Original Research Article

'For the Love of the Environment'

Reflections on Professional Music Practice and Climate Change in Nigeria

Abstract

This paper reflects on issues of noise pollution through professional music practice and its impact on the environment. The paper argues that while many physical phenomena like bush burning, gas flaring, gaseous emissions and deforestation have been put forward as major causative factors in global warming and climate change, the issue of noise pollution through excessive sound pressure levels of music production by way of music merchandising, products promotion and live performances in indoor and outdoor venues, have been underplayed as a possible causative factor. It argues further that if sound is propagated through the vibration of air molecules creating regions of high pressure (compression) and low pressure (rarefaction), then there is a relationship between sound production and climate changes. The paper first and foremost reflects on the theory that 'loudness equates power and domination of space' and seeks to understand why music/sound professionals, government agencies and music consumers have come to accept loudness as a way of life in Nigeria as in many other African countries. Data for this paper were gathered through observation of music production events, interviews with professionals and audiences. The paper concludes that the technology of digital downloads,acoustic treatment of performance venues, training and re-training of music and sound re-enforcement professionals as well as appropriate legislation by government, are some significant ways to check noise pollution generated from professional music practice thereby making our environment more ecologically-friendly.

Keywords: Environment, Reflections, Music, Practice, Climate, and Change

To be Reconstructed

Introduction

In about 2004, ~~our~~ the departmental band was contracted to play at a dinner organised by the of..... Otolaryngological Society of Nigeria (an association for Ear, Nose and Throat doctors (ENT). As usual, we wanted to impress the audience not just with the quality of our music but also in terms of volume or amplitude of our musical equipment. As the band struck the first chord, somebody walked up and asked us to reduce the volume of the music which we did. As we continued to play, there were yet, more calls for reduction of sound pressure and volume levels until we were practically singing and playing in soft whispers before we were allowed to continue the performance. Afterwards, the doctors took time to educate us and ~~my~~ the band on the dangers of loud music, especially as regards auditory perception and gradual loss of hearing. Their complain made very little sense to us then especially considering our acquired behaviour of professional practice where the core lesson is 'the

louder the better', our instrument for creating audience awareness and domination of the musical atmosphere.

Several years later when I began to study sound and teach acoustics and electronics to undergraduate students, we began to come across terms like 'threshold of pain', 'listeners' fatigue', 'frequency bias', 'grating', 'sympathetic vibration, 'the decibel scale' and so on all of which represent 'danger signs' as regards loud music. It was at this point in our academic and professional practice that we came to appreciate the lessons I learnt from the ENT doctors that night. In about 2001/2002, there was also news making the round that a church building collapsed in Ibadan, Western Nigeria due to long exposure to sound from a pipe organ. All these point to the fact that sounds has the power to affect both human and physical phenomena.

The consensus opinion in many areas of environmental research is that the climate is changing and that the change is due mainly to human activities and their impact on the environment. Climate change caused by human activities or anthropogenic factors have given birth to a new climatic terminology referred to generally as global warming.While many physical phenomena like bush burning, gas flaring, gaseous emissions from vehicles, industries and deforestation among others, have been held accountable for climate change in various parts of the world, the impact of very loud sounds on the environment as it relates to issues in global warming and climate change have been largely ignored until very recently. This paper attempts to fill this gap by drawing attention to the growing culture of loud music/noise through musical productions and merchandising and their likely impact on the environment.As a way to foreground my discussion. I will let you in on the decibel scale which attempts to capture the volume of sound from various sources in modern societies.

Use of 1st person pronoun not allowed in technical writing.

