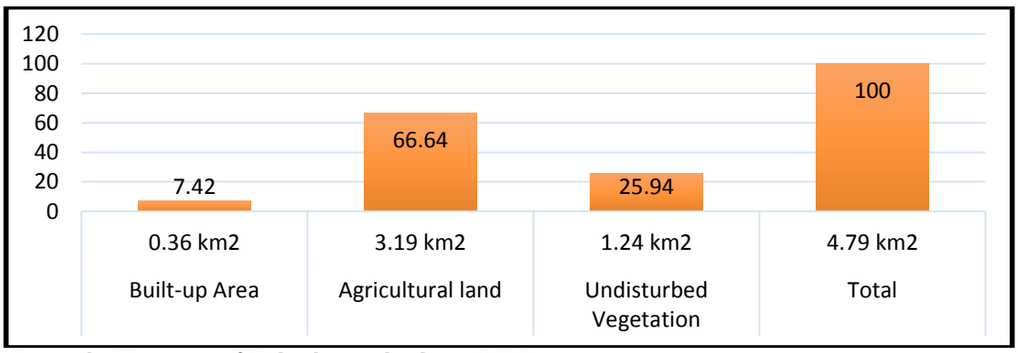

Figure 1b: Histogram of Gidan kwano land use (2006)

Figure 2a and 2b shows the image characteristics of Gidan kwano in 2016. Built-up area represented in red colour had grown to an area of 0.96km^2 (19.95%). Disturbed vegetation (Agricultural land) covers an area of 3.51km^2 (73.34%) and Vegetation represented in green had an area of 0.32km^2 (6.70%).

