

# AN ANALYSIS OF THE NIGERIAN AVIATION ENVIRONMENTAL POLLUTION OUTLOOK WITHIN THE CONTEXT OF INTERNATIONAL AIR LAW\*

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## *Abstract*

Article 37 of Chicago Convention bestowed on the International Civil Aviation Organisation (ICAO) the powers to make Standards and Recommended Practices (SARPS) for all parties participating in aviation activities. This regulatory powers and functions include inter alia, environmental standards. Thus, the Article provides that ICAO should work in line with the changes in aviation industry, to ensure an up to date work and procedure for change driven standards. The relevant Act and regulations for compliance and implementation of international law for protection of aviation environment in Nigeria include the Civil Aviation Act 2006, the Civil Aviation Regulations 2012 and 2015. The purpose of this study is to critically analyse the level of compliance and implementation of SARPS in Nigeria with a view to ensuring that the Nigerian Civil aviation sector aligns with the global efforts of providing a clean and sustainable aviation environment. The paper combines a detailed analysis of international, regional and domestic legislative framework and jurisprudence, to provide a systematic exposition of the subject matter. The authors used primary and secondary sources of data for this study, which include both published and unpublished works. Data generated from the study were analysed using doctrinal and descriptive methods, as well as content analysis. In conclusion, the paper makes recommendations for the strict enforcement of the aviation environmental laws towards safer and more secure air transportation experience in the Country.

**Keywords:** Aviation Emission, International Air Law, Nigerian Civil Aviation Regulations 2015, Environmental Law, Airport Environment

## 1.1. Introduction

Civil aviation has gradually evolved from an elitist mode of transportation to an essential commodity for the society at large. In the wake of increasingly organized movement of goods and services in a globalized world order<sup>1</sup> facilitated by liberalization<sup>2</sup>, there is rising pressure on civil aviation as supersonic mode of transportation. With increasing commercialization and growth of the aviation industry, it is a hard fact that aviation is an unsustainable technology that it will not be a significant feature in humans' future, and it will eventually be abandoned<sup>3</sup>. The sustainability issue of the aviation transport system with regard to environmental challenges constitutes the cause for concern. Environmental issues associated with aviation are critically important to the future development of aviation infrastructure, even as the science of climate change is still relatively new and the future is uncertain<sup>4</sup>.

Accordingly, environmental protection has become a major issue not only in Nigeria, but in international aviation. This phenomenon is exacerbated by the fact that there have over the years been an increasing amount of residential development surrounding airports coupled with the continued growth of commercial air travel. Consequently, air pollution surrounding airports has

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<sup>1</sup> Debasis Poddar. 'Aviation Environmental Protection: Imperative for a Sustainable Movement Through Omission of (Toxic) Emission', *Current Developments in Air and Space Law*, National Law University, Delhi, 2012.

<sup>2</sup> See 'Airport is Too Important to Privatize—A letter to the Editor' (1992) (15) *Wall Street Journal*; Babcock and Brown, Inc. and John F. Brown Company, Inc. 1992; 'Los Angeles International Airport Privatization Study'. Los Angeles, CA: City of Los Angeles. Department of Airports (May); Berry, Steven T. 'Airport Presence as Product Differentiation' (1990) (80)2 *The American Economic Review* p. 394-399; Delbono, Flavio 'Privatization and Liberalization in Labour-Managed Industries' (1992) (7) *Journal of Industrial and Comparative Economics* p. 325-333.

<sup>3</sup> Ghanshyam, Singh. "Aviation Industry: Emerging Legal Challenges". *Current Developments in R. Sing, S.D. Rao (eds.), Current Developments in Air and Space Law*, (NLUD Press).

<sup>4</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.



become a significant concern for local and regional governments as contaminants emitted by aircraft and airport sources can affect human health and the environment significantly.<sup>5</sup>

The concept of aviation safety imposes a corresponding duty of care on stakeholders in the industry. As such, the discussion under aviation security cannot be complete without touching on the issue of aviation environmental protection. The reciprocity here is that the health of the aviation industry has a direct effect on human health, while the opposite also holds true.

## 1.2. Sources and Impact of Aviation Pollution

The *sources* of these environmental hazards are not far-fetched. Aircrafts and airports have been known to be the primary sources of pollution in the aviation industry and its environment. Industry activities such as Crop dusting, airport expansion, new airport construction, and low-flying aircraft can negatively impact the environment with noise, emissions, polluted water runoff, and habitat destruction among other things. Aerial spraying of pesticides also gives rise to wide environmental problems. This is more so, considering the fact that very harmful pesticides are usually applied to farms and other related uses by way of aerial spray. The possibility of these chemicals spreading to other neighbouring farms and other areas, thereby destroying the flora and fauna is very high indeed. Expansion of Runways may equally occasion the destruction of habitat of many animals and plants, in addition to noise pollution, which is the primary impact of aviation on national parks and wildlife refuges. Many of these impacts are generic to most large infrastructure developments and by and large, can be mitigated.<sup>6</sup>

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<sup>5</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 60.

