

Environmental Evaluation of the Existing Road Traffic Planning Implication in Benin City, Nigeria

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Abstract

This study examined environmental evaluation of the existing road traffic planning implication in Benin City, Nigeria. Transportation is integrated with urban life as an action paving the way to reach economical, social and cultural resources. Transportation planning is a decision-making process that develops through the interactive influence of different sides and their exchange of ideas. These sides consist of individuals and benefit groups, planners and decision-makers. Data for this study were collected from primary sources, through the random administration of two hundred (200) questionnaires and the physical survey. Results from this study revealed that there is a significant impact of the existing road traffic planning implication on transportation land use in Benin City metropolis. This study therefore recommended that the untarred roads within the study area should be tarred, and that government should provide adequate funds to redress the already initiated and future environmental problems on transportation land use in the study area.

Keywords: Environmental Problems, Roads, Traffic Planning Issues and The Way Forward.

1.1 Introduction and Background to the Study

The environmental impacts of roads (both positive and negative) include the local effects of highways (public roads) such as on noise, water pollution, habitat destruction / disturbance and local air quality and the wider effects which may include climate change from vehicle emissions. The design, construction and management of roads, parking and other related facilities as well as the design and regulation of vehicles can change the impacts to varying degrees (www.epa.gov/air/emissions/voc.htm, March, 2016).

Rilwani and Osayande (2001) observed that natural landforms such as hills, rocks and massive trees force roads construction to meander, to bypass these landforms and they form natural obstructions to free flow of surface runoff. Thus, the poor integration of land use and urban drainage at all stages of urban planning handicaps free deposition at the rightful places. Thus, the provision of buildings, reservoirs, roads bridges, culverts, paved walkways, parking lots and so on, are essential facilities of transportation land use activities, because they are all aspects of human endeavours that ensure, healthy and aesthetically pleasing transportation land use activities (Rilwani and Osayande, 2001).

Beckmann (1980) stated that roads are used not only to relocate persons and goods, in other words, purely for transport or traffic purposes, but also have residential and access functions. While roads generally perform traffic functions outside urban areas, town and village roads play an important part in the residential function. Accordingly, the term 'environment' is not limited to the natural surroundings, to the same extent as in undeveloped areas. Rather, the aim is to ensure that traffic can be managed in a way, which is compatible with the urban situation, in other words; in a way that is also socially acceptable. This means that transport and traffic planning must also take account of traditional lifestyles in the area.

Recently, public enlightenment campaign of environmental degradation arising from land and or water management practices was carried out by Edo State Government in the same vein, provision is equally being made for the upgrading and maintenance of infrastructural facilities, especially the road transport networks in the city, to enhance environmentally sound and quality road networks and aesthetically pleasing urban environment. Despite all these, there has been little achievement in the control of these problems on transportation land use within Benin City metropolis. Thus, an attempt to study these severe environment problems on transportation land use planning in the Benin City metropolis is the focus of the present research (Adebayo & Jegede, 2010).

1.2 Statement of the Research Problem

One particular characteristics of the environmental damage caused by road traffic is that the impact is made up of a large number of minor factors (the World Environment, 1982) sectors of the infrastructure connected with the traffic system (refineries, fuel, transportation, workshops, dumps) also make a contribution. The assumption that these cause only a negligible fraction of the environmental burden will result in road users failing to change their customary behavior in the way that is needed (The World Environment, 1982).

The basic cause of urban flooding and erosion menace on transportation land use is man's modification of the basin network and channels characteristics during the process of settlement on the particular flood plain (Adeleke, 1998). Natural surfaces are replaced by more impermeable roads and concrete, which have very low infiltration capacity.

- Some of the road transport problems faced in Benin City includes;
- i. the challenges of funds needed for rehabilitation and upgrading for routine maintenance
 - ii. high rates of accidents on the roads due to poor condition of the roads
 - iii. lack of accountability of some Engineers working on the road
 - iv. decline in the quality of offered services on the roads
 - v. weak institutional arrangements / coordination in the road transport
 - vi. high costs of construction of roads and maintenance
 - vii. majority of the trunk and regional road networks are in poor condition due to the high intensity of rain fall in the area
 - viii. there is also the problems of gullies and flooding on the road networks causing traffic jam and go slow.

1.3 General and Specific Objectives of the Study

The general objective of the study is to investigate the prevailing environmental problems on transportation land use in Benin City.

The specific objectives of the study are to:

- i. Examine the existing road traffic planning implication in Benin City.
- ii. Assess the prevailing environmental problems as it affects transportation land use development in the study area.
- iii. Proffer appropriate recommendations in solving the problems identified, and channelize, how best the existing road transportation in the study area can be improved.

1.4 The Hypothesis

- i. There is significant impact of the existing road traffic planning implication on transportation land use in Benin City.
- ii. There is a significant impact of the existing road traffic planning implication on transportation land use in Benin City.