Table 1

~~Fig. 1.~~The Decibel Scale & associated noise sources

~~Db~~ Decibel Value	~~Source~~ Noise Source
0	Threshold of hearing
10	Quite whisper
20	Conversation
20-50	Quite conversation
40-45	Hotel/theatre
50-65	Loud conversation
65-70	Traffic on busy street
65-90	Train
75-80	Factory (light medium work)
90	Heavy traffic
90-100	Thunder
110-140	Jet plane take-off
130	Threshold of pain
140-190	Space rocket take-off

(Source: Encarta Premium Dictionary 2009)

The noise sources as listed in Table 1 ~~This list above~~ is typical of a Western society. When placed in the African context, the list will have to be extended to include sounds from mosques and churches (which are growing in leaps and bounds in modern African societies), noise of school children, sounds from record shops, street vendors, generators, light/heavy ammunitions, music merchandising/promotion, live performances, street shows and so on. It is important to observe also that, the phenomena listed in the decibel scale do not occur in isolation. For example a factory will not stop work because a jet plane is taking off; neither will noise of heavy traffic cease when thunder strikes. It therefore means that in modern societies, experiencing noise from multiple sources amounted to several decibels of sound amplitude almost on a daily basis. Again, while most of the sounds generated by the sources listed in the decibel scale exists momentarily, musical shows may last for ~~several~~ hours which translates to several hours

of 'charging' the atmosphere with continuous vibrations of molecules of air. Among other things, this paper will reflect on the theory that loudness relates to power and domination of space and seeks to understand why music/sound professionals, government agencies and music consumers in Africa have come to accept loudness as a way of life. The paper then examine ways through which professional musical practice can contribute to issues of environmental degradation and what measures can be put in place to arrest this development.

.**Music, the Arts and Climate Change: A Review**

Although issues of climate change and global warming began more as scientific enquiries and discourses, recent history has shown that there are great academic and artistic interests in the arts and the environment. For example, in 2009, Richard L. Wallace of the environmental studies programme of Ursinus College Pennsylvania compiled a list of 282 songs released by musicians on environmental issues (Anderton ÷ 1978), while photo exhibitions have been organised in other areas with thematic focus on climate change. It has also been reported that Michael Jackson was working on a song on climate change before his death (Enendu: 1994).

Energy, climate change and impact of different music delivery methods ~~was~~ the focus of a study by Weber et al. ~~Christopher L. Weber, Jonathan G. Koomey and Scott H. Mathews~~ (2009) ~~of the Department of Civil and Environmental Engineering, Carnegie Mellon University; Lawrence Beckley National Laboratory and Stanford University.~~ Their study assessed the energy and carbon dioxide emissions with several alternative methods of delivering one album of music to a final consumer, either through traditional retail method or via e-commerce sale of compact disc using digital download services. Additionally, they ~~Their study~~ observed ~~among other things~~ that purchasing music digitally reduces the energy and carbon dioxide emissions by between 40-80%. This reduction is due to the elimination of CDs, CD packaging and the physical delivery of CDs to households, while still conceding to the fact that there are increasing emissions associated with internet data flows (Microsoft and Intel 2009).

At the University of Cambridge, the Centre for Research in Arts, Social Sciences and the Humanities (CRASSH) has a study group focused on climate change[3]. This interdisciplinary group explores issues surrounding climate change from an aesthetic and cultural standpoint, giving voice

and platform to a growing number of artists, writers, film directors, journalists, photographers and so on. Several issues have been raised on the subject of noise pollution in Nigeria today. Many legislative arms of government have also discussed and called for immediate actions on noise pollution taking into account its relative health hazards to millions of Nigerians. Such action was ~~taking~~ taken by the Lagos State House of Assembly through a motion '' Need for Regulation of Noise Pollution in Lagos State (www.vanguardngr accessed on July 24, 2015) calling on the executive governor of Lagos to embark on public enlightenment campaign to sensitise the public on the dangers of noise pollution. The Nations Newspaper also reported that Acoustics experts have warned that unless the government enforces laws that will prevent noise pollution, many individuals may become deaf' *(www.thenationonline accessed October 7, 2015).* Noise is our enemy. It is not only loud enemy of our ears; it is also an enemy to the environment as it pollutes our surroundings. Constant exposure to loud noise, experts say, affects our auditory system; especially when it is above the normal 85 decibels (dBs). Noise above the normal decibels is capable of perforating our ear membranes which can result in temporary hearing loss. ~~The picture below is a good sample~~ Figure 1 shows a typical photograph of the types of horn speakers used by most churches, mosques and recorded music sellers in Lagos and other parts of Nigeria:

