

INTERNATIONAL LAW AND THE  
MANAGEMENT OF AIR POLLUTION  
FROM THE AVIATION INDUSTRY

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## **DEDICATION**

I would like to dedicate this work to my family, especially my parents, the Late Mrs. Eunice Akong'o Radol and the Late Mr. Solomon Nyowino Obobo. Thank you for the values you taught me. I also dedicate this work to Nabeel, for giving life a whole new meaning.

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## LIST OF ACRONYMS

- CAEP- Committee on Aviation and Environmental Protection
- COP- Conference of Parties
- EMCA- Environmental Management and Co-ordination Act, Kenya
- GHG- Green House Gases
- ICAO- International Civil Aviation Organisation
- NEMA- National Environment Management Authority, Kenya
- REDD- Reducing Emissions from Deforestation and Forest Degradation
- UNFCCC- United Nations Framework Convention on Climate Change
- NEPA- National Environment Protection Policy Act
- CAEE- Committee on Aircraft Emissions
- IPCC- Intergovernmental Panel on Climate Change
- CAN- Committee on Aircraft Noise
- LTO- Landing and Take-off cycle
- CO<sub>2</sub>- Carbon Dioxide
- NO<sub>x</sub>- Nitrogen Oxides
- IATA- International Air Transport Association
- UNECE- United Nations Economic Commission for Europe
- EMEP- European Monitoring and Evaluation Programme
- SBSTA- Subsidiary Body for Scientific and Technological Advice
- UNCED- United Nations Conference on Environment and Development

EER- European Entrepreneurial Region

AFCAC- African Civil Aviation Commission

AFRAA- African Airlines Association

CASSOA- Civil Aviation Safety and Security Oversight Authority, East African Community

KCAA- Kenya Civil Aviation Authority

GLADs- Global Aviation Dialogues

MBMs- Market Based Measures

## UNITED NATIONS OFFICIAL DOCUMENTS

1. Charter of the United Nations, 24 October 1945, 1 U.N.T.S XVI
2. The 1992 United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107.
3. The Vienna Convention for the Protection of the Ozone Layer. 22 March 1985,- U.S.T.-, T.I.A.S. No. 11,097, 26 I.L.M. 1516 (1987) U.N.T.S 1513
4. The Montreal Protocol on Substances that Deplete the Ozone Layer. 1552 U.N.T.S 3; 26 ILM 1550 (1987)
5. The Kyoto Protocol to the United Nations Framework Convention on Climate Change, U.N Doc. FCCC/CP/1997/7/ Dec. 10, 1997; 37 ILM 22 (1998); 2303 U.N.T.S 148/[2008] A.T.S. 2/37 ILM 22 (1998)
6. The Convention on International Civil Aviation (Chicago Convention) 15 U.N.T.S 295
7. Convention on Long-Range Transboundary Air Pollution T.I.A.S 10541; 1302 U.N.T.S 217; 18 I.L.M 1442 (1979)



## LIST OF STATUTES

1. The Constitution of Kenya, 2010.
2. Civil Aviation Act, No 21 of 2013.
3. Protocol on Establishment of Civil Aviation Safety and Security Oversight Agency.
4. Supplement No. 71- The Civil Aviation (Airworthiness) Regulations; Legal Notice No. 38 of 2013.
5. Treaty for the Establishment of the East African Community.
6. Environmental Management and Co-ordination Act No. 8 of 1999.
7. Clean Air Act; 1970, Pub. L. No 91-604.84 Stat. 1676.

## **LIST OF CASES**

1. Petition for Rulemaking under the Clean Air Act to Reduce Emissions of Air Pollutants from Aircraft that Contribute to Global Climate Change
2. Case C-366/10

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

The mushroom cloud, nuclear winter, the 'hole' in the stratospheric ozone layer, the 'green house effect', these disturbing images all suggest that our civilization's Faustian thirst for knowledge has outstripped our capacity to foresee and ward off the effects of dominating nature too completely<sup>1</sup>

As the world continues to develop, new machinery is developed and the old ones improved with every waking moment. Ever since the Wright brothers successfully launched an airplane in 1903, the world has never looked back in the aviation sector. Several companies have come up to manufacture these machines that enable population masses to travel to various parts of the world within a short span of time, the main ones being the Boeing and the Airbus companies. This is to serve the ever growing, air commuting population. In an effort to make the world a global village, the aviation industry has picked pace at an amazingly fast rate, with 2014 recording more than 100,000 flights per day, this being the highest ever.<sup>2</sup> The number of flights occurring per day does not only include the reasons for commuting, but with the evolution of warfare, came the air force. Almost all states have an air force where training goes on, on a daily basis and other activities, like transportation, manning the territorial air space and during wars, an increased number of airplanes in the air have been witnessed. This, although not the focus of the study as the research is on civil aircraft, is still important to be mentioned.

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<sup>1</sup> Jasanoff Sheila, Science at the Bar; Law, Science and Technology in America, (Harvard University Press,1995), p. 3

<sup>2</sup> Retrieved from: <<http://www.garfors.com/2014/06/100000-flights-day.html>> (as accessed on 31<sup>st</sup> October 2014 at 5:45 pm).

The amount of energy used by a fully laden A380 (a model of the airbus company), according to its engine maker, Rolls Royce, is as that used by 3500 family cars, equivalent to six cars for each passenger it has on board.<sup>3</sup> This is just for a passenger plane. Statistics show that long haul flights<sup>4</sup> use more energy than the short haul flights because of the load they carry and the distance they cover. The amount of energy used is directly proportional to the amount of emissions released into the atmosphere as it corresponds to the amount of fuel used. The amount of carbon dioxide (CO<sub>2</sub>), released as a byproduct has increased to 83% since 1990, in international aviation.<sup>5</sup> Apart from carbon dioxide, when jet fuel is burnt, it releases water vapour (H<sub>2</sub>O). This explains the white trail that is left by airplanes flying at certain altitudes, especially military jets, since the temperatures in that region are cool causing the vapour to condense. This water vapour (contrail) has a greenhouse effect, since it reflects heat back to the earth.<sup>6</sup>

The other pollutants released into the atmosphere include nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>), carbon monoxide (CO) and other unburnt or partially combustible hydrocarbons which make the major composition of the greenhouse gases since the fuel burnt to produce energy is composed of intricate chains of hydrogen and carbons.<sup>7</sup> The amount of each pollutant released is dependent on the type of jet fuel used, since some have a higher composition of carbon, compared to hydrogen, than others. The amount of

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<sup>3</sup>Retrieved from :< [http://www.flyingclean.com/impacts\\_airplane\\_pollution\\_climate\\_change\\_and\\_health](http://www.flyingclean.com/impacts_airplane_pollution_climate_change_and_health)> (as accessed on 23rd October 2014 at 11:45 pm).

<sup>4</sup>Long haul flights refers to flights that pertain to long distances and also engaged in the transport of freight as retrieved form < <http://www.thefreedictionary.com/long+haul/>> (as accessed on 29<sup>th</sup> October 2014 at 1:39 am).

<sup>5</sup> Retrieved from < <http://www.davidsuzuki.org/issues/climate-change/science/climate-change-basics/air-travel-and-climate-change/>> (accessed on 30<sup>th</sup> October 2014 at 10:30 am)

<sup>6</sup> Federal Aviation Administration Office of Environment and Energy, Aviation and Emissions: A primer (January 2005) p. 2.

<sup>7</sup> Starik A. M (2008), Gaseous and Particulate Emissions with Jet Engine Exhaust and Atmospheric Pollution, in Advances on Propulsion Technology for High-Speed Aircraft (pp. 15-1 – 15-22). Educational Notes RTO-EN-AVT-150, Paper 15. Neuilly-sur-Seine, France: RTO p. 2.

fuel consumed by this sector in 1990 was 156.7 million US gallons per day, and in 2001 the consumption was 189.1 million US gallons per day.<sup>8</sup> This shows an increase in the amount of fuel used in the aviation sector. The aviation industry is the fourth largest pollutant in the United States of America.<sup>9</sup>

Besides the activities in the aviation sector, space exploration programmes being undertaken by various states, with the sending of various vessels into space, have also intensified, with the USA and Russia taking the lead. The amount of emissions released into the atmosphere during the launches of space exploration aircraft increases, as the exploration activities intensify. The amount of fuel consumed during these launches is approximated to be at 3.5 million pounds.<sup>10</sup> These emissions contribute to the pollution of air.

Apart from the gaseous emissions from planes, there are other types of pollution that originate from this sector. A lot of heat is produced during flights of both airplanes and spacecrafts. This brings into focus the question of heat pollution. Noise pollution is a problem,<sup>11</sup> although the International Civil Aviation Organization has tried to minimize this by introducing charges.<sup>12</sup>

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<sup>8</sup> Aviation Fuels Technical Review p. 6 (retrieved from <[https://www.cgabusinessdesk.com/document/aviation\\_tech\\_review.pdf](https://www.cgabusinessdesk.com/document/aviation_tech_review.pdf)> (as at 7:29 on 29<sup>th</sup> October 2014).)

<sup>9</sup> Retrieved from <<http://thehill.com/policy/energy-environment/216844-epa-puts-climate-target-on-airlines>> (as retrieved on 6<sup>th</sup> November 2014 at 12:34 pm).

<sup>10</sup> George Adams, Re: How much pollution does each space launch produce. Retrieved from <<http://www.madsci.org/posts/archives/2000-10/973014746.Es.r.html>> (accessed at 12.34 pm on 4<sup>th</sup> November 2014).

<sup>11</sup> International Civil Aviation Organization website <<http://www.icao.int/environmental-protection/pages/noise.aspx>> (accessed on 27<sup>th</sup> November 2014 at 11:05 pm).

<sup>12</sup> Manual of Airport and Air Navigation Facility Tariffs (Doc 7100)

Environmental concerns have hit the headlines in the recent past, but with more focus on industrial emissions, the ozone and the world forest cover with recommendations being made on how to reduce, restore and increase the same, respectively.<sup>13</sup> This is because of the effects of climatic changes that have been experienced in the past. The amount of pollution caused by planes is not given the attention it deserves despite the fact that they release gaseous waste directly in the atmosphere.<sup>14</sup>

There have been several initiatives towards the conservation of the environment. The United Nations Environment Program has come up with various initiatives and agencies that are mandated with the protection of the environment. Under the Marrakesh Accords (4 CP/7), the Technology Transfer Framework was formed, where the parties to the UNFCCC<sup>15</sup> agreed to work together on a set of technology transfer activities, for the implementation of article 4 para.5 of the UNFCCC, for meaningful and effective action. There have also been established several other mechanisms to deal with the problem of technology's detrimental effect on the environment, which include the Technology Mechanism.<sup>16</sup>

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<sup>13</sup> The REDD program that is aimed at the mitigation of climate change through the reduction of green house gases and the removal of the green house gases through enhance forest management in the developing countries and the various environmental instruments aimed at the protection of the ozone layer

<sup>14</sup> The focus of the ICAO on the protection of the Environment has not been felt as the role it played in the reduction of noise pollution from aircraft. At the moment there is a committee, the CAEP, which is in the process of coming up with some regulation to the same despite the prolonged use of aircraft.

<<http://www.epa.gov/otaq/aviation.htm>> (accessed on 18 Dec 2014 at 11:32 am).

<sup>15</sup> The 1992 United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107.

<sup>16</sup> The Technology Executive Committee and the Climate, Technology Centre and network; these are the two agencies created under the Technology Mechanism with the sole purpose of enhancing the exchange of information and support of the development of environmentally sound technologies so as to reduce and eventually cut the emissions that are harmful to the environment.

## **1.2 Statement of the Problem**

There are several international instruments that deal with the problem of air pollution, with the Convention on Long-Range Transboundary Air Pollution<sup>17</sup> standing out. These instruments are however, regional, despite the fact that air pollution cannot be confined within a specific region. The effects of air pollution are felt all over the world, with the place of emission being affected the least. However, despite these provisions, none of the instruments deal with source based pollution from the aviation sector since they are all generic. The issue that arises, therefore, is whether or not the pollution from the aviation industry needs special attention. A lacuna has been created with the negligent treatment of air pollution from the aviation industry by the international legal instruments and the international environmental protection regimes.

## **1.3 Hypotheses**

This research is guided by the following hypotheses;

1. There are adequate provisions that cater for the protection of the environment in the aviation industry.
2. There is no nexus between the protection of the environment and the aviation industry.
3. There are sufficient mechanisms for the implementation of the provisions on the protection of the environment in the aviation industry.

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<sup>17</sup> T.I.A.S 10541; 1302 U.N.T.S 217; 18 I.L.M 1442 (1979)

## 1.4 Research questions

This study seeks to answer the following questions:

1. Can the law find a balance between scientific development and innovation and environmental protection?
2. Is the current legal regime fully equipped to handle the challenges posed by the ever developing scientific innovations in the rapidly growing aviation industry?
3. Are there compliant mechanisms to ensure strict adherence to the provisions on environmental conservation with regard to the aviation industry?
4. Is there an interlinkage between environmental protection and the aviation industry?

## 1.5 Theoretical Framework

Law is a social phenomenon. It is put in place as set of rules to guide society in their daily routine. According to Savigny, law is an expression;<sup>18</sup> it represents the wishes of the people it governs. It is also a protective mechanism, put in place for the benefit of the community being governed, as it is a practical craft of systematic social control of relations and institutions. Its main purpose is to secure the conditions of social life, which is determined by the content of the law.

Environment has immense impact on the society as a whole as it affects the day to day lives of the inhabitants of the earth. The law is, therefore, important to govern this sector,

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<sup>18</sup> Cotterrell R., The Sociology of Law; An Introduction, 2<sup>nd</sup> Ed. (Butterworths London, Dublin, Edinburg)



hence, it should reflect the best interests of the society, which is to live in a clean and healthy environment. To this end, law and environmental protection should be incorporated into the social structure of any community so as to involve the people in both the making and implementing of these laws. This is also to prevent the mushrooming of paper parks since, if implementing the environmental laws is made a social affair, all and sundry will take part in it.

As a social factor in the society, the law is bound to change in order to suit those it seeks to guide. As the world continues to evolve, so should the law. This should be seen in the amendments of the already existing legal provisions and the new ones being passed. With the rapid advancement in technology, and the environment forming a basis of the community, the law should endeavor to promote the use of the technology in an environmentally sound manner, such that the provisions made under both systems are complementary.

One of the many principles used in the conservation of the environment is the intergenerational and intragenerational equity which was expounded by the Oposa v Factoran<sup>19</sup> in the Philippines where a group of minors filed a class suit seeking to have the environment conserved and preserved for their enjoyment and that of future generations by opposing the issuance of timber licenses. It is, therefore, our social obligation to take care of the environment and embrace the principle of sustainable development as propounded by article 3 of the United Nations Framework Convention on

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<sup>19</sup> Oposa et al. v. Fulgencio S. Factoran, Jr. et al (G.R. No. 101083)

Climate Change.<sup>20</sup> Environmental protection, therefore, if taken as a social obligation, will reduce the risk of the creation of paper parks.

