

# Environmental Impacts of Airports: A Research on The Istanbul 3rd Airport

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*Lately, Turkey is globally showed a great development and success as a record in aviation industry. The two airports in Istanbul, the city that has the most of traffic in the country, have been working at full capacity and they are stuck in the city. So it is considered that there is a need to a new airport. Istanbul 3rd Airport that is already started to be built in Istanbul is a project that refers to be a turning point on behalf of aviation in Turkey. It is a so-called giant project with some integrated projects like The 3rd Bridge and Canal Istanbul. It is bringing that the economical and social benefits. But some civil organizations are expecting that the environmental harms on the vicinity that the airport will be setup will be at too high comparing to the economic and social benefits. The devastation is severe and there is no return. At the vicinity that the airport will be setup, there are important agricultural areas, meadows, forest areas and wetlands for Istanbul. Also millions of migratory birds flies over the area every year. Besides the risk of bird-strikes against aircrafts, the impacts on the birds will be extreme, if the airport is setup on this area. It seems to be seen that the birds will be exhausted and most of them dead after the long and tiring Istanbul Bosphorus trip searching for their resting areas and food and water sources like forest areas and wetlands that are being destroyed. At the vicinity the habitat and the ecosystem will be harmed highly destroying the wetlands and millions of woods. The compulsory purchase of the area that is providing the agricultural activities of Istanbul will impact the region and city wide economy. The specialists expect that in time, Istanbul will encounter some impacts with no returns like air pollution, drought and climate change by the devastation. Also the city has been getting migration for long years and it is pushing the limits of traffic and accommodation opportunities. The expectations are these mega projects will fasten the migration. Civil organizations think that the chosen area for the airport is wrong and there may be some other alternatives. The considerations got place on media a lot. This article aims to present the impacts evaluations that are expected that the airport may cause.*

Keywords : Environmental Management, Business Ethics, Airports

## 1. Introduction

For the sustainability and efficiency of an existing airport or building a new one, long term airport planning is required. This is significant for the future of the airport. To serve the dinamically characterised aviation demand best and the most economic way airport authorities prepare master plans.

During the master planning, the physical requirements and economic feasibilities etc. are very important but the environmental plannings that if not considered may cause

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massive devastations. Not to meet these difficulties and harms it must be considered on the planning step of the airport.

Up to the characteristics of the selected site of the airport, the impacts may range. At the environmental planning step of an airport, the planners must consider the evaluations, after that the harms to the ecosystem may be reduced to the minimum levels.

## **2. Literature Review**

### **2.1. Environmental planning of airports**

While Transportation Master Planning, Aviation System Planning and Airport Master Planning focuses on the airport planning for the regions aviation demand, if a new airport or a extension of a current airport is needed then an airport master plan must be prepared for the individual airport. There are some various phases to make an airport master plan. Environmental planning is just one of them.

Airports have long been a focus of environmental concern. Because of their size, functional requirements, and use in transporting passengers and highvalue cargo, airports tend to be located on large, flat sites near populated areas. Suitable sites are often found on the shores of rivers, lakes, and oceans, or in wetlands or other types of landscape thought to have little economic value when originally selected for airport development. However, these sites often support important ecological systems whose disturbance can affect plant and animal communities, as well as humans. (TRB, 2003)

The construction of a new airport or an enlargement of an existing one represents extensive investments and building works. It is therefore necessary to design the entire airport project for the longest time period possible. The maximum possibilities of the airport development in the proposed locality should be considered, within the limits of the airport's critical constraints. As well as ensuring that the capacity and operational requirements are met safely, the issues concerning the airport and its surroundings should be considered, particularly the impact of the airport on the nearby population and environment. (Kazda & Caves, 2000)

### **2.2. The natural impacts of airports**

Many problems are created to people, ecological systems, water resources, air quality, noise, by the existing airports in many cities, due to lack of planned approach in their location, size and configuration. Airports must be planned with utmost considerations to environment, and community concerns on a long term basis, well coordinated with comprehensive regional plan of development and expansion of the city. (Saxena S. C., 2008)

In this chapter, the impacts that airports have on the environment like land and public parts are revealed. Generally the main environmental impacts are divided like these below:

1. Noise;
2. Air and water pollution;
3. Waste and energy management;
4. Wildlife, heritage, and landscape.

### **Noise**

This is the most common impact encountered. Aviation noise extends beyond the boundary of the airport into areas over which the airport operator has no authority but where the noise resulting from aircraft operations is still considered to be the airport's responsibility. If there are noise-sensitive activities within specified areas of noise impact, then there is a significant impact. (Ashford & Wright, 1992)