The few examples above highlight the growing interest in climate change as a cultural and artistic phenomenon. Music by its very nature is multidisciplinary spread across the arts, social sciences, pure and applied science, medicine and technology among others. Again, music, especially the commercially promoted type, involves a long chain of human activities and energies. From song writing to studio recording, cassette/CD duplication, live performances in theatres/ auditoria or open spaces, promotion and distribution of recorded music to the final consumer, the music production chain continually interacts with the environment as sonic, electrical, technological and industrial phenomena justifying its study as an anthropogenic factor in climate change.

Recently, eateries, fuel filling stations and motor garages are not left out in the notorious attitude of using loud sound/noise to shorten human life's span. Visits to some of these places have indicated that just at the entrance, you will be welcomed by loud sound emanating from the amplified speaker system which may make you to think of a birthday or other celebration is on-going in the premises. The wattage of sound emanating from those speakers will leave customers partially deaf for about sixty minutes (60 minutes) after disengaging from the eatery. This practice of loud music playing at eateries has become another of advertising their product and calling attention of people but little does the operators realise the dangers caused on the inhabitants of these areas where such eatery is located. Figure 2 is a photograph of an eatery named Tantalizer at Ile-Ife Nigeria ~~A pictorial example as given below is a confirmation of my participant observation at Tantalizer Ile – Ife~~ which is a typical resemblance of the operation in virtually all ~~the~~ Tantalizer's eateries nationwide:

Poor sentence construction

Figure 2: Tantalizer eatery at Opa area of Ile-ife. Picture taken on July 15, 2015 @ about 3pm

Personal Pronoun

Worship auditoria are not left out in this obnoxious attitude of loud sound production which is referred to (within the religious circle) as strong 'element of praise' (Marcuse: 1975). However, as can be observed from the examples above, there is very little research if at all, on music and the environment in the Africa yet, the threat of sound/noise pollution is currently on the increase in many African urban societies and the likely consequences on climate change and environmental is worth our academic attention. For many years as a church musician, my argument has always been on the need to adequately treat the acoustics of worship auditorium. There is the need to take into consideration what wattage of sound can any room accommodate? Speakers systems are set up in the church without proper acoustic consideration. The Pastor, the choir and the congregation with no sound amplifying support

Sound Production, Transmission, Reception and the Environment

The branch of physics which deals with sound is known as acoustics. Acoustics can therefore be defined as the science that studies sound production, transmission, reception and the effects of sound in a given space or channel.In simple terms, sound is thought of as movement of air caused by a vibrating body. "Sound is essentially, the movement of air in the form of pressure waves, radiating from a source and radiating in all directions" (Collison 1976 cited in Enendu 1994: 17). Three basic elements are needed to create sound: A vibrating body. A medium for the vibration to travel in and a receiver who converts the vibration to a useable form. Vibrations (sound level) are strongly close to the source and gets weaker with distance. The speed at which the vibration travels is known as the speed of sound and is dependent on atmospheric pressure. Generally, the speed can be taken as 300metres per second (m/s). However, it is very rare to have a simple state of a vibrating body, a medium and a receiver because many things vibrate in our environment at the same time producing unwanted signals which we generally refer to as noise. Thus ,we speak of signal-to-noise-ratio; the ration of the wanted signal to the unwanted signal.

"Sound is essentially, the movement of air in the form of pressure waves, radiating from a source and radiating in all directions" (Collison 1976 cited in Enendu 1994:17). In all, sound waves moves through the air once generated causing ripples and changes in air pressure which we perceive as sound. Sound waves are longitudinal waves just like ocean waves; creating crest and troughs (rising and falling waves) as they move through the air (see Anderton 1978: 8-10). There is therefore a strong relationship between sound and atmospheric pressure or other climatic conditions. This accounts for the differing behaviour of sound in various places and enclosures. Generally sound waves are set in motion when an object is made to vibrate and is then transmitted usually through the air or atmosphere and received by the human ear. The basic elements of sound include frequency (arising from the number of crest-trough combination per second), amplitude (loudness) as well as intensity (strength of signal).