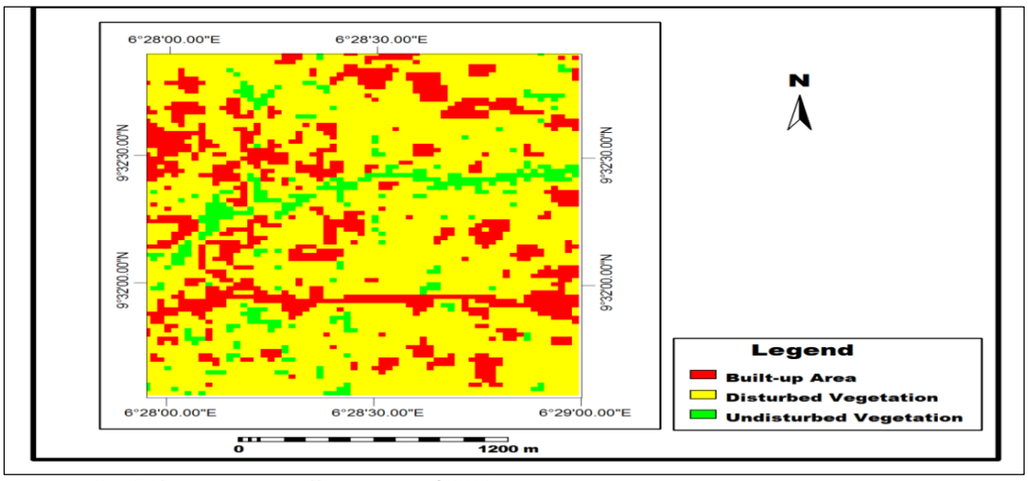

Figure 2a: Gidan Kwano satellite image of 2016

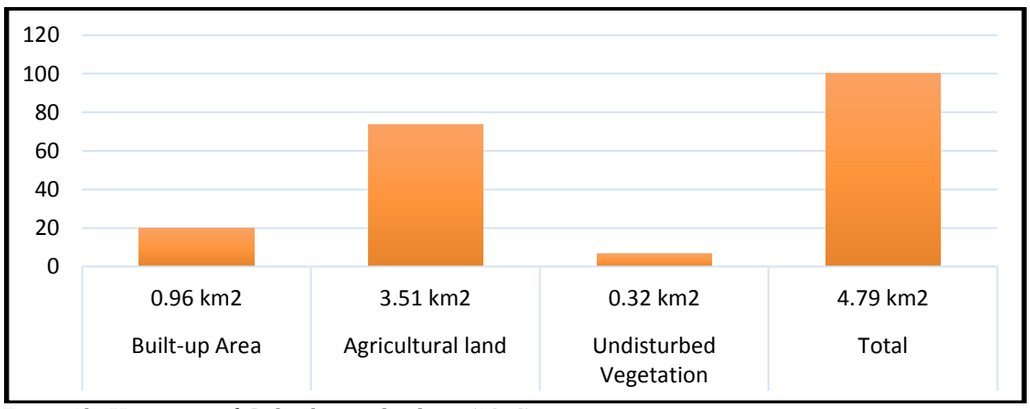

Figure 2b: Histogram of Gidan kwano land use (2016)

Figure 3a and 3b shows the area cover of Tudun Fulani in 2006; the red colour depicts built-up areas covering an area of 0.92km^2 (17.75%). Disturbed Vegetation (Agricultural land) in

yellow covers an area of 3.19km^2 (68.98%). Vegetation with an area of 0.76km^2 (13.30%) is represented in green.

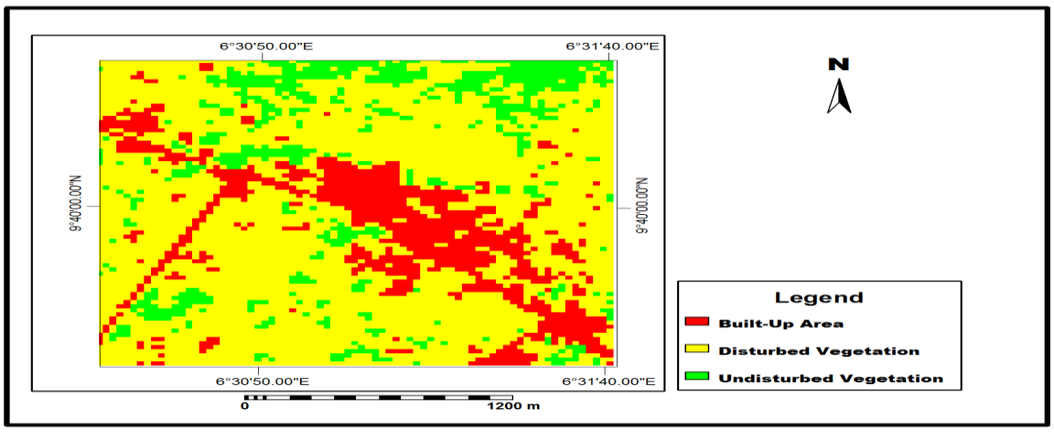

Figure 3a: Tudun Fulani satellite image of 2006

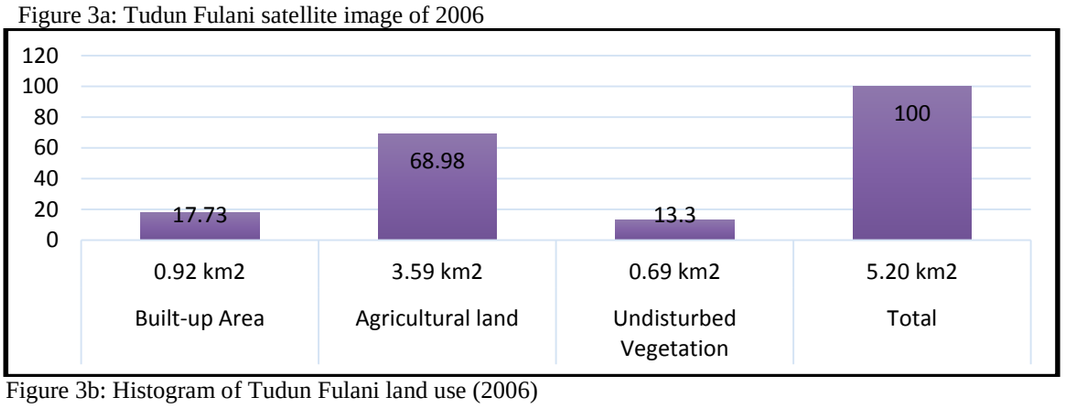

Figure 3b: Histogram of Tudun Fulani land use (2006)

