

Urban Greenway Retrofit: Improving the Pedestrians' Walking Experience of Kano Metropolis

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Abstract

A pedestrian pathway near an active railway may seem absurd at first, but as communities seek alternatives to the automobile, greenway system may be viable solution. This study aims to explore ways in which public needs can foster more sustainable development processes through greenway systems by providing answers on how public need influences the development of urban greenway along active railway corridors. To facilitate the main study that will cover all the isolated corridors within Kano metropolis, a pilot study was carried using a purposive case of an urban railway system that runs through Nassarawa local government area in Kano metropolis. Population for the study includes corridors users and property owners along the corridor. Quantitative and qualitative methods of research were used to get a better understanding of site typology, site inventory, and future program requirements. Qualitative data was gathered by observing and analyzing the sites directly through observation checklist (spatial analysis) and structured questionnaire were distributed to the corridor users and property owners along the corridor. The study revealed that several factors that influenced the development process along the corridor are the available railway right-of-way widths, connections to Public spaces, and pedestrian routes. The study spans much of the corridor, analyses possible routes from home to destinations and greens paces throughout the neighbourhood, including commercial areas.

Keywords: Greenway, Pedestrian, Sustainable Development, Urban, Corridor

Background of the Study

Trail systems within cities' urban fabrics are often disconnected (Bossert, 2011). Often they were not planned to develop as a city sprawled outward and the movement of people from places of living, work and play. Rather, they were developed along or near natural corridors, utility easements, canals, parkways, or wherever else they "fit," rarely straying into the vicinity of automobile right-of-ways (Bossert, 2011).

Consequently, "How can public need influence the development of urban greenway along an active railway corridor?" "The idea came about from the idea of rails-to-trails, which involves the rehabilitation of isolated railways into pedestrian greenways. Rails-with-trails are similar concept, except a pedestrian corridor is created adjacent to an active rail line(s). Due to the difficulty of planning safe and efficient trails within existing city infrastructure, active rail line corridors may serve as an alternative for pedestrian routes. Railroad corridors often travel through the heart of cities, paralleling residential, commercial, and industrial areas, making them prime locations to create vital community connections within the urban fabric.

Railways are generally the first form of mass transportation, not until the development of the motorcar in the early 20th century, had a virtual monopoly on land transport. The Nigerian Railway Corporation is 113 years old and it runs a unilaterally designed track system of 1067mm cape gauge. At the moment, the railway System has been undergoing some rehabilitation and modernization with the full political and financial support of the Federal Government through the Federal Ministry of Transport; having completed it phases of rehabilitation of its vast assets, is expected to play an increasingly pivotal role in the economic and social developments of the country in this millennium. (Nigerian Railway Corporation, 2013).

Utilizing spaces along railway corridors can provide direct connections to destinations, creating a more cohesive urban fabric. A pedestrian corridor can safely exist with an active railway corridor to improve the physical ties within a segregated portion of a city, while enhancing non-motorized transportation, and become an environmental, economic, and recreational resource. An efficient and safe pedestrian corridor design, using greenway development, along a railway may decrease automobile use and benefit public health, local economics and transportation, community pride, and identity (Rails-to-Trails Conservancy: Benefits of Rail-Trails).

An inclusive definition as proposed by Ahern (1995) described greenways as "networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use." Key characteristics of greenways as implied in this definition and distinguishing it from other landscape planning concepts are their: primarily linear spatial configuration, ability to provide linkages, multifunctional nature and, support of sustainable development. Given these fundamental characteristics, urban greenway typologies could be proposed based on spatial scale, landscape context, goals and planning strategies.

Greenways development can be categorized into three generations (Searns, 1995) according to their evolving functions, with each successive generation increasing in complexity and serving a multitude of objectives than the previous.

- i. Generation 1 greenways (pre-1700s- circa 1960) describe the axes, boulevards and parkways which simply linked urban spaces.
- ii. Generation 2 greenways (circa 1960- circa 1985) are essentially recreational in nature. These trail-oriented linear parks provide access to rivers, streams, ridgelines, railbeds and other corridors in the urban fabric.
- iii. Generation 3 greenways (circa 1985 onwards) are multi-objective linear park functioning as wildlife preservation corridors, flood damage control and reduction, water quality, rail with trail system, (eg. providing alternative transportation forms), urban beautification and recreation.