Repitition Why?

Generally, sound waves are set in motion when an object is made to vibrate and is then transmitted usually, through the air or atmosphere and received by the human ear. The basic elements of sound include frequency (arising from the number of crest-trough combination per second), amplitude (loudness), and speed of travel as well as intensity (strength of signal). Music is generally referred to as organised sound that is pleasant to the ear while noise is defined as unorganised or unwanted sound that is unpleasant to the ear. However, it is important to point out that a very thin line exists between music and noise. Consequently music can easily become noise especially when it gets into the threshold of pain and grating arising from excessive decibel output and frequency bias.

Music is considered noisy when it played at excessive volume with accompanying distortion of pure signals. It then becomes unpleasant to human ear. A major distinction between sound and noise is that sound is regarded as noise when it becomes a source of inconvenience to the conveniences of man and animal. Noise pollution is not unique or peculiar to developing countries alone; it is a common occurrence and of highest magnitude in most of the advanced countries. For instance, Kapoor and Singh (1995) assert that China until the third century used noise for torturing instead of hanging men for dangerous crime.

Similarly in India, until lately, considered noise grievous just like any other serious crime (Nagi, Dhillon and Dhlwal: 1999).

Loudness as Power and the Domination of Space

Schaffer (1977) argues that "loudness relates to power" (Cited in Machin 2000: 116). In the same vein Van Leeuwen (1999) sees volume (loudness) as connected to social status and also that noise takes up or invades a social space (cited in Machin 2000:116). While these assertions may be true, it should be stressed here that the idea that loudness relates to power is not African especially given the acoustic nature of our instruments as well as performance contexts and audience size. Rather, loudness as power and domination of space may be traceable to the West where the industrial revolution introduced not only electronic equipment with volume controls but most significantly, the technology of amplification and sound reinforcement which have come to define contemporary professional musical practice. Based on the effects of European incursion and eventual colonisation (Emielu:,2013). African musicians and their audience have inherited the technology of loudness as an essential aspect of contemporary musical performances.As Greene rightly observes "as Western sound technologies are drawn into music making around the world, their hard wirings begin to structure local musical practices in certain ways, imposing their musical logics on societies that adopt them (Greene 2005 p 6). In this sense "musicians have become not only producers of music but also significant consumers of technology" (Thèrberge 1997 cited in Greene and Porcello 2005 pp.6-7). However, while industrial societies have evolved several laws to regulate loudness, most African nations do not have functional laws in this regard. Rather, for both patrons and musicians and marketers, loudness remains connected to social status and power which supports schaffer'stheory. The end result of all these is the creation of a sound culture of loudness. We give a few examples here to buttress the ~~our~~ points.

In the late 1990s, Benson and Hedges Cigarette Company tagged one of their series of musical shows 'Loud in Lagos'[4]. This show and many others which followed across Nigerian cities usually consisted of heavy wattage of sound generation which could be heard several metres from the venue of performance with the same frequency balance, amplitude and sound intensity. Since this

pioneering efforts by Benson and Hedges, many other multi-national companies such as Nigerian Breweries, GLO, MTN, Airtel, Coca-Cola and Pepsi have resorted to using very loud music and popular musicians as brand-marketing strategies in their so-called 'Road Shows'. Events such as 'Star Trek', 'Glo Show', Maltina and Malta Guinness 'Street Dance' among several others, have become important events that involve heavy wattage of music and sound reinforcement as well as gaseous emissions from trucks that transport equipment, generating sets and possibly radiations from electronic/ICT equipment used. These phenomena of course, have their implications on the environment either in the short or long run.It is the contention of this paper that as more and more companies and organizations join this bandwagon in what may be described in advertising terms as a 'war of brands', the music will keep on getting louder, if only to enforce and re-enforce brand supremacy and command brand loyalty. While it has been argued above that loudness takes up social, there is no mention of atmospheric space which sound occupies. Because ~~Since~~ sound travels through the air and also conditioned by atmospheric pressure, it stands to reason that at certain sound pressure levels (SPL), the atmosphere may be saturated with sound and over time could lead to pollution and environmental degradation.

