

Compliance Level of Base Transmission Stations with National Environmental Standards for Telecommunications and Broadcast Facilities in Calabar Metropolis, Southern Nigeria

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Abstract: *The low rate of compliance with environmental standards in telecommunication and broadcast facilities in Calabar is linked to the low-level of awareness among residents in the study location as well as low-level compliance monitoring inspection by the regulatory agency. This study adopted a cross-sectional approach primarily used to determine the prevalence of BTS non-compliance with environmental standards. Primary sources of data that was used for the assessment included mast inventory/Geo-reference, questionnaires, field measurements and interviews. Checklist was structured to reflect the National Environmental (Standards for Telecommunication/Broadcast Facilities) Regulations, 2011. The study identified weak compliance of BTSs to Environmental Standards. This is partly due to the ambition of providers to maximise profit and weak enforcement standards. To enhance compliance, it is important that NESREA as a regulatory agency must put in place measures to increase the present level of enforcement. From the findings, the percentages of BTS that meet the National Standards are very insignificant.*

Key Words: *Compliance, Base transmission stations, Global System for Mobile communications, co-location*

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I. Introduction

The future growth of urban development in Nigeria, together with a continued search for a higher standard of living and a better quality of life, depend to a large extent on an increased access to transport and telecommunication facilities. Nigeria has Africa's largest mobile market, with more than 148 million subscribers and a penetration of about 107 per cent leaves us with problems of network congestion and quality of service on the one hand and the complexity of base transceiver stations (BTSs) siting requirements, safety criteria and environmental considerations on the other hand (NCC, 2014). According to the European Telecommunication Standard (1994), 'a base transceiver station (BTS) is a piece of network equipment that facilitates wireless communication between a device and network'. A BTS consists of the Antennas that relay radio messages, transceivers, duplexers, amplifiers and sometimes generators.

Compliance with environmental laws is one of the greatest challenges facing especially the developing world today. In their efforts to contend with the problem, governments of different developing countries have risen to the challenge by providing regulations under their respective telecommunication and broadcast facilities. The Nigeria government is no exception to this development. Taking a clue from the prevailing concern about the need for global action on environmental law compliance of BTSs, the Federal Government passed into law the National Environmental (Standards for Telecommunication and Broadcast Facilities) Regulations, 2011. These regulations are to protect the environment and human health, ensure safety and general welfare, eliminate or minimize public and private losses due to the activities of the telecommunications and broadcast industry most especially in the built urban environment.

The primary purpose of regulating the siting of BTSs is to provide for the health, safety and welfare of people living close to base stations. Accordingly, the legislative objective of the National Environmental (Standards for Telecommunications and Broadcast Facilities) Regulations, 2011 under consideration was to ensure that all new base stations comply with the provisions of the environmental impact assessment (EIA) Act. Cap. E12 (Laws of the Federation of Nigeria, 2004). Others include setback requirement, visual intrusiveness, decommissioning of abandoned sites, noise level standards for power generators and other standards to which all Global System for Mobile communications (GSM) facility operators are expected to comply. Compliance here is to among others; ensure consistent application of environmental laws, regulations and standards in all the operations of the GSM facility operators.

It is observed that despite the good intentions of the law and the efforts of the existing National Environmental Standards and Regulations Enforcement Agency (NESREA) in Calabar, the rate at which violations persist is high, even in the face of the on-going sanctions. This is a clear indication also of the persistent weight of the factors that are responsible for the persistent violations. In Calabar, cases abound in which despite being aware, GSM operators continue to violate the national standards for siting of BTSs. This provokes a strong suspicion that lack of awareness of standards and regulations of the law alone is not a sufficient determinant of compliance. This study therefore, looked into the assessment of the environmental law compliance of BTS. Furthermore, the role of development control as a potent tool for city management is investigated. This is because it ensures the continual growth and management of a city to enhance orderliness, improved city image, health and aesthetics. It also ensures that the environmental challenges as a result of city growth and adoption of technological innovations that enhances wellbeing can be reduced to tolerable levels.

The problem

The global concern for the safety of lives and property as a result of the siting of BTSs has made many developed countries of the world to enact environmental laws regulating the activities of GSM operators. The United States and the United Kingdom has long ago enacted laws regulating the siting of base stations in the urban environment. These laws came into being as a result of associated and perceived dangers living close to a BTS. When GSM was first introduced in Nigeria in 2001, there were no national environmental standards to regulate the activities of GSM operators. This facilitated indiscriminate siting of base stations without an environmental impact assessment, thereby leading to frequent mast collapse and other discomfort to residents such as noise, fumes and vibration.

