



Projected environmental effects of the Third Airport in Istanbul

Elif Kutay Karacor^{1*} and Dalia Korshid²

¹ *Department of Landscape Architecture, Faculty of Forestry, Duzce University, Turkey.* ² *Department of City and Regional Planning, Faculty of Architecture, Istanbul Technical University, Turkey.* *e-mail: elifkaracor@yahoo.com, dalia_k_90@hotmail.com

Received 9 January 2015, accepted 22 March 2015.

Abstract

Together with globalization process, airports have become focal points of the cities. They increase the competitiveness amongst the cities by facilitating movements of capital, technology, knowledge and people. Their global importance affects the local characteristics of cities in terms of increased built up areas with density, fragmented landscapes. Many environmentalists criticize airports due to the fact that the land use decisions following their construction lead to several environmental problems. The aim of this study was to analyze the projected impacts of building the 'Third Airport of Istanbul in Turkey' on the land use and to draw the attention of interest groups to prevent the negative impacts of the airport before opening. Although, some experts and non-governmental organizations have realized the negative impacts of the airport from an environmental perspective, they have not mentioned how the area will change in the future. The main research questions to be asked and studied are the possible impacts of the third airport on the area and the changes that may occur in the land use and density in the area. The study used primary research by analyzing and observing the current situation of the third airport project. Comparative analysis was used by studying Sabiha Gokcen Airport which is second airport project in Istanbul to learn what kind of land use changes occurred before and after the project. Following these studies, secondary research was used as well. Therefore, both the positive and negative impacts of the third airport project were estimated and evaluated. It is expected that the new airport will bring positive opportunities to further develop foreign investment, tourism and job opportunities. However, it will also lead to the development of many new buildings to meet the needs of travelers and users of the airport which will therefore lead to many environmental and ecological problems.

Key words: Ecological planning, land use, transportation.

Introduction

Global air traffic has grown especially within the last 30 years. The number of passengers who have travelled worldwide by air transportation has reached to 2500 million in 2010¹. So, airports have become vital functional nodes in the world economy as they lead to regional, national, and international competitiveness. Airports have led to new urban forms, as their direct and indirect impacts spill over airport boundaries, since they are growth nodes for local areas and economies. Together with its employment and income generating capabilities, airport-led urban development comes with costs and risks from economic, environmental, and cultural perspectives. New urban developments, even the most successful ones in connection with planned mega-airports, raise a host of planning issues².

There is a need to study the effects of transportation modes on the land use in the area it is to be built. We focused on the 'Third Airport project of Istanbul' that is still under construction and under debate in terms of land use decisions. Although some reports and national press have mentioned the negative impacts of the airport on environmental aspects, they have not noticed how the

area will change in the future. The main research questions to be asked and studied were the possible impacts of the third airport on the area and the changes that may occur in the land use and density in the area.

The aim of this study was to analyze the projected impacts of building the third airport in Istanbul on the land use patterns and decisions and to draw attention of interest groups to prevent the negative impacts of the airport before its construction and opening. The impacts depend on several factors, such as ecological, environmental, social and economic factors. Therefore, the positive and negative impacts were evaluated. It is expected that due to nature of the airport's location which is a dense forest area, its construction will lead to a great need to develop many new buildings and functions to meet the demands of the travelers and users of the airport which will in return lead to many negative impacts in terms of the ecosystems and their habitats. We focused the projected increase in this density and set estimate impacts based on a comparative analysis with another airport located in Istanbul.

Land Use Decisions for Airports

Airports usually need a large expanse of land to support their operations. For example, an airport runway of about 4 km in length is needed to serve aircraft movements. In addition, passenger terminals, cargo handling areas, car parking lots and aircraft maintenance facilities need a great amount of land³. Airport areas are therefore preferred to be built out of the city centers in order to minimize the increase of density in already crowded urbanized areas. However, airports that are located in un-urbanized areas lead to new developing areas and cause the area to grow both in size and in services, therefore putting pressure on the natural environment. Natural landscapes are therefore broken up into smaller pieces by these new developments and especially by the new connection roads that are built around the airport. Airports cannot make sufficient profits by just landing planes; they must have alternate sources of revenue which are established in the surrounding areas. Their environmental effects should be considered and changes should be harmonized with the local and regional planning strategies⁴.

Environmental effects of airports: Most airports located in cities and towns are surrounded by green belts. After the destruction of habitats in Europe, some legal instruments have been implemented. Especially in Europe habitats are declining and legislation is tightening in respect to protection of 'the countryside'⁵. Habitat management on airports has a significant role in the frequency of wildlife damage. Airports that are close to habitats would increase the likelihood of wildlife strikes⁶⁻⁸. Most of environmentalists criticize the development of new airports on natural environments since some environmental issues such as noise, pollution, impact on property prices, loss of biodiversity and heritage sites, and accident risk².