Nagata (2001) in his discussion was of the view that 'loudness' syndrome has encroached into religious worship centres with heavy wattage of sound blaring from Hi-fi equipment in churches especially the modern Pentecostal churches since the 1990s ~~(Nagata: 2001)~~. There seems to be a 'war' of sounds in churches today in a bid to win more converts or show superiority over their 'less endowed' colleagues without considering audience size and other implications for architectural and environmental acoustics.In some of the church services we attended as part of this research, we found out that any attempt to reduce the volume of music or the preacher's microphone volume, was met with vehement resistance and sometimes open confrontation between the sound engineer and the pastor or musicians.

Moving away from the corporate arena, musicians and their patrons have also resorted to a war of supremacy through sound amplitude and intensity. In Nigeria and ~~in~~ Ghana for example, people are attracted to the venue of social ceremonies more by loud noise/music than by invitation cards; the

louder the music, the more successful the ceremony. It is also a common practice for celebrants to show their affluence on such occasions by inviting many musical groups to perform. Commenting on the use of sound for social gathering and party celebration, Emielu (xx) cited a funeral ceremony attended in Benin City, Nigeria in 2005 which had five live bands playing simultaneously; each child of the deceased hired his/her own band. In such a situation for example, loudness or amplitude ~~becomes~~ became a selling-point for the musician and also a sign of supremacy over his 'less fortunate' colleagues. This action of multi-musicians performing at and for a particular occasion as orchestrated by show of class syndrome was a reflection of our level of the dangers acquired through loud sound assimilation. In such a situation for example, loudness or amplitude becomes a selling-point for the musician and also a sign of supremacy over his 'less fortunate' colleagues. ~~The figure below~~ Figures 3& 4 further expresses the point on the loudness of sound:

Figure3: *The speaker system of a band at a social function (picture taken by the researcher on July 4, 2015*

a)

b)

Figure 4: *The speaker system of two different band groups at a social function (picture taken by the researcher on July 25, 2015*

As a result of ignorance of the dangers of loud sound on human health, Nigerians appreciate loud music, especially under the influence of alcohol; this gives strength to the celebrant and guests alike. This is also an avenue to display wealth affluence as a tool for the oppression of

the less privileged. The picture of a man in his late sixties (60s) who was not satisfied with sound out and in order to get his feel had to move closer to the front of the speaker to dance. (see Figure 5)

a)

b)