<sup>6</sup> *Ibid*

Expansion of old airports and establishment of new airports are at loggerheads with ever-increasing population as airport and human compete for the limited space. Although most airports were built outside the cities, the cities have grown to catch up with the airports, thus raising the degree of hazard. A very good example is the Murtala Muhammed Airport in Lagos and a few others in the Country. Moreover, most airports in the world are old. There is a set of competing claims between development and environment to offer conundrum of choice between movement of goods and services on one side and right to health along with privacy and peace of mind on the other. Tied to this struggle for space is the fact of hazard which poses a grave consequence to human health<sup>7</sup>. Specifically, the adverse effects of aviation that are of concern to the environment as follows<sup>8</sup>:

- (i) Air pollution
- (ii) Noise pollution
- (iii) Water pollution
- (iv) Greenhouse effect
- (v) Depletion of ozone layer
- (vi) Other environmental hazards caused by aviation<sup>9</sup>.

The *impact* of aviation on Environment is much wider than simply reducing public exposure to noise. Aviation noise and other forms of pollutions have damaging health implications.

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<sup>7</sup> Murtala Ganiyu A. Murgan and Ghafur Ahmid 'Assessment of Implementation of International Law on Reduction of Aviation Emission under the Nigerian Civil Aviation Regulations 2015' NAUJILJ 10 (1) 2019.

<sup>8</sup> Ghanshyam, Singh. *Op. Cit.*

<sup>9</sup> Essentially, noise pollution and (toxic) emission forms the crux of challenges in the aviation environment.



### 1.3. Aviation Noise Pollution

Like other noise pollutants, aviation noise pollution poses severe impact on the health and overall wellbeing of the populace. Millions of people are disturbed by aircraft noise the world over, and the trend is getting worse<sup>10</sup>. The noise impact of aviation can have significant adverse effects on people living close to an airport, including interference with communication, sleep disturbances, annoyance responses, performance effects and psychological effects<sup>11</sup>. As stated by Professor Singh, a study found that 71% of people heard the aircraft noise, 20% bothered to some extent, 7% bothered moderately and 2% very or extremely bothered<sup>12</sup>. Moreover, a study of the effects of noise on children by the department of design and Environmental analysis at Cornell University in New York, found a variety of problems in children exposed to noise compared to children not exposed to noise: blood pressure elevation, learned helplessness, deficiencies inability to discriminate words and possible delays in cognitive development<sup>13</sup>. Another reported health impact of noise is increased anxiety and levels of annoyance<sup>14</sup>, while mere loudness accounts for less than 50% annoyance from noise<sup>15</sup>. Moreover, international health issues of pandemics have proved that aviation can have major impact on health issues. SARs, H1N1 among others, have made the spread of virus truly global and cannot be considered localized.

### 1.4. Aviation Air Pollution

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<sup>10</sup> About 5 million people's health could be affected as a result of just one airport as findings suggests.

<sup>11</sup> Ghanshyam, Singh. *Op Cit.*

<sup>12</sup> *Ibid*

<sup>13</sup> *Ibid*

<sup>14</sup> *Ibid*

<sup>15</sup> *Ibid*

Aviation air pollution on the other hand, is the bane of climate change (a change in the average weather). There is no doubt that long-term global climate changes have many implications for natural eco systems<sup>16</sup>. The combustion of aircraft engines have been known to produce emissions similar to emissions from other fuel-based automobiles. Airports and aircraft have been known to cause a variety of air pollution at many different elevations and at considerable distances<sup>17</sup>.

Aircraft flying overhead are known to emit toxic compounds in massive amounts over an area 12 miles long, 12 miles wide on take-off, 6-12 miles on landing. Moreover, taxiing airplanes emit hundreds of tons of greenhouse gases. Emissions from aircraft below 1,000 feet above the ground are mainly involved in influencing local air quality. These emissions disperse with the wind and blend with emissions of other sources from the surrounding domestic factory and transport pollution. Aviation contributes less than 4% of man-made atmospheric emissions. But some of aviation's emissions are emitted in the upper atmosphere and may have a more direct effect<sup>18</sup>.