The protection of the environment should not be interpreted from a positivist's view, since the space is a global common and the air space above any state is within the sovereign jurisdiction of that state hence the doctrine of sovereignty<sup>21</sup> of states will be a major hindrance to the implementation of provisions towards the same.

## 1.6 Literature Review

Sheila Jasanoff, in, Science at the Bar,<sup>22</sup> sheds light to this study as it seeks to find a balance between the two fields of law and science, technology and innovation and how both can be balanced in the protection of the environment while at the same time promoting scientific innovation in the aviation sector. The study seeks to find a balance between science and technology on one hand and law on the other hand. She argues that legal systems have been instrumental in the creation and sustenance of public understanding of science and technology as well as the law using science and technology to resolve technical controversies that are presented before this system. She is of the opinion that the law governing science, technology and innovation should be made and interpreted by experts in that field. She questions the ability of judicial officers, i.e., the

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<sup>20</sup> May 9, 1992, S. Treaty Doc No. 102-38; 1771 U.N.T.S. 107.

<sup>21</sup> Article 2 (1) of the Charter of the United Nations; 24 October 1945, 1 U.N.T.S XVI.

<sup>22</sup> Sheila Jasanoff, Science at the Bar; Law, Science and Technology in America, (Harvard University Press, 1995)

judges to rule on matters that deal with science, technology and innovation when in fact, they have little or no technical knowledge in that field in the interpretation of environmental legal provisions.

The authors of Climate Law and Developing Countries: Legal and Policy Challenges for the World Economy<sup>23</sup> are of the view that despite climate change being a global problem, the disparity of the effects of the same are felt differently by both the developed and the developing countries. They suggested that the mitigation strategy of zero carbon be shifted to a negative carbon scenario be adopted to curb the effects of GHG. They focused on the approach being taken in the post-Kyoto negotiations to address the shortcomings of the Kyoto Protocol<sup>24</sup> by not sidelining the major-emitting developing countries. This is done by setting the target emissions not by the 1990 standards but by emissions per capita. This is relevant to the study as it deals with technology and its effects on the environment. This was one of the main issues in discussions during negotiations to the buildup of the 2015 Agreement, which generally are meant to replace the Kyoto Protocol. The main focus of the 2015 Agreement on technology was the transfer of the technology and technological knowhow between Conference of Parties to the U.N.F.C.C.C, whose main aim was to combat environmental degradation which is the main cause of climate change.

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<sup>23</sup> Edward Elgar Publishing Ltd; Cheltenham,U.K, Northampton, 2009

<sup>24</sup> The Kyoto protocol to the United Nations Framework Convention on Climate Change, December 11, 1997, FCCC/CP/1997/7/Add.1(March 24, 1998)

In an article on the Massachusetts Institute of Technology website, Morgan Bettex in [A Link between Air Travels and Deaths on the Ground](#)<sup>25</sup>, publishes his research findings, where he found out that about 3500 premature deaths in China and India are caused by emissions from aircraft flying over the North American and European airspace. This is because of wind deflection<sup>26</sup> which carries the pollutants eastwards. He also found out that, due to the dense population in these two states, the amount of ammonia released into the atmosphere as a result of agricultural practices is high and when the ammonia reacts with oxidized nitrogen oxide and sulphur oxide, the resultant compound is known to be carcinogenic and is known to cause respiratory problems as well as having other harmful effects on the human body. This is especially for aircraft that are on cruise speed which fly in the lower stratospheric region.

Kubiszewski and Cleveland examine, in their article on Sustainable Development and International Environmental issues, the outcome of the Rio Earth Summit 1992.<sup>27</sup> Several non-binding instruments aimed at the protection of the environment globally were adopted. They applaud the zeal that was displayed during the negotiations, which were aimed at reducing the GHGs in the atmosphere, the protection the ozone layer and the commitment to environmental protection from the participating parties. The focus of the COP was to protect the environment in light of widespread use of technology.

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<sup>25</sup>Retrieved from < <http://newsoffice.mit.edu/2010/airplane-emissions-0928>>( accessed on 30<sup>th</sup> October 2014 at 11:27 am).

<sup>26</sup> A phenomenon that is caused by revolution of the earth which causes the deflection of wind to the right in the northern hemisphere while the deflection of wind in the southern hemisphere is to the left.

<sup>27</sup> Kubiszewski, I., & Cleveland, C. (2012), United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil. Retrieved from <<http://www.eoearth.org/view/article/156773>> (at 13:55 pm on 2<sup>nd</sup> November 2014.).

Gaseous and Particulate Emissions with Jet Engine Exhaust and Atmospheric Pollution,

by A. M Starik,<sup>28</sup> examines the various gaseous wastes released during flights and the adverse effects they have on the atmosphere and gives the effects the gases have to the atmosphere. He posits that the sulphate aerosols released into the atmosphere when the civil aircraft is travelling at supersonic speed can cause the depletion of the ozone layer. He examines the composition of the jet fuel, and especially the jet kerosene, that is most commonly in use especially by the military and the by-products released during combustion to produce energy. He examined each chemical in detail and the effect it has on the atmosphere. The fuel composition contains intricate carbon and hydrogen chains which, when burnt to produce energy, release carbons and other volatile chemical compounds that cause the degradation of the environment.

Katta G. Murty posits in, Greenhouse Gas Pollution in the Stratosphere Due to Increasing Airplane Traffic, Effects on the Environment, that, the increase in greenhouse gases is caused by the increase in airline traffic around the globe. The volume of these gases is higher in the stratosphere than in the whole atmosphere. This is an indication that increased air traffic has adverse effects on the environment. It is also stated that in every 10 seconds around the clock in the developed countries, a plane is either taking off or landing. The use of the aviation industry is also employed by the military. This increases the number of airborne machinery whether it is for surveillance, transportation, training or securing the territorial area. She quotes from the Washington Post of 29<sup>th</sup> July, 2000, where it was stated that the rate of global warming is not yet fully understood as was

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<sup>28</sup> Starik A. M (2008), Gaseous and Particulate Emissions with Jet Engine Exhaust and Atmospheric Pollution, In Advances on Propulsion Technology for High-Speed Aircraft (pp. 15-1 – 15-22). Educational Notes RTO-EN-AVT-150, Paper 15. Neuilly-sur-Seine, France: RTO

earlier thought. The effects of carbon dioxide in the lower stratospheric region where most planes are flown, to minimize the amount of fuel used, is high in this region of the atmosphere as there are no vegetation to act as carbon sinks in comparison to ground transportation where some of the carbon dioxide is absorbed.

## **1.7 Research Methodology**

During the course of the study, the main source of information will include both primary and secondary sources. Primary sources will, among others, include international environmental instruments and statutes. Secondary sources of information include the internet, text books, journals and articles that are concerned with environmental conservation in the aviation sector.

## **1.8 Chapter Breakdown**

### **Chapter One: Introduction**

This entails a brief overview of;

- The introduction of the study topic and the ends it intends to achieve.
- It looks at the problems that led to the research and the questions intended to be answered.
- It includes a review of some texts relevant to the study.
- Various hypotheses taken during the study are outlined.

### **Chapter Two: The evolution of environmental law and aviation**

Here, the chapter seeks to look deeply at;

- It includes a sketch of the evolution of environmental law with regards to the aviation industry since 1903 to date.
- The approaches that have been undertaken towards the conservation of the environment in relation to the aviation industry.

### **Chapter Three: Environmental law position on aviation**

- This chapter looks into the various international, regional and national initiatives undertaken by different organizations and Kenya respectively in order to curb the environmental menace posed by the ever growing aviation industry.
- It examines the responses taken in the protection of the environment in the aviation sector with a specific example of a European Union/North American case study.
- A comparative study of the American Environmental Protection Agency and Kenya's actions to combat pollution from the Aviation sector.

### **Chapter Four: Challenges facing Environmental Conservation in the aviation sector**

This chapter explores;

- The shortcomings that the legal instruments intended for the protection of the environment have.
- It assesses the challenges that are facing global environmental conservation, the tragedy of the global commons.
- The ineffectiveness of the mechanisms put forward for the deterrence of pollution.

## **Chapter Five: Recommendations and Conclusion**

This concluding chapter sums up;

- The summaries from the chapters covered earlier.
- A brief summary of the recommendations to the approach taken in environmental conservation, sustainable use of the same and how law can find a balance between promoting scientific innovation and environmental protection bearing in mind the doctrine of state sovereignty.
- It also presents the findings of the research and the conclusion to the study.



## CHAPTER TWO

### HISTORICAL EVOLUTION OF THE ENVIRONMENTAL LAWS

#### 2.1 Introduction

The previous chapter introduced the topic and outlined the objectives that the study seeks to achieve and the issues to be addressed. Aviation causes environmental degradation since the jet fuel used is composed mainly of hydrocarbons, which mainly release CO<sub>2</sub> and water after combustion.<sup>29</sup> This chapter focuses on the changes that the laws dealing with pollution from the aviation sector have undergone, starting from their inception to where they are at present. It entails a study in the development of the Chicago Convention,<sup>30</sup> the United Nations Framework Convention on Climate Change,<sup>31</sup> the Vienna Convention for the Protection Ozone Layer,<sup>32</sup> and the Convention on the Long Range Transboundary Pollution.<sup>33</sup> Apart from the historical evolution, it looks at how each of these legal instruments relates to the protection of the environment from the adverse effects caused by pollution from the aviation sector. This chapter looks at two different approaches that are taken in the management of source based pollution from aviation.

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<sup>29</sup> Starik A. M (2008), Gaseous and Particulate Emissions with Jet Engine Exhaust and Atmospheric Pollution, in *Advances on propulsion Technology for High Speed Aircraft* (pp. 15-1-15-22). Educational Notes RTO-EN-AVT-150, Paper 15. Neuilly-sur-Seine, France: RTO

<sup>30</sup> 15 U.N.T.S 295.

<sup>31</sup> May 9, 1992, S. Treaty Doc No. 102-38; 1771 U.N.T.S 107.

<sup>32</sup> 22 March 1985,- UST-TIAS No. 11, 097;26 ILM 1516 (1987); U.N.T.S 1513.

<sup>33</sup> TIAS 10541; 1302 U.N.T.S 217; 18 ILM 1442 (1979).

## 2.2 Chicago Convention

The scientific breakthrough of the Wright brothers in 1903, in aviation, signified the beginning of globalization; they had devised a way in which transportation could be eased. This also marked the beginning of international aviation as we now know it. It was a catalyst for growth and connectivity. Although it took some time for the knowledge in aviation to be fully utilized, the aviation industry boomed, mainly because of the World Wars. This was because of the need to use bombers and also as a way of transportation. The continued use of aircraft polluted the environment, but this was not the focus at that moment. The laws enacted to deal with aviation were domestic and attempts at coming up with an international instrument were aimed also at governing other areas than the environment, especially in matters that deal with the nationalities of aircraft and the regulation of flights into and over foreign territory. Of historical importance was the International Air Navigation Conference of Paris in 1910. The main areas covered by the various commissions held after 1910 were to deal with the issues of the law of the nations, administrative and technical matters, customs and the regulation of aerial navigation.<sup>34</sup> It was not until 1944 that the first global instrument dealing with aviation was adopted, despite an attempt at the same in Paris in 1919<sup>35</sup> and in Havana in 1928.<sup>36</sup>

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<sup>34</sup> The Postal History of ICAO- The Paris Convention of 1910: The path to Internationalism retrieved from <[http://www.icao.int/secretariat/PostalHistory/1910\\_the\\_paris\\_convention.htm](http://www.icao.int/secretariat/PostalHistory/1910_the_paris_convention.htm)>( accessed at 12:38 on 10<sup>th</sup> February 2015).

<sup>35</sup> Convention relating to the Regulation of Aerial Navigation, Paris Convention of 1919 retrieved from <<http://unterm.un.org/DGAACS/untterm.nsf/8fa942046ff7601c85256983007ca4d8/e8a725a703847fac852569fa00002bf7?OpenDocument> > (accessed on 19<sup>th</sup> April 2015 at 7:30 pm ).

<sup>36</sup> Convention on Commercial Aviation retrieved from <[http://www.icao.int/secretariat/PostalHistory/1928\\_the\\_havana\\_convention.htm](http://www.icao.int/secretariat/PostalHistory/1928_the_havana_convention.htm)>( accessed on 19<sup>th</sup> April 2015 at 7:31 pm).

As Joseph Koehler posits, 'law is relative to the civilization of the place and time whose mission is the advancement of civilization through forcible ordering of society'.<sup>37</sup> A conference was organized to address the issues that the continuous use of airplanes posed globally. The Chicago conference of 1944 saw the establishment of a provisional body,<sup>38</sup> on the 7<sup>th</sup> of December that year, as a result of the adoption of the Interim Agreement on International Civil Aviation. This was because of the use of airplanes during the World War II. This instrument did not, however, cover environmental concerns of pollution caused by the airplanes.

The Convention on International Civil Aviation (Chicago Convention)<sup>39</sup> came into force on the 4<sup>th</sup> of April 1947, and it replaced the Interim Agreement. This Convention established the International Civil Aviation Organisation (I.C.A.O), which is a specialized agency of the U.N mandated with the establishment of standards, recommended practices and guidelines on the various aspects of international civil aviation, inclusive of environmental protection.<sup>40</sup> The United Nations Economic and Social Council, in its resolution of 13<sup>th</sup> April 1948,<sup>41</sup> invited the contracting party states, to use their respective national regulations, as far as was practical, for the application of those standards that are regulatory in nature.

The main problem focused on at the beginning was the noise that was produced by the aircraft; the emissions were not of immediate concern to even the environmentalists. The noise pollution problem was not dealt with until 1968, when the I.C.A.O Assembly

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<sup>37</sup> James A Gardner, "The Sociological Jurisprudence of Roscoe Pound" Villanova University School of Law Digital Repository, Villanova Law Review, Vol. 7, Iss. I (1961)

<sup>38</sup> The Provisional International Civil Aviation Organisation (PICAO)

<sup>39</sup> 7<sup>th</sup> December 1944, (1994); 15 U.N.T.S 295.

<sup>40</sup> Annex 16 (volumes I and II) of the Chicago Convention; 15 U.N.T.S 295.

<sup>41</sup> S/RES/47 (1948)

adopted a resolution to curb the problem of noise pollution.<sup>42</sup> This was as a result of complaints from the communities in the vicinity of airports. This led to the establishment of the Committee on Aircraft Noise (C.A.N) in 1969, to assist the I.C.A.O in the management of aircraft noise by developing different noise certification requirements for different classes of aircraft. This area is now governed by Volume I of Annex 16 of the Chicago Convention. This Annex provides for the specifications that aircraft engines need to meet so as not to exceed the noise level certified by each respective state.