Aircraft noise has traditionally been considered the most important environmental problem at airports and, in many cases, public tolerance of aircraft noise has been diminishing. This is in spite of the fact that over the years the noise levels associated with aircraft movements has been declining this reduction has been primarily due to the development of less noisy aircraft and the pressure of more stringent requirements for noise certification of new aircraft types. Current aircraft types are typically 20dB quieter than aircraft of 30 years ago – reducing noise annoyance by around 75 percent. (Graham, 2003)

### **Air and water pollution**

Many of the larger, more densely populated urban areas are facing serious difficulties associated with the emission of dangerous gaseous and particulate matter into the atmosphere from industrial processes, combustion, and transportation. Air pollution affects the public welfare including the personal comfort and health of people, and it causes damage to soil, water, vegetation, wildlife, and animals, deterioration of property and erosion of property values, and a reduction in visibility resulting in losses of aesthetic appeal and increased hazards in transportation. Air pollution is the introduction of foreign substances or compounds into the air or the alteration of the concentrations of naturally occurring elements. Hub airports with a considerable volume of commercial jet aircraft traffic may contribute substantially to this problem. (Horonjeff & McKelvey, 1994)

Water pollution at airports can occur for a number of different reasons. Surface water discharge or run-off which goes into local watercourses from runways, aprons, car parks and other land development may be contaminated by anti-icing and de-icing fluids such as glycol which are used during the winter months. The chemicals used in maintaining and washing aircraft and vehicles, as well as fire training activities and fuel spillages, can also contribute to this pollution. Leakages from underground tanks

and pipes, and grass fertilizers used in landscaping activities can contaminate the soil. Then there is the normal wastewater from buildings and facilities such as domestic sewerage. An increasing number of airports now monitor water quality as well as air quality and have adopted various measures to minimize this water pollution. These include revised operational practices to reduce the use of the harmful chemicals, to improve cleaning processes and to minimize the spillage and leakages. Balancing reservoir treatment may be undertaken before the surface water joins local watercourses. (Graham, 2003)

### **Waste and energy management**

An airport with a capacity of approximately 5 million passengers a year can generate as much waste as a small town. Airports generate between 0.5 and 1.0 tonnes per annum per 1000 passengers. To minimise the negative impact on the environment in connection with waste dumping, it is necessary to look for ways to decrease the quantity of waste particularly by recycling, reuse and introduction of wasteless technologies. In developed countries the concepts of separation and recycling are supported by legislative measures. These measures include tax relief and direct state subsidies. This will further be accelerated by the fact that in all countries there will be a gradual increase of prices for dumping of waste. (Kazda & Caves, 2000)

### **Wildlife, heritage and landscape**

Consideration of the impact of airport development on changes in the natural state of land and waterways is essential to protect ecosystems. Living and nonliving elements, plants, and animals all interact on land and in water to produce highly interdependent aquatic and terrestrial ecosystems. The relationship between species and the ecosystem is essential to maintain the life support system for wildlife, waterfowl, flora, fauna, and endangered species. Of particular importance are vegetation, plant, and animal life. The principal impacts which could occur are the loss of or injury to the organisms or the loss or degradation of the ecosystem. (Horonjeff & McKelvey, 1994)

Airport construction and its activities destroy the natural habitat and feeding ground for wild life. Aircrafts strike the birds in the air. Migration routes of birds, wild animals, should be avoided for use of the aircraft to provide protection to birds and wild life. Life support system of different species in the area should be identified and impact of airports on their requirements for food, water and life support requirement of vegetation etc. should be studied for providing long term protection. (Saxena S. C., 2008)

## **2.3. The Istanbul 3rd Airport**

In this part, the environmental impact evaluations is discussed of the Istanbul 3rd Airport, of which construction is already started. It is possible that these are

categorised as the impacts on the forest areas, wetlands, migratory birds and the local community.

### a) Forest Areas

The site selection for the airport project is totally 76.500.000 m<sup>2</sup> area and the nearly 61.720.000 m<sup>2</sup> of it is forest region. (EIA, 2013)

According to the Environmental Impact Assessment (EIA) Report, the 80% of the project site is forest area. The site selection of The Istanbul 3rd Airport is commented on media as it is giving a serious damage on the ecosystem destroying millions of woods. Also the impacts will possibly be air pollution and drought all over Istanbul city.

The panoramic photograph presented in the Final EIA Report can be seen below. It is the forest area that the airport will be built.