Although aviation air quality concerns are mainly related to the area on and around airports, other adjoining environments are not completely left out. Moreover, the fact that residential areas are catching up with airports due to population explosion validates this view. The main local air quality relevant emissions attributed to aircraft operations at airports include<sup>19</sup>:

- (i) Oxides of Nitrogen (NOX)

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<sup>16</sup> Debasis, Poddar. op cit

<sup>17</sup> *Ibid*

<sup>18</sup> *Ibid*

<sup>19</sup> *Ibid*



- (ii) Carbon Dioxide (CO<sub>2</sub>)<sup>20</sup> & Carbon Monoxide (CO)
- (iii) Un-burnt hydrocarbons [CH<sub>4</sub> and Volatile Organic Compounds (VOCs)]
- (iv) Sulphur Dioxide (SO<sub>2</sub>)
- (v) Fine Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)
- (vi) Water Vapour and Odour

### 1.5. Aviation Water Pollution

This is another important environmental issue. Airports have been known as a major source of water pollution<sup>21</sup> as they are used to dumping toxic chemicals – used to de-ice airplanes during winter storms – into waterways. Millions of gallons of glycols are used for aircraft de-icing at airports. Glycols are the most voluminous water pollutants from airports. According to Podder, the airlines mix 55% glycol and 45% water, heat the mixture to about 185°F, and spray the planes down with it during de-icing<sup>22</sup>. He revealed further that 50% – 80% of the glycols may end up in the local waterways. Ethylene glycol is more effective and more toxic than propylene glycol. Both consume high levels of oxygen during decomposition and this can deplete waterways of oxygen and kill fish. A small number of airports are successful in recapturing glycols following use and few of them to be recycled for other uses. Recycled glycols are generally used for coal companies, paint manufacturers and general motors. But the recycled glycols are never used for de-icing in the United States unlike in Europe<sup>23</sup>.

### 1.6. Legal Implication of Aviation Environmental Pollution

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<sup>20</sup> A 2005 reports concludes that aircraft emissions include greenhouse gases such as CO<sub>2</sub> 6.3% of British CO<sub>2</sub> emissions are from aviation. Aviation account for around 2% of the CO<sub>2</sub> emissions globally. 50% more emissions from aviation expected by 2020, assuming fuel efficiency improves by 50%.

<sup>21</sup> Debasis, Poddar. Op Cit.

<sup>22</sup> *Ibid*

<sup>23</sup> *Ibid*

To begin with, the gamut of the foregoing hazards could be construed from a legal perspective as constituting the tort of nuisance. As such, aviation noise may easily be construed as an interference with property which constitutes nuisance under Torts Law. The condition is that there must be interference with the use or enjoyment of land, or some right over or in connection with it, causing damage to the plaintiff. The two main ingredients are therefore injury to property and interference with personal comfort<sup>24</sup>.

In this connection, it is imperative to consider the legal provisions relative to controlling aviation pollution. The Common Law remedy against nuisance was the only means available to curtail excessive noise prior to the development of environmental jurisprudence, and this was wholly based on the discretion of the Judge<sup>25</sup>. Whether a particular noise constitutes a nuisance, after all, is often a question of degree. However this position seems to be evolving. Modern environmental law commenced with Declaration of the United Nations Conference on the Human Environment made at Stockholm on 16th June 1972. Again, In the UN made a Charter for Nature in 1982; and in 1989 the 'Hague Declaration on the Environment' to protect Ozone layer around the globe, and prevent global warming of the atmosphere was enacted. In 2002, another UN Declaration was made in Johannesburg, South Africa for Sustainable Development. The Kyoto Protocol 2005, which is an amendment to the United Nations Framework Convention on Climate Change (UNFCCC) was ratified by many countries and commits to reduce carbon dioxide and five other greenhouse gases.

The law against climate change remains the age-long maxim of *salus populi suprema lex*, which prioritizes interest of the people over and above interest of

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<sup>24</sup> Poddar, Debasis 'Aviation Environmental Protection: Toward a Quieter Movement (Larger) Public Interest'. *Current Developments in Air and Space Law*, op cit

<sup>25</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 62.



individual or interest group in particular, no action (which includes omission) is allowed to the detriment of community. Hence, gross violation of relevant national or international statutory provisions would constitute tort or crime, as the case may be. Civil aviation is commercial enterprise and therefore subject to public policy, while transnational civil aviation (transcends territorial jurisdiction of states in terms of its trajectory) is subject to universal public interest and global warming is inimical to such collective interest<sup>26</sup>. Accordingly, civil aviation cannot continue emission of either CO<sub>2</sub> or non-CO<sub>2</sub> GHG to the detriment of international community<sup>27</sup>.