Figure 4a and 4b shows the growth characteristics of Tudun Fulani in 2016. Built-up areas represented with red covers an area of 1.25km^2 (24.08%). Disturbed vegetation (Agricultural land) represented with yellow covers 3.19km^2 (61.39%). Vegetation covers 0.76km^2 (14.53%) is represented with green.

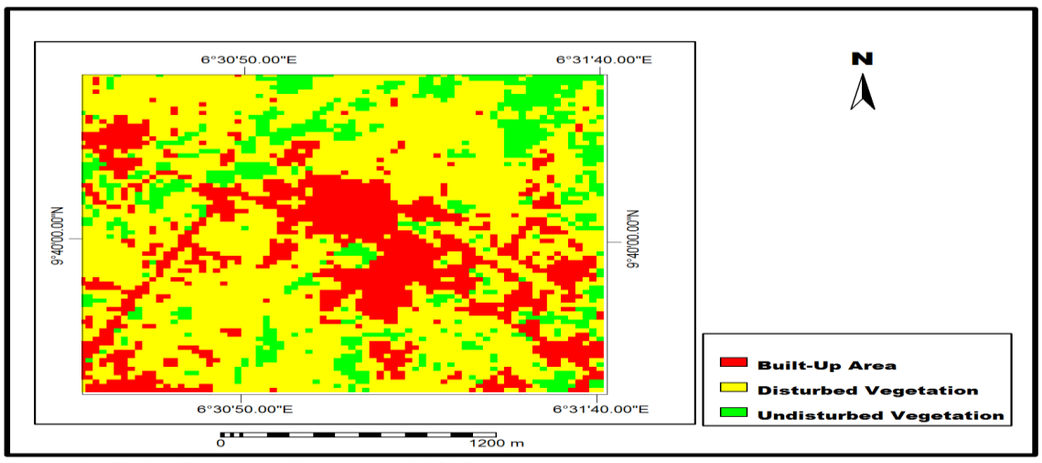

Figure 4a: Tudun Fulani satellite image of 2016

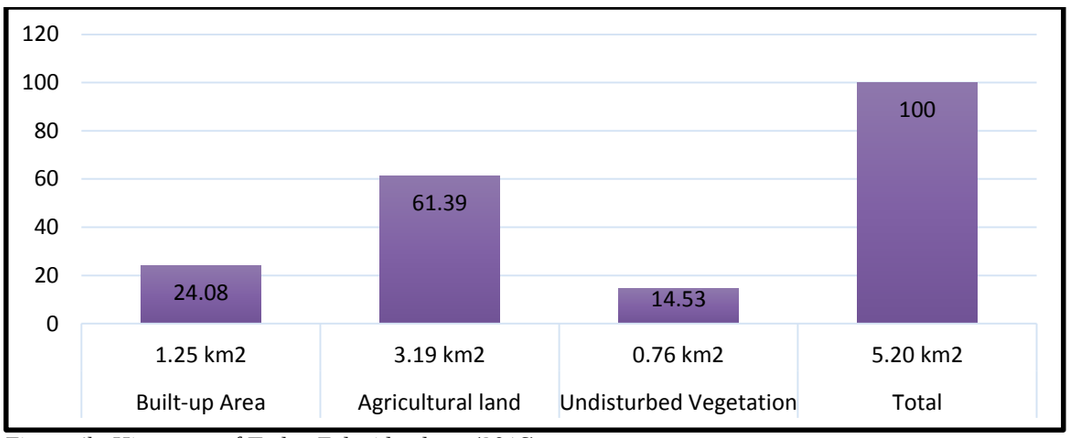

Figure 4b: Histogram of Tudun Fulani land use (2016)

Figure 5a and 5b shows the extent of Shango in 2006. Built-up area showed in red colour had an area of 1.32km^2 (8.65%). Disturbed vegetation (Agricultural land) covers an area of 11.81km^2 (77.71%) represented in yellow colour. Vegetation represented with green had an area of 1.94km^2 (12.76%) and Water body represented in blue covers an area of 0.13km^2 (0.88%).