The gaseous waste released into the atmosphere was not considered as a major problem until 1972, during the United Nations Conference on Human Environment (U.N.C.H.E), I.C.A.O's position on the problem that the environment faces was put in the open, where it was stated in a clause in the resolution,

In fulfilling this role ICAO is conscious of the adverse environmental impact that may be related to aircraft activity and its responsibility and that of its member States to achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the human environment<sup>43</sup>

The U.N.C.H.E meeting motivated the ICAO's adoption of Resolution A18-11,<sup>44</sup> which specifically led to an action on the question of engine emissions and the detailed proposals on how to control them. It was also at this 18<sup>th</sup> conference that a resolution was adopted reaffirming the role of the international community in conjunction with I.C.A.O

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<sup>42</sup> Resolution A 16-3 retrieved from <<http://www.icao.int/assembly37/docs>> (accessed on 19<sup>th</sup> April 2015 at 7:56 pm).

<sup>43</sup> Assembly Resolution A18-11 retrieved from <<http://www.icao.int/assembly37/docs>> (accessed on 19<sup>th</sup> April 2015 at 8:00 pm ).

<sup>44</sup> Retrieved from <<http://www.icao.int/assembly37/docs>> (accessed on 19<sup>th</sup> April 2015 at 8:00 pm).

in the protection of the environment.<sup>45</sup> This, consequently, led to the establishment of the Aircraft Engine Emissions Study Group in 1973 as part of the action programme concerning the environment by the I.C.A.O.<sup>46</sup> The subsequent establishment of the Committee on the Aircraft Engine Emissions (C.A.E. E) was for the development of specific standards for aircraft engine emissions, which set the limits for the emission of smoke and other gaseous pollutants to be produced in the future and the venting of raw fuels.<sup>47</sup> A resolution was adopted in 1980, which dealt with aircraft noise and engine emissions from subsonic aircraft and requested states not to allow the use of foreign registered aircraft that did not conform to the specifications of I.C.A.O within their airspace.<sup>48</sup> It was also during this time that Annex 16 of the Chicago Convention was renamed as the Environmental Protection Annex. The Committee on Aircraft Engine Emissions came up with standards that were adopted in 1981, which set the limits for the emission of smoke and certain types of pollutants for large turbo engines and turbofan engines to be produced after 1<sup>st</sup> of January 1983. The emission of carbon monoxide, unburned hydrocarbons and oxides of nitrogen was also restricted for aircraft manufactured from the 1<sup>st</sup> January 1986. These standards are based on the Landing and Take Off cycle, which basically covers aircraft moving on the ground to 3000 ft above

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<sup>45</sup> Resolution A18-12 retrieved from <<http://www.icao.int/assembly37/docs>> (accessed on 19<sup>th</sup> April 2015 at 8:00 pm).

<sup>46</sup> Postal History of ICAO- Annex 16, Environmental Protection. Retrieved from <[http://www.icao.int/secretariat/PostalHistory/annex\\_16\\_environmental\\_protection.htm](http://www.icao.int/secretariat/PostalHistory/annex_16_environmental_protection.htm)> (accessed on 15<sup>th</sup> February 2015 at 11:24 am).

<sup>47</sup> Circular 134 –AN/94 of 1977 retrieved from <[https://books.google.co.ke/books?id=fWz1AwAAQBAJ&pg=PA40&lpg=PA40&dq=circular+134-AN/94+of+1977&source=bl&ots=uIXLGADvzm&sig=UYTfbNL6DkNhNcxGKEY0ygVWrY&hl=en&sa=X&ei=V-EzVYfyNYSU7Qb984D4DA&redir\\_esc=y#v=onepage&q=circular%20134-AN%2F94%20of%201977&f=false](https://books.google.co.ke/books?id=fWz1AwAAQBAJ&pg=PA40&lpg=PA40&dq=circular+134-AN/94+of+1977&source=bl&ots=uIXLGADvzm&sig=UYTfbNL6DkNhNcxGKEY0ygVWrY&hl=en&sa=X&ei=V-EzVYfyNYSU7Qb984D4DA&redir_esc=y#v=onepage&q=circular%20134-AN%2F94%20of%201977&f=false)> (accessed on 19<sup>th</sup> April 2015 at 8:13 pm).

<sup>48</sup> Resolution A23-10 retrieved from <[http://www.mdcr.cz/NR/rdonlyres/2B068C0F-F73A-4015-BFAD-4C3ED5823EC2/0/9848\\_AssemblyResolutinsInForce.pdf](http://www.mdcr.cz/NR/rdonlyres/2B068C0F-F73A-4015-BFAD-4C3ED5823EC2/0/9848_AssemblyResolutinsInForce.pdf)> (on 19<sup>th</sup> April 2015 at 8:17 pm).

the ground.<sup>49</sup> More standards were adopted that restricted the intentional venting of raw fuel to the atmosphere from all engine powered turbines that were to be manufactured from 18<sup>th</sup> February 1982.

In keeping with the ideal put forth by Joseph Koehler on upholding the purpose of the law, it being to maintain the existing values of civilization and to carry forward human development,<sup>50</sup> a technical committee of the I.C.A.O, the Committee on Aviation Environmental Protection (C.A.E.P), was established in 1983, to assist in the formulation of new policies and in adopting new standards and recommended practices (S.A.R.Ps)<sup>51</sup> related to aircraft noise and emissions. In addition to generally assisting in the reduction of the impact aviation has on the environment, the C.A.E.P is an amalgamation of the Committee on Aircraft Noise and the Committee on Aircraft Engine Emissions and its mandate is to inform the decision of the I.C.A.O (the Council and the Assembly) by providing the organisation with aviation environmental trends assessment reports on future air traffic projections and availing impact assessments of proposed policies and developments. These recommendations are then reviewed and adopted by the I.C.A.O Council and reported to the I.C.A.O Assembly where the main policies are defined ultimately. In the proposals and the assessments, the Committee on Aviation Environmental Protection takes into account several factors that include technical feasibility, national and international research findings into the impact of emissions and the possible means of controlling them, the reasonableness, economically, of the

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<sup>49</sup> IPCC Guidelines on National Greenhouse Gas Inventories. (Reference Manual, page 1.98; Cambridge University Press, Cambridge, UK and New York, NY, USA, 1999).

<sup>50</sup> James A Gardner, "The Sociological Jurisprudence of Roscoe Pound" Villanova University School of Law Digital Repository, Villanova Law Review, Vol. 7, Iss. I, (1961).

<sup>51</sup> Article 37 supra.

proposal, the benefit to the environment, the developments in the other fields and interdependencies of measures, such as those measures taken to reduce noise and pollution.

This Committee has several working groups that help in the making of these recommendations. These groups include:

1. The Working Group 3 (WG3), that updates Annex 16 Vol. II<sup>52</sup> and is in the process of formulating Vol. III which is intended to develop new aircraft CO<sub>2</sub> standards;
2. The Aviation Carbon Calculator Support Group (ACCS), which updates and successfully develops a transparent and an impartial methodology of CO<sub>2</sub> computing from passenger travel;
3. The Global Market Based Measure Technical Task Force (G.M.T.F), which develops recommendations for the Monitoring, Reporting and Verification (M.R.V) system of international aviation emissions and for the quality of offset remits for use in a global market based measure for international aviation;
4. The Impacts and Science Group (ISG), which informs the Committee and the Secretariat on scientific findings that include aircraft particulate matter impacts, the implication to aviation limiting the increase in global average temperatures to less than 2<sup>0</sup> C above the pre-industrial levels; and

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<sup>52</sup> The Annex in the Chicago Convention that addresses the issue of environmental protection in relation to the harmful effects of aviation.

5. The Alternative Fuel Task Force, (A.F.T.F), which assesses the potential range of aviation emissions reduction from the use of alternative fuel up to 2050.<sup>53</sup>

During the United Nations Conference on Environment and Development (U.N.C.E.D), Earth Summit, in Rio de Janeiro, in 1992, some principles related to the protection of the environment from the effects of aviation were adopted. Although these principles do not directly tackle the problem of pollution from aviation, the principles deal with pollution as a whole. The principles adopted include Principle 3 which provides that developmental rights are to be fulfilled in an equitable way that meets the requirements of sustainability. These developments are to be carried out in a manner that seeks to meet the needs of both the present and the future generations. Principle 7 introduces the common but differentiated responsibility approach which seeks to make environmental protection a global goal, while at the same time encouraging different techniques aimed at protecting the environment, depending on the technological advancement of each state. In this case, to improve engine technology in order to improve engine efficiency which, in turn, reduces the production of pollutants over the years.<sup>54</sup> These improvements have also been done to jet fuel.<sup>55</sup> This has been shown by the use of solar powered aircraft. A test flight of the same was carried out in June 2010 in Switzerland where an airplane flew for 24 hours, powered by batteries that were charged by 12,000 solar panels that had collected energy while aloft.<sup>56</sup>

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<sup>53</sup> In A38-WP/430, the Sustainable Alternative Fuel Expert Group was established in order to develop recommendations on sustainable alternative fuel for fuel.

<sup>54</sup> ICAO Environmental Repots 2010 Aircraft Technology Improvements retrieved from < [http://www.icao.int/environmental-protection/Documents/EnvironmentReport-2r010/ICAO\\_EnvReport10-Ch2\\_en.pdf](http://www.icao.int/environmental-protection/Documents/EnvironmentReport-2r010/ICAO_EnvReport10-Ch2_en.pdf)>( accessed on 19<sup>th</sup> May 2015 at 1:43 pm).

<sup>55</sup> Ibid.

<sup>56</sup> Retrieved from< <http://www.theguardian.com/environment/2010/jul/08/solar-impulse-24-hour-flight> > (on 19th May 2015 at 1:40 pm ).



In 1993, during the 2<sup>nd</sup> meeting of the Committee on Aviation Environmental Protection, more stringent measures were adopted by the committee on the emission limits of NO<sub>x</sub>. Improvements in the smoke and gaseous emissions certification procedure were also done during this time. Another improvement was made in 1995 with the issue of the I.C.A.O Engine Exhaust Emissions Data Bank, which contains a comprehensive database of emissions from aircraft engines certification data.<sup>57</sup> The information in the data bank is submitted to the engine manufacturers so that they manufacture aircraft engines that comply with the standards set, in order to reduce pollution.

The Open Emissions Trading<sup>58</sup> is a cost effective measure that was introduced by the C.E.A.P to reduce environmental pollution in the long term, provided that is an open system across all economic sectors. It was endorsed by the I.C.A.O in 2001 and in 2004, with a request to the Council, at both meetings, to develop as a matter of priority, the guidelines for the open emission trading in international aviation, with a special focus on the establishment of both structural and legal basis for aviations participation in the open trading system. Its main elements include key features, such as monitoring, reporting and compliance.

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<sup>57</sup> Doc 19646 retrieved from <<https://easa.europa.eu/document-library/icao-aircraft-engine-emissions-databank>> on 19<sup>th</sup> May 2015 at 1:49pm.

<sup>58</sup> CAEP/5-IP 22. 5/01/01- this Open Trading System is a system encapsulated in article 17 of the Kyoto Protocol to the United Nations Framework Convention to Climate Change, U.N Doc. FCCC/CP/1997/7/(Dec. 10, 1997); 37 ILM 22 (1998); 2303 UNTS 148/[2008] ATS 2/37/ILM (1998), and it allows countries that have emission units to spare to sell the excess capacity to countries that have exceeded their targets.

The most recent standard of NO<sub>x</sub> was, however, agreed on in February 2010,<sup>59</sup> with an effective date of 31<sup>st</sup> December 2013. This improved the former standard by about 15% on large engines and 5-15% on small engines.

A resolution<sup>60</sup> adopted in 2010 called upon states and different organisations to partner with I.C.A.O in working towards achieving an annual global average fuel efficiency improvement of 2% until 2020. An aspired global fuel efficiency improvement at the rate of 2% per annum thereafter from 2021 to 2050 was also included. The rate was to be calculated on the basis of volume of fuel used per revenue tonne kilometer performed. Emissions Standard was established in this resolution. This is a set of measures aimed at reducing greenhouse emissions from the aviation sector.

Subsequently, a CO<sub>2</sub> metric system was developed in 2012. It is a measure of the fuel burn performance of an aircraft where the amount of emission can be measured. This aims at reducing the amount of emissions by encouraging the use of fuel efficient technologies in the development and design of new aircraft.<sup>61</sup>

Annex 16 Vol. II does, however, focus on emission in the vicinity of the airports and the effect of emissions below 3000 feet. Aircraft emissions at cruise speed are not covered under these provisions, despite the fact that almost 90% of aviation fuel is burnt at this

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<sup>59</sup> CAEP/8 retrieved from < <http://www.greenaironline.com/news.php?viewStory=764>> ( accessed on 19<sup>th</sup> May 2015 at 2:03 pm).

<sup>60</sup> Resolution A37-19 retrieved from < [http://www.icao.int/environmental-protection/37thAssembly/A37\\_Res19\\_en.pdf](http://www.icao.int/environmental-protection/37thAssembly/A37_Res19_en.pdf)> (accessed on 19<sup>th</sup> May 2015 at 2:10 pm).

<sup>61</sup> Policy Update International Civil Aviation Organization's CO<sub>2</sub> Certification Requirement for New Aircraft August 2013 Edition retrieved from < [http://www.theicct.org/sites/default/files/publications/ICCTupdate\\_ICAO\\_CO2cert\\_aug2013a.pdf](http://www.theicct.org/sites/default/files/publications/ICCTupdate_ICAO_CO2cert_aug2013a.pdf)> (accessed on 19<sup>th</sup> May 2015 at 2:30 pm).

speed. In addition, this type of pollution is seen to cause a number of premature deaths annually especially in China and India.<sup>62</sup>

Annex 16 Volume II of the Chicago Convention<sup>63</sup> is the main instrument that deals with the aspect of environmental protection in relation to aviation. Part I deals mostly with definitions, Part II with standards relating to vented fuels, and Part III with standards relating to emissions certification applicable to certain classes of specified aircraft engines. This somehow deals with the problem posed by aviation to the environment, but not in totality.

The 2013 Working Paper<sup>64</sup> developed during the 38<sup>th</sup> I.C.A.O Assembly, recognized that 689 million tonnes of carbon dioxide, which make up 2% of the global total emission, was from aviation. It stated that the technology, operations and infrastructural measures are key to aviation sector's long term solution for sustainable growth. This can be done through concerted industry and investment and engagement from governments. It proposes that by 2016, I.C.A.O member states should have agreed to develop a single, global market based measure for adoption.

Volume III of Annex 16 is currently under development and it is to deal mainly with CO<sub>2</sub>, specifically the emissions standard. As aviation is not expressly covered under the Kyoto Protocol,<sup>65</sup> it is important that the emissions from this sector be covered by other provisions that deal with the protection of the environment in this regard. As one of the

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<sup>62</sup> Morgan Bettex, "A Link Between Air Travel and Deaths on the Ground: M.I.T News Office (September 28, 2010) retrieved from < <http://newsoffice.mit.edu/2010/airplane-emissions-0928>> (accessed on 15<sup>th</sup> February 2015 at 12:00 pm).

<sup>63</sup> 15 UNTS 295.

<sup>64</sup> A38-WP/68 retrieved from [http://www.icao.int/Meetings/a38/Documents/WP/wp068\\_rev2\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp068_rev2_en.pdf) (accessed on 20<sup>th</sup> May 2015 at 5:44 pm).