In addition, emission of GHG is tantamount to unjust enrichment of one sector at the cost of others and thereby attracts the *quantum meruit* as international trade through civil aviation cannot be allowed to grow at the cost of local occupations including agriculture, being a fundamental one<sup>28</sup>. Moreover, even unintentional damage to other(s) constitutes tort of negligence irrespective of absence of *mens rea* at the back of human mind. As such the aviation industry cannot plead or feign ignorance, at least in the post-*Rio* world, and thereby stuck into last but not the least point of allegation, that of culpability while there is a series of increasingly frequent international endeavours—from *Rio* (1992) to *Kyoto* (1997) to *Johannesburg* (2002) to *Bali* (2007) to *Copenhagen* (2009) to break the pace of anthropogenic interference with the climate system<sup>29</sup>. While such a potential climate threat is matter of public record all over the world, *ignorantia juris non excusat* is at ease applicable to errant civil aviation industry for intentional pollution of life sustaining climate in the only planet carrying life to the detriment of such carrying capacity of the Earth. Thus

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<sup>26</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>27</sup> *Ibid*

<sup>28</sup> *Ibid*

<sup>29</sup> *Ibid*

onus of proof seems to lie on the accused to unfound the allegation of *mens rea* behind such emission which may trigger slow but steady motion of climate holocaust all over the world. Even if such *mens rea* cannot be established beyond reasonable doubt, allegation of criminal negligence may be pleaded and proved against civil aviation industry in terms of intensity and frequency of such offence(s).<sup>30</sup> Such culpability and act of impunity if not tackled has the potential affecting not only the integrity of climate, but will also have a toll existing life forms including humanity will suffer irreversible damage. Irreparable loss of bio-diversity leaves the world of flora and fauna at bay with its perennially broken food chains.<sup>31</sup>

Certain issues in public international jurisprudence are emerging, like responsibility of states for internationally wrongful acts and international liability for injurious consequences arising out of acts not prohibited by international law. The first arm of this deals with prevention of trans-boundary damage from hazardous activities. The second arm deals with allocation of loss in the case of trans-boundary harm arising out of hazardous activities which may tentatively suit such an omission of emission and emission of omission on the part of civil aviation industry at higher altitude of atmosphere. While the former covers culpability on the part of people in power of states and thereby provides for responsibility for acts (which may include omission as well) perpetrated in official capacity, the latter covers other action (or omission) not condemned under law for the time being in force but hazardous enough for other states to withstand such activities<sup>32</sup>. The doctrine of vicarious liability should be applied to determine accountability under the common law system and thereby extend wider trajectory of law beyond the phenomena at a glance.

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<sup>30</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>31</sup> *Ibid*

<sup>32</sup> *Ibid*



Another common law principle of strict liability also may be applicable here to subject the wrongdoer through procedural technicality of judicial process<sup>33</sup>. While such matter generally lies in civil jurisdiction, doctrine of criminal negligence may be invoked as well<sup>34</sup>.

A jurisprudential *corpus* of law, that is, environmental aviation law is required in view of the following reasons, as advanced by Poddar,

- (i) With the passage of ever-increasing movement of goods and services throughout the world under international trade regime, civil aviation becomes sunrise industry with its expansionist mode-through extension of old airports or establishment of new airports or both and thereby set to perpetrate more noise against population adjacent to airports. In its given trend of expansion, public interest is in peril.
- (ii) Under common law system a piece of land, as immovable property, may also include the column of space above the surface *ad infinitum*.
- (iii) Under law of torts, aviation noise may at ease be considered as interference with property.
- (iv) Rule of contributory negligence under *volenti non fit injuria*-a Latin maxim used to excuse defendant in like cases cannot be applicable.
- (v) Besides population, domestic cattle and wildlife are affected by aviation noise. Adversity of aviation noise on fauna is obvious enough as compared to serenity of wilderness deviation of which may cause catastrophic change in physiological and behavioral patterns of sub-human folk. Adversity of aviation noise on flora, however, is still a matter of conjecture. In a nutshell, there is a vacuum in terms of settled

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<sup>33</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>34</sup> *Ibid*

law to balance between such competing and, at times, conflicting claims of interest operative within given society<sup>35</sup>.

### 1.7. International Response

There have been concerted efforts by the international community in response to the above concern. The Kyoto Protocol<sup>36</sup>, which was adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC)<sup>37</sup> calls for developed countries<sup>38</sup> to pursue limitation or reduction of greenhouse gases from “aviation bunker fuels”<sup>39</sup> working through ICAO. The ICAO 37<sup>th</sup> Assembly resolved that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue ton kilometer performed<sup>40</sup>.

To give effect to this target, the international community made a concerted effort through ICAO for a global approach to mitigating the impact of aviation on the environment including:

- (i) Limiting or reducing the number of people affected by significant aircraft noise;

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<sup>35</sup> Malathi, K. “Aviation Pollution-Impact on Environment” in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>36</sup> Article 2.2 of the Kyoto Protocol.

<sup>37</sup> The (UNFCCC) principle of common but differentiated responsibilities requires the developed countries to take the lead in addressing climate change while providing necessary support to developing States in their voluntary actions through different mechanisms such as the Clean Development Mechanism (CDM).

<sup>38</sup> Annex I Parties.

<sup>39</sup> international aviation.

<sup>40</sup> Woldeyohannes, Mesfin Fikru. *Op Cit*.