When the National Environmental (Standards for Telecommunication and Broadcast Facilities) Regulations, 2011 was enacted to regulate the activities of the telecommunication and broadcast facilities in Nigeria, there was hope of restricting and prohibiting environmental impact from activities which are dangerous to health, safety and property due to the activities of GSM facility operators. Regrettably, a decade years after the law, there are still new cases of gross violations in Calabar, the capital city and administrative headquarters of Cross River State, along with its socio-economic implications.

Based on field studies, more than 50 percent of BTSs in the metropolis are located in close proximity to residential buildings, schools, offices, business and commercial areas in contravention of the regulated minimum setback of 10 metres. Not less than 50 percent of the total number of base stations in the study area violates the provisions of a site specific EIA (NESREA, 2015). These base stations, no doubt are at the risk of impacting negatively on the health and safety of lives and properties. By the turn of the year 2014, the Cross River State field office of the National Environmental Standards and Regulations Enforcement Agency (NESREA) sanctioned eight suspected base stations for violating the provisions of the EIA Act of 2004 as amended. By the second quarter of the year 2015, four more non-compliant cases were sanctioned by the same facility operator. If stricter sanctions are not put in place to serve as deterrent to GSM service providers, one can begin to imagine how deplorable the situation would be in the nearest future, especially, in the areas which are yet to be completely built up.

Non-compliant BTSs are widely spread throughout Calabar metropolis. They range from those sited in outright disregard to already secured building plan to those sited without a site specific EIA. A violation of any of the provisions of the sector regulations is a violation of the EIA Act whether an audit is conducted or not, and, where Audit is done whether it is approved or not the damage has already been done. Where an audit is approved, any other violation means a violation of the approved audit. However, where un-approved, it becomes a violation of the requirements that BTSs can only commence after a site specific EIA is conducted and an Environmental Impact Statement (EIS) or certificate issued.

In Calabar metropolis, these violations vary from one BTS to another. In Akim/Big Qua Town residential districts, for instance, BTS belonging to MTEL located at plot 175 Eta Agbor layout and 55 IBB road both have setbacks of 1.2 and 4.7 metres respectively to the nearest residential building and another belonging to Airtel located at plot 375 Etta Agbor layout have setback of 4 metres from residential buildings against the required standard of 10 metres. These BTSs have been sited in violation of the provisions of section 5(4)(g) of the National Environmental (Standards for Telecommunication and Broadcast Facilities) Regulation, 2011. Such BTSs are source of great discomfort to residents.

The study area

Calabar is the capital city of Cross River State, south-south Nigeria. Settled in the early 17th century by the Efik, Quas and Efut people, the town became a centre for trade between white traders on the coast and natives farther inland. Fish and farm products such as cassava, bananas, palm oil, and palm kernels were traded at Calabar port for European manufactured goods. The town also served as a major slave-trading depot. Duke Town and the other Efik settlements near Calabar such as: Henshaw Town, Creek Town and Obutong (Old

Town) were forcibly united into the loosely knit state of Old Calabar by the Ekpe secret cult, which was controlled by the towns' merchant houses.

By the mid-19th century, after the ease off of the slave trade, Duke Town accepted British protection in 1884, the town, which was called Old Calabar until 1904, served at different times as capital of the Oil Rivers Protectorate (1885–1893), the Niger Coast Protectorate (1893–1900), Southern Nigeria (1900–1906) and the Capital of Cross River State in 27th May, 1967 till date. The name Old Calabar (as distinguished from the port and river named New Calabar, 120 miles [193 km] west) was originally given by 15th-century Portuguese navigators to the African inhabitants of that part of the Gulf of Guinea coast (Calabar, 2012). Calabar has long been an educational centre. Its first missionary school, established by the Reverend Hope Waddell of the Free Church of Scotland in 1846, helped influence the Ekpe secret cult to pass a law in 1850 prohibiting human sacrifice. Today, it consists of two local government areas namely: Calabar South local Government Area with its headquarters at Anantigha and Calabar Municipal with its headquarters at Ediba.

Geographically, Calabar lies between Longitudes $8^{\circ} 19' 30''$ and $8^{\circ} 25' 30''$ east of the Greenwich Meridian and Latitudes $4^{\circ} 57' 55''$ and $5^{\circ} 40' 30''$ north of the Equator. It comprises of Calabar Municipality and Calabar South Local Government Area, which occupy an area of about 406 square kilometer (figure 1). Using growth rate of 2.8 per cent and a 2006 baseline population of 328,826 (National Population Commission, 2006), the total population is estimated at above 400,000 in 2017. The city which is sandwiched in between two rivers, the Calabar River and Kwa River has a lowland terrain with highest and lowest points at about 100m and 2m respectively (Okon, Ogba, Idoko, Eni&Sule, 2015).