<sup>65</sup> Kyoto Protocol to the United Nations Framework Convention on Climate Change; UN Doc FCCC/CP/1997/7/Add.1,( Dec. 10, 1997); 37 ILM 22 (1998).

gases with a green house effect emitted by aviation, provision for the protection of the environment from CO<sub>2</sub> is important as the pollutant focused on previously was NO<sub>x</sub>.

The International Air Transport Association contributes to several I.C.A.O technical panels so as to come up with the relevant instruments that touch on aviation, as it is the global body that deals with standardization of airline operations. Its role in the protection of the environment was seen in the endorsement of a resolution on Implementation of the Aviation Carbon-Neutral Growth Strategy (CNG2020). The Aviation Carbon-Neutral Growth Strategy provides governments with a set of strategies on how to develop a single market based measure and a way of integrating the single market based measure as part of an overall package in order to achieve the CGN2020. It has also encouraged I.C.A.O to develop, by 2016, a single and 'mandatory' scheme for offsetting carbon globally as a means of helping to operationalize CNG2020, which is aimed at a carbon neutral growth.<sup>66</sup>

### **2.3 The Vienna Convention for the Protection of the Ozone Layer**

This Convention was adopted in 1985 and entered into force on the 22<sup>nd</sup> of September 1988.<sup>67</sup> This Convention was concluded as a result of a scientific finding which highlighted the harmful effects of chemicals on the stratospheric ozone layer, carried out in 1974. In 1977, the United Nations Environment Program concluded a World Plan of Action on ozone layer which called for intensive research and monitoring of the ozone

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<sup>66</sup> Guy Turner and Annie Peterson, Carbon Neutral Growth for Aviation-At What Price? Retrieved from <[http://www.edf.org/sites/default/files/BNEF\\_EDF\\_Carbon\\_Neutral\\_Growth\\_For\\_Aviation\\_At\\_What\\_Price.pdf](http://www.edf.org/sites/default/files/BNEF_EDF_Carbon_Neutral_Growth_For_Aviation_At_What_Price.pdf)> (accessed on 13<sup>th</sup> March 2015).

<sup>67</sup> 22<sup>nd</sup> March 1985, - UST-TIAS NO. 11,097, 26 ILM 1516 (1987) U.N.T.S 1513.

layer.<sup>68</sup> In 1981, U.N.E.P's Governing Council authorized U.N.E.P to draft a global framework convention on stratospheric ozone protection.

The Vienna Convention is a global framework agreement in which states agree to cooperate in the various relevant researches and scientific assessments of the ozone problem, exchange information and adopt appropriate measures to prevent activities that harm the ozone layer. Its obligations are, however, general and contain no specific limits on chemicals that deplete the ozone.<sup>69</sup>

This instrument does not directly deal with the protection of the environment from the effects of aviation. The Protocol to this Convention is the Montreal Protocol,<sup>70</sup> which phases out numerous substances that deplete the ozone. A special report prepared by the Intergovernmental Panel on Climate Change and Experts from I.C.A.O on Aviation and the Global Atmosphere,<sup>71</sup> estimated the impacts of global aviation on ozone layer and the climate system. The Intergovernmental Panel on Climate Change continues collaborating with the Scientific Assessment Panel<sup>72</sup> to work on the potential effects that emissions from aviation have on the ozone, causing its depletion, and climate change.

This instrument is important to this study since the adverse effects of pollution are felt in the atmosphere and, hence, the depletion of the ozone. The collaboration between the assessment bodies and the Intergovernmental Panel on Climate Change, I.C.A.O and the

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<sup>68</sup> Retrieved from <<http://www.esrl.noaa.gov/gmd/ozwv/dobson/papers/wmobro/action.html>> (accessed on 26th May 2015 at 10:20 pm).

<sup>69</sup> Retrieved from <<http://legal.un.org/avl/ha/vcpol/vcpol.html>> (accessed on 26<sup>th</sup> May 2015 at 10:25 pm)

<sup>70</sup> 1552 U.N.T.S 3; 26 ILM 1550 (1987).

<sup>71</sup> I.P.C.C, Aviation and the Global Atmosphere, A Special Report of I.P.C.C Working Groups I and III, (Cambridge University Press, pp. 373, WMO, UNEP, 1999).

<sup>72</sup> This is a panel consisting of scientists from around the world, who assesses the status of the depletion of the ozone and the relevant atmospheric science issues.

Subsidiary Body on Scientific, Technical and Technological Advice is encouraged by the Conference of Parties.<sup>73</sup>

## **2.4 The Convention on Long Range Transboundary Air Pollution**

The demonstration by scientists in the 1960s on the interrelationship between sulphur emissions in Europe and acidification of the Scandinavian lakes, marked the history of the Convention. The United Nations Conference on Human Environment in 1972 in Stockholm was the start of the active international cooperation against acidification.

It was between 1972 and 1977 that hypotheses that posited that air pollutants could travel over long distances where they would be deposited and subsequent damage were confirmed. A high level ministerial meeting was held within the United Nations Economic Commission for Europe (U.N.E.C.E) framework on the protection of the environment in Geneva, to respond to these acute problems. The end result was the Convention,<sup>74</sup> which was signed in 1979 and entered into force in 1983.<sup>75</sup>

This was the first internationally legally binding instrument dealing with the problem of air pollution on a regional level. It deals with the question of management of air quality in Article 6, where research, exchange of information and monitoring of the results should be taken into account together with cost and effectiveness, locally, when combating air pollution. It tackles the problem of pollution and its effects in the European

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<sup>73</sup> Decision VCV/2 of its fifth meeting retrieved from the Handbook for the Vienna Convention for the Protection of the Ozone Layer 9<sup>th</sup> Edition (2012) at pg 26.

<sup>74</sup> TIAS 10541; 1302 U.N.T.S 217; 18 ILM 1442 (1979).

<sup>75</sup> Retrieved from < [http://www.unece.org/env/lrtap/lrtap\\_h1.html](http://www.unece.org/env/lrtap/lrtap_h1.html) > (accessed on 26th May 2015 at 11:27 pm).

and the North American region, where it has provided a forum for the establishment of relations which ease the process of getting an agreement centered around shared interests and objectives, especially on the issue of regional aspects affecting climate change. It is, however, not adequate in the handling of the problem of pollution from aviation as a source, as it focuses on generic pollutants. It is also a regional instrument, as it regulates the European and North American airspace. Although a lot of pollution occurs in these areas, the movement of aerial pollutants cannot be confined in a certain area. A study conducted shows that the effects on pollution caused in these regions are felt in the Asian continent with a lot of premature deaths being reported in China and India.<sup>76</sup>

This instrument is important to this study since it deals with the specific case of concern, air pollution. The Convention lays down the general principles on the cooperation, internationally, on the abatement of air pollution,<sup>77</sup> as well as setting up an institutional framework for research and policy.<sup>78</sup> The contracting parties are to initiate and co-operate in research and development of technology, improved models for a better understanding of the long range pollutants as well as the education and training of programmes that relate to the environmental aspect of pollution as encapsulated in Article 7.

## **2.5 United Nations Framework Convention on Climate Change**

The United Nations Framework Convention on Climate Change is one of the main international instruments directed towards environmental protection and climate

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<sup>76</sup> Morgan Bettex, "A Link between Air Travel and Deaths on the Ground" M.I.T News Office (28<sup>th</sup> September 2010).

<sup>77</sup> Article 3 of the Convention on Long Range Transboundary Air Pollution; TIAS 10541; 1302 U.N.T.S 217; 18 ILM 1442 (1979)

<sup>78</sup> Article 8 and Article 10 *ibid*

change.<sup>79</sup> The main objective of this instrument is to “stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system”.<sup>80</sup> It seeks to control all the other pollutants not controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer.<sup>81</sup>

The Kyoto Protocol<sup>82</sup> is a supplement to this Convention. Although it does not control pollution emanating from aviation directly, it can be impliedly construed to limit the production of green house gases and the reduction of the same. This applies to aviation in this case as some of the pollutants from this sector are green house gases. Under Article 2.2, parties in Annex I shall pursue the reduction and limitation of greenhouse gases not controlled by the Montreal Protocol in aviation through the I.C.A.O. This has been done by the Subsidiary Body for Scientific and Technological Advice (S.B.S.T.A), established under Article 9. Its mandate is to provide other subsidiary bodies and the Conference of Parties with information and advice on scientific and technological matters in relation to the convention. The Convention also mandates the Subsidiary Body for Implementation (S.B.I), established, under Article 10, to aid the Conference of Parties in the assessment and review of the effective implementation of the Convention, particularly in the examination of the emission inventories submitted by the parties<sup>83</sup> so as to gauge the general effectiveness of the Convention.

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<sup>79</sup> May 9, 1992, S. Treaty Doc. 102-38; 1771 U.N.T.S 107.

<sup>80</sup> Article 2 of the UNFCCC; 1771 U.N.T.S 107.

<sup>81</sup> 1552 U.N.T.S 3; 26 ILM 1550 (1887).

<sup>82</sup> UN Doc FCCC/CP/1997/7/ Dec 10, 1997: 37 ILM 22 (1998); 2303 U.N.T.S 148/[2008] ATS 2/37 ILM 22 (1998).

<sup>83</sup> This is a framework developed for the estimation and reporting of the emission in accordance to the 1996 IPCC Guidelines for the Preparation of Greenhouse Gas (GHG) Inventories and the UNFCCC guidelines on annual inventories, emissions from International aviation and maritime transport.



The provisions that deal with the protection of the environment have been developed over time and have evolved since then. These provisions are still in the early stages of development since aviation is also a developing concept. At the moment the main provision is, however, Annex 16 Vol. II of the Chicago Convention.<sup>84</sup>

## 2.6 The Approaches Taken in Environmental Protection

In the aviation industry, there is no specific approach taken in the conservation of the environment. The common but differentiated responsibilities approach is taken by environmentalists globally, and this is seen as an effective way of combating pollution, as each pollutant is held accountable for the pollution they are responsible for. This is encapsulated in Principle 7 of the Rio Declaration on Environment and Development,<sup>85</sup> where the developed countries acknowledged their responsibility internationally in the pursuit of sustainable development due to their huge command in both technology and finances. This is also seen in the 1996 Intergovernmental Panel on Climate Change Guidelines for the National Greenhouse Gas Inventories,<sup>86</sup> which is used to determine how much atmospheric pollutants are released by each country, how much is removed and if the respective countries meet the legally-binding targets. The effectiveness of this approach is aided by the nationality principle accorded to aircraft.<sup>87</sup> This is to make each state responsible, as the state where the aircraft is registered is considered as its place of

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<sup>84</sup> 15 UNTS 295.

<sup>85</sup> Retrieved from

<<http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>> (on 27<sup>th</sup> May 2015 at 12:49 pm).

<sup>86</sup> Retrieved from <<http://www.ipcc.ch/graphics/speeches/sbsta-19-statement-revision-1996.pdf>> (on 27<sup>th</sup> May 2015 at 1:03 pm).

<sup>87</sup> Chapter III, article 17 of the Chicago Convention; 15 U.N.T.S 295.

nationality and the standards set by I.C.A.O require countries not to allow any aircraft that violates environmental standards set into their airspace. This makes the responsibility of taking care of the environment a collective affair as the bodies responsible are made up of people of different nationalities and also a national affair as per the Intergovernmental Panel on Climate Change guidelines. These guidelines are to assist in the compilation of greenhouse gas inventories, including those from aviation. The guidelines also suggested the use of information on fuel consumption from airline companies by surveying the companies or estimating the movement of aircraft.<sup>88</sup>

This approach is effective since each state is made to account for the pollution aviation produces in its air space. It circumvents the sovereignty principle as it recognizes that environmental protection is a global problem, while at the same time promotes the protection of the environment by giving each state a choice of the way the respective states will undertake towards the same. This approach seeks to find a balance between environmental protection and improvements in scientific sophistication of each state in relation to aviation.

The sustainable development approach, too, is important in this case. This principle seeks to find a compromise between environmental protection and development. Since the backbone of aviation lies in scientific innovation, the application of this principle is vital as it promotes innovativeness, but with the protection of the environment in mind. This has been seen with the development of aircraft that uses solar energy, as was seen from a test flight done in Switzerland.<sup>89</sup> As though this was not enough, the delegation that

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<sup>88</sup> I.C.A.O Environmental Report 2010, Aviation and Climate Change, pg. 56.

<sup>89</sup> Retrieved from < <http://www.theguardian.com/environment/2010/jul/08/solar-impulse-24-hour-flight> > on 19th May 2015 at 1:40 pm.

attended the 2014 Rio +20 Conference connected flights from Montreal to Rio for the United Nations Conference on Sustainable Development on aircraft that were powered by sustainable alternative fuel.<sup>90</sup> This is an important step taken while applying this approach. It is encapsulated in Principle 4 of the Rio Declaration on Environment and Development which states that, “in order to achieve sustainable development, environmental protection shall constitute an integral part of the developmental process and it cannot be considered in isolation from it”.<sup>91</sup>

This approach is instrumental to this study since it seeks to find a balance between scientific innovation, which is the backbone of aviation, and environmental protection. It is, however, important to see how scientific innovativeness in aviation is dealt with when it comes to environmental protection.

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<sup>90</sup> Retrieved from < <http://www.ainonline.com/aviation-news/air-transport/2012-06-25/biofuel-flights-take-dignitaries-un-conference> > on 27<sup>th</sup> May 2015 at 1:02pm.

<sup>91</sup> Retrieved from <<http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>> on 27<sup>th</sup> May 2015 at 12:49 pm.

## CHAPTER THREE

# INSTITUTIONAL FRAMEWORKS FOR THE MANAGEMENT OF POLLUTION FROM AVIATION

### 3.1 Introduction

This chapter provides an indepth analysis of the institutions set up to manage pollution from aviation. These institutions are both the international ones and the national institutions. A comparative study of the national environmental watchdogs of two states is done, in a bid to compare how the respective states have dealt with the pollution problem. A case study is also included in this chapter to show how this problem is being handled by the European Union and, specifically, the decision of the European Court of Justice on the introduction of the Emissions Trading in the E.U.

### 3.2 The International Institutions

#### 3.2.1 The International Civil Aviation Organisation

I.C.A.O is the main international body mandated with the protection of the environment<sup>92</sup> in relation to pollution emanating from the aviation sector; regulates civil aviation. It is a specialized agency of the United Nations Organisation, established by the Chicago Convention<sup>93</sup> and mandated with the setting and adoption of standards and the recommending of practices in order to foster the safe development of civil aviation. It seeks to regulate the operating practices and procedures on the technical issues in

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<sup>92</sup> Annex 16 Vol. II of the Convention on International Civil Aviation; 15 UNTS 295. This is one of the strategic objectives it is mandated with for the maintenance of safe and orderly development of international civil aviation;

<sup>93</sup> Part II, Chapter VII at Article 43 of the Chicago Convention; 15 UNTS 295.

aviation. It is composed of the Assembly, Council and any other bodies as may be necessary.<sup>94</sup> This body enjoys full legal capacity in the territory of a contracting state as is necessary for the performance of its functions, in addition to having full juridical capacity that is to be enjoyed in accordance with the constitution of that state and the laws of the particular contracting state.<sup>95</sup> This is to help the Organisation in fulfilling its mandate by tackling the main barrier posed by the doctrine of state sovereignty.