Greenways are increasingly recognized as an integral part of public infrastructures. For example, they enhance citizen's mobility by enabling more pedestrian and bicycle safe areas. They provide linkages between neighborhoods and existing parks adding venues for community networking and recreational opportunities. Greenways enhance scenic views, increase awareness of historical areas, and protect ecologically sensitive areas within the city setting where they exist (Little, 1990). These networks also facilitate urban infrastructure redevelopment, such as abandoned railways and roads (Marcus and Francis, 1998).

Ecological benefits of greenways range from protecting biological diversity of species to abiotic benefits. By fostering connectivity, genetic stagnation is alleviated through reduction of island population and the resulting inbreeding (Little, 1990; Noss, 1987). Greenways benefit other ecological processes by helping sustain water quality, abate pollution, deter soil erosion and facilitate the exchange of energy and nutrients within the system (Jongman, 2003; Noss, 1987).

However, these corridors which people commute to on a regular basis, in most Nigerian cities, have poor ecological interactions due to some activities like the waste disposed along the corridor, some portion of the corridors serve as criminal hide outs, poor connectivity to community resources such as schools, open spaces and places of work.

Hence, this paper aims to explore ways in which public needs can foster more sustainable development processes through greenway systems. The specific objectives of this study are to:

1. Assess the perception of the corridor users and property owner on the interactions of community resources with its landscape.
2. Assess the impact of the corridor's current status on community livability.

Research Methodology

The proposed site for the study was located along an active railway corridor that travels through Nassarawa Local Government area of Kano Metropolis comprising of four isolated communities i.e. Badawa Community, Yankaba Community, Kawaje-Jigirya Community, and the Nassarawa G.R.A Community (Figure 1 & 2)

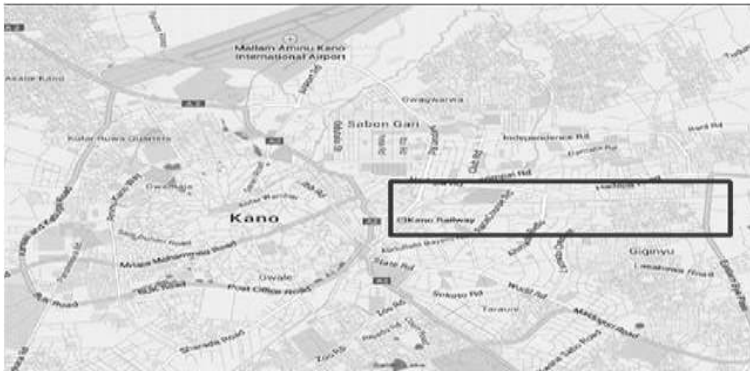


Figure 1: Terrain map of Kano metropolis
Source: Google Earth 2014



Figure 2: Neighborhood Map
Source: Google Earth 2014

Quantitative and qualitative methods of research were used to get a better understanding of site typology, site inventory, and future program requirements. Purposive and convenient sampling approaches were employed in selection of the respondents from the population of the study, which compose of corridor users and property owners (Table 1 & 2). The population of the corridor user is made up of four (4) travel modes.

Table 1: Population Proportion of Corridor Users

<i>S/N</i>	<i>Corridor Users</i>	<i>Population Proportion (%)</i>
1	PEDESTRIANS	51
2	BICYCLIST	25
3	JOGGERS/TRAINERS	16
4	WHEELBARROW PUSHER	8

Source: Authors, 2014

Table 2: Population of Property Owners along The Corridor

<i>S/N.</i>	<i>Property Owner along the Corridor</i>	<i>Number</i>
1.	COMMERCIAL	4
2.	SCHOOLS	3
3.	OFFICES	2
4.	INDUSTRIES	1
5.	RESIDENTS	219

Source: Authors, 2014

Two (2) research instruments were used in conducting this study. These are structured questionnaire and observation checklist. The structured questionnaires were distributed both to the corridor users (24) and property owners (17) along the corridor. The questionnaire was designed as series of questions to achieve the research objectives. Being that the corridor is a mixed use neighborhood; the questionnaire is of two versions (English and Hausa language) where the Hausa version is for those who do not understand English. The response rate of questionnaire was 87%. While qualitative data was gathered by observing and analyzing the sites directly through observation checklist (spatial analysis). The checklist was designed to answer research objective two (2). It is a micro-space checklist survey, designed to reinforce findings from public involvement activities and planning analysis. Descriptive statistics was used in analyzing the data from the questionnaire while the data from the checklist was analysis using factor of analysis/segments matrix.