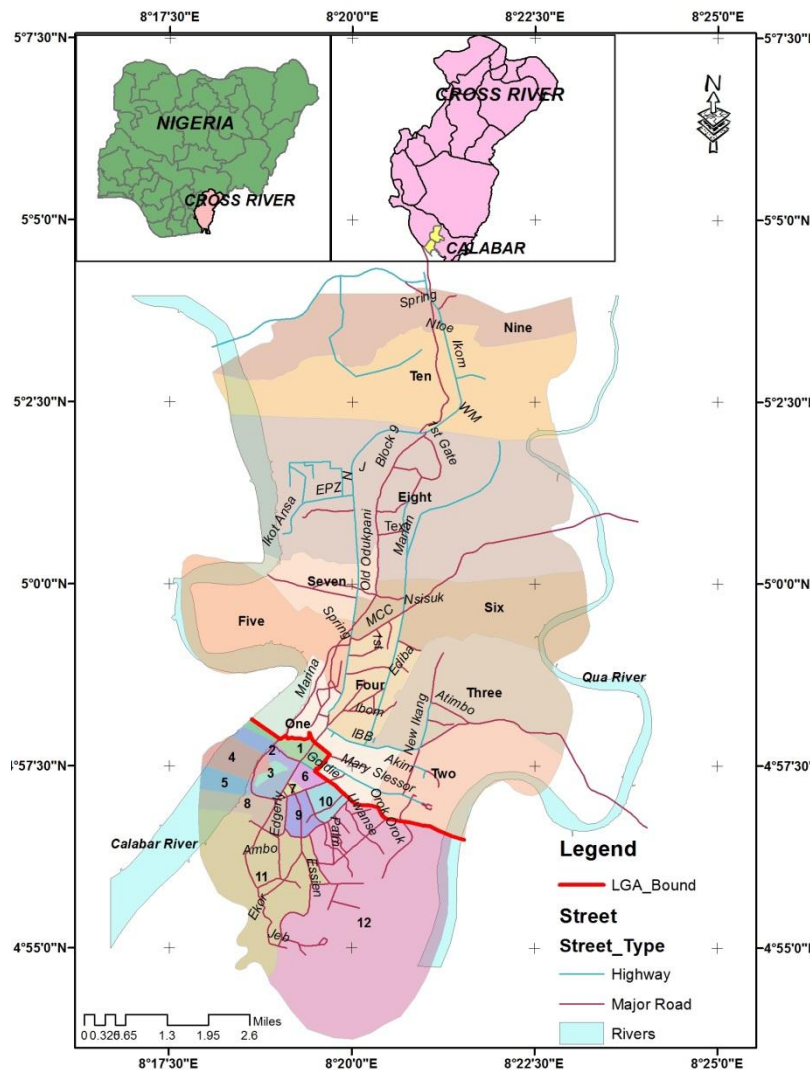


Figure 1: Calabar Metropolis showing major streets and road network. Insert: Nigeria showing Cross River; Cross River showing Calabar Metropolis.

II. Literature Review

Compliance with environmental regulations calls for discipline on the part of the organization/operator and it has cost implications (Adefemi, 2008). It also implies a voluntary decision to conform to the ethics/ norms and best practices of the production process in an environmentally friendly manner (Nwokeabia, 2005). Where the organization/operator is unable or unwilling to carry out recommended/prescribed practices (operation codes), sanctions could be applied, through the enforcement process (May, Winter, 1999). Usually, laws as well as penalties are laid down, governing all aspects of the production/ development process. The importance of compliance, therefore is to ensure the sustainable management, conservation and wise use of natural resources; guaranteeing perpetual availability of natural resources, without degrading/destroying the resource base. An effective compliance strategy brings many benefits to society (May, 2004). First, and most important, is the improved environmental quality and public health that results when environmental requirements are complied with. Second, compliance with environmental requirements reinforces the credibility of environmental protection efforts and the legal systems that support them. Third, an effective enforcement programme helps ensure fairness for those who willingly comply with environmental requirements. Finally, compliance can bring economic benefits to individual facilities and to society (Kilaparti& Sylvia, 2006)