1.5 Decision Rule

The null hypothesis (H₀) will be rejected, if the 't' calculated value is greater than the 't' table value at (alpha level of 0.05). If otherwise, the alternative hypothesis (H₁) will be accepted.

1.6 The Study Area

Benin City has a history of being one of the foremost destinations of Europeans during their exploration of African continent many centuries ago (www.edo-nation.net). Some of her flesh points have remained enviable tourists' attraction for the state.

Benin City lies approximately between latitude 6° 20' North of the equator and longitude 5° 37' East of the Greenwich meridian. Benin City is the capital of Edo State and Edo State is bounded in the South by Delta State, in the North by Kogi State, in the East by River Niger and Anambra State, and in the West by Ondo State.

Soil types in the Benin low land ranges from loose poorly productive sand in the South-East to fertile clayey soil in the North-East close to the Niger, the Osse and Benin drainage basins have alluvial and hydromorphic soils.

The main ecological problem in Benin City is flooding, soil erosion and scarcity of water and outcrops of basement rocks. Flooding and erosion are acute in Oredo, Egor and Ikpoba-Okha Local Government Areas of Benin City. Rainfall and the removal of vegetal cover and unplanned land use development are the main cause of the problems (www.edo-nation.net, 2009).

Transportation in Benin City is mainly by road and, to some extent by air and water. On road transportation, Benin City is transverse by a network of Federal (Trunk A) State (Trunk B) township and rural earth roads (Benin City, 2015). Consequently, the city is well linked to other parts of the state and country, particularly Lagos, Abuja, Port Harcourt, Onitsha and Ibadan etc.

The distinct relief regions in Benin City are the swamps / creek. There are six types of physical features, which constitute the landscape of Benin City. In the Benin low land is found sandy coastal plain and alluvium clay with some hills in the East. River Osse, Orhionmwon and Ikpoba drain the area. With the exception of River Osse, that has a wide flowing plain, the other rivers are characterized by steeply incised valleys in their upper courses, they become broad as they enter River Ethiopia in Delta State.

1.7. Conceptual Framework and Literature Review

Homer Hoyt's sector model was applied to this study. Homer Hoyt's sector model was propounded by Homer Hoyt in (1939).

Hoyt's model states that different income classes in a city trends to be found in distinct area describable

in terms of sectors of a circle centered on the Central Business District (CBD). The reason is that, transportation land use is usually concentrated along a particular route radiating from the centre of the city. Thus, just like a high class residential district radiates from the city centre, so does a low class one Homer Hoyt's (1939) land use model modified that of Burgess (1925) land use model, following the development of public transport. Burgess (1925) model suggested that transport and physical features were important, with industrial areas developing outward in sectors along main transport routes (road, river and canals) and housing growing up around these.

Land use can be defined as the series of activities in which a particular land is used, for the purpose of socio-economic and regional development. The various land use activities carried out are transportation, infrastructural, social, residential and religious land use activities.

These series of land use activities and their improper planning produce district distribution of environmental problems, such as flooding and erosion, therefore serving as a clog in the wheel of development on transportation land use activities. Thus, the improper integration of land uses such as industries residential land uses etc and urban drainage at all stages of urban planning handicap the successful development of transportation land use within the study area.

Road transportation is considered as an integral part of nation's infrastructure and often termed as its "socio-economic lifeline" since it is used to promote social and economic activities more than any other form of transportation (Solway, 1999, Bruton 1995). Thus, a road transportation system comprises facilities and activities domain.

Hossain and Davies (2007) carried out a research on the impacts of flooding on road transportation in Bangladesh. Their research findings stated that the country is prone to frequent and debilitating flood, often followed by loss of life and heavy economic damage. Their research findings further noted that the route network system of the country undergoes frequent disruption each year, causing great suffering to the people.

Transportation planners in developing countries face a number of problems "that require innovative solutions" large increase in urban population and pollution have seriously compromised existing transportation systems and significantly increased the challenges of creating future transportation systems. And 'despite extensive spending on urban transportation systems' the problems "seem to only get worse" (Gaurey, Ernest, Young, and Khisty, 1998).

Afolabi (2005) noted that the environment is itself, the point in which one is found at a time, the surroundings, the more distant places, other earth components, conditions, prospects and problems, which account for its flourishing or otherwise. In general, the environment provides all life support systems in the air, water, on land and in the forests (Glasson et al, 1999).

Environmental problems therefore manifests as a result of different land use activities of man to earn his living and his livelihood. In the urban land use, deforestation and Benin City in particular, which results from uncontrolled logging and tree felling for the purpose of transportation development in Benin City, this goes with its loss of precious biological diversity.

1.8 Research Methodology

Data for this study were collected through the administration of two hundred (200) questionnaires. The data were generated through the use of two hundred (200) questionnaires and physical survey that were used by the researchers and upon such information further analysis were done. This study therefore employed the primary source of data collection, with the random administration of two hundred (200) questionnaires on respondents within the study area, to obtain the needed data for this research. The physical survey method was carried out in this work to observe the true condition of the roads.