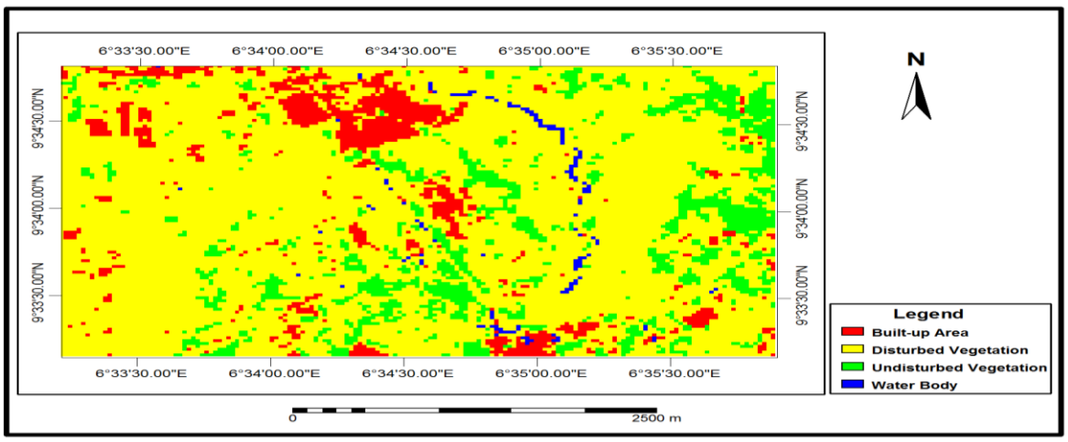

Figure 5a: Shango satellite image of 2006

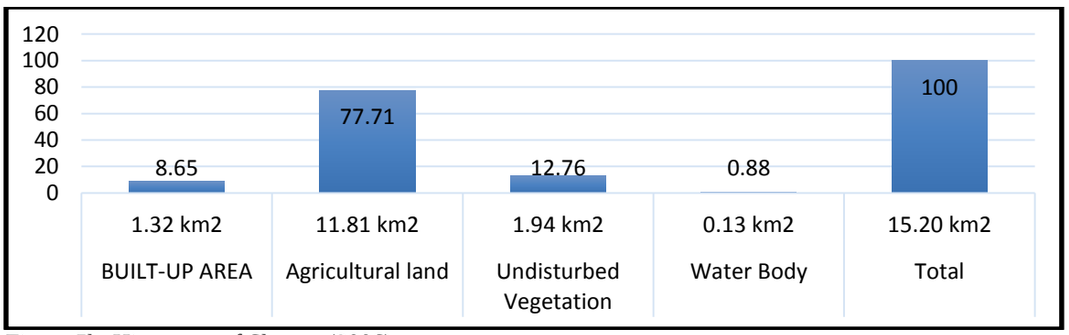

Figure 5b: Histogram of Shango (2006)

Figure 6a and 6b shows the growth of Shango in 2016. Built-up area represented in red colour occupied an area of 2.89km^2 (18.92%). Disturbed vegetation (Agricultural land) covers an area of 10.42km^2 (68.25%). Vegetation represented in green covered an area of 1.01km^2 (6.56%) and Water body represented in blue covered an area of 0.96`km^2 (6.27%).