According to a report by the then Federal Department of Forestry in conjunction with Federal Ministry of Environment, Housing and Urban Development (2006), public compliance with environmental regulations is strongly influenced by several factors. These factors include; poverty, poor political will reflected in the low to zero level of funding for resource management and inadequate funding to support staff/activities, weak legal framework, lack or low level of public awareness, non-inclusion of local communities in decision making, to name a few (FDF/FMEH&UD, 2006). As recommended by Nwokeabia (2005), dismantling these constraints to compliance represent management approaches. Most important however, is the need for awareness on the part of all stakeholders and publics. There is need for public enlightenment and attitudinal change at all levels, from the highest decision makers to the 'average man on the street'

According to Baldwin (1995), an important step in developing programme priorities is to identify which groups are regulated, and to understand as far as possible their sophistication, ability, motivation, and willingness to comply. An accurate profile of the regulated community help policy makers focus the compliance strategy (including both compliance promotion and enforcement response) to optimize its effectiveness (Adefemi, 2008). It is also valuable for designing compliance monitoring schemes. The process of profiling the regulated communities makes the regulated community aware of the requirements, aware that the enforcement programme officials know who they are, and aware that they will be expected to comply. Atlas (2001) informed that contact with the regulated community is the first step in creating a perception of an effective compliance programme. Thus, the process of identifying the regulated community can be a form of compliance promotion. The need for and ability to identify the regulated community depends in part on the size and number of sources. He further stated that if the regulated community consists of numerous small facilities, it may be very difficult to perform a comprehensive survey. In such cases, he advised that programme officials may decide to identify a subset of the regulated community (e.g., only those facilities within a specific geographical area that is highly polluted). At a minimum, programme officials can maintain records of complaints reported, which will help identify potential violators. The regulated community may include: Corporations, Small businesses, Public agencies/government-owned facilities and individuals.

Compliance promotion is any activity that encourages voluntary compliance with environmental requirements. It helps overcome some of the barriers to compliance. Most compliance strategies involve both activities to promote and enforce requirements. Policymakers will need to determine the most effective mix of compliance promotion and enforcement response (Adefemi, 2008). Experience has shown that promotion alone is often not effective. Enforcement is important to create a climate in which members of the regulated community will have clear incentives to make use of the opportunities and resources provided by promotion (Baldwin, 2005). Experience in several countries has also shown that enforcement alone is not as effective as enforcement combined with promotion. This is particularly true for example when: The size of the regulated community far exceeds the programme's resources for enforcement; the regulated community is generally willing to comply voluntarily and there is a cultural resistance to enforcement.

According to Bardch and Kagan (1982), Promotion is an important element of most compliance programmes. Six approaches to compliance monitoring are as follows: Providing education and technical assistance to the regulated community; Building public support; Publicizing success stories; Creative financing arrangements; Providing economic incentives; Building environmental management within the regulated community. Based on a World Bank report (2004), it was enumerated that compliance promotion can also take the form of education and technical assistance

Education and technical assistance are fundamental to voluntary compliance. They are essential to overcome barriers of ignorance or inability that otherwise would prevent compliance. They make it easier and more possible for the regulated community to comply by providing information about the requirements and how

to meet them and by providing assistance to help regulated facilities take the necessary steps for compliance. Education and technical assistance are particularly important in the early stages of a new requirement-based programme, and whenever the programme requirements change (World Bank, 2004).

III. Methodology

This study adopted a cross-sectional approach primarily used to determine the prevalence of BTS non-compliance with environmental standards. The prevalence is used to equal the number of cases in a population at a particular point in time. All the measurements on each base station are made at one point in time. Prevalence is very important to this study because it compares considerably the possibility of any particular violation and the predictive value of compliance. For example, knowing that voluntary compliance among the telecom service providers is very rare enables the researcher to look for other causes of non-compliance with environmental law in the siting of BTSs. Cross sectional studies are also used to infer causation and are the best way to determine prevalence, they are relatively quick, can be used to study multiple outcome and do not differentiate between cause and effect or the succession of events.