Data Analysis and Findings

Data generated from this study by administering the structured questionnaires to the respondent and checklist survey of the corridor were analyzed in this section. The analysis and findings are arranged in line with the research objectives as follows:

Objective No. 1: To assess the perception of the property owners and corridor users on the interaction between the corridor activities and its landscape

The variables required to achieve this objective are respondents perception on; developing mobility access, facilities to develop or improve, most important issue to be addressed, intense of accessing community resources, why people do not access the corridor and type of preferable walking path to use when accessing the corridor.

Property Owners Response on Interaction between Corridor Activities and it Landscape

From Table 3 it shows that 29 property owners responded to the questionnaire.

Table 3: Property Owners Questionnaire Distribution

S/N	Neighborhood	Respondents
a)	Resident	20
b)	Commercial advocate	4
c)	School owner	2
d)	industry owner	1
e)	Agency or office advocate	2
	Total	29

Source: Authors Field Work, 2015

Table 4 summarized the property owners' response regarding developing mobility access along the corridor. The finding indicates that the greenway development should encourage more of pedestrian access (55.2%) than automobile (13.8%).

Table 4: Respondents Opinion ON Developing Mobility Access

S/N	Travel Modes	Respondents	%
a.	Automobile	4	13.8%
b.	Bicycle	9	31%
c.	Pedestrian	16	55.2%

Source: Authors Field Work, 2015

Table 5 shows property owners response on facilities to develop or improve, which ranges from: i- pedestrian walk and crosswalk, ii- street furniture, iii- transit stop/shelter and iv- pedestrian light and signal. From the responses as shown in table 5, E- received highest response with 37.9%, C- received higher response with 24.1% then, and D- received high response with 20.7%.

Table 5: Respondent Views on Facilities to Develop or Improve

a)	b)	c)	d)	e)
i & ii	I & iii	I, ii & iii	ii, iii & iv	all of the above
2(6.9%)	3(10.3%)	7(24.1%)	6(20.7%)	11(37.9%)

Source: Authors Field Work, 2015

The table 6 shows respondents view on their biggest concern for the corridor improvement. From the table, response received reveals that the respondent's high priority/concern was accessibility with 44.8% and the Medium priority/concern was safety with 31% then, the low priority/concern was Beautification with 20.7%.

Table 6: Respondents View on their Biggest Concern for the Corridor Improvement

S/N	Factors	Respondents	%
a)	Beautification	6	20.7%
b)	Safety	9	31%
c)	Accessibility	13	44.8%
d)	Public right of way	1	3.5%

Source: Authors Field Work, 2015

From Table 7 below, the following were obtained when the respondent were ask about the most important issue to see addressed.

Table 7: Response on the Most Important Issue to See Addressed

Reasons	Rank #1	Rank #2	Rank #3	Rank #4
a. Hazardous condition (crime/ darkness)	11 37.9%	8 27.5%	3 10.3%	7 24.1%
b. Unattractive surroundings	10 34.5%	12 41.4%	8 27.6%	1 3.5%
c. Lack of paths/connections	7 24.1%	13 44.8%	6 20.7%	3 10.3%
d. Health condition(debris, waste disposal)	5 17.2%	12 41.4%	8 27.6%	4 13.8%
e. Difficult intersections and crosswalk	3 10.3%	9 31%	9 31%	8 27.6%

Source: Authors Field Work, 2015

From the Table (7), the study unveils that “Hazardous condition” was most ranked #1 (most important issue to see addressed) with 37.9% responses while lack of paths/connection was most ranked #2 with 44.8%.

Corridor Users Response on Interaction between Corridor Activities and it Landscape
Table 8 shows 50 corridor users responded to the questionnaire.

Table 8: Corridor User Questionnaire Distribution

S/N	Users	Respondents
a)	Pedestrian	25
b)	Bicyclist	13
c)	jogger/trainer	4
d)	wheelbarrow pusher	4
	Total	50

Source: Authors Field Work, 2015

From Table 9, the following were obtained when the respondent were asked about accessing community resources through the corridor.