Aircraft noise: Aircraft noise is accepted as one of the most crucial issues that causes environmental disturbance to the communities who are settled around the airports. As a result of growth in air transport demand, the number of aircraft movements at the airport increases noise pollutions. The impact of aircraft noise has grown with the growth in aircraft movements³. Because of growing awareness of the noise issue, inhabitants near airports are placing greater emphasis on low noise environments⁹.

Air pollution and climate change: Airports are criticized because of their tendency to lead to poor air quality by burning fossil fuels and emitting carbon gases. Poor air quality has adverse effects on the health of humans and other species surrounding the airports¹⁰. The aviation industry is thought to be responsible for 3% to 5% of the world-wide carbon emission. Growth in global air transport is forecast to increase aviation carbon dioxide emissions by some three times between 1990 and 2050, and total global warming effects are forecast to increase some four folds over the same period⁵.

The major sources of air pollution come from transport, aircraft emissions and apron activities such as aircraft refueling. The importance of airport related emissions varies from one site to another depending on the location of the airport relative to settlement areas⁵. Planners should develop their transport policies in a way that will not worsen air quality through any mechanism, including land use response¹¹.

Accident risk: Communities surrounding airports increase attention to the accident risk and direct fatalities arising from aircraft accidents. Accident rates tend to be higher along the approach and departure routes, where denser air traffic exists. In consequence, airport growth may be restricted on the settlement areas to protect people⁵.

Ecosystems: Because of their physical size and environmental impact, airports alter the ecosystems which are located around them¹⁰. By covering large areas, airports create new zones which either damage to wildlife or lead to ecological monoculture. Airport development can be restricted by the value of the habitats threatened⁵.

Material and Methods

Material: The Third Airport of Istanbul is being still constructed on the north European side between Yenikoy and Akpınar districts where the biggest forestland and wetland of the city are located. It is surrounded by few forest villages and small towns (Fig. 1). The construction zone is approximately a 7,659 hectares region near Terkos Lake where around 6,172 hectares of this area is state-owned forest land¹².

Methods: In the beginning primary research was used to analyze and observe the current situation of the third airport project. Following the primary research, comparative analysis methods were used, where Sabiha Gokcen Airport was studied to learn what kind of land use changes occurred before and after the project. In scope of this, secondary research was used as well books, articles, EIA reports, etc. The methodology was mainly comparative, evaluative and descriptive (Fig. 2).



Figure 1. Location of the Third Airport¹³.

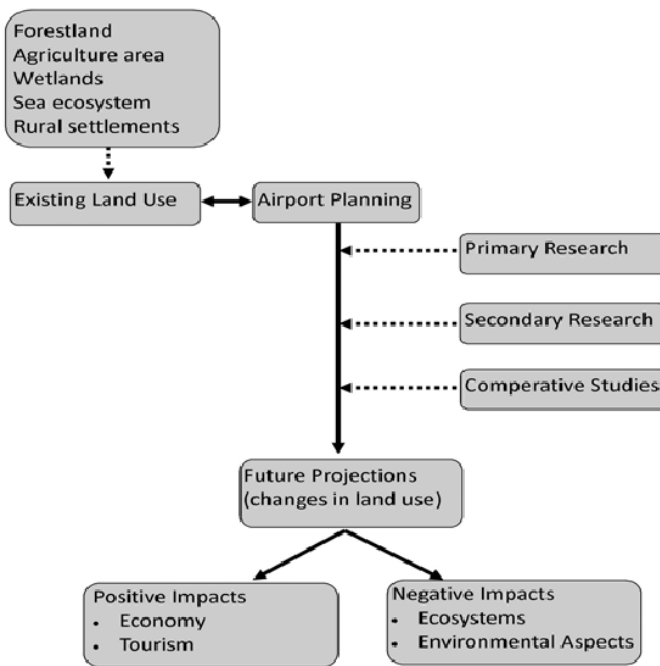


Figure 2. Graphical scheme of the study.

Results

Land use change on Sabiha Gokcen Airport: We evaluated the effects of Sabiha Gokcen airport on the land use of the area to compare it with the study area (Fig. 3). Sabiha Gokcen International Airport is located in Pendik district in Asian side of Istanbul. It is served as a civil status and was opened in 2011 as a second international airport after Ataturk International Airport.

In 1982, before Sabiha Gokcen airport was built, the urban density in Pendik area was low, there were no major investments around the area and no major transportation connections/roads. From the economical aspect, the land prices were reasonable and the rents were low¹⁴. In terms of transportation, there were only a few other major transportation networks and bus stops. The area had fairly low accessibility levels due to the nature of the sparse inhabitants. The lands in the area were mostly comprised of industrial and agricultural lands.