Primary sources of data that was used for the assessment include mast inventory/ Geo-reference, questionnaires, measurements and field interviews. Secondary Sources of data employed includes: Environmental law books, Environmental Standard requirements of BTSs, journals and manuals, extant laws, digital maps, NESREA news magazines, internet, National Population Commission, NESREA Cross River State field office and Guidelines on Technical Specifications for the Installation of Telecommunication Masts and Towers. Data on environmental standard requirement such as land use, BTS category, setback, access road, paved road, source of power, generator type, excessive height or cluster, functionality and contingency plan. These are provisions of the National Environmental (Standards for Telecommunication and Broadcast Facilities) Regulations, 2011 that is used to map the level of BTS compliance

Checklist was structured to reflect the National Environmental (Standards for Telecommunication/Broadcast Facilities) Regulations, 2011. This was done in order to reduce unnecessary oversight and to facilitate the researcher's direct field observations/measurements. Some of these variables includes: setback, fencing, caution signs and bund wall around diesel storage tank, and so on. This data was presented with the aid of maps and charts. Data on BTS location: Global Positioning System (GPS) was used to record the exact location of BTSs in Calabar. Readings were taken from the gate of each base station and away from obstacles. This was done in order to avoid interference with satellites position (Levine, 1996). This data was used to map the distribution of BTS in the study area.

IV. Results And Discussion Of Findings

BTS categories and distribution according to land use

Categories of BTSs were examined to reveal the level of sustainability achieved since the advent of mobile telephony in Nigeria. It was revealed that single location has the highest percentage score of 89.2 percent of the total score and co-location has the least score of 2.9 percent. This in other words does not encourage the provisions of Section 3(2)(f) of the National Regulation. This section of the regulation encourages co-location of mast by different service providers in order to reduce indiscriminate siting of base stations and associated negative impact. This is considered poor compliance. This result is shown in figure 2.

This section contains findings from the data collected from the guided checklist on Environmental Standards for Telecommunications and Broadcast Facilities Regulations, 2011. The summary of the National Environmental Standards requirements for the telecom sector enabled the derivation of a checklist used during field surveys to map level of compliance of each sampled BTS. To show the distribution of BTSs according to land use classification in the study area, residential areas has the highest percentage (65.7 percent) of BTSs as shown in figure 3 coloured with black. This was as a result of the need to service the desires and need of GSM users in the study area which in the other way round violates the provisions of section 5(4)(a) of the Regulation. It was observed that despite the good intentions of the law, the rate at which network providers violate the siting of BTS in residential areas in Calabar Metropolis is high. This is followed far behind by unspecified areas (15.7 percent); these areas can neither be classified residential, industrial, commercial or wildlife sanctuary, but have a characteristic of what could be termed a "mixed land use". The implication is that, these two land use areas have the highest risk factor associated with the siting of BTS such as mast collapse, fumes, vibration, noise and visual intrusiveness (figure 4). It is not clear how much weight is assigned to elevation compared to land use when suitability analysis is conducted for mast location. What is clear however is the fact that the mobile telephone operators are most interested in location of mast in high density residential areas to maximise huge profit.

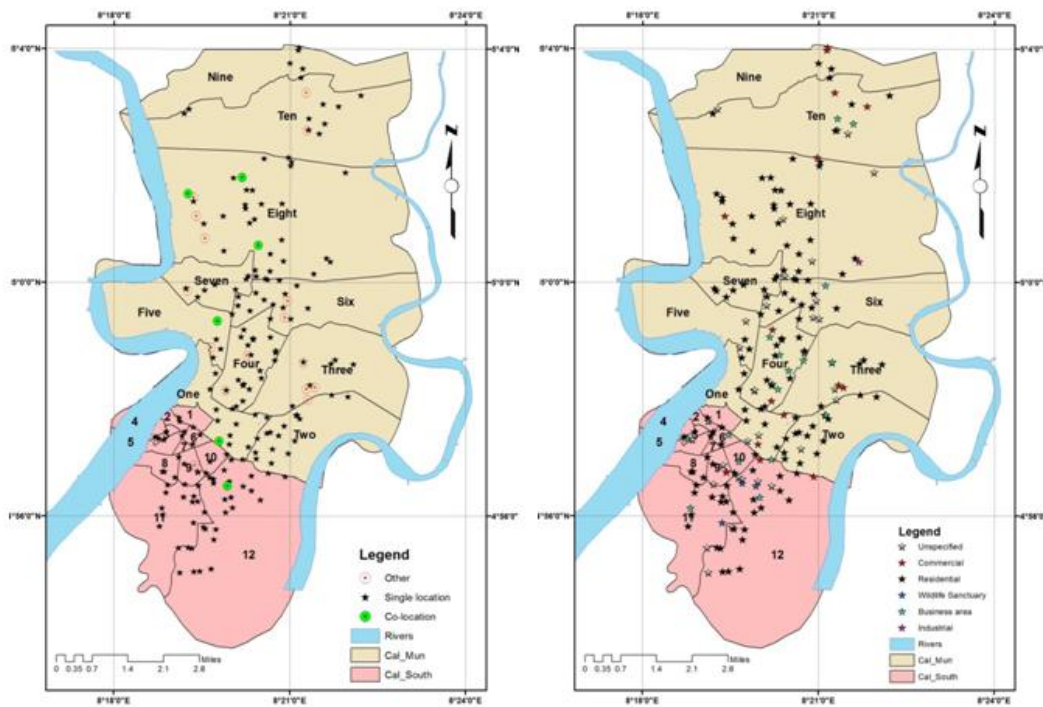


Figure 2: Calabar Metropolis showing BTs categories; and Figure 3: Distribution of BTs based on land use category