*Picture 1. Project Site Panoramic Photograph*



**Source:** EIA Report, 2013, Appendix-4

*Cutting woods in The North Forest means destruction of the carbon storage space that has very important place to prevent the climate change. The desertification in the north of Istanbul will lead us step by step to the drought that is the most major result of the climate change. (yesilgazete.org, 2014)*

*The woods in the north of Marmara, creates one of the unprecedented ecosystems extending along The Black Sea from Bulgaria in the west to Agva in the east. These woods that helps Marmara to breathe like naturally filtering the air current also are one of the most important parts by holding the ground and surface water actions in the vicinity. The North Forest is the home of various kinds of endemic plants and species also is the resting center of millions of migratory birds that are flying over on the longest bird migration route to Europe. Considering the human life The North Forest is the only one life source providing food, water and air to the people living at the neck of the woods. (spoist.org, 2014)*

## b) Wetlands

There are lots of dry and running creeks in the project area. These creeks in question will be destroyed during the landscaping work. (EIA, 2013)

These puddles that are totally 660 hectares are average 3 meters and the deepest one is Kulakcayiri which is 12-13 meters deep. The smallest puddle is 1.697 m<sup>2</sup> and the biggest puddle is Kulakcayiri with the space of 953.000 m<sup>2</sup>. These puddles will be used to provide usage and irrigation water for the construction work. Then they will be filled with excavation and padding material. Therefore the wetland will lose its existing. The aquatic and live life will end at these and the surrounding areas. (EIA, 2013)



A large number of wetlands in the project area have great importance for the migratory birds to rest after the arduous journey of Istanbul Bosphorus. These wetlands in question are presented in the Final EIA Appendix-10 and Appendix-11. In addition, the benefits of

wetlands to the environment are mentioned at the Final EIA Appendix-18.

About the drinking water source the Terkos Lake that is very close to the project area and is providing the 22% percentage of drinking water need of the city is gonna be in danger with its two important feeding creeks destroyed. That will force Istanbul to suffer for it in future. Also considering this with the destruction of the woods, climate change, air pollution and the loss of live life will unfortunately be ending.

## c) Migratory Birds

### Number of Migratory Birds

It is not exactly known how many birds fly over totally. During the fall migration countable storks from a single point relatively were counted better. The most of the counted birds are storks and their numbers are between 205.000 and 500.000 (Porter and Willis 1968). It is counted as 500.000 at least because all Eastern Europe population of these storks pass over Turkey. The raptors are less numbered. During the only kind of researches in the spring and fall they are counted nearly 80.000 birds as 30.000 falcons, 20.000 honey buzzards, and 20.000 lesser spotted eagles. However in 2008 during the fall, in three weeks more than 150.000 falcons were



counted. For this reason, the passing over birds are not less than 250.000 can be said.



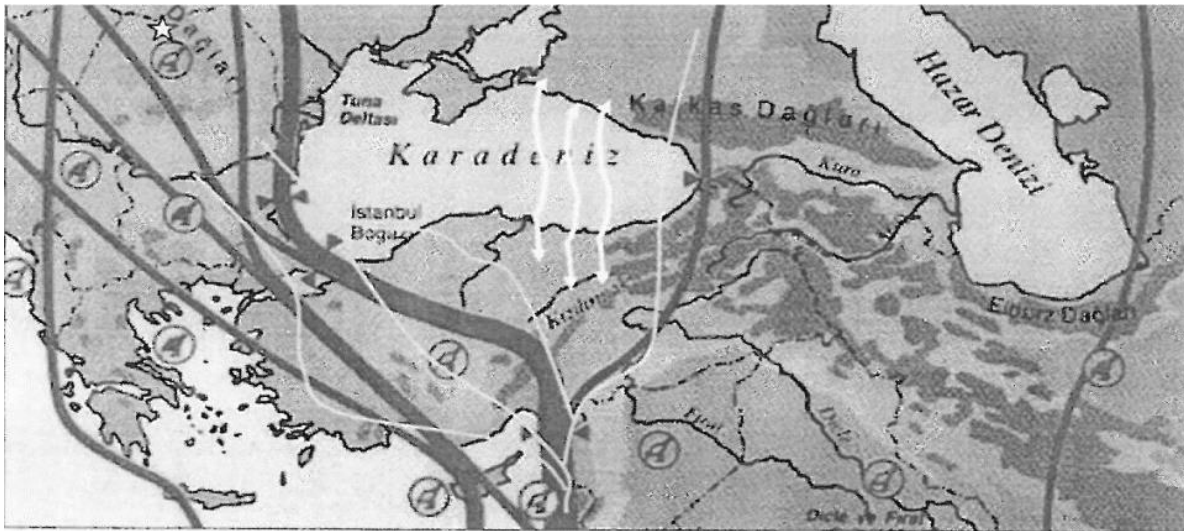
### Migration Routes

To summarize the passing over birds are like:

- min. 500.000 storks (*Ciconia ciconia*) ve 25.000 black storks (*Ciconia nigra*)
- min. 250.000 raptors, mostly falcons (*Buteo buteo*), honey buzzards (*Pernis apivorus*), lesser spotted eagles (*Aquila pomarina*)

The researches on the migratory birds routes are limited because the observations were not enough. But the impressions of some experienced specialists are like in spring birds mostly fly over towards the north of Kocaeli and Catalca peninsulas that created Istanbul. However there are some birds passing over the Marmara Sea towards the Europe side in spring time. It is also seen oftenly that they pass over the Terkos Lake. In spring time, the migration can not be seen from Camlica Hill but from Toygar Hill and Rumelikavagi on Europe side.

Picture 2. Migratory Birds Routes Flying Over Turkey



Source: Final EIA Report, 2013, Appendix-19, p. 2/9

Autumn migration is different. According to the Bulgarian bird migration map, most of the birds fly over Burgaz along the Black Sea side.

After that birds fly over the Terkos Lake. But there may be seen migration all over the bosporus both north and south side. In the fall transition storks and raptors prefer a different route. Storks mostly prefer the way down to Marmara Ereğli and Silivri side and then they follow the Marmara Sea coast to fly over the Ataturk Airport. Birds

prefer this way particularly at southwest to take the advantage of it to fly over the sea to the islands then they follow the ships to Yalova coasts. Raptors fly at northeaster and they can pass from everywhere over the bosporus. (EIA, 2013)

It is written at the Final EIA Report Appendix-19 on 6th page, the area is very significant by many reasons for the birds as mentioned above. This project will impact forest habitat, wetlands and sea ecosystem and surrounding livings. Many species will end or have to change their living space.

The Final EIA Report Appendix-19 presents the picture below showing the resting areas of the migratory birds and the project area.

Picture 1. The Resting Areas Of The Immigratory Birds Flying Over Turkey



Source: Final EIA Report, 2013, Appendix-19, p. 5/9

Analyzing the Final EIA Report and its Appendix-19 the migratory birds routes cross the project area and the birds are counted as hundreds of thousands. The Appendix-19 puts the importance of the place into words for the migratory birds. Also there is a risk of bird-strike against the aircrafts over the airport. So that the biggest nature conservation network Birdlife International needed to make an assessment of the situation with a meeting in Istanbul.

***Istanbul's third airport under construction in the northern part of the city will cause widespread deaths among migratory birds, as it will be located on part of a perilous route for birds seeking to reach Europe from Africa, officials from BirdLife International have warned.***

*The \$30 billion airport to the north of Istanbul is being constructed in a forest and wetland area. However, this region is used as a resting place by migrant birds travelling between Europe and Africa. The birds rest and feed there and then continue their journey. If the government doesn't abandon its insistence on constructing the airport, despite all the warnings from environmentalists who are*



*concerned about the negative impacts the airport might have on the natural environment of this forest area, an important migratory route for billions of birds will be blocked. If this happens, İstanbul's third airport will be responsible for a massive number of migratory birds' deaths.* (<http://m.todayszaman.com/>, 2014)

The picture below is captured during the Istanbul meeting of Birdlife International.



#### **d) Impacts on the Local Community**

The impacts during the construction of the project probably can be lined up as the end of life in the woods, puddles and lakes, devastation of the creeks and the nature, dust, noise and waste creations. (EIA, 2013) With this statement one of the major impacts of the project will be the noise during the construction and operating phases.

One of the main sources of income in the district of the villages are livestock. In general, livestock for milk production are made. Small family herds rather than large farms of livestock are seen mostly. According to 2008 datas, 14,800 livestock units of cattle are bred by families of 1150. 96 families engaged in small ruminants and the total 12.200 pieces of small animals are bred. In Kemerburgaz and Gokturk districts of Eyup fruits and vegetables are produced. Rather, tomatoes, eggplant, peppers, cucumbers, squash, lettuce, cabbage, parsley, green onions, and beans etc.. grown vegetables are marketed to the people of İstanbul. (EIA, 2013)

236 hectares used for livestock activities within the project area will be taken out of qualifications. (EIA, 2013)

Also the implementation of the project will impact on the socio-economic environment. The greatest impact of the project on the socio-economic structure is that expropriation of immovable property services within the area that the units will be built in. (EIA, 2013)

These statements in the Final EIA Report defines the meadows and farms that are the only living sources of the people around will be expropriated. This means the people living there will have problems with their income sources.