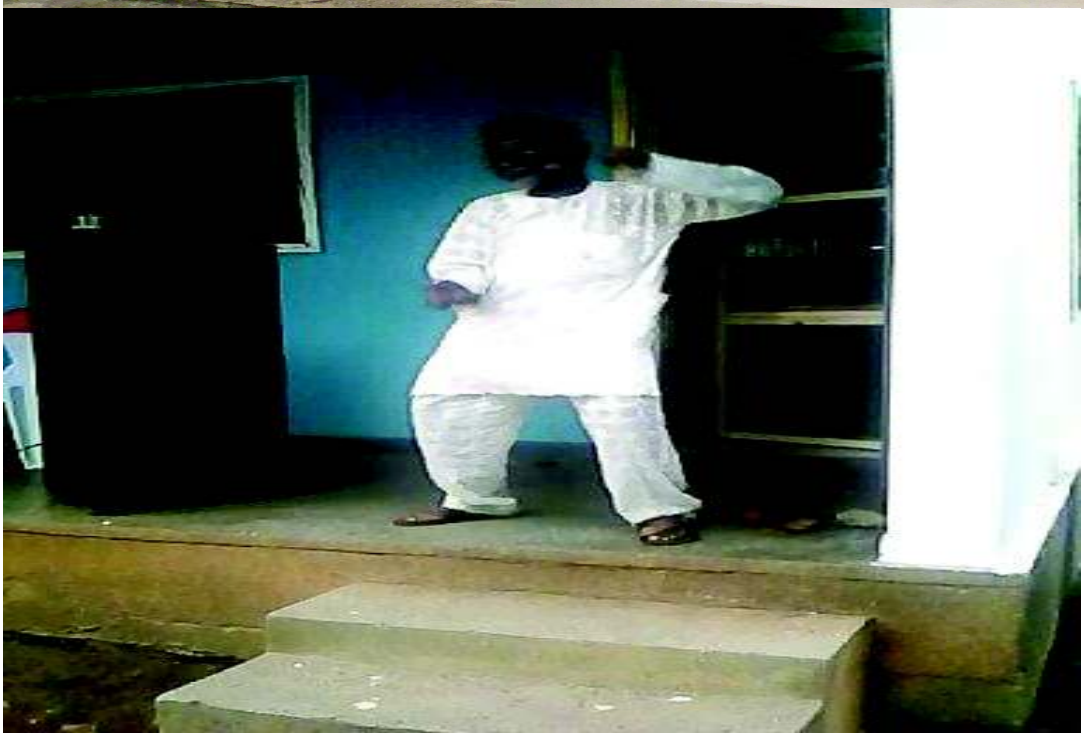

Figure 5: Add Title....?

Figure 6c: *Ignorant Nigerian dancing his health out at a social gathering (Picture taken May 27, 2015)*

Use of Headphones as Sound Facilitator

Variety of sound systems is the variety of amplification systems ~~in form~~ that come in all shapes and sizes of ~~headphones and earphones~~ headphones and earphones. These devices are potentially dangerous if used improperly, they can cause permanent hearing loss. Hearing loss is defined as a common problem caused by noise, aging, disease, and heredity. Hearing is a complex sense involving both the ear's ability to detect sounds and the brain's ability to interpret those sounds, including musical sounds and the sounds of speech (Oishi: 2011). Exposure to noise pollution, especially for younger people, has gone from huge boom boxes and car stereo speakers to sound delivered directly into the ear through headphones or earphones.

Hearing specialist David A Schesse (xx) commented that Headphones and earphones appear to be the most damaging. ~~Since~~ Because noise-induced hearing loss is a result of intensity (loudness) and duration of exposure, these devices may be capable of inducing a permanent bilateral sensor neural hearing loss especially if they are used at a volume setting of four or above for extended periods.

The use of headphone is becoming mostly popular among Nigerians especially, youths between the teen ages and early adulthood; this practice is also found among adults. Many Nigerian are not conscious of the danger inherent in regular use of headphones or

earphones, this action is probably as a result of ignorance of the effects or probably enjoy loud sound and ignore or defile warnings on the dangers at the expense. ~~The picture below~~ Figure 7 reflects sample of ignorance of most Nigerians:

Figure 7
to be titled

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Wearing headphones or earplugs has been suggested as a possible predisposing factor for external ear canal infection since their use can increase the temperature and humidity of the canal, create the potential for skin abrasion and provide a vehicle for the introduction of organisms into the canal skin (Senturia : 1980). It is not wrong criminal to use headphone or earphone to prevent other people from hearing the sound, either for the reason of privacy or to avoid disturbance but if the volume of such device is not controlled then, there is that possibility to affect such user and constitute impairment to ear threshold.

Some studies have found somewhat increased risks for temporary hearing damage from listening to music during strenuous exercise, compared to when listening at rest. Some Finland researchers consisting of Airo et al., ~~Erkko; J. Pekkarinen; P. Olkinuora (1996)~~ recommended that exercisers should set their headphone volumes to half of their normal loudness and only use them for half an hour. With modern technology on the production of noise cancelling headphones which are so effective that a person may not be able to hear oncoming traffic or pay attention to people around him/her. Greenfield (2013) considers this as a general danger that music in headphones can distract the listener and lead to dangerous situations (Greenfield ~~(~~2013)