- (ii) Limiting or reducing the impact of aviation emissions on local air quality;  
and
- (iii) Limiting or reducing the impact of aviation greenhouse gas emissions on  
global climate<sup>41</sup>.

In this connection, ICAO has adopted a Balanced Approach to Aircraft Noise Management with the goal of addressing the noise problem in the most cost-effective manner. This approach consists of four principal elements, namely:

- (i) Reduction at source (quieter aircraft),
- (ii) Land-use planning and management,
- (iii) Noise abatement operational procedures and
- (iv) Operating restrictions

The scope of ICAO's policy-making to address the environmental impact of aircraft engine emissions has over the years been expanded to include the impact of aircraft engine emissions during flight on climate change. Total CO<sub>2</sub> aviation emission is approximately 2 per cent of the Global Greenhouse Emissions but it is expected to grow around 3-4 per cent per year. Be that as it may, it is gratifying to note that significant progress has been made over the years by ICAO in addressing these environmental issues through the work of its Committee on Aviation Environmental Protection (CAEP) and by the industry<sup>42</sup>, including:

- (i) Adoption of noise restriction and emissions standards,
- (ii) Technological improvement in aircraft engines and fuel operational efficiency and
- (iii) Introduction of market based measures<sup>43</sup>.

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<sup>41</sup> Woldeyohannes, Mesfin Fikru. *Op Cit.*

<sup>42</sup> *Ibid*

<sup>43</sup> Market-based measures include emissions trading, emission related levies - charges and taxes, and emissions offsetting.

The objective of the global community in regulating the menacing effects of environmental pollution is to ensure the sustainable development of an environmentally friendly civil aviation industry. It is the duty of every State (Nigeria inclusive) to take necessary measures to ensure continuous development and growth of civil aviation with minimal adverse impact on the environment. In pursuit of this objective the Nigerian Civil Aviation Regulations in its Part 16<sup>44</sup> provides for the protection of the nation's aviation environment. Accordingly, Section 2 of the Regulation provides that the NCAA shall grant or validate noise certificate to an aircraft on the basis of satisfactory evidence that the aircraft complies with the requirements as prescribed in Annex 16 of the Chicago Convention 1944<sup>45</sup>. It goes further to state that no person may take off or land an aircraft, to which this Part applies, at a Nigerian Airport without a valid noise certificate, except in an emergency, or with the written permission of the Director General of the Authority<sup>46</sup>. Moreover, the Regulation states that the Authority shall not grant or validate a noise certification to an aircraft that does not comply with the above requirement of Annex 16<sup>47</sup>.

### 1.8. Specific Role of ICAO

Environmental protection has become a major issue in international aviation, no doubt. As stated earlier, the ICAO and the global forum for civil aviation have established an objective to minimize adverse effect of global civil aviation on the environment and aviation at some levels. Particularly, ICAO has made concerted effort for a global approach to mitigating the impact of aviation on the environment. These include:

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<sup>44</sup> See Part 16 Environmental Protection Regulation B 1157.

<sup>45</sup> Also known as ICAO Annex 16.

<sup>46</sup> See Section 2 (i) and (ii).

<sup>47</sup> *Ibid* (iii).



- (i) Limiting or reducing the number of people affected by significant aircraft noise;
- (ii) Limiting or reducing the impact of aviation emissions on local air quality; and
- (iii) Limiting or reducing the impact of aviation greenhouse gas emissions on global climate<sup>48</sup>.

The foregoing initiatives by the Agency are generally meant to set guiding principles which are not legally binding but indeed of persuasive value and thereby contribute to legitimacy of operation on the part of aviation industry. In its Assembly Resolutions, the ICAO emphasizes on arrest of aviation noise<sup>49</sup>. The ICAO conducts periodic reviews of night curfew restrictions<sup>50</sup>. Moreover, pitfalls of night curfew restrictions are pointed out to prove the same as self-defeating enough. The ICAO has also set its rationale behind imposition of noise related charges. Also there is time-bound agenda vis-à-vis abatement of noise set before member states so that the same may not be delayed *ad infinitum*<sup>51</sup>.

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<sup>48</sup> See Declaration of the United Nations Conference on the Human Environment, 1972, paragraph 2. Available at: [http://www.unep.org/Law/PDF/Stockholm\\_Declaration.pdf](http://www.unep.org/Law/PDF/Stockholm_Declaration.pdf) accessed on September 27, 2010.

<sup>49</sup> See ICAO Environmental Report 2007, Part 2, Aircraft Noise—Defining the Problem, p. 20. Available at: [http://www.icao.int/env/pubs/env\\_report\\_07.pdf](http://www.icao.int/env/pubs/env_report_07.pdf) accessed on September 25, 2010.

<sup>50</sup> Some countries have requested the ICAO to review the night curfew restriction imposed by some countries on the operation of airlines and arguing that the imposition of night curfew creates a mismatch in utilizing infrastructure round-the-clock and hampers the growth of airlines. Malathi, K. Op Cit.