The Assembly is made up of representatives of all the contracting states.<sup>96</sup> It reviews, in detail, the work of the Organisation and sets up policies to be used for the next three years. It votes the budget triennially, when it has its meetings. It can, however, hold extraordinary meetings at any time at the call of the Council or at the request of more than one fifth of the total number of the contracting parties. The powers and duties of the Assembly are set out in Article 49 of the Convention and include the determination of the rules of procedure governing it and the establishment of subsidiary commissions as may be required. It has the general mandate of reviewing the work of the Organisation in the technical, administrative, economic, legal and technical cooperation fields in detail, in addition to the approval of the amendments to the Convention.<sup>97</sup>

The Council is a body composed of thirty three members elected by the Assembly, for a three year term, hence it is the executive committee.<sup>98</sup> The Assembly elects these members in its triennial meetings. The Council is a permanent body responsible to the Assembly. The Assembly has guidelines that guide it in the voting of the members of the

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<sup>94</sup> Article 43 *ibid.*

<sup>95</sup> Article 47 *ibid.*

<sup>96</sup> Article 48 *ibid.*

<sup>97</sup> Retrieved from < <http://www.icao.int/about-icao/Pages/Assembly.aspx> > (accessed on 31<sup>st</sup> May 2015 at 1:19 pm).

<sup>98</sup> Article 50 *ibid.*

Council, which include the state that is of chief importance in air transport, that is one that that has a lot of aviation activities, states that make the largest contribution to the provision of the largest facilities for international civil aviation, and states whose designation ensures the representation of major geographical areas in the world.

The decisions of the Council are made by majority vote.<sup>99</sup> The functions of the Council are provided for in Article 54 of the Convention. One of the outstanding functions is the adoption of the International Standards and Recommended Practices (S.A.R.Ps) of the Convention, for the purposes of convenience, and designating them as annexes.<sup>100</sup> The contracting parties are finally notified of the specific action taken. The Standards and Recommended Practices are not part of the Convention itself as they are designated as Annexes and, hence, their approval is not regulated by the usual process governing the Convention's amendment process.

The composition of the I.C.A.O is not made complete by the Assembly and the Council; rather there are a lot more bodies that help in the fulfillment of the Organization's mandate in environmental protection. One such body is the Committee on Aviation Environmental Protection (C.A.E.P), which is a technical committee of the Organisation. It is a technical committee that was established in 1983.<sup>101</sup> Its main function is to assist in the formulation of new policies and the adoption of new standards and recommended practices in relation to the impact aviation has on the environment.<sup>102</sup> This Committee is made up of three working groups, I, II, and III, with

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<sup>99</sup> Article 52 of the Chicago Convention; 15 UNTS 295.

<sup>100</sup> Chapter VI *ibid*.

<sup>101</sup> I.C.A.O Environmental Report 2010, Aviation and Climate Change, pg. 75.

<sup>102</sup> Retrieved from < <http://www.icao.int/environmental-protection/Documents/CAEP/Images/OrganigramStructure.jpg> > ( accessed on 31st May 2015 at 2:32pm).

the third group dealing with emissions technical issues. It deals with aircraft performance matters and emission technical issues, including updating Vol. II of Annex 16 and the development of the new CO<sub>2</sub> standard in aircraft.<sup>103</sup>

The Global Framework for Aviation Alternative Fuels (G.F.A.A.F) was launched at the ICAO Conference on Aviation and Alternative Fuels in 2009.<sup>104</sup> This framework provides the way forward for addressing the green house gas emissions from international aviation as well as information on the achievements of the I.C.A.O.

I.C.A.O has a No Country Left Behind Campaign (N.C.L.B) through which it seeks to assist different states in the implementation of the I.C.A.O Standards and Recommended Practices in order to achieve a globally harmonized implementation method.<sup>105</sup>

During the I.C.A.O meeting in Montreal at the beginning of May 2015, the Global Aviation Dialogues (G.L.A.Ds) on Market Based Measures (M.B.Ms) was designed so as to share information on M.B.Ms and their potential role in the mitigation of CO<sub>2</sub> emissions from international aviation, to update I.C.A.O's progress on the development of its global scheme and to provide the opportunity for feedback and discussion amongst member states and the relevant organisations. G.L.A.Ds is structurally and formatively designed to inform and engage non-Council members of the I.C.A.O member states on the basics of M.B.Ms and complement the emissions mitigation measures as well as the important role of an international aviation M.B.M. The dialogues on M.B.Ms were

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<sup>103</sup> Ibid.

<sup>104</sup> Retrieved from <[http://www.icao.int/environmental-protection/Documents/STATEMENTS/sbsta-32\\_Paper.pdf](http://www.icao.int/environmental-protection/Documents/STATEMENTS/sbsta-32_Paper.pdf)> (accessed on 31<sup>st</sup> May 2015 at 8:41 pm).

<sup>105</sup> Retrieved from <<http://web.mit.edu/aeroastro/news/magazine/aeroastro7/n-3.html>> (accessed on 19<sup>th</sup> May 2015 at 1:20pm).

highlighted by topics on environmental integrity, cost effectiveness and simplicity of a global scene, the need for differentiation without discrimination, the common goal of avoiding excessive cost and administrative burdens.<sup>106</sup>

I.C.A.O is set to conduct a seminar on Global aviation Partnerships on Emission Reduction in September, 2015 in Montreal Canada. One of the issues up for discussion includes the carbon markets, and specifically the carbon trading program.<sup>107</sup>

This body has regional offices all over the world so as to deal with specific problems affecting the regions.<sup>108</sup> These functional regions are subdivided according to the distinctive and specific air navigation problems of a similar nature. This is to enhance the effectiveness of the Organisation as each geographical region has different climatic conditions and also the economic activities make the effects of pollution from aviation be felt in a varied manner. Some regions also have a lot of aviation activities than others, e.g., the North American and European airspace as compared with the Eastern African one.<sup>109</sup>

In a nutshell, I.C.A.O has been and is still, in the process of managing pollution from aviation as the industry is progressing. It is a laudable achievement for the Organisation, considering the progress made in such a short time.

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<sup>106</sup> Retrieved from <<http://www.icao.int/Newsroom/Pages/ICAO-WRAPS-UP-SUCCESSFUL-MULTI-REGION-OUTREACH-EFFORT-ON-GLOBAL-MBM-FOR-INTERNATIONAL-AIR-TRANSPORT.aspx>> (accessed on 19<sup>th</sup> May 2015 at 1:25pm).

<sup>107</sup> Retrieved from <<http://www.icao.int/meetings/GLADs-2015/Pages/default.aspx>> (accessed on 19<sup>th</sup> May 2015 at 1:15pm).

<sup>108</sup> Retrieved from <<http://www.icao.int/secretariat/Pages/regional-offices.aspx>> (accessed on 31<sup>st</sup> May 2015 at 8:56pm).

<sup>109</sup> Retrieved from <<http://www.icao.int/secretariat/Pages/ro-responsibilities.aspx>> (accessed on 31<sup>st</sup> May 2015 at 8:45 pm).



### 3.2.2 The International Air Transport Association

This Association was founded in Havana, Cuba in 1945. It is a successor to the International Air Traffic Association that was founded in 1919 at The Hague.<sup>110</sup>

I.A.T.A is a non-governmental body that supports inter-airline co-operation through the promotion of safe, reliable, secure and economical air services for the benefit of the consumers globally. It was founded by 57 members from 31 states, mostly from Europe and North America. It consists of around 250 airlines as members as at present.<sup>111</sup> It has a 'standing observer' status in the ICAO Assembly. In addition to contributing to the various technical panels, the Association can participate by submitting motions and amendments.<sup>112</sup> This status enables the practical implementation of the standards set during I.C.A.O assemblies as airlines have their grievances addressed.<sup>113</sup> This is by the help of an environmental committee (ENCOM), which advises the Association on environmental strategies and policies. Although its main function is to support airline activity and help in the formulation of standards and policies in this sector, it ensures that the views of airlines are represented in international conventions. It is, therefore, a technical and commercial association.<sup>114</sup>

It has set up some mechanisms aimed at the reduction of air pollution, which include the use of alternative fuels by the various airlines in a move towards sustainability. This is

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<sup>110</sup> Retrieved from <<http://www.iata.org/about/Pages/history.aspx>> (accessed on 31<sup>st</sup> May 2015 at 9:00pm).

<sup>111</sup> Retrieved from <<http://www.iata.org/about/Pages/history.aspx>> (accessed on 1<sup>st</sup> June 2015 at 8:53 pm).

<sup>112</sup> Retrieved from <<http://www.iata.org/policy/icao-assembly/Pages/index.aspx>> (accessed on 1<sup>st</sup> June 2015 at 9:24 pm).

<sup>113</sup> Tiago Fidalgo De Freitas, From Participation towards Compliance: The Role of Private Actors in the Making of S.A.R.Ps by I.C.A.O presented at III Viterbo Conference on Global Administrative Law on June 2007

<sup>114</sup> Retrieved from <<http://www.iata.org/whatwedo/workgroups/Pages/env.aspx>> (accessed on 1<sup>st</sup> June 2015 at 9:31pm).

done mostly by the use of sustainable aviation jet fuel with mostly biojet fuels, which are currently in use. The fuels are low-carbon, available for aviation and are short or mid-term strategies. They are derived from sustainable oil crops, such as the Jatropha. Several tests have been carried out and this way has been proven to be viable.<sup>115</sup>

Secondly, carbon offset programmes are also used as a mechanism in the management of pollution from aviation. A carbon offset is an environmental protection mechanism aimed at the reduction of carbon dioxide or other green house gases in order to compensate for an emission made elsewhere. This was done in late 2009 by the introduction of the carbon offset programmes. There are several mechanisms set for this to work, and these include an independent verification by the Quality Assurance Standard (Q.A.S); which, arranges for the purchase of carbon, familiarizes airlines with carbon market mechanisms, among others. I.C.A.O assists here by providing the CO<sub>2</sub> Emissions Calculator.<sup>116</sup>

Environmental assessments are aimed at improving the environmental management of airlines. It is a voluntary programme specifically designed for the independent assessment and improving of environmental management. Its scope includes waste management, local air pollution, noise and greenhouse emissions. This assessment is done in line with other programmes, such as the operational safety audit and the safety audit program for ground operations. This assessment is underpinned by environmental standards based on

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<sup>115</sup> Retrieved from <<http://www.iata.org/whatwedo/environment/Pages/alternative-fuels.aspx>> (accessed on 1<sup>st</sup> June 2015 at 9:41pm).

<sup>116</sup> Retrieved from <<http://www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx>> (accessed on 1<sup>st</sup> June 2015 at 9:45pm).

principles such as ISO 14001.<sup>117</sup> The ISO 14001 is a family of international standards for environmental management. It sets out the criteria for an environmental management system for companies and organisations. The ISO 14001:2004, one of the ISO 14001 standards, provides assurance to company management, employees and external shareholders that environmental impact is being measured and improved.<sup>118</sup>

In 2010, during its 69<sup>th</sup> annual general meeting, the Association endorsed a resolution on the Implementation of the Aviation Carbon-Neutral Growth (CNG2020) Strategy. This strategy is aimed at endorsing Market Based Measures (M.B.Ms) in aviation as part of broader measures in addressing CO<sub>2</sub> emissions from aviation that cannot be achieved through cost effective, in-sector mechanisms. These M.B.Ms, among other functions, should not be designed or used as a means for the generation of revenues or suppression of air travel, but should be agreed on by governments, should be cost-effective and should preserve fair competition due to the highly competitive nature of the airline industry, should maximize environmental integrity and at the same time minimize competitive distortion and administrative complexity.<sup>119</sup>

As an association of several airlines, the support of this Association is needed in order to manage pollution from aviation. This is due to the massive support it has from its members, who are the stakeholders in this transport sector.

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<sup>117</sup> Retrieved from <<http://www.iata.org/whatwedo/environment/Pages/environmental-assessment.aspx>> (accessed on 1<sup>st</sup> June 2015 at 9:47pm).

<sup>118</sup> Retrieved from <<http://www.iso.org/iso/home/standards/management-standards/iso14000.htm>> (accessed on 7<sup>th</sup> July 2015 at 1:20 pm).

<sup>119</sup> Retrieved from <<http://www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx>> (accessed on 1st June 2015 at 10:47 pm).

### 3.2.3 The Intergovernmental Panel on Climate Change

This is a scientific body under the auspices of the United Nations. It was established by the World Meteorological Organisation (W.M.O) and the United Nations Environment Programme (U.N.E.P) in 1988. Its main mandate is the provision of scientific information and a scientific view of the state of climate change and the potential impacts on both the environment and socio-economic activities. It reviews and assesses the scientific, technical and socio-economic information globally so as to improve on the understanding of climate change. As an intergovernmental body, it liaises with governments to help in the objective and complete assessment of current information. This organisation does not, however, conduct research nor monitor climate change parameters.<sup>120</sup>

The organisation was formed with the mandate of helping in the better understanding of the phenomenon characterized by climate change. It is, therefore, composed of scientists from all over the world. Its aim is to reflect a range of views and expertise, hence the review process is fundamental for the Panel to ensure an objective and complete assessment of current information from the various scientists.<sup>121</sup>

The work I.P.C.C does is important to this study since the views of several scientists from around the globe are important in the better understanding of the impact aviation has on the environment. Aviation is seen to cause climate change and environmental degradation as a result.<sup>122</sup> This is shown in the special report that was prepared following a request

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<sup>120</sup> Retrieved from <<http://ipcc.ch/organization/organization.shtml>> (accessed on 1<sup>st</sup> June 2015 at 10:54pm).

<sup>121</sup> Ibid.

<sup>122</sup> Joyce E. Penner et al., *Aviation and the Global Atmosphere: Summary for Policymakers* A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on substances that Deplete the Ozone Layer (Published for the Intergovernmental Panel on Climate Change, 1999).

from the I.C.A.O and the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer.<sup>123</sup> This report was prepared with the aim of identifying and mitigating the impacts of aviation on the environment.<sup>124</sup> This report looks at the composition of the emission from aircraft and the projected rate of growth in the industry from 1994 to 2015. It also examines the effects of each of the pollutants on the climate and the ozone, as well as estimating the time these pollutants take before they are completely broken down naturally. There are various suggestions on how to reduce the impact that aviation has on the environment, which include changing aircraft and engine technology, regulatory and economic measures as well as operational practices and fuel. These changes are to have a long term effect.

### **3.3 The Regional Institutions**

#### **3.3.1 The European Union**

Aviation is the source of about 3 % of the total green house emissions in the European Union, with a large percentage from international flights. As one of the oldest regional organisations, aviation as a means of transport is significantly in use in the region.<sup>125</sup>

The European Parliament and Council of the European Union adopted the European Union Emissions Trading System (E.U E.T.S), in 2008,<sup>126</sup> which is a system set up to

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<sup>123</sup> 1552 UNTS 3; 26 ILM 1550 (1887).