51.000 vehicle/day will be added to the traffic of the road. D010 Kemerburgaz-Hasdal Road capacity is 42.511 vehicle/day and during the operation of the project that will be up to 93.511 vehicle/day. In this case, during the operational phase, D010 Kemerburgaz-Hasdal current vehicle volume will be increased by 120%. (EIA, 2013) 229 The Final EIA Report agrees with these statement about D010 Kemerburgaz-Hasdal Road will be running more than twice of its capacity. (EIA, 2013)

Also Istanbul will exposure to a city-wide heavy traffic because the airport will be very big with a 150 million passengers a year capacity. That means lots of vehicles will be added to the city traffic as mentioned at the news.

*The project is planned for an economic life of 100 years. Operational capacity will be 150 million passengers a year. Daily passenger capacity is expected to be approximately 411 thousand passengers. During the operation phase it is expected that about nearly two thousands of commercial vehicles and a hundred thousand of cars will enter and exit the airport daily. (www.milliyet.com, 2013)*

### **3. The Findings and Conclusions**

The great development in the aviation industry in Turkey required some country-wide infrastructures. The long term aviation system plans were published in the 2023 Transportation Targets. A major objective of them was the 3rd airport to Istanbul region. The 3rd Airport which tender is completed and the construction is already began faced the media due to the environmental damages depending to its size and site selection. It is understood that the site selection should have been made by environmentalists and specialists not to harm the habitat and the ecosystem this much. Otherwise, irreversible destruction to the project area may be encountered.

Especially the destructions are the defeat of millions of migratory birds traveling between Africa and Europe annually, air pollution, climate change and drought caused by the destruction of the lungs of Istanbul so-called Northern Forests and the wetland area. Besides these the common problems like air and water pollution, waste, noise, traffic growth etc. of airports impacts to the environments must be considered to be prevented.

### **4. References**

Ashford, N., & Wright, P. 1992. *Airport Engineering*. John Wiley & Sons, Inc.

Ayman, O. 2014, January 27. *yesilgazete.org*. May 25, 2014 Mega Projeler kurakliga davetiye cikariyor!: <http://yesilgazete.org/blog/2014/01/27/mega-projeler-kurakliga-davetiye-cikariyor-oya-ayman/>

- Balkan, A., & Unal, B. 2013, April 15. *www.milliyet.com*. May 21, 2014 3. havalimani raporu korkuttu: <http://www.milliyet.com.tr/3-havalimani-raporu-korkuttu/gundem/gundemdetay/15.04.2013/1693633/default.htm>
- Graham, A. 2003. *Managing Airports An International Perspective*. Elsevier Butterworth Heinemann.
- Horonjeff, R., & McKelvey, F. 1994. *Planning & Design of Airports*. McGraw-Hill, Inc.
- Kazda, A., & Caves, R. 2000. *Airport Design and Operation*. Elsevier Ltd.
- Savgi, G. 2014, May 10. <http://m.todayszaman.com/>. May 25, 2014 Istanbul's 3rd airport to cause widespread migrant bird deaths: <http://m.todayszaman.com/news-347371-istanbuls-3rd-airport-to-cause-widespread-migrant-bird-deaths.html>
- Saxena, S. C. 2008. *Airport Engineering Planning and Design*. CBS Publishers & Distributors.
- T.C. Ulaştırma, Denizcilik ve Haberleşme Bakanlığı Altyapı Yatırımları Genel Müdürlüğü. 2013. *Istanbul Bölgesi 3. Havalimani Nihai CED Raporu*. İstanbul İli, Arnavutköy ve Eyüp İlçeleri: AK-TEL Mühendislik Egt.Tur.Gd.San.Tic.Ltd. Sti.
- TMMOB Şehir Plancıları Odası İstanbul Şubesi. 2014, April 27. *spoist.org*. June 2, 2014 Kuzey Ormanları Savunması Marmara Bölge Forumuna Çağrı: <http://www.spoist.org/etkinlik-rehberi/kuzey-ormanlari-savunmasi-marmara-bolge-forumuna-cagri>
- Transportation Research Board. 2003. *AIRPORT RESEARCH NEEDS: Cooperative Solutions / Committee for a Study of an Airport Cooperative Research Program*. Washington, D.C. , USA: National Academy of Sciences.