<sup>51</sup> See Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report), paragraph 15. Available at: <http://www.un-documents.net/ocf-02.htm#I> accessed on September 27, 2010; Central Pollution Control Board Annual Report 2004-2005, Table 5.21. Also available at: [http://www.cpcb.nic.in/noise\\_pollution/Ambient%20Noise%20LevelinVicinityofIGIAirportNewDelhi-2004.pdf](http://www.cpcb.nic.in/noise_pollution/Ambient%20Noise%20LevelinVicinityofIGIAirportNewDelhi-2004.pdf) accessed on September 26, 2010.

To encourage environmental safety practices, the ICAO has prescribed noise certification standards from time to time. All commercial aircrafts must meet those standards. The 33rd ICAO Assembly adopted a Resolution for introducing the concept of a *Balanced Approach*' to Noise Management comprising four principal elements to mitigate noise, viz:

- (i) Reduction of aircraft noise at source (quieter aircraft).
- (ii) Land use planning and management.
- (iii) Noise abatement operational procedures.
- (iv) Operating restrictions, with the goal of addressing the noise problem in the most cost-effective manner.

Airports are expected to adopt noise quota system at local level for over and above the noise certification standards. Accordingly a limit on the number of movements and a quota or *noise budget* which represents sum of noise over specific period is prescribed. In *Griggs v. Allegheny County*,<sup>52</sup> the court held that the Airport was responsible for acquiring sufficient land adjacent to the airport to reduce the impact of aviation noise and, if it failed to do so, was liable for resulting damages from aircraft noise.

In recent years, the scope of ICAO's policy-making to address the environmental impact of aircraft engine emissions has been expanded to include the impact of aircraft engine emissions during flight on climate. Significant progress has been made over the years by ICAO in addressing these environmental issues through the work of its Committee on Aviation Environmental Protection (CAEP) and by the industry. This includes the adoption of noise restriction and emissions standards, technological improvement in aircraft engines and fuel operational efficiency and introduction of market based measures. Market-based measures include

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<sup>52</sup> 369 U.S. 84 (1962).



emissions trading, emission related levies - charges and taxes, and emissions offsetting.

Consequently, States (Nigeria inclusive) are under international legal obligation to respect aviation environmental regime through strict compliance to the rules and regulations and other parameters. Although no member state is legally bound by international norms set by the ICAO<sup>53</sup>, adherence to the same provides legitimacy to the states in terms of its operation. The United Nations Framework Convention on Climate Change (UNFCCC) principle of common but differentiated responsibilities requires the developed countries to take the lead in addressing climate change while providing necessary support to developing States in their voluntary actions through different mechanisms such as the Clean Development Mechanism (CDM). Moreover, the Kyoto Protocol<sup>54</sup>, which was adopted by the Conference of the Parties to the UNFCCC calls for developed countries (Annex I Parties) to pursue limitation or reduction of greenhouse gases from “aviation bunker fuels” (international aviation) working through ICAO. The ICAO 37<sup>th</sup> Assembly resolved that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2% cent until 2020 and an aspirational global fuel efficiency improvement rate of 2% cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue ton kilometer performed.

### **1.9. Remedial Measures against Aviation Pollution**

The solution to aviation environmental problems requires a holistic approach - in the legal, technical, operational and behavioral paradigms. The aviation industry must work on cutting down aircraft noise and emission levels to an impressive level in a relatively short period of time. It is high time to adopt

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<sup>53</sup> The way ‘Soft law’ Doctrine Operates in International law.

<sup>54</sup> Article 2 (2) of the Kyoto Protocol.

remedial measures to alleviate the problem. Some remedial measures have been suggested as palliatives to the challenges of aviation environment. Some of these measures will not only help to conserve fuel, but will also reduce the aviation pollution: These are:

### 1.9.1. *Innovating Technologically-driven Solution*

Environmental impacts of aviation can be reduced using technological means.

As re-echoed by Professor Singh,

- (i) Aircraft engines and airframes can be made quieter,
- (ii) The emissions of air pollutants and greenhouse gases can be reduced by improving the efficiency of engines,
- (iii) The environmental impacts of airport operations can be lessened through careful engineering and mitigation (e.g. recycling wastes, ensuring energy efficiency in buildings and locating infrastructure away from sensitive habitats)<sup>55</sup>.

### 1.9.2. *Imposition of Fuel Taxes*

An aviation fuel tax would encourage more efficient aircraft by taxing fuel consumption. According to the International Air Transport Association, fuel makes up less than 15 % of the cost of flying so there is little incentive for airlines to invest in more efficient aircraft. Unlike an emissions trading scheme, which will take years to develop, an aviation fuel tax could be implemented relatively quickly by removing the fuel tax exemption from existing bilateral air service agreements<sup>56</sup>.