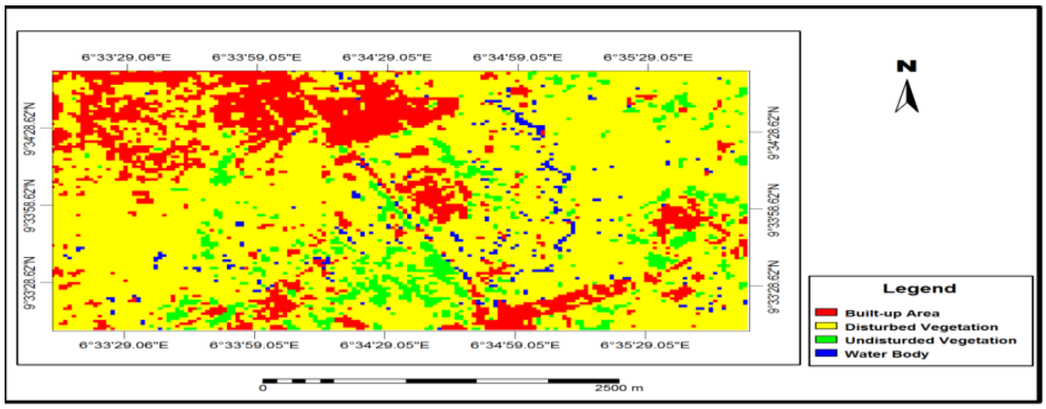

Figure 6a: Shango satellite image of 2016

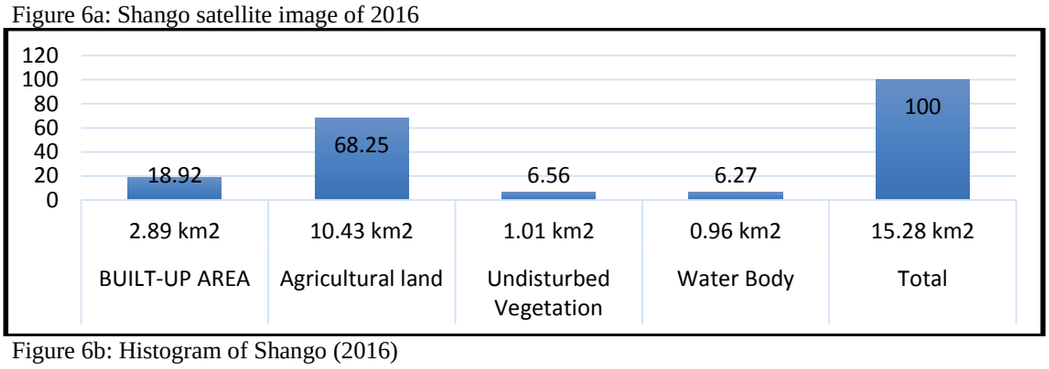

Figure 6b: Histogram of Shango (2016)

As shown in table 2, the magnitude of change in Gidan kwano between 2006 and 2016 was calculated by subtracting A from B (Land use in 2006 from 2016). The percentages of change (E) were calculated by dividing the magnitude of change of each land use by ten years (reference year) and multiply by 100. The table then revealed Built-up has been growing at 0.006km^2 yearly and Agricultural land growing at 0.0032km^2 yearly.

Table 2: Magnitude and percentage of change in land use (Gidan kwano 2006-2016)

CLASSES	A 2006	B 2016	C MAGNITUDE OF CHANGE (B – A)	D ANNUAL FREQUENCY OF CHANGE C/10	E PERCENTAGE OF CHANGE C/A * 1OO
Built-up	0.36	0.96	0.60	0.06	166.66
Agriculture Land	3.19	3.51	0.32	0.0032	10.13
Vegetation	1.24	0.32	-0.92	-0.092	-74.19
Total	4.79	4.79	0	-0.03	102.6

Source: Researchers Field work August, 2017

In table 3, the magnitude of change in Tudun Fulani between 2006 and 2016 was calculated by subtracting A from B (Land use in 2006 from 2016). The percentages of change (E) were calculated by dividing the magnitude of change of each land use by ten years (reference year) and multiply by 100. The table shows that Built-up has been growing at 0.033km^2 yearly and Agricultural land has been declining at 0.04km^2 yearly.