The Way Forward

In Nigeria, the problem of noise pollution is wide spread. Several studies report that noise level in metropolitan cities exceeds specified standard limits. A study by Ugwuanyi (2004) conducted in Makurdi, Nigeria found that the noise pollution level in the city was about 3 dB(A) to 10 dB(A) above the recommended upper limit of 82 dB(A). Anomohanran (2008) also found that the peak noise level at road junction in Abraka, Nigeria to be 100 dB (A). This noise level is higher than the recommended level of 60 dB (A) for commercial and residential areas. Ighoroje (2004) investigated the level of noise pollution in selected industrial locations in Benin City, Nigeria. The average ambient noise level in Sawmills, Electro-acoustic market and food processing industrial areas was ~~determined to be~~ measured above 90 dB (A). This noise level is well above the healthy noise level of 60 dB (A).

While many African nations have embraced the idea of environmental management which has necessitated the setting up of a number of national and regional environmental agencies. They are yet to embrace the idea of noise control as an integral part of the framework of policies on environmental protection. In the United States of America for example, out of about 32 environmental laws, provision is made for noise control. The US noise control act of 1972 establishes a national policy to promote an environment for all Americans from noise that jeopardises their health and welfare. The United Kingdom too, has environmental laws including legislation on noise. Of great significance is the formation of The Noise Abatement Society in the U.K. established by John Connell (O.B.E.). In 1960, he successfully lobbied the noise abatement act through parliament, establishing for the first time in the U.K. that noise taken ~~is a~~ statutory nuisance. Over the years, the society has been involved in creating awareness and education about sound and the use of sound. Due to the ignorance of Nigerians on the fact that there exist a close nexus between noise pollution and sustainable city, little or no attention is paid to the control of noise pollution in Nigeria. The

execution and implementation of the law as regards environmental pollution is never implemented to the letter. It is observed that the persistence of this problem could endanger the future stability of human health and could aggravate the human health catastrophe in the fast growing cities in Nigeria.

The first approach and effective measure of abating noise pollution to control through heavy taxation on the so called celebrants and the band, not only this, a minimum volume level of sound production in the public should be prescribed in order to maintain a particular sound volume which will commensurate with the ideal sound level expected.

Secondly, Use of Combination of Barriers as Noise barriers is among the most common alleviative measures used. They are most effective if they break the line of sight between the noise source and the receptors being protected, and if they are thick enough to absorb or reflect the noise received. Various materials and barrier facade patterns have been extensively tested to provide maximum reflection, absorption, or dispersion of noise without being aesthetically ugly. According to Mehravaran, (2011), if the line of sight between receiver and highways is blocked with barriers, the 5 dB attenuation can be expected. Then, adding 1 ~~meter~~ metre to the barrier height provides the additional 1.5 dB attenuation. Length of barriers should be long enough, to diffract only small portion of noise through the edge of the barriers. Barriers should be so long that the distance between receiver and barrier end in at least four times of the perpendicular distance between receiver and barrier.

Conclusion and Recommendations

This study has drawn attention to an important and emerging area of discourse on arts and the environment and the role of professional music practice and climate change. The paper observes that while some attention is currently being paid to music and climate change, the issue of loud music and noise pollution from such occurrences have been ignored. Our societies, especially in Africa, are becoming very noisy in the name of musicality and over time, this may constitute environmental hazards through distortions in atmospheric pressure. Although establishing a direct relationship

between noise/music and climate change will require a multi-disciplinary research over several years and in several climatic and cultural zones, this paper concludes that loud music and noise are subtle agents of environmental degradation. It also submits that electrical/electronic equipment used for sound production and re-enforcement could also cause environmental hazards through some forms of radiations and gaseous emissions. Owing to the increasing noise levels occasioned by very loud music and other agents in African cities, the time has come to begin legislation on noise control. This paper recommends that acceptable optimal standards of sound production either in enclosures or in open spaces should be established for effective sound control. More importantly, a lot of awareness and advocacy should be carried out so as to sensitise the citizenry on the dangers of very loud music which most times translates to noise. Finally, the paper recommends that sound/noise pollution should form part of the environmental policies of African nations.

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