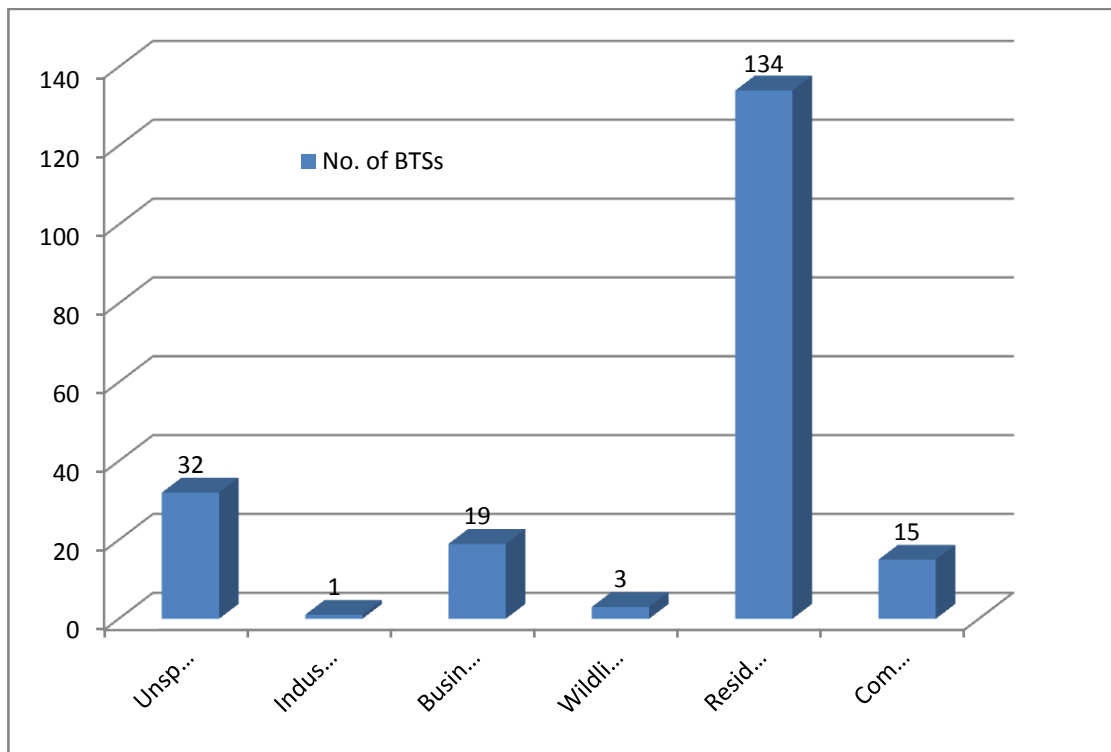


Figure 4: Number of BTs locations according to land use in Calabar

The level of BTS compliance with setback

The study also revealed that about 67.6 percent of BTSs have a setback of 0-10m from the closest residential, business or commercial building. This implies that majority of the base stations are located too close to residents either in their living quarters or business places and also stand higher risk of associated dangers that accompany the siting of Base Transceiver Stations. From the same data, 21.1 percent was found to be above 10

meters as required by the provisions of Section 5(4)(b) of the National Regulation, while 11.3 percent (unspecified) of BTSs are sited in areas that are not close to residential, business or commercial areas.

Figure 5 shows the spatial distribution of BTSs based on setback in the study area, only 21.1 percent met the required setback within the National Standard used for this study. Out of the total population, 11.3 percent of BTSs are considered safer in terms of danger to lives and properties. Going by this record, it suggests the need for a more serious implementation of the requirements for minimum setback as required by the law, especially in areas of high population density.