Table 3: Magnitude and percentage of change in land use (Tudun Fulani 2006-2016)

CLASSES	A 2006	B 2016	C MAGNITUDE OF CHANGE (B – A)	D ANNUAL FREQUENCY OF CHANGE C/10	E PERCENTAGE OF CHANGE C/A * 1OO
Built-up	0.92	1.25	0.33	0.033	35.87
Agriculture Land	3.59	3.19	-0.40	-0.04	-11.14
Vegetation	0.69	0.76	0.07	0.007	10.14
Total	5.20	5.20	0	0	34.87

Source: Researchers Field work August 2017

In table 4, the magnitude of change in Shango between 2006 and 2016 was calculated by subtracting A from B (Land use in 2006 from 2016). The percentages of change (E) were calculated by dividing the magnitude of change of each land use by ten years (reference year) and multiply by 100. The table shows that Built-up has been growing at 0.157km^2 yearly and Agricultural land has been declining at 0.139km^2 yearly.

Table 4: Magnitude and percentage of change in land use (Shango 2006-2016)

CLASSES	A 2006	B 2016	C MAGNITUDE OF CHANGE (B – A)	D ANNUAL FREQUENCY OF CHANGE C/10	E PERCENTAGE OF CHANGE C/A * 1OO
Built-up	1.32	2.89	1.57	0.157	118.94
Agriculture Land	11.81	10.42	-1.39	-0.139	-11.77
Vegetation	1.94	1.01	-0.93	-0.093	-47.94
Water Body	0.13	0.96	0.83	0.083	638.46
Total	15.20	15.28	0.08	0.008	649.75

Source: Researchers Field work August 2017

Table 5 shows the summary of the opinion of Gidan Kwano respondents on the causes of urban growth in the neighbourhood; the respondents attributed the presence of the Federal University of Technology as the main cause of urban growth in the neighbourhood followed by improved infrastructure, affordable houses, availability of land for farming and presence of market respectively.

Table 5: Causes of urban growth in Gidan kwano

Causes of Urban growth	**SA**	**A**	**D**	**SD**	**TWR**	**Mean**	**RII**	**Rank**
1. Presence of the University	57	6	0	0	246	3.90	0.98	1st
2. Improved Infrastructure	11	52	0	0	200	3.17	0.79	2nd
3. Affordable houses	6	48	9	0	186	2.95	0.74	3rd
4. Availability of land for farming	2	27	29	5	152	2.41	0.60	4th
5. Presence of Market	0	4	57	2	128	2.03	0.51	5th

Source: Researchers Field work August 2017

Table 6 shows the causes of urban growth in Tudun Fulani, the respondents agreed that presence of good road was the main causes of urban growth in the neighbourhood, availability of land for farming, improved infrastructure, affordable houses and presence of market assume the second, third, fourth and fifth positions respectively.

Table 6: Causes of urban growth in Tudun Fulani

Causes of Urban growth	**SA**	**A**	**D**	**SD**	**TWR**	**Mean**	**RII**	**Rank**
1. Presence of Road Network	18	40	1	1	194	3.29	0.82	1st
2. Availability of land for farming	19	33	6	1	188	3.19	0.80	2nd
3. Improved Infrastructure	10	49	0	0	187	3.17	0.79	3rd
4. Affordable houses	13	40	3	3	181	3.11	0.77	4th
5. Presence of Market	2	2	45	10	114	1.93	0.48	5th

Source: Researchers Field work August 2017

Table 7 illustrates the opinion of respondents in Shango as to the causes of urban growth in the neighborhood; the respondents believed that the presence of the College of Education

Minna was the main cause of urban growth and this was followed by Affordable houses, presence of market, improved infrastructure and availability of land for farming come last.