Table 9: Respondents Opinion on Intense of Accessing Community Resources through the Corridor

Never	Rarely(Less Than Twice A Month)	Sometimes (Once A Week)	Frequently (3-4 Times Per Week)	Daily(5-7times Per Week)
1	12	19	15	3
2%	24%	38%	30%	6%
8	6	10	17	18
16%	12%	20%	34%	18%
1	4	7	9	29
2%	8%	14%	18%	58%
3	2	11	9	25
6%	4%	22%	18%	50%
5	14	12	7	12
10%	28%	24%	14%	24%

Source: Authors Field Work, 2015

From the table above, over a half of the respondents (58%) reported using the corridor to work daily while, 50% reported using the corridor to school daily. Over a third (34%) reported using the corridor for social visit frequently. Over a third of the respondent (38%) reported that using the corridor for exercise once a week.

From Table 10 below, the following were obtained when the respondents were asked why people do not access the corridor. From the table, the study reveals that “Lack of path/connection” (52%) and hazardous condition” (36%) were most ranked #1 for not accessing the corridor while for almost ranked #2 both unattractive surrounding and lack of path/connection were cited 24% for not accessing the corridor.

From table 10: Respondents Views on why people do not Access the Corridor

	Reasons	Rank #1	Rank #2	Rank #3	Rank #4
a.	Hazardous condition (crime/ darkness)	18 36%	10 20%	10 20%	12 24%
b.	Unattractive surroundings	10 20%	12 24%	11 22%	17 34%
c.	Lack of paths/connections	26 52%	12 24%	4 8%	4 16%
d.	Health condition(debris, waste disposal)	14 28%	10 20%	20 40%	6 12%
e.	Difficult intersections and crosswalk	8 16%	8 16%	17 34%	17 34%

Source: Authors Field Work, 2015

Table 11 shows response received on type of walking path preferred. The study reveals that Respondents were nearly evenly divided over their preferred walking paths as unpaved and others both received 10% of responses. Sidewalk received highest (52%) response while paved multi use paths receive higher response (28%)

Table 11: Response Received on Type of Walking Path Preferred to Use

S/N	Factors	Respondents	%
a)	Unpaved paths	5	10%
b)	Paved multi-use paths	14	28%
c)	Sidewalk and crosswalk	26	52%
d)	Others	5	10%

Source: Authors Field Work, 2015

Objective No. 2: To assess the impact of the corridor's current status on the community livability

The factors of analysis required to achieve this objective are; vegetation, drainage, topography, land use, traffic condition, accessibility/circulation, pedestrian amenities, sidewalk condition, lighting condition, and signage.

Figure 3 below, shows spatial delineation of the corridor. There are three primary segments in the neighborhood corridor as shown in the map.



Fig 3: Corridor Spatial Delineation

Source: Authors Field Work, 2015

Segment A(west end) cover from railway yard/ Audu Bako road to Ahmadu Bello road, segment B(central section) cover from Ahmadu Bello road to “gwado-gwado” stream/ Badawa bus stop and segment C covers from “gwado-gwado” stream to ring road eastern by pass.

Table 12 shows a summarized micro-space checklist survey of the entire corridor while below is a brief description of the factors of analysis on the checklist and findings from the corridor.

Table 12: Summarized Micro-Space Checklist Survey of the Entire Corridor

S/ N	Factor Of Analysis	Segments		
		A	B	C
i.	Vegetation	Average dense trees along adjacent road with fair ground cover at golf course	Fair tree vegetation around buildings with no plantation along the rail track	The area is void of plantation that expose the area to extreme harsh weather condition
ii.	Drainage	Drainage of water is natural as it drain into constructed surface channels while at the golf course runoff water are left to drain naturally	Waste Water are channeled underground into individual residence soak away pit	No good drainage for the collection of surface water
iii.	Topography	The area is relatively flat land with undulation/saddle slope at the golf course	Relatively flat land	Relatively flat land with eroding coast toward the east.
iv.	Zoning/ Land -Use	Recreational and commercial activities are at high level with almost 50% of the land use	Strictly residential area with commercial activities at it higher level along the major roads.	High density residential area with open space like football pitch, cemetery, and juma'at mosque
v.	Traffic Condition	High pedestrian movement along the rail track earlier in the day and late evening with high vehicular movement along the major roads	Average pedestrian movement with access along the major roads	High pedestrian movement along the rail track earlier in the day and late evening as many are closing or going to school, place of work etc
vi.	Accessibility / Circulation	Good accessibility from adjoining roads with fair circulation	Fair accessibility from rail track with fair circulation	Fair accessibility from rail track with poor circulation
vii.	Pedestrian Amenities	The area is almost void of pedestrian amenities	The area is void of pedestrian amenities	The area is void of pedestrian amenities
viii.	Sidewalk Condition	Inadequate sidewalk with poor connection	Inadequate sidewalk with poor connection	Poor sidewalk
ix.	Lighting Condition	Fair lighting condition	Street lights are in state of repair	Street lights are not in good state
x.	Signage	Inadequate provision of sign post	Fair rail/ road crossing signage	Street name and sign post are hardly visible