In the entire study area, there was no ward that recorded 100 percent compliance with the minimum 10 meters setback from residential buildings. The wards that show non-compliance to setback most are: Ward 11 and ward 12 in Calabar South and ward one, two, four and seven in Calabar Municipal. These wards are mostly characterised by residential houses and small scale businesses and petty trading. It is also in these areas that the University of Calabar, Cross River State University of Science and Technology (CRUTECH), School of Health Technology and the popular Watt market are located. As a result of the high population pull of these facilities, the scramble for any available space to site a base station in order to service GSM users also became a problem. Since these base stations are sited in an already built up area, it has brought along with it the problem of setback as already developed properties cannot be readjusted to accommodate the base stations.

BTSs and sources of power

Results from analysis also observed that 89.7 percent of the total BTSs population uses generator as the main source of power supply and 1.0 percent depend solely on public source of power supply. This clearly shows the level of BTSs dependence on generators as the major source of power supply. Others that were unspecified are either solar powered or uses inverter or combination of sources and constitutes 8.3 percent (Figure 6). However, most of these generators are sound proofed in order to cushion the negative effect of noise pollution on the environment, the consequences of the proliferation of these generators in terms of carbon smoke is severe.

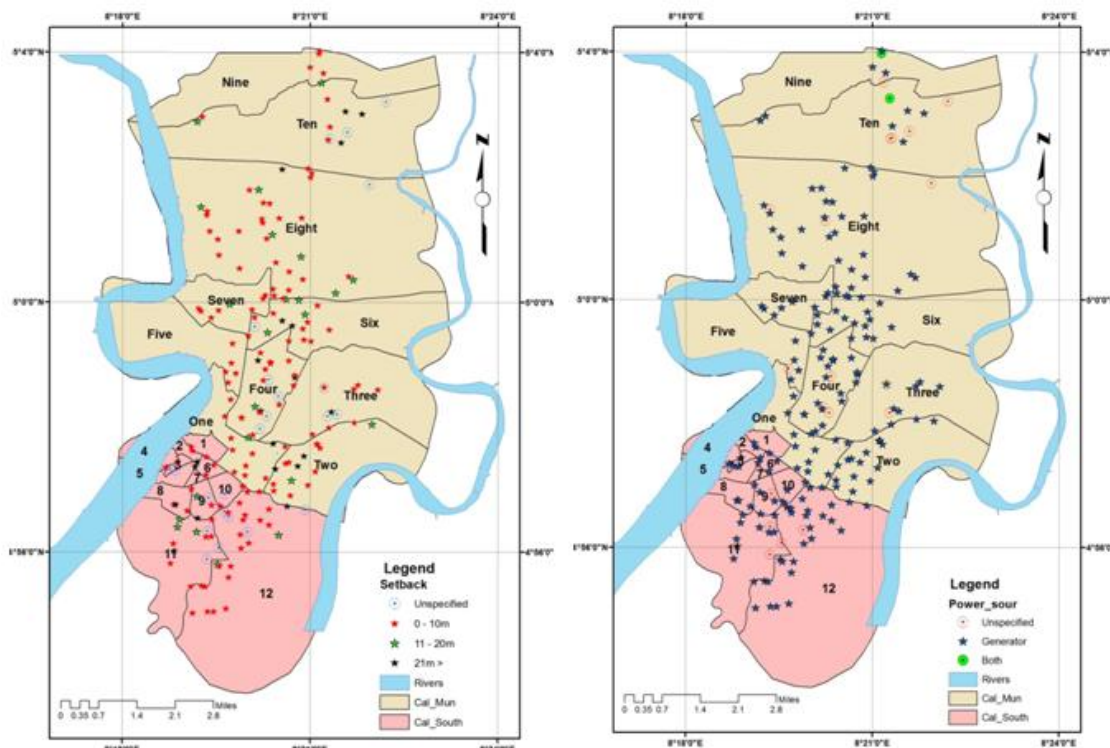


Figure 5: Calabar Metropolis showing setback of each BTS; and Figure 6; sources of power for BTSs

BTS location and other requirements

In addition, other standards such as excessive height or cluster and functionality were also considered. Out of the total score, 68.4 percent BTS meets the National Standard of excessive height or cluster (number of antennae per mast) while 42.0 percent are excessively clustered. However, it was also observed that 5.4 percent of the total score are not functional either as a result of the service provider been out of operation for over three years or more. This alone violates the provisions of Section 6(1)(2) of the National Regulation.