Table 7: Shango causes of urban growth

Causes of Urban growth	SA	A	D	SD	TWR	Mean	RII	Rank
1.Presence of COE Minna	68	8	0	0	297	3.91	0.98	1st
2. Affordable houses	7	64	5	0	230	3.03	0.76	2nd
3. Presence of Market	3	30	35	8	180	2.37	0.59	3rd
4. Improved Infrastructure	2	12	50	12	156	2.05	0.51	4th
5. Availability of land for farming	6	7	39	24	147	1.93	0.48	5th

Source: Researchers Field work August 2017

Table 8 shows the impact of urban growth on the farmer's activities as well as the environment of Gidan kwano. The farmer's perceptions were ranked in order of magnitude and the factor that most likely affect them. The farmers opined that the increase in prices of farm yields due to urban growth was the most prevailing circumstance, followed by relocation due to urban growth, hindrance in accessibility, reduced number of farmers and reduced crop yield came last.

Table 8: Socio-economic and Environmental Impact of Gidan Kwano

Socio-economic and Environmental Impact	SA	A	D	SD	TWR	Mean	RII	Rank
1. Urban growth has led to increase in prices of farm yield	22	39	0	2	207	3.31	0.80	1st
2. Urban growth have caused relocation	5	53	5	0	189	3.00	0.75	2nd
3. Urban growth has hindered accessibility to farmland	13	22	24	4	170	2.70	0.67	3rd
4. Urban growth have reduced the number of Farmers	4	20	32	7	147	2.33	0.58	4th
5. Has the number of crop yield reduced	1	4	51	7	125	1.98	0.50	5th

Source: Researcher's Field work August 2017

Table 9 show the views of Tudun-Fulani farmers as to the impact urban growth had on them as well as their environment. The factors were ranked as to which affect them mostly. Increased prices of farm yields came first, followed by accessibility problem, relocation due to urban growth, reduced crop yield and reduced number of farmers came last.

Table 9: Socio-economic and Environmental Impact of Tudun Fulani

Socio-economic and Environmental Impact	SA	A	D	SD	TWR	Mean	RII	Rank
1. Urban growth has led to increase in prices of farm yield	25	34	0	0	202	3.42	0.92	1st
2. Urban growth has hindered accessibility to farmland	22	29	7	1	190	3.22	0.81	2nd
3. Urban growth have caused relocation	13	44	1	1	187	3.21	0.79	3rd
4. Has the number of crop yield reduced	7	2	33	17	117	1.98	0.50	4th
5. Urban growth have reduced the number of Farmers	3	7	22	27	104	1.76	0.44	5th

Source: Researcher's Field work August 2017

Table 10 shows the impact urban growth has on the farmers as well as the environment of Shango. The farmer's opinions were ranked in order of magnitude and the factor that most likely affect them came first. The farmers were of the opinion that urban growth has seriously hindered accessibility, followed by increased prices of farm yield, reduced number of farmers, relocation and reduced crop yield came last.

Table 10: Socio-economic and Environmental Impact of Shango.

Socio-economic and Environmental Impact	SA	A	D	SD	TWR	Mean	RII	Rank
1. Urban growth has hindered accessibility to farmland	73	2	1	0	300	3.95	0.99	1st
2. Urban growth has led to increase in prices of farm yield	46	30	0	0	274	3.61	0.90	2nd
3. Urban growth have reduced the number of Farmers	2	36	30	8	184	2.42	0.61	3rd
4. Urban growth have caused relocation	7	68	1	0	234	3.12	0.77	4th
5. Has the number of crop yield reduced	2	0	62	12	144	1.89	0.47	5th

Source: Researcher's Field work August 2017.

Figure 7 shows the overlay of extents and the direction of growth and it reveal that there would be further encroachment into agricultural land in the future thereby depriving farmers of cultivable land. It further shows that the neighbourhood is growing towards the south-east region of the study area.