In 2001, after the airport was built and opened, there was a need for new access roads and new transportation networks to reach to and from the airport. New roads also affected the land use and created new investment areas. Therefore, the urban density increased in the area as the major investments developed and brought in new opportunities such as new jobs which lead to new housing developments.

In 2015, today, the area is heavily urbanized with well accessible areas and major transportation networks. Settlement areas have greatly increased compared to three decades ago when the area comprised of sparse settlements. Most of agricultural land has been converted to settlement area.

The land values in Pendik district have the most increased land value rates. Both Kadikoy and Pendik districts witnessed the greatest increase in rents and land values in the city. Increase rates in these districts have reached 20% within only one year¹⁶. Rapid growth potential of Sabiha Gokcen Airport led to development of the metro plans, TEM highway, E-5 roadway, and eventually increased land values. The population between the years 2000-2007 witnessed a great percentage change. Following the opening of the airport in 2001, the urban density increased. Therefore, bringing in more opportunities for people to live and work in the area. As the area continued to develop and became more accessible over the years, the population also increased¹⁷.

Future projection of the third airport and its vicinity: The third airport is expected to change land use and urban density in the surrounding lands and areas. New settlement areas and business districts are expected to be developed around the airport and eventually expand further. The airport will need certain functions (such as hotels, roads, shopping areas, markets, etc.) to support the passenger flow. Although, it is reported that the area has a protected zone with no developments allowed, this will eventually be inevitable as seen in Sabiha Gokcen Airport. Also, the population of the area is expected to rise.

Population distribution in the northern part of the city is expected to rise, and employment distribution, as well. This is due to the fact that the airport will bring many opportunities in the area, as seen in Sabiha Gokcen Airport case study, the land use changes significantly create new transportation networks, major investments and increased urban density. Therefore, similar results are expected in the northern part of Istanbul with the development of other major transport roads and rail systems.

Easy accessible and well connected transportation modes would increase the attractiveness of the city. Eventually, international trade is developed and venues of the city are increased making the city a more globalized one. The economic opportunities that the airport will bring are definitely positive, as it will offer many new job opportunities. However, this urban expansion will affect the land values in the area and it is expected to boom especially with the other investments such as the new road networks and the third bridge which connects two side of Istanbul.



Figure 3. Land use change of Pendik area before and after Sabiha Gokcen Airport¹⁵.



Figure 4. Existing land cover situation ¹³.

Ecological characteristics and possible environmental effects:

According to Istanbul Environmental Plan (1/100,000), the biggest part of the north side in Istanbul is forestland (Fig. 4). Following the implementing of the project, some environmental changes will occur. There are currently 70 artificial ponds in the area and they have own freshwater ecosystem. It is planned to use these ponds for irrigation and construction purposes which will later be filled with construction materials ¹³. It will lead to a great decrease in living ecosystems. In addition, some creeks which currently flow through the project area will be filled and lot of living organisms will be affected negatively.

Furthermore, Terkos Lake which is considered to be a significant habitat for bird species is approximately 2.5 km away from the project area ¹³. It would be a threat for flights and bird species. Agricultural lands which are located around the project area will lose their functions as well.

Environmental impact reports of the airport project suggests that the replantation of forest trees out of the project area ¹³, however, studies show that replantation processes give little chance to trees for living and surviving, therefore causing many trees to become endangered. It is expected that Terkos, Alibey and Pirincci dam basins will be affected by a decrease of water collection and an increase in pollution levels.

Conclusions

Natural landscapes and wildlife are ignored by the new development decisions and projects of new buildings and extending roads. Open lands will therefore become fragmented into small pieces that do not comply with the needs of the habitat¹⁸. On the other hand, several countries are therefore increasingly concerned about achieving environmental sustainability through the efficient land use ¹⁹. Airports are an important component of the landscape and, therefore, they should contribute to and be subject to landscape level factors that affect natural life and wildlife populations ⁷. So, economical development is provided and natural landscapes are protected by considering efficient land use of airports. The airports of Istanbul don't meet the demand of airlines and passenger capacity. Commercial aircraft traffic of Istanbul airports is expected to exceed 1 million aircraft and 118 million passenger movements in a year by 2030 ²⁰. Therefore, the need for a new airport is inevitable fact for the city. Our conclusion includes projected assumptions based on previous Sabiha Gokcen Airport. According to this, building a new mode of transport will subsequently result in a change in the land use and will lead to a development in the infrastructure and density. After the analysis

and findings, results help us in determining the possible positive and negative impacts on the area. We assume the projected changes in the economic, social and environmental aspects based on the previous study. Due to the fact that the third airport is not built yet, therefore the results we can produce are limited because they will be based on only expectations and projections not on actual situations.