### 1.9.3. *Introducing Emissions Levy*

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<sup>55</sup> Ghanshyam, Singh. Op Cit.

<sup>56</sup> Ibid



An alternative way to make airlines pay for their pollution is through a charge or tax on aircraft emissions. The European Union has suggested an environmental charge (levy) on aircraft emissions could be implemented on a European wide basis if no action is taken internationally to reduce aircraft emissions. The emissions levy has advantages over a fuel tax in that it would directly tax emissions and not just fuel consumption. It would also be easier to introduce a levy as bilateral air service agreements don't prevent levies on emissions, unlike fuel taxes. An aviation tax or emissions levy is necessary as airlines should pay for the pollution they cause just like other transport operators, it would encourage the development of more efficient and less polluting aircraft, it would help reduce demand for air travel and it would much easier to implement than emissions trading permits<sup>57</sup>.

#### 1.9.4. *Emissions Trading - Profiting from Pollution*

Some Airline operators are arguing for an emissions trading system to reduce green-house gas emissions from aircraft. Emissions trading would enable Airlines to buy and sell greenhouse gas permits. Each permit would allow an agreed level of a greenhouse gas such as CO<sub>2</sub> to be emitted. The attraction for Airlines is that those who have chosen to invest in more efficient Aircraft will be rewarded under such a scheme, not least because they will be able to profit from selling their excess CO<sub>2</sub> allowance. The other major attraction is that there will be no real constraint on air travel expansion if Airlines are able to buy emissions permits from other industry sectors<sup>58</sup>.

#### 1.9.5. *Alternatives to Flying*

There have been a number of studies showing how air travel produces far more CO<sub>2</sub> emissions per passenger than rail compared to the emissions from other

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<sup>57</sup> Ibid

<sup>58</sup> Ibid

modes of transport. So air travel is more polluting than rail. There should be more investment on High speed rails. Moreover rely more on Advances in telecommunications which can reduce the need to travel. Tele and video-conferencing is a viable alternative to flying for many business travelers. They can also reduce travelling time, traffic congestion and aircraft pollution, Government should ensure the new Airports policy has a clear strategy to reduce aircraft greenhouse gases. They should also properly enforce these policies and should suspend any further major Airport developments until its Airports policy is published<sup>59</sup>.

- (i) *Establishment of a Coordination Committee* between airport air traffic control and aircraft operators for aircraft noise management<sup>60</sup>.
- (ii) *Depicting preferred noise routes* to avoid residential areas as far as possible<sup>61</sup>.
- (iii) *Avoiding over flying sensitive sites* such as schools hospitals and residential areas<sup>62</sup>.
- (iv) *Optimum use of runways and routes*<sup>63</sup>.
- (v) *Adopting continuous descent approach, low-power-low-drop techniques and departure techniques* for abatement of noise and emissions<sup>64</sup>.
- (vi) *Avoiding unnecessary use of auxiliary power units* of aircraft reduces sound as well as emissions<sup>65</sup>.
- (vii) *Towing aircraft instead of using jet engines* to taxi reduces noise pollution and emissions. Single engine taxiing reduce the emissions. Since

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<sup>59</sup> Ibid

<sup>60</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>61</sup> Ibid

<sup>62</sup> Ibid

<sup>63</sup> Ibid

<sup>64</sup> Ibid

<sup>65</sup> Ibid



some airplanes lack the ability to taxi on one engine, the crew must be properly trained in the technique of single engine taxiing<sup>66</sup>.

- (viii) *Limiting night operations.* Night landings should be restricted to only aircraft with new engines, which produce less noise<sup>67</sup>.
- (ix) *Providing noise insulators* for the most severely affected houses of surrounding the airports<sup>68</sup>.
- (x) *Monitoring individual noise levels* of aircrafts and penalizing any breach<sup>69</sup>.
- (xi) *Applying different operational charges* according to the noisiness of the aircraft<sup>70</sup>.
- (xii) *Avoiding aircraft queuing* on the ground with engines running<sup>71</sup>.
- (xiii) *Increasing the use of public transport* and pedestrian access to airports<sup>72</sup>.
- (xiv) *Using of electric vehicles* or less polluting fuels in airport and airport buildings<sup>73</sup>.
- (xv) *Energy management* in buildings and for airfield systems<sup>74</sup>.
- (xvi) *Using fugitive emission controls*<sup>75</sup>.
- (xvii) *Conserve fuel* by making routes more direct, increasing load factor and capacity of more fuel optimised routes, operating more fuel efficient aircrafts etc<sup>76</sup>.