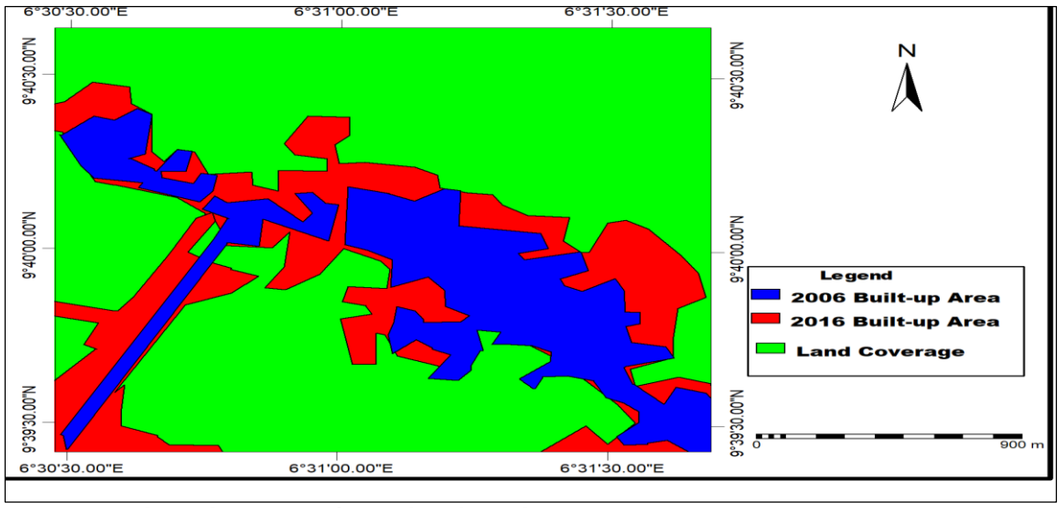

Figure 7: Overlay and Direction of Growth in the study area

SUMMARY OF FINDINGS

Research findings revealed that Built-up areas in Gidan-Kwano has been growing at 0.006km^2 yearly and Agricultural land also growing slowly at 0.0032km^2 yearly. In Tundun Fulani and Shango, Built-up has been growing at 0.033km^2 and 0.157km^2 yearly while Agricultural land declining at 0.04km^2 and 0.139km^2 yearly respectively. Summary of the opinion of Gidan Kwano respondents on the causes of urban growth in the neighborhood attributed the growth to the presence of the Federal University of Technology as the main cause of urban growth in the neighborhood followed by improved infrastructure, affordable houses, availability of land for farming and presence of market respectively. Similarly, the causes of urban growth in Tudun Fulani was attributed by the respondents to the presence of good road, availability of land for farming, improved infrastructure, affordable houses and presence of market, and in Shango the causes of urban growth in the was also attributed to the presence of the College of Education Minna followed by the Affordable houses, presence of market, improved infrastructure and availability of land for farming.

On the impact of urban growth on the farmer's activities as well as the environment, in Gidan kwano. Tundu-Fulani and Shango, the farmers affirmed that there has been increase in prices of farm yields due to urban growth taking over the available land for farming and most of the farmers have relocated inwardly due to this growth they also reported hindrance in land accessibility and reduced crop yield. The study further revealed that there would be further encroachment into agricultural land in Minna in the future and this will further hinder farmers access to cultivable land, the reason for this is that the development is growing towards south where lands are available for farming. The implication of the findings to the study areas is that Minna is losing valuable lands available for farming gradually to building development which at the short run leads to increase in the price of farm produce and food insecurity at the long run.

CONCLUSION

This research study has assessed the effect urban growth has on agricultural land uses in Minna Peri-urban and it concluded that the increase in houses and population has made agricultural activities move towards the fringe. The result of the study shows that the positive effect urban growth has on agricultural land uses overweighs its negative effects. The result shows that upon the growth experienced in the neighbourhoods, there is no decline in the economic wellbeing of the inhabitants of the study area and this shows that urban growth is not to be seen in a bad light.

RECOMMENDATION

The study recommends that there is urgent need for the Niger State Urban Development Board to take possible actions relating to urban land use so as to curtail conflicting land uses, the Niger State Urban Development Board should ensure it monitors and controls the pattern of development so as to reduce encroachment into agricultural land. There is need for the upgrading of Minna master plan and it should be strictly adhered to, and also land owners should be enlightened against selling of Agricultural land.

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