As a conclusion, we developed some suggestions about the third airport's land use decisions and its future effects.

- Ecological features of the areas exhibit a unique character and they will be affected from the new developments which can contribute to economic aspects.
- Together with new road connections and building areas, landscape patches will be destroyed. Unfortunately, previous airport projects show us landscape patches will transform to new urbanized functions and lose their natural importance.
- To prevent undesired developments, the necessity of the airport should be discussed and ecological importance of the area should be taken into account by governors.
- Even though there is a need for a new airport due to increased passenger flow, the location choice of the new airport threatens the natural landscapes. So, the airport area should be located where the risks are less and the benefits are more.

References

¹Gelhausen, M.C., Berster, P. and Wilken, D. 2013. Do airport capacity constraints have a serious impact on the future development of air traffic? *Journal of Air Transport Management* **28**:3-13.

²Freestone, R. 2009. Planning, sustainability and airport-led urban development. *International Planning Studies* **14**(2):161-176.

³Jatmika, H. 2001. Economic, Social and Spatial Impacts of Major Commercial Airports and Their Management: A Case Study of Sydney (Kingsford Smith) Airport. Doctor of Philosophy thesis, School of Civil and Environmental Engineering, the University of New South Wales Sydney, Australia.

⁴Stevens, N. 2006. City airports to airport cities. *Queensland Planner* **46** (1):37.

⁵Upham, P., Thomas, C., Gillingwater, D. and Raper, D. 2003. Environmental capacity and airport operations: Current issues and future prospects. *Journal of Air Transport Management* **9**:145-151.

⁶Blackwell, B.F. and Wright, S.E. 2006. Collisions of red-tailed hawks (*Buteo jamaicensis*), turkey (*Cathartes aura*), and black vultures (*Coragyps atratus*) with aircraft: Implications for bird strike reduction. *Journal of Raptor Research* **40**(1):76-80.

⁷Blackwell, B.F., DeVault, T.L., Fernández-Juricic, E. and Dolbeerc, R.A. 2009. Wildlife collisions with aircraft: A missing component of land-use planning for airports. *Landscape and Urban Planning* **93**:1-9.

- ⁸Dolbeer, R.A. 2006. Height distribution of birds as recorded by collisions with civil aircraft. *Journal of Wildlife Management* **70**(5):1345-1350.
- ⁹May, M. and Hill, S.B. 2006. Questioning airport expansion — A case study of Canberra International Airport. *Journal of Transport Geography* **14**:437–450.
- ¹⁰Edwards, B. 2004. *The Modern Airport Terminal - New Approaches to Airport Architecture*. 2nd edn. Spon Press, Oxon, 304 p.
- ¹¹Still, B., May, A.D. and Bristow, A. L. 1999. The assessment of transport impacts on land use: Practical uses in strategic planning. *Transport Policy* **6**:83–98.
- ¹²Anonymous 2013. Consortium wins Istanbul airport tender for 22.1 billion euros. Retrieved 16.01.15 from <http://www.hurriyetdailynews.com/consortium-wins-istanbul-airport-tender-for-221-billion-euros.aspx?pageID=238&nID=46153&NewsCatID=344>.
- ¹³EIA 2013. Environmental Impact Assessment Report of the Third Airport. (in Turkish).
- ¹⁴Terzi, F. and Bolen, F. 2011. An analysis of spatial development tendency of Istanbul. *A|Z ITU Journal of the Faculty of Architecture* **8**(2):35-48.
- ¹⁵Anonymous 2015. Land use change. Retrieved 16.01.2015 from <http://sehirrehberi.ibb.gov.tr>.
- ¹⁶Terzi, F. 2009. *Urban Spatial Development and Spatial Strategies for Residential Areas* (in Turkish). Unpublished Doctor of Philosophy thesis, Institute of Science and Technology, Urban and Regional Planning, Istanbul Technical University, Istanbul.
- ¹⁷TUIK 2014. Population change in Pendik (in Turkish). Retrieved 31.12.2014 from <http://www.tuik.gov.tr/>
- ¹⁸Shore, W.B. 2006. Land-use, transportation and sustainability. *Technology in Society* **28**:27–43.
- ¹⁹Rezaei, A., Hoseini, S.M., Hedjazi, S.Y. and Asadi, A. 2012. Conceptualizing sustainable natural resource management in Iran: A country report. *Journal of Food, Agriculture & Environment* **10**(2): 764-770.
- ²⁰Saldiraner, Y. 2012. The new airport in Istanbul: expectations and opportunities. *Journal of Case Research in Business & Economics* **5**:1-11.