Other requirements for BTSs are access road, paved road and contingency plan which show that 85.8percent of BTS has access roads and 54.4 percent of the roads are not paved. Contingency plan such as presence of bund wall around fuel dump to prevent spillage from spreading, fire fighting equipments are also rated in the order of excellent, good, average, fair and unknown. Out of these total number 38 18.6 percentare rated as ‘excellent’, 69.1 percent as ‘good’, 2.5 percentas‘average’, 1.0 percentas ‘fair’, and 8.8 percent as‘unknown’ (figures 7 and 8)

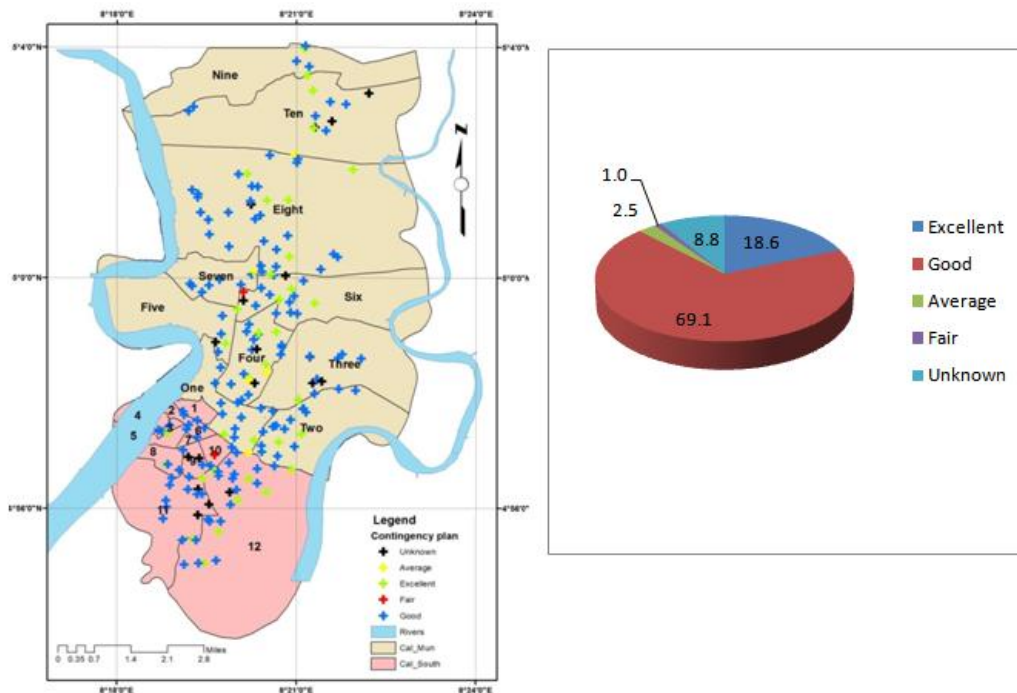


Figure 7: Calabar Metropolis showing BTSs with contingency plan; and Figure 8: Contingency plan assessment of BTSs

V. Conclusion And Policy Recommendations

It is concluded that the low rate of compliance with environmental standards in telecommunication and broadcast facilities in Calabar is linked to the low-level awareness among residents in the study location and weak regulatory agencies. GSM operators failed to comply even though aware of the existence of the law on compliance. It is suspected that other factors such as poverty, social status, non-availability of land and level of education of residents may have accounted for the high level of non-compliance by GSM operators in the study area. It is recommended as further area of research extension that a study is carried out to examine the relative strength of each of these variables to the prediction of compliance in the telecommunication and broadcast industry. This will provide a multi-dimensional explanation of compliance determinant in the study area.

The analysis of data based on the various outcomes represents the provisions of environmental law, socio-economic status and resident’s perception in living close to BTS. Solutions which will improve compliance on one hand as well as increase the effective monitoring of NESREA’s enforcement activities on the other is imperative in order to ameliorate the persistence of environmental law non-compliance occasioned by non-implementation of the law.

The following recommendations are provided using a three-perspective approach directed to residents, NESREA and the Government. To enhance compliance, it is important that NESREA must put in place measures to increase the present level of enforcement. From the findings, the percentages of BTS that meet the National Standards are very insignificant. Compliance here refers to voluntary or enforcement of the various provisions of existing National Environmental Standards in Calabar. NESREA should adopt a more pragmatic approach to awareness, compliance monitoring and enforcement of the National Environmental (Standards for Telecommunications and Broadcast Facilities) Regulations, 2011. This should go beyond mere information about the existence of the National Regulations but they should also involve the GSM operators in formulating or in which they were consulted before formulation. GSM operators would more readily and also comply with prohibitions, which they see as their own. GSM operators want to make contributions and sacrifices to things for which they are aware of the benefits that accrue to them.

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