<sup>124</sup> Joyce E. Penner et al., *Aviation and the Global Atmosphere: Summary for Policymakers* A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on substances that Deplete the Ozone Layer (Published for the Intergovernmental Panel on Climate Change, 1999).

<sup>125</sup> Retrieved from <<http://www.theguardian.com/environment/2007/dec/20/pollution.eu>> (accessed on 1<sup>st</sup> June 2015 at 11:42 pm).

<sup>126</sup> Directive 2008/101/EC- this system requires operators of aircrafts to monitor and report CO<sub>2</sub> emissions and surrender an equivalent number of allowances; retrieved from <<http://www.eea.europa.eu/policy-documents/directive-2008-101-ec>> (accessed on 1<sup>st</sup> June 2015 at 11:54pm).

help combat climate change by reducing green house emissions in a cost effective way. This makes the first and, by far, the biggest international system for emissions trading allowances. The E.U E.T.S is a regional system that operates under the Kyoto Protocol with the main aim of reducing industrial greenhouse gases cost effectively. It works on the principle of 'cap and trade'. This seeks to set the total amount of greenhouse gases that can be emitted by any installation in the system and the companies that own these installations have to surrender allowances that cover the emissions by these companies.<sup>127</sup> The system is now in its third phase, which is to run till 2020 from 2013. Aviation was included in the system in January 2013,<sup>128</sup> and it is to cover all flights taking off and landing in the E.U, regardless of whether the airplane originated from or was headed to any state in the E.U. However, the E.U suspended the system to extra E.U flights until the I.C.A.O comes up with a global agreement on greenhouse gas emission mitigation from aviation.<sup>129</sup> This system applies to intra- E.U flights. By regulation, airline operators were exempted from the obligation to submit reports that have been verified and having to surrender allowances to and from non- European Environment Agency (E.E.A) airports for emissions produced from 2013 to 2016.<sup>130</sup>

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<sup>127</sup> Retrieved from [http://www.ec.europa.eu/clima/policies/ets/index\\_en.htm](http://www.ec.europa.eu/clima/policies/ets/index_en.htm) (accessed on 13th June 2015 at 9:51pm).

<sup>128</sup> Amendment to Directive 2003/87/EC From the Official Journal of the European Union retrieved from <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:008:0003:0021:EN:PDF> > (accessed on 1<sup>st</sup> June at 11:56pm).

<sup>129</sup> Retrieved from <[http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm) > (accessed on 2<sup>nd</sup> June 2015 at 12:29am).

<sup>130</sup> Regulation (E.U) No. 421/2014 of the European Parliament and Council, of April 16<sup>th</sup>, 2014 amending Directive 2003/87/EC establishing a scheme for green house gas emission allowance trading within the community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions (Text with EEA relevance) retrieved from <<http://euissuetracker.com/en/eu-legislation/11248/eu-emission-trading-system-2014-2020-derogation-for-aviation> > (accessed on 2<sup>nd</sup> June 2015 at 12:33am).

The Convention on Long-Range Transboundary Air Pollution,<sup>131</sup> applies in this region and it is implemented by the European Monitoring and Evaluation Program (E.M.E.P), under the directions of United Nations Economic Commission for Europe (U.N.E.C.E). There are several Protocols to this Convention that address certain emissions and, hence, aid in the conservation of the environment with regard to pollution from aviation. These Protocols include the Sofia Protocol,<sup>132</sup> which seeks to freeze the emission of nitrogen oxides and the Gothenburg Protocol,<sup>133</sup> which seeks to cut the emission of NO<sub>x</sub> and sulphur dioxide. These Protocols do not tackle the problem of pollution from aviation directly as they are generic in nature

The European and South Atlantic (EUR/NAT) branch of I.C.A.O, has also played an important role in helping to reduce pollution from the aviation sector. As stated earlier, these regional offices established by the I.C.A.O are meant to deal with a problem affecting a particular region, as each region has its own specific problems.<sup>134</sup>

This region has a lot of air transport activities and, hence, the need to scrutinize the measures put in place to deal with the pollution from this sector. As the leading region in terms of integration, the E.U has had to deal with environmental problems that cause respiratory and other problems in the social setting. Although the Convention on Long Range Transboundary Air Pollution is generic in nature, it covers NO<sub>x</sub>, sulphur oxides and other gaseous emissions that are detrimental to the environment and are emitted by the

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<sup>131</sup> TIAS 10541; 1302 UNTS 217; 18 ILM 1442 (1979).

<sup>132</sup> The 1988 Sofia Protocol to the 1979 Convention on Long Range Transboundary Air Pollution concerning the control of emissions of Nitrogen oxides or their Transboundary Fluxes retrieved from <[http://www.unece.org/env/lrtap/nitr\\_h1.html](http://www.unece.org/env/lrtap/nitr_h1.html)> (accessed on 2<sup>nd</sup> June 2015 at 12:40am).

<sup>133</sup> The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and ground level Ozone retrieved from <[http://www.unece.org/env/lrtap/multi\\_h1.html](http://www.unece.org/env/lrtap/multi_h1.html)> (accessed on 2<sup>nd</sup> June 2015 at 12:45am).

<sup>134</sup> Retrieved from <<http://www.icao.int/EURNAT/Pages/welcome.aspx>> (accessed on 2nd June 2015 at 12:47am).

aviation sector.<sup>135</sup>The Convention on Long Range Transboundary Air Pollution<sup>136</sup> is a regional instrument that seeks to help in the management of the environment in the European region.

### 3.2.4 The East African Community

The East African region is projected to witness a 10% growth in air travel by 2015.<sup>137</sup> The region has taken steps to ensure that the aviation sector develops sustainably by adopting the I.C.A.O set standards, due to the presence of a regional office in Nairobi, the Eastern and Southern African (E.S.A.F) Office. The region has no regional instrument that addresses pollution from the aviation sector. It relies on the general Standards and Recommended Practices in use internationally through the East African Civil Aviation Safety Project.<sup>138</sup>

This is partly because of the period the Community has been in place. It is known that this regional integration was created in 1999, and the treaty<sup>139</sup> that was adopted provides

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<sup>135</sup> Starik A. M (2008), Gaseous and Particulate Emissions With Jet Engine Exhaust and Atmospheric Pollution, *In Advances on Propulsion Technology for High Speed Aircraft* (pp. 15-1- 15-22). Educational Notes RTO-EN-AVT-150, Paper 15. Neuilly-sur-Seine, France: RTO p. 2.

<sup>136</sup> TIAS 10541; 1302 UNTS 217; 18 ILM 1442 (1979).

<sup>137</sup> An observation made by Matindi Ladislaus, the Principal Aviation Officer, East African Community Secretariat. On 24<sup>th</sup> January 2013(Retrieved from < <http://www.trademarksa.org/news/africa-urged-modernize-airports-spur-economic-growth> > (accessed on 2nd April 2015 at 4:00pm).

<sup>138</sup> AFI Planning and Implementation Regional Group 16th Meeting (APIRG/16)- APIRG/16-WP/37 – *Harmonization of Civil Aviation Regulations in the East African Community* retrieved from <[http://www.icao.int/WACAF/Documents/APIRG/APIRG16/Docs/apirg16wp37\\_en.pdf](http://www.icao.int/WACAF/Documents/APIRG/APIRG16/Docs/apirg16wp37_en.pdf)> (accessed on 2<sup>nd</sup> June 2015 at 8:47 pm).

<sup>139</sup> The Treaty for the Establishment of the East African Community (EAC) retrieved from < [http://www.eac.int/gender/index.php?option=com\\_content&id=41:eac-treaty](http://www.eac.int/gender/index.php?option=com_content&id=41:eac-treaty)> (accessed on 2<sup>nd</sup> June 2015 at 8:53pm)



for the adoption of common policies in this sector in collaboration with both I.A.T.A and I.C.A.O.<sup>140</sup>

The Civil Aviation Safety and Security Oversight Agency (C.A.S.S.O.A) was established by the East African Community and commenced operations on the 1<sup>st</sup> of June 2007. It is mandated, under Article 92 of the E.A.C Treaty, to make air transport services safe, efficient and profitable, to adopt common policies for the development of civil air transport, harmonization of civil aviation rules and regulations, coordination of measures and cooperation in the maintenance of high security.<sup>141</sup> The Agency has its primary functions set out in Article 5 of the Protocol for the Establishment of C.A.S.S.O.A,<sup>142</sup> and these include assisting the Partner States in meeting the safety and security oversight obligations and responsibilities under the Chicago Convention and its Annexes.<sup>143</sup>

The Community has made a step towards the protection of the environment within the region despite the duration that the Community has been in operation. This is commendable since environmental protection should be taken as a responsibility of all. This is shown by the establishment of the C.A.S.S.O.A, which is charged with the implementation of the provisions in the Chicago Convention, which includes the protection of the environment. This is seen in Article 92 (l) of the E.A.C Treaty where C.A.S.S.O.A is to adopt common aircraft standards and technical specifications. These

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<sup>140</sup> Article 92 of the EAC treaty.

<sup>141</sup> Retrieved from < <http://www.cassoa.org/index.php/explore/2014-04-15-09-17-10/whoweare>> (accessed on 2<sup>nd</sup> June 2015 at 9:09 pm).

<sup>142</sup> Retrieved from <

[http://www.eac.int/legal/index.php?option=com\\_docman&task=doc\\_details&gid=175&Itemid=47](http://www.eac.int/legal/index.php?option=com_docman&task=doc_details&gid=175&Itemid=47)> (accessed on 2<sup>nd</sup> June 2015 at 9:22pm).

<sup>143</sup> Retrieved from < <http://www.cassoa.org/index.php/explore/2014-04-15-09-17-10/whoweare>> (accessed on 2<sup>nd</sup> June 2015 at 9:21pm).

specifications can be interpreted as those of I.C.A.O, whose main purpose is to conserve the environment.

### **3.4 The National Institutions**

The study of national institutions is important since the mandate of ICAO does not extend to domestic flights.<sup>144</sup> The implementation of the standards set by the international community and, specifically, I.C.A.O, is made easy by the national institution which is in charge of the air space of each state. The hindrance posed by the doctrine of sovereignty is not a problem in this case.

#### **3.4.1 The National Environment Management Authority**

This is the main body mandated with the protection of the environment in Kenya. It is established under section 7 of the Environmental Management and Co-ordination Act (E.M.C.A).<sup>145</sup> Its object and purpose is to exercise supervision and co-ordination over all matters in relation to the environment and to be an instrument for the governmental policies on the environment.<sup>146</sup> This agency does not deal with aviation related issues in terms of pollution. The E.M.C.A generally addresses air pollution from moving sources

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<sup>144</sup>Statement from the International Civil Aviation Organisation (ICAO) to the Ninth Session of the Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC) <<http://www.icao.int/environmental-protection/Documents/STATEMENTS/cop9.pdf>> (accessed on 3<sup>rd</sup> June 2015 at 1:20pm at pg.2 ).

<sup>145</sup> Act No. 8 of 1999.

<sup>146</sup> Sec 9 *ibid*.

and aeroplanes are mentioned as mobile sources of air pollution.<sup>147</sup> In the Fourth Schedule, there are industries that are mentioned as being responsible for air pollution, but aviation is not among them.

Although N.E.M.A is the main body mandated with the protection of the environment in Kenya, it is the Kenya Civil Aviation Authority (K.C.A.A) which is the main body that oversees the protection of the environment from the pollutants emitted by aviation.<sup>148</sup>

The Kenya Civil Aviation Authority was established on the 24<sup>th</sup> of October 2002 by the Civil Aviation (Amendment) Act.<sup>149</sup> It is guided by the Standards and Recommended Practices established by I.C.A.O, as well as the provisions of the Chicago Convention,<sup>150</sup> as read with Article 2(6) of the Constitution. The control of emissions from aviation is done by the Authority by granting emission certification and recognizing the certificates issued by other certifying authority of other states of any aircraft within the Kenyan airspace.<sup>151</sup> The certification requirements need to be in compliance with the regulations stipulated by Annex 16 Volume II to the Chicago Convention.<sup>152</sup>

This shows Kenya's commitment towards the control of pollution from aviation. Any aircraft that is in the jurisdiction of the Authority needs to have the certification required, showing that the engine specifications are compliant in order to reduce pollution.<sup>153</sup> The Kenya Civil Aviation Authority has made commendable strides to combat pollution from aviation. This is shown by the practical implementation of the provisions of Annex 16 to

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<sup>147</sup> Sec 2 of E.M.C.A.

<sup>148</sup> Sec 7 (1)(y) and (z) of the Civil Aviation Act No. 21 of 2013.

<sup>149</sup> Sec 4 *ibid.*

<sup>150</sup> Sec 7(3) *ibid.*

<sup>151</sup> Sec 3 of the Civil Aviation (Airworthiness) Regulations 2013 Legal Notice No.83.

<sup>152</sup> Sec 37 *ibid.*

<sup>153</sup> *Ibid.*

the Chicago convention, especially on engine specifications. It is easier to implement these provisions especially since all the aircraft plying the Kenyan airspace are required to have met these specifications, otherwise they would be grounded. This is a success since these specifications are international and are a requirement of all airplane manufacturers.

### **3.4.2 The Environmental Protection Agency**

This is the agency that is responsible for the conservation of the environment in the U.S. It was established in December 1970 as a consolidation into one agency, the mandate of environmental protection from a variety of federal research, monitoring, setting of standards and enforcement activities. The agency was established as an autonomous regulatory body that oversees the enforcement of the Environmental Policy by Reorganization Plan No. 3 of 9<sup>th</sup> July 1970, by the Congress.<sup>154</sup>

The Agency has established aircraft emissions standards that are enforced by the Federal Aviation Administration.<sup>155</sup> It has also recently proposed and adopted new emission standards and the provisions related to it for aircraft turbine engines that have a rated thrust that is greater than 26.7 kilonewtons.<sup>156</sup> The Office of Transportation Air Quality (O.T.A.Q), a branch of the Agency, and the Federal Aviation Administration's (F.A.A) Office of Environment and Energy provided the organic gas specification profile to be

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<sup>154</sup> Retrieved from < <http://www2.epa.gov/aboutepa/guardian-origins-epa>> (accessed on 2<sup>nd</sup> June 2015 at 11:56pm).

<sup>155</sup> The National Ambient Air Quality Standards (NAAQS) are specifically meant to protect the health and the environment.