The data for this study were analyzed, using the simple percentage statistical method to analyze the rate at which environmental problems affects transportation land use in Benin City metropolis. The student t-test statistical method was employed to test the stated hypotheses.

1.9. Presentation of Results and Discussions

Table 1.1 Affected Roads by Erosion

	Frequency	Percentage
Yes	140	70.0
No	60	30.0
Total	200	100.0

Source: Field work, 2016.

Table 1.1 revealed that 140 representing 70% of the respondents noted that their roads were affected by erosion in the area, and 60 representing 30.0% of the respondents stated that their roads were not affected by erosion problem. The implication of this is that majority of the roads in the Benin City metropolis have been dilapidated by the problems of erosion.

Table 1.2 Reaction of the town Planning Authority to Environmental Problems on transportation land-use.

	Frequency	Percentage
Positive	75	37.5
Negative	125	62.5
Total	200	100.0

Source: Field work, 2016.

Table 1.2 shows that 75 representing 37.5% of the respondents observed that the reaction of the town planning authority to environmental problems on transportation land use within the study area was positive, while 125 representing 62.5% of the respondents stated that the response was negative. This suggests that majority of the existing road networks affected by environmental problems in the study area were not given adequate attention by the town planning authority.

Table 1.3. Resultant effects of Flooding and Erosion on Transportation land-use

	Frequency	Percentage
Accident	33	16.5
Traffic jam	34	17.0
Slow vehicular movement	84	42.0
Few vehicles on the road	49	24.5
Total	200	100.0

Source: Field work, 2016.

Table 1.3 indicates that 33 representing 16.5% of the respondents observed that the resultant effects of flooding and erosion on transportation land use in the study area was accident, 34 representing 17.0% of the respondents stated traffic jam, 84 representing 42.0% stated slow vehicular movement, and 49 representing 24.5% of the respondents stated few vehicles on the road. This implies that, the effects of flooding and erosion on transportation land use had led to the slow vehicular movement in the study area, resulting to waste of precious time of the road users.

Table 1.4: Solutions to the prevailing Environmental Problems on Transportation Land Use in the Study Area.

	Frequency	Percentage
The promotion of integrated ecosystem	43	21.5
Improved drainage system	102	51.0
Enlightenment campaign on transportation land use	32	16.0
Problems resulting from flooding and erosion on drainage channels	23	11.5
Total	200	100.0

Source: Field work, 2016.

Table 1.4 revealed that 43 representing 21.5% of the respondents stated that the promotion of integrated ecosystem would serve as a solution to environmental problems on transportation land use in the area, 102 representing 51.0% suggested the improvement of the drainage system, 32 representing 16.0% suggested enlightenment campaign, while 23 representing 11.5% suggested discouragement of refuse dumps on drainage channels. This implies that, the major solution to environmental problems on transportation land use in the study area would be the rehabilitation of the existing drainage facilities, and the construction of more drainage facilities to ameliorate the problem of flooding and erosion on transportation land use in the study area.

1.10 Testing of the Hypothesis

Hypothesis 1: There is no significant impact of the existing road traffic planning implication on transportation land use in Benin City.

Table 1.5: Hypothesis Testing

Paired groups	Mean	Standard deviation	Degree	t-cal	t-tab
Existing road traffic planning implication on transportation land use	15.7900	2.89964	199	77.011	.960

From table 1.5, the 't' calculated value (77.011) is greater than the 't' table value (1.960), we therefore reject the null hypothesis and conclude that there is a significant impact of the existing road traffic planning implication on transportation land use in Benin City. Thus, the introduction and implementation of the urban master plan, provision of more drainage system, good road network construction and the enforcement of proper environmental management strategies by the Town Planning Authority were lagging behind in the study area.

1.11 Recommendations and Conclusion

In view of the findings in this study, it will be of great benefit, if the following recommendations are given

serious consideration.

There is need for coordination between the various relevant expertises located in the Agencies of Government to be strengthened and improved upon for effective networking and integrated drainage system, control and management of flooding and erosion menace on transportation land use in the Benin City metropolis.

There is need for the government to provide adequate funds to redress the problems on transportation land use, which emanates from flooding and erosion in the study area.

Most of the untarred roads, if not all should be properly tarred in the study area, so as to avert the prevailing problems of flooding and erosion on road network.

Road networks should be constructed parallel to the main slope direction or to stream channels in order to prevent the creation of new water channels against the general landscape trend, which usually end up in gullies that cut off the roads.

In conclusion, the impact of environmental problems such as flooding and erosion on transportation land use in Benin City metropolis is a direct consequence of uncontrolled urbanization, characterized by the absence of a well-articulated drainage system, comprehensive physical planning, poor road construction and development control. Thus, environmental problems on transportation land use in Benin City metropolis requires a multi-disciplinary approach for its effective control and development.

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