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<sup>66</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>67</sup> *Ibid*

<sup>68</sup> *Ibid*

<sup>69</sup> *Ibid*

<sup>70</sup> *Ibid*

<sup>71</sup> *Ibid*

<sup>72</sup> *Ibid*

<sup>73</sup> *Ibid*

<sup>74</sup> *Ibid*

<sup>75</sup> *Ibid*

<sup>76</sup> *Ibid*

- (xviii) The small airlines and airports may be *revived* to avoid mega airports. The domestic and international hubs are to be separated to avoid congestion in airspace and on ground<sup>77</sup>.
- (xix) Mega cities need to be *de-congested* by careful planning of global civil aviation<sup>78</sup>.
- (xx) A nice exercise has to make a planning for better world order based on unity and diversity of global life with international cooperation, confidence building measures among nations, regional and federal approach to suit various ecological systems and cultures and people of the world belong one human species i.e. mankind is one species<sup>79</sup>.
- (xxi) Aircraft *weight* must be reduced to save CO2 emissions and make engines with longer combustion zones to reduce NOX<sup>80</sup>.

### 1.10. Conclusion

Finally, the authors are of the firm belief that these steps could help not only in making the aviation more efficient but also guarantee a secured life for the generations to come tomorrow. We should ensure that the aviation industry develops not at the cost of our environment. Both should be taken hand in hand and none given more importance than the other. We should satisfy the needs of the present day without putting the needs of tomorrow at stake, namely, the concept of sustainable development which means that environmental considerations are closely integrated into the economic development processes, so as to ensure that the natural resource base that supports economic growth is not depleted by that growth, that the ecological

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<sup>77</sup> Malathi, K. "Aviation Pollution-Impact on Environment" in R. Sing, S.D. Rao (eds.), *Current Developments in Air and Space Law*, (NLUD Press) pp. 59-68.

<sup>78</sup> *Ibid*

<sup>79</sup> *Ibid*

<sup>80</sup> *Ibid*



diversity or regenerative capacity of natural systems is not reduced, and that both environmental and economic health are sustained through time. A safe environment is necessary for the aviation industry to thrive. For sustainable global environment, it is necessary to revise global and national policies on civil aviation in order to provide harmony with the natural environment and maintain atmosphere in a pollution free state. Therefore, instead of imposing strict restrictions on aviation, ensuring strict adherence of the measures which reduces the pollution levels of the aircrafts and airports in line with global best practices as prescribed by the Civil Aviation Act 2006 the Civil Aviation Regulations 2012 and 2015 and international aviation codes should be pursued.

#### **1.11. Recommendations for the Nigerian Government**

Therefore, to achieve the objective reducing to its barest minimum the menacing effects of environmental pollution towards ensuring the sustainable development of an environmentally friendly civil aviation industry, the following suggestions must be implemented<sup>81</sup>:

- (i) Government should ensure the implementation of applicable ICAO SARPs on aircraft noise and engine emissions Member States shall support ICAO efforts to achieve global annual fuel efficiency improvement, and develop action plans as applicable.
- (ii) The Authority should ensure adherence to the UNFCCC principle of common but differentiated responsibilities and implement mechanisms to reduce aircraft emissions and limit the impact on environment.

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<sup>81</sup> Woldeyohannes, Mesfin Fikru. *Op Cit.*

- (iii) Government should take into cognisance ICAO guiding principles when designing and implementing their Market Based Measures (MBMs).
- (iv) Government should ensure that commercial aircraft operators from States below the *de minimis* threshold of 1 per cent of total global revenue ton kilometres shall qualify for exemption for application of MBMs that are established on national, regional and global levels.
- (v) Government should ensure that Airport Operators comply with the environmental protection programme approved by the Civil Aviation Authorities.
- (vi) The Authorities should encourage aircraft operators in the country to acquire and use modern, quieter and more fuel efficient aircraft. In this regard, the country is urged to ratify the Cape Town Convention on International Interest on Mobile Equipment and Aircraft protocol in order to facilitate cheaper aircraft financing.
- (vii) Government should accelerate the development and implementation of fuel efficient routings and operational procedures to reduce aviation emissions.
- (viii) Government should accelerate efforts to achieve environmental benefits through the application of satellite-based technologies that improve the efficiency of air navigation.
- (ix) Government should reduce legal, security, economic and other institutional barriers to enable the implementation of the new ATM operational concepts for the environmentally efficient use of airspace.
- (x) Government is urged to develop policy actions to accelerate the appropriate development, deployment and use of sustainable alternative fuels for aviation.



(xi) Government should foster effective collaboration with other States through AFCAC, ICAO and other relevant international bodies, to study, identify, develop and implement processes and mechanisms to facilitate the provision of technical and financial assistance, as well as facilitate access to existing and new financial resources, technology transfer and capacity building, to developing countries, and to exchange information on best practices.

Finally, the paramount importance of the need to guarantee aviation safety, security, and environmental protection to the development of the Nigerian air transport sector cannot be overemphasized.