<sup>156</sup> Section 231(a) of the Clean Air Act.

used in the emissions inventories of aircraft that operate on turbojet, turbofan and turboprop engines that are fueled with jet-A fuel, that is kerosene based, on 27<sup>th</sup> of May 2014.<sup>157</sup> The new standards include more stringent emission standards for NO<sub>x</sub>.<sup>158</sup> The Environmental Protection Agency has adopted measures that are consistent with the standards set by I.C.A.O.<sup>159</sup> The Agency has also submitted an information paper to the I.C.A.O setting out a time frame for initiating the domestic process that addresses the issue of greenhouse gas emissions from aircraft under the Clean Air Act in 2014.<sup>160</sup> This is done in response to a court ruling that required the Environmental Protection Agency to make a determination of whether greenhouse gas emissions from aircrafts cause or actually contribute to the pollution of air that may be reasonably anticipated to cause danger to public health or welfare.<sup>161</sup> In addition to the above steps, the Agency is also in the rule making process that seeks to add aircraft emissions to the list of regulated pollution sources and, hence, regulate the emissions if they are found to be a risk to the health of the public. The Clean Air Act, at section 231, also requires the Agency to establish standards that are based on the latest science in order to maintain air quality and control emissions.

In a nutshell, the Agency is on the track towards the protection of the environment from pollutants emitted by aviation. The major strides it has taken in the domestication and

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<sup>157</sup> Retrieved from < <http://www.epa.gov/otaq/aviation.htm> > (accessed on 3rd April 2015 at 11:28 am).

<sup>158</sup> CEAP/6 and CEAP/8 retrieved from < <http://web.mit.edu/aeroastro/partner/reports/caep8/caep8-nox-using-apmt.pdf> > (accessed on 3<sup>rd</sup> June 2015 at 12:30am).

<sup>159</sup> Regulatory Announcement; New Emissions Standards for New Commercial Aircraft Engines by the United States Environment Protection Agency Office of Transportation and Air Quality; EPA 420-F-05-015 of November 2005.

<sup>160</sup> 1970, Pub. L. No 91-604, 84 Stat. 1676.

<sup>161</sup> Petition for Rulemaking Under the Clean Air Act to Reduce Emissions of Air Pollutants from Aircraft that Contribute to Global Climate Change retrieved from < <http://www.epa.gov/otaq/documents/aviation/foe-cbd-ej-oc-aircraft-ghg-petition-12-05-07.pdf> > (accessed on 19th May 2015 at 2:23 pm).

coming up with its own rules to combat pollution from aviation are commendable. This is also aided by the fact that it is a national body and, hence, the implementation of the same would not be met with the obstacles, such as the principle of sovereignty.

### **3.5 A Comparative Study between Kenya and the U.S.A**

A comparison of the steps taken by the two states in the protection of the environment from aviation pollutants is done so that the attention that this problem is given is weighed. As stated earlier, Kenya does not have domestic provisions that deal directly with the problem of pollution from the aviation sector. The country relies on the standards set by I.C.A.O to combat the negative effects on the environment caused by aviation.<sup>162</sup>

In comparison, the E.P.A has had to adopt their own standards that are in line with those of I.C.A.O,<sup>163</sup> partly because of intense lobbying from environmental groups, the main being Friends of the Earth and Center for Biological Diversity, that even took the Agency to court to ensure the safety of the surroundings from the harmful effects of aviation.<sup>164</sup>

The case was a petition to request the E.P.A to make a finding on the effects of aviation on the environment. As one of the countries that have a lot of civil air activity, it is bound to ensure the safety of its citizens. It has also domesticated the standards set by the Organisation. As a national body, implementation of the provisions set by I.C.A.O is easier.

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<sup>162</sup> Sec 7 of the Civil Aviation Act.

<sup>163</sup> Regulatory Announcement; New Emissions Standards for New Commercial Aircraft Engines by the United States Environment Protection Agency Office of Transportation and Air Quality; EPA 420-F-05-015 of November 2005.

<sup>164</sup> Petition for Rulemaking Under the Clean Air Act to Reduce Emissions of Air Pollutants from Aircraft that Contribute to Global Climate Change retrieved from <http://www.epa.gov/otaq/documents/aviation/foe-cbd-ej-oc-aircraft-ghg-petition-12-05-07.pdf> (accessed on 19th May 2015 at 2:23 pm).

The E.P.A has taken steps towards the protection of the environment and is being seen to work towards the same as compared to K.C.A.A. This is seen from their response, where the E.P.A undertook to conduct a research to determine whether the emissions from aviation are a threat to the environment and human health. Although Kenya does not have local mechanisms put in place to combat pollution from aviation, the domestication of international provisions and setting up the K.C.A.A is commendable towards the accomplishment of the same. As a country that is the hub of Eastern Africa, it is imperative that the problem posed by aviation be addressed in the earliest time possible.

In comparison, thereof, both states are dealing with pollution from aviation, although differently. This is seen from the undertaking that E.P.A took to conduct a research on the effects of aviation on the environment, while K.C.A.A uses the specifications set up by I.C.A.O.

### **3.6 A Case Example**

This case study is important as it shows how the problem emission from the aviation sector has been handled. This case is the only one so far that shows how the same has been handled.

Three airlines, American Airlines, Continental Airlines and United Airlines, and the Air Transport Association of America (A.T.A.A) brought a suit against the E.U in the E.C.J against the introduction of Emissions Trading.<sup>165</sup> The legal action began in the High Court of England and Wales and was referred to the European Court of Justice so as to

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<sup>165</sup> Case C-366/10.

test the legal validity of the Trading System and see if it was in compliance with the principles of international law. By Directive 2003/87/EC, as amended by Directive 2008/101/EC, a legislation was introduced that required all airlines that fly to and from Europe to pay a fee that would be used to offset emissions from 2012 onwards. The legislation was opposed due to the proposed element of the bloc's Emission Trading System (E.T.S) contending that it would not only be costly, but also illegal and unfair for the long haul carriers. The U.S team was contesting the extraterritorial and unilateral nature of the legislation, arguing that the measure was a violation of the Kyoto Protocol,<sup>166</sup> Article 37, which states, albeit indirectly, that the regulation of greenhouse gas emissions from international aviation was the mandate of the I.C.A.O, under the Chicago Convention, the E.U/U.S Open Skies Agreement<sup>167</sup> as well as the established principles of customary international law.

The E.C.J held that the E.U was not a party to the Chicago Convention, although the member states are and, hence, had not assumed exclusive competence in the international civil aviation field. The E.U was, therefore, not bound by its rules and hence the rules were of no relevance to the question of validity of the EU legislation. There were several principles that were not considered by the court, such as the extra-territoriality principle, the principle of sovereignty over airspace, the nationality principle in relation to aircraft and the duty exemptions, although they overlap with the Open Skies Agreement, and rules of customary international law that were examined. The E.U has approved the Kyoto Protocol and, hence, the E.C.J held that the rules therein were not sufficiently

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<sup>166</sup> UN Doc. FCCC/CP/1997/7/Dec.10, 1997;37 ILM 22 (1998); 2303 UNTS 148/[2008].

<sup>167</sup> This is a bi-lateral air transport agreement that seeks to liberalize aviation services, especially in civil aviation between the U.S and the E.U; L 134 of 25.5.2007.



precise or unconditional to allow individuals the right to rely on it in any legal proceedings that sought to contest the validity of an act of the E.U law. Although the E.U is bound by the Open Skies Agreement, there was no infringement of any of its provisions by the legislation. There was also no attempt to impose extra-territoriality rules on emissions allowances. Article 7 of the Open Skies Agreement requires aircraft to comply with the E.U rules when it enters or departs a member state territory. The territoriality and the sovereignty principles were not infringed as only aircrafts physically in the territory of a member state are subject to the unlimited jurisdiction of the E.U.<sup>168</sup>

This case shows the seriousness that environmental protection from pollutants emitted by aviation is given in the European Union. The ruling of the Court had the effect that the E.U had a right to include non-E.U flights in the E.T.S, which shows the willingness of the Union in combating this problem.

The precedent set by the E.C.J in combating environmental pollution from aviation is a very good one, and which ought to be replicated. This precedent needs to be replicated by other regions in order to combat the pollution menace from the aviation industry.

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<sup>168</sup> Retrieved from < <https://litigation-essentials.lexisnexis.com/webcd/app?action=DocumentDisplay&crawlid=1&doctype=cite&docid=20+Column.+J.+Eur.+L.+143&srctype=smi&srcid=3B15&key=e56469dbf2826e4b0b87a33a8ebf4cec> > (accessed on 3<sup>rd</sup> June 2015 at 1:26am).

## CHAPTER FOUR

### CHALLENGES TO ENVIRONMENTAL PROTECTION IN AVIATION

#### 4.1 Introduction

This chapter looks at the challenges that the protection of the environment from the aviation sector are faced with. The chapter seeks to explore the hurdles that have hindered environmental conservation. These include both institutional and legal challenges, starting from the international scene to the national level. These challenges are assessed from the tragedy of the commons perspective. The tragedy of the commons is a problem that most shared resources face, in that they are used by all, but cared for by none. This specifically affects those resources that do not fall under the jurisdiction of any state and, hence, at the disposal of all.<sup>169</sup> This chapter also looks at the ineffectiveness of the mechanisms put forward for the deterrence of pollution from the aviation sector.

#### 4.2 Institutional Challenges

The institutions set up to deal with the problem posed by aviation to the environment are international, regional and national. At every stage, there are challenges that these institutions face, starting with the very obvious one of the doctrine of state sovereignty. Article 2 of the Charter of the United Nations<sup>170</sup> states 'the Organisation is based on the principle of sovereign equality of all its members', this, read with Article 1 of the Chicago convention,<sup>171</sup> brings out the doctrine clearly. As a body established under the

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<sup>169</sup> Training Manual on International Environmental Law at pg. 67.

<sup>170</sup> 24 October 1945, 1 UNTS XVI.

<sup>171</sup> Which states that the contracting States recognize that every state has complete and exclusive sovereignty over the airspace above its territory.

Chicago Convention,<sup>172</sup> and a specialized agency of the United Nations Organisation, I.C.A.O is bound by this principle and, hence, cannot act in the territory of any state in case of a violation of the principles put forward by it, without the express authorization of the state. A state cannot be 'forced' so to say, to adopt and implement the provisions put forward for environmental protection. As a basic principle of international law, state sovereignty has ensured sanity in the international community. This hinders the operation of the Organisation since it cannot act in a vacuum, and neither can the pollution from aviation be confined to a single state.

The provisions of the Annex 16 to the Chicago Convention<sup>173</sup> are not legally binding on any state, and neither are the Standards and Recommended Practices.<sup>174</sup> This is a major problem to the I.C.A.O, since the Organisation has the mandate to protect the environment, but lacks the enforcement mechanism that is needed to do the same. This is because of the nature of the instrument establishing the Organisation. I.C.A.O was established as a specialized agency, with a core mandate of streamlining the global civil aviation sector.<sup>175</sup> Annex 16 Volume II to the Chicago Convention is the main provision for the protection of the environment from pollution caused by aviation. The legal nature of these provisions makes it hard for the same to be enforced without the express consent of the respective states. The provisions cannot be enforced in any territory of a sovereign state without the authorization of the state. In case of any violation it is the duty of the state where the violation has occurred to take action and if that state fails to do so, then the Organisation cannot do so.

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<sup>172</sup> 15 UNTS 295.

<sup>173</sup> Ibid .

<sup>174</sup> Article 38 *ibid*.

<sup>175</sup> Article 3(a) *ibid*.

The legal status of the Standards and Recommended Practices can be described as having the force of soft law, as it does not have the binding force that characterizes the traditional hard law provisions.<sup>176</sup> This is encapsulated in Article 37 of the Chicago Convention which states that

“Each contracting state undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such conformity will facilitate and improve air navigation. To this end the International Civil Aviation Organisation shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures dealing with...”

The above provision clearly shows the ‘softness’ of the provisions. When read together with Article 38, gives states the option of choosing to adhere to all or part of the provisions and the standards set by I.C.A.O, in addition to making their own provisions as they deem fit. Article 38 provides, ‘which states that any state which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation of the differences between its own practice and that established by the international standard...’. This is a setback since most states are guided by economic incentives and not the concern over environmental issues. A state like Kenya, for example, has not taken any step, other than domestication of the Convention,<sup>177</sup> in the practical implementation of the standards put forward. She has no specific mechanisms

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<sup>176</sup> Jurgen Friedrich, International Environmental “Soft Law”: The Functions and Limits of Non-Binding Instruments in International Environmental Governance and Law (Springer Berlin, 2013).

<sup>177</sup> Sec 7 (z) of the Civil Aviation Act No. 21 of 2013.

set up in her national environmental watchdog to deal with aviation pollution as has been done by the Environmental Protection Agency in the United States of America.

The tragedy of the commons also explains another problem facing environmental protection from pollutants released by aviation activities.<sup>178</sup> The tragedy of the commons is used to describe a situation where a shared common resource is used for the benefit of an individual or a group of people, whose actions lead to long term detrimental effect of that resource.<sup>179</sup> This is a problem that most shared common resources face. In this case, it is the air that is common to all mankind. The pollution of air cannot be confined to a specific area and, hence, even the establishment of I.C.A.O, is not enough to deal with this issue. Some countries have not ratified the Chicago Convention,<sup>180</sup> and those that have, do not have the relevant mechanisms set up for the implementation of the same. In addition, the states that suffer the most from this type of pollution do so from the pollution caused in other regions.<sup>181</sup> This, if not dealt with in time, is potentially catastrophic, judging from the environmental disasters experienced in the past, such as the tsunami, which was as a result of global warming.

This problem is also in Africa, where most governments are not keen on curbing pollution from the aviation sector, for the reason that the sector is not as developed as it is

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<sup>178</sup> Aristotle posits that that which is common to the greatest number has the least care bestowed upon it... retrieved from <<http://www.gurteen.com/gurteen/gurteen.nsf/id/X0005FBA6/htm>> (accessed on 3<sup>rd</sup> June 2015 at 9:00 pm).

<sup>179</sup> Retrieved from <<http://www.wisegeek.org/what-is-the-tragedy-of-the-commons.htm>> (accessed on 3<sup>rd</sup> June 2015 at 8:56 am).

<sup>180</sup> 15 UNTS 295.

<sup>181</sup> In the article by Morgan Bettex, "A Link Between Air Travel and Deaths on the Ground: M.I.T News Office (September 28, 2010) (retrieved from <<http://newsoffice.mit.edu/2010/airplane-emissions-0928>> (accessed on 15<sup>th</sup> February 2015 at 12:00 noon).

in Europe or Northern America.<sup>182</sup> As the transport sector continues to grow, so does the amount of pollutants in the air. The developing states also do not take this problem seriously. The main reason for this is that pollution, in general, is considered a problem that the developed countries have created and it is them to solve it. In the current environmental wars, especially on the common but differentiated responsibilities debate encapsulated in the Kyoto Protocol,<sup>183</sup> industrialized states, like China and India, have come out strongly against being pooled in the category of developed states that should pay for the pollution they cause, arguing that historical emitters need to be responsible yet they are part of the leading global pollutants.<sup>184</sup> With a population of more than 2 billion,<sup>185</sup> and as the world's largest growing civil aviation markets, this is a great challenge posed by China and India. The pollution caused by all the activities is not specifically addressed. This is the tragedy of the commons in environmental protection.