Source: Authors Field Work, 2015

From Table 12 above, the findings reveals that segment A has an average dense tree along adjacent road with fair ground cover at golf course, while segment B has Fair tree vegetation around buildings with no plantation along the rail track and segment C is void of plantation that expose the area to extreme harsh weather condition. For drainages of these segments, the finding unveils that in segment A drainage of water is natural as it drain into constructed surface channels while at the golf course runoff water are left to drain naturally while for segment B waste water are channelled underground into individual residence soak away pit and for segment C no good drainage for the collection of surface water. Comparison of the level of land-use from Table 4.8 shows that in segment A, recreational and commercial activities are at high level with almost 50% of the land-use while segment B is strictly residential area with commercial activities at it higher level along the major roads and segment C high density residential area with open space like football pitch, cemetery, and juma'at mosque. In term of accessibility and circulation, Table 12 reveals that segment A has good accessibility from adjoining roads with fair circulation then segment B has Fair accessibility from rail track with fair circulation lastly segment C has Fair accessibility from rail track with poor circulation. Lighting, sidewalk and pedestrian amenities are considered most essential in greenway with trail design where these facilities were in poor state in the entire segments.

Summary of Findings

This section summarizes issues on general findings from the questionnaire and the checklist survey conducted. This summary is arranged in research objectives format. For the first objective, the research unveils that the top priority travel modes for improvement along the corridor were pedestrian and bicycle route. The study further reveals that the type of walking path preferred by both property owners and corridor users were sidewalk, crosswalk and paved path. Furthermore findings from conducted questionnaire with corridor users on intense of accessing community resources through the corridor reveals that over a half of the respondent reported using the corridor to work daily while almost half of the respondents uses the corridor to school daily. And about a third of the respondent uses the corridor for social visit frequently. Moreover this study also unveils that that the corridor is void of pedestrian amenities as combination of pedestrian walk and crossing, street furniture, transit shelter and pedestrian light and signals had high response in the conducted questionnaire with the property owners.

For the second objective, checklist survey reveals that the corridor in study is void of pedestrian amenities with poor signage and lighting condition. The topography of the corridor was relatively flat land with eroding coast eastward of the corridor while for drainages, runoff water are left to drain naturally and absorb into soil where place like Badawa community with slump population density has no good drainage channels. On traffic condition, the study also reveals average pedestrian movement along the rail corridor early in the day and late evening. Last but not the least the vegetation, the corridor is void of plantation especially adjacent of the rail track except the golf course with fair ground cover and scanty tree plantation around some building westward of the corridor.

There are many green spaces throughout the corridor, but they are mostly connected through sidewalks next to roadways. These green spaces include parks, recreation areas, golf courses and other linear trail which are avenue for moderate physical activity, such as walking and biking, for quick daily errands may be answer to a healthier society.

Conclusion

This study sets out to explore the ways in which public needs can foster more sustainable development processes through greenway systems in Kano metropolis not to change the minds of sceptics, but to improve the daily lives of community residents. Human behaviour is linked to the layout and design of the urban area where they live, work, or play. The location and type of transportation systems available, places of work, parks and open spaces, and schools all play roles in people's lives. In short, the location of such places affects community livability. By having multi-functioning spaces, people can interact with the environment and learn natural processes. Spaces provide natural habitat and area for infiltration of water runoff, among others. The study spans much of the corridor, analyses possible routes from home to destinations and greens paces throughout the neighbourhood, including commercial areas. Road crossing to have speed tables with narrowed roadway, pavement change, and indicator tree sets.

The following is a conclusion of issues associated with the corridor and how designers can do to create a safe and successful greenway system: Designers and planners would potentially work with community residents, the railway authority, law enforcement officials, adjacent landowners, transportation officials, and public transit, parks and recreation, and health departments to create a design and build strategy. Finally, study suggests that the presence of trees and vegetation creates a more pleasant environment and that people are more willing to spend money at such locations. This information can be utilized as an incentive for greener streetscapes in cities: the more desirable a place is, the more likely it will be visited, and in turn, money spent. Although the study was done in small cities, this idea can be considered with small businesses in Nigeria.

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