I.C.A.O has a mandate to protect the environment from the pollution that aviation causes.<sup>186</sup> This, however, only applies to civil aircraft.<sup>187</sup> Military helicopters,<sup>188</sup> taxi flights, pleasure flights<sup>189</sup> and state aircraft also ply the airspace, yet the pollution they

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<sup>182</sup> Retrieved from < <http://www.sciencedirect.com/science/article/pii/S0967070X15000694>> (accessed on 3<sup>rd</sup> June 2015 at 9:14 am).

<sup>183</sup> The Kyoto Protocol to the United Nations Framework Convention on Climate Change, U.N Doc. FCCC/CP/1997/7/ Dec. 10, 1997; 37 ILM 22 (1998); 2303 U.N.T.S 148/ [2008] A.T.S. 2/37 ILM 22 (1998).

<sup>184</sup> Retrieved from < [http://www.dbp.idebate.org/en/index.php/Debate%3A\\_Developed\\_countries\\_have\\_a\\_higher\\_obligation\\_to\\_combat\\_climate\\_change](http://www.dbp.idebate.org/en/index.php/Debate%3A_Developed_countries_have_a_higher_obligation_to_combat_climate_change)> (accessed on 3<sup>rd</sup> June 2015 at 9:06 am).

<sup>185</sup> Retrieved from < <http://data.worldbank.org/indicator/SP.POP.TOTL>> as accessed on 14<sup>th</sup> April 2015 at 9:17 p.m.

<sup>186</sup> Annex 16 Vol. II of the Chicago Convention.

<sup>187</sup> Article 3 *ibid*.

<sup>188</sup> Category IA5.

<sup>189</sup> Kristin Rypadal, [Aircraft Emissions; Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories](#) at pg 7.

cause is not taken into account. This shows a lacuna in the protection of the environment. The pollution caused by both military and state aircraft is not different from that caused by civil aircraft, hence the regime managing the pollution caused by these two should not be different. The amount of pollutants released from the military and state aircraft is a lot, for instance, when jet planes are preparing to land, the excess fuel is dumped in order to prevent a fireball that can erupt in case of crash landing. This causes pollution to the environment but is termed as a safety maneuver aimed at saving lives. In addition to that for one to qualify for the role of a commander in the Air Force, one needs to have attained a minimum of 3,000 hours, in the American Air Force.<sup>190</sup> The problem that the drafters of the Chicago Convention, and Annex 16 Vol.II, sought to address was that these types of aircraft fly only in the territory of their state and only in a foreign state's jurisdiction on specific occasions.<sup>191</sup> This was laudable, but they failed to recognize the fact that air pollution cannot be confined to a specific state. The amount of pollution generated by these two categories of aircraft is substantial and, hence, should not go unnoticed as is the case at present. The provision of the Chicago Convention and, specifically Article 3, creates this lacuna. The problem here is that military aviation activities cause a lot of pollution that has been ignored for a long time and continues to be so, instead of being addressed. The aircraft used in combat activities roughly outnumber the other aircraft type by 3:1.<sup>192</sup>

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<sup>190</sup> Retrieved from < <http://www.globalresearch.ca/inconvenient-truths-about-military-air-shows/5305197>> (accessed on 3<sup>rd</sup> June 2015 at 1:05pm).

<sup>191</sup> Article 3 (c) of the Chicago Convention.

<sup>192</sup> Retrieved from <<http://www.ipcc.ch/ipccreports/sres/aviation/115.htm>> (accessed on 3<sup>rd</sup> June 2015 at 1:29pm).

The mandate of I.C.A.O covers only the Landing Take Off (L.T.O) Cycle, ascent, descent and the aircraft at cruise speed are not covered.<sup>193</sup> This is a major challenge since aircraft at cruise speed still burn fuel and pollutants are released as a result. The pollution caused by civil aircraft at cruise speed is not taken into consideration when calculating the amount of pollutants released. This poses a great challenge as the true amount of pollution caused by the aviation sector is not reflected. The Organisation also has not set up an audit program that ensures that the Standards and Recommended Practices are adhered to by the contracting states.

#### **4.3 Legal Challenges**

The Chicago Convention, at Article 37, clearly states that the states are to secure the highest practicable degree of conformity to the regulations, standards and procedures stipulated by the I.C.A.O. This challenge is similar to the one that the doctrine of state sovereignty poses, in that, although there are provisions for the management of pollution from aviation, neither the instrument nor the Organisation has the mandate to enforce the same, without the express authorization of the state. I.C.A.O too does not have the mandate to operate in any state without its express authorization. Despite the binding effect of the Standards and Recommended Practices (SARPs), states cannot be ‘coaxed’, so to say, into implementing them.

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<sup>193</sup> ICAO 2013 Environmental Report, *Destination Green*, at pg. 81 (retrieved from < <http://cfapp.icao.int/Environmental-Report-2013/files/assets/basic-html/page1.html>> ( accessed on 3<sup>rd</sup> June 2015 at 1:31pm).



Military and state aircraft are not to fly in the territory of another state without express authorization of the other state.<sup>194</sup> This has both merits and demerits. On merits, the state which owns the aircraft has full control of the aircraft and, hence, can control the pollution caused. In addition, the specific state has the power to dictate the engine types in a bid to reduce pollution before allowing that aircraft into their airspace. The main disadvantage is the usual one posed by the doctrine of sovereignty, such that no other state can control the airspace of another, and neither can any state intervene in case of pollution in another state's territory. In Kenya, for example, there are military training programs that are carried out almost every day. These pilot training programs cause pollution. The pollution from this type of aircraft is not governed by any provisions, including I.C.A.O standards and provisions.<sup>195</sup>

The Kenya Civil Aviation Authority has a mandate over civil aircraft.<sup>196</sup> N.E.M.A, the national environmental watchdog, too, does not have any mandate to protect the environment from the harmful effects of pollutants emitted by aviation. This shows that although states can control state and military aircraft in their airspaces, they cannot control the pollution caused in their neighboring states and neither can they limit the pollution to any airspace.

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<sup>194</sup> Article 3 of the Chicago Convention; 15 UNTS 295.

<sup>195</sup> Article 3 (a) *ibid.*

<sup>196</sup> Sec 6 of the Civil Aviation Act 2013.

The provision of Annex 16 Vol.II covers emissions in the vicinity of airports and its effects up to 3000 feet.<sup>197</sup> These provisions do not cover emissions during cruise speed as stated above.

The Convention on the Long Range Transboundary Air Pollution<sup>198</sup> covers only pollutants from generic sources. Source based pollution has not been dealt with in this instrument. At the moment, this is the main instrument that governs the protection of the environment from air pollution in Europe. It is also a legally binding international instrument whose main purpose is the protection of air from pollutants. The main disadvantage is that it is a regional instrument that covers the European and North American airspaces.

The challenges that environmental protection face from pollution caused by the aviation sector are not many. Despite this fact, the harmful effects are still being felt and hence the need to address the shortcomings. It will be interesting to see how the above challenges will be addressed so as to manage this problem sustainably.

The Kenya Civil Aviation Authority does not face many challenges since it is in charge of a national airspace. The authority does not face the challenge that state sovereignty poses, rather, it does not have any authority over military and state aircraft as its mandate only extends to civil aircraft.<sup>199</sup>

The best way of dealing with the above challenges is by the co-operation of states in combating this problem, especially in the use of approved engine designs and the

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<sup>197</sup> Morgan Bettex, "A Link Between Air Travel and Deaths on the Ground: M.I.T News Office (September 28, 2010).

<sup>198</sup> TIAS 10541; 1302 UNTS 217; 18 ILM 1442 (1979).

<sup>199</sup> Section 3(2) of the Civil Aviation Act, No.21 of 2013

encouraged use of jet fuel sourced from plant sources as opposed to the fuel in use at present.

## CHAPTER FIVE

### RECOMMENDATIONS AND CONCLUSION

#### 5.1 Introduction

This chapter entails a brief summary of the preceding topics covered by this research. It includes the findings of the research and the recommendations on the various approaches taken in the conservation of the environment, the sustainable use of the same and how the legal provisions have tried to find a balance between scientific innovation and environmental protection. It also looks at the problems that environmental protection faces and the various suggestions put forward towards the reduction of the same.

#### 5.2 Recommendations

The findings in the study show that there is an interlinkage between environmental protection and aviation. This confirms the concerns raised in the research questions at the beginning of the study. There is, therefore, the need for the protection of the environment from the harmful pollutants emitted by aviation. As seen, pollution caused by aviation is significant, in that the fuel used is composed mainly of hydrocarbons, which releases CO<sub>2</sub> and water as by products.<sup>200</sup>

The legal regime is fully equipped with provisions to handle the challenges posed by the ever developing scientific innovations in the rapidly growing aviation industry. This is seen by the adoption of engine types that are meant to promote sustainability. However, the doctrine of state sovereignty is main hindrance to the implementation of the current

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<sup>200</sup> Starik A. M (2008), Gaseous and Particulate Emissions with Jet Engine Exhaust and Atmospheric Pollution, in Advances on propulsion Technology for High Speed Aircraft (pp. 15-1-15-22). Educational Notes RTO-EN-AVT-150, Paper 15. Neuilly-sur-Seine, France: RTO.

legal provisions, which should be dealt with conclusively. The mandate of I.C.A.O to act is therefore limited as the Organisation cannot act unless it is expressly permitted by the respective state. It is therefore correct to conclude that the regime is fully equipped to manage pollution from aviation, but lack the enforcement mandate to enforce the same. It is recommended, that for the full implementation of the provisions for the management of pollution, environmental issues be dealt with separately from political issues, as the pollution cannot be confined to a particular place. This calls for states to put aside the political differences and embrace unity in dealing with this issue. The airlines, when purchasing these machines should ensure that the specifications put forth by the Organisation are strictly adhered to. The fuel specifications, too, should be followed by both the selling and buying states.

The approach taken by I.C.A.O can be said to encompass the characteristics of the principle of sustainable development. It will, however, be better if the precautionary principle is adopted, and implemented to the letter. Although the principle of sustainable development seeks to find a compromise between environmental protection and development, precaution needs to be taken to avoid the harmful effects of pollution from aviation. This is to prevent a situation where states have to come together to mitigate or come up with strategies to clean the air.

The adherence to the Standards and Recommended Practices (S.A.R.Ps) and other provisions of the Chicago Convention should not be out of fear of ostracization from the international aviation community but rather, from the concern of the environment, for states. I.C.A.O should set up an audit programme that assesses whether the S.A.R.Ps are adhered to by the contracting states.

### 5.3 Conclusion

This research was guided by several hypotheses and research questions that were to be tried and to be answered, respectively. There is a nexus between the protection of the environment and aviation. This has been proven by the findings of the study.

The main problem that this study focused on was the inadequacy of the provisions that seek to help in the management of pollution from aviation. It has been seen that there are several provisions that have been set up to manage the same. The main provision is Annex 16 Vol.II of the Chicago Convention.<sup>201</sup> This Convention has been supplemented by the Convention on the Long-Range Transboundary Air Pollution,<sup>202</sup> the United Nations Framework Convention on Climate Change<sup>203</sup> and the Vienna Convention for the Protection of the Ozone Layer.<sup>204</sup> These instruments, apart from the Chicago Convention, do not tackle pollution from aviation directly. The problem of air pollution from the aviation industry is not treated negligently, as posed in the statement of the problem.

The provisions that cater for the protection of the environment in the aviation sector are not adequate. The main provisions are found in Annex 16 Vol.II of the Chicago Convention.<sup>205</sup> This is supplemented by other provisions. These provisions, as stated above, and the Standards and Recommended Practices by I.C.A.O, are still deficient since they do not cover the emissions from state and military aircraft, and neither do they

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<sup>201</sup> 15 U.N.T.S 295.

<sup>202</sup> TIAS 10541; 1302 U.N.T.S 217; 18 ILM 1442( 1979).

<sup>203</sup> May 9, 1992, S. Treaty Doc No. 102-38; 1771 U.N.T.S 107.

<sup>204</sup> 22 March 1985,- UST-TIAS No. 11, 097; 26 ILM 1516 (1987) U.N.T.S 1513.

<sup>205</sup> 15 U.N.T.S 295.

cover civil aircraft at cruise speed.<sup>206</sup> Although mechanisms are in place for engine and fuel specifications to reduce pollution, they are not adequate.<sup>207</sup> This is because for state and military aircraft, adherence to these specifications is at the option of each respective state. The pollution caused by these two types of aircraft is significant.<sup>208</sup>

The law has tried to find a balance between scientific innovation and environmental protection by the introduction of the sustainable development principle in the Kyoto Protocol.<sup>209</sup> This is a major boost to the environmental protection since the basis of aviation is scientific innovation, and finding a balance between the two is important.

There are mechanisms set up towards the implementation of the provisions on the protection of the environment in the aviation sector. There are compliant mechanisms set aside to ensure adherence of the provisions on environmental protection with regard to the aviation sector, although these mechanisms are not as strict as they should be. The restriction on the engine types to be manufactured contained in Article 37 of the Chicago Convention, as well as the adoption of Resolution A23-10,<sup>210</sup> which requested states not to allow the use of foreign registered aircraft that did not conform to the I.C.A.O's specifications within their airspace, make up some of the compliant mechanisms set up.

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<sup>206</sup> 2013 Environmental Report, Destination Green, at pg. 81 (retrieved from <<http://cfapp.icao.int/Environmental-Report-2013/files/assets/basic-html/page1.html>> (accessed on 3<sup>rd</sup> June 2015 at 1:31pm).

<sup>207</sup> Annex 6 for engines efficiency, Annex 8 for Airworthiness of aircraft of the Chicago Convention 15 U.N.T.S 295.

<sup>208</sup> Retrieved from <<http://www.ipcc.ch/ipccreports/sres/aviation/115.htm>> (accessed on 3<sup>rd</sup> June 2015 at 1:29pm), where the ratio of combat aircraft to other aircraft types is 3:1, yet this is just one type of military aircraft used.

<sup>209</sup> Article 2; U.N Doc. FCCC/CP/1997/7/Dec. 10, 1997; 37 ILM 22 (1998); 2303 U.N.T.S 148/ [2008] ATS 2/37/ILM (1998).

<sup>210</sup> Retrieved from <[http://www.mdcr.cz/NR/rdonlyres/2B068C0F-F73A-4015-BFAD-4C3ED5823EC2/0/9848\\_AssemblyResolutinsInForce.pdf](http://www.mdcr.cz/NR/rdonlyres/2B068C0F-F73A-4015-BFAD-4C3ED5823EC2/0/9848_AssemblyResolutinsInForce.pdf)> (on 19<sup>th</sup> April 2015 at 8:17 pm).

The major problem to the implementation of these mechanisms is still the doctrine of state sovereignty as posited in the previous chapter.

It can, therefore, be concluded that the protection of the environment from pollutants emitted by the aviation sector is on the right track. This is despite the obstacles that hinder the same. There is still a lot to be done for the implementation of the mechanisms set up to deal with the pollution menace from the aviation sector, from the research. The states therefore should apply Standards and Recommended Practices and the provisions in the Chicago Convention, not because of fear of being ostracized by the international aviation community, but because of their concern for the environment.



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