



Journal of Applied Sciences

ISSN 1812-5654

science
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Environmental Pollution and Solution Recommendations of Konya City, Turkey

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Abstract: The purpose of this study was to find out environmental problems of Konya city, Turkey, by means of evaluating the present studies related statistics, field survey performed the city. As the result of the survey, air and noise pollution were pinpointed in the city center as the most important environmental pollution, while agricultural land lose and water pollution were determined as the most important environmental problem in the city boundaries and in Konya Province respectively. The recommendations which can be useful for the solution were made for the improvement of the city as a contemporary settlement.

Key words: Pollution, environmental, urbanization, Konya

INTRODUCTION

Beginning with the Industrial Revolution, pollution has become a prevalent feature of the modern world (Abdul-Wahab and Al-Arairni, 2004). Although the Industrial Revolution was a period of great technical achievement and economic development, it also marked the beginning of increasingly serious environmental deterioration. The rapidly growing population, new urbanization and industrialization, rapid development of technology, increasing numbers of industrial products and more research leading to more discoveries created local and regional environmental stress through such elements as swage disposal, mineral extraction, energy conversion and the sprawl of urban-industrial activities over the adjacent rural land (Buchwald, 1980; Kemp, 1998).

The 20th century was the century of urbanization (Konijnendijk, 2000). According to United Nations figures, in 1800 only 50 million (5% of the world's population) lived in towns and cities worldwide while there were 240 million people, 14% of the world's human inhabitants, around 1900 (EEA, 1998). As late as in 1960, the figure had risen to 1 billion, approximately one-thirds of the people and to 2.4 billion (the world population 5.7 billion) in 1995 (Cooklin and Keen, 2000). By 2025, the majority of the world's population will have in cities, with the total urban population doubling to more than 5000 million people, representing about 61% of the world's population (Hall and Pfeiffer, 2000).

Urban growth is seen as an essential component of economic growth in the developing world. Cities are

considered the attraction of global manufacturing investment is vital to the continued competitiveness of urban centres, especially in developing countries (Zetter and Hassan, 2002). Yet the urbanization process has dramatically changed the relationship between human society and the natural environment. Most obviously the natural environment has been exploited to support economic growth (Konijnendijk, 2000).

Too often in the past, development projects have taken in developing countries without Environmental Impact Assessment (EIA) studies or conscious efforts to predict and mitigate adverse environmental impacts. Hence, in most cases, such projects have not only become destructive to the environment, but they have also endangered the very basis on which continuity and sustainability of development depends (Opocu, 2001).

Environmental pollution can be defined as follows: The deep penetration of the hazardous wastes and disposals, which contains the toxic substances affecting the health of all the specious and corrupting the natural habitats, into the soil, water and air. Environmental pollution may also be defined as the ecological hazards produced by the human beings, which corrupts the ecological balance of the ecosystems (Çepel, 2003).

Turkey, which is a developing country, is beset by environmental problems that began to attract the attention they deserve only since the late 1970s. The most significant environmental problems may be classified into eight groups; air pollution, water pollution, soil pollution and degeneration, solid wasted disposal, noise pollution, negative effect on flora and fauna, pesticide, energy (Anonymous, 1998).

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The main reasons of the environmental problems in Turkey are listed as follows (Özcan, 2004):

- The environmental problems are not discussed and pronounced loudly and effectively in public and in media.
- Due to the inadequate resources and funds for academic researches and education, the academicians can not have a good chance to come up with new ideas and projects that leads to the solutions of the problems.
- The projects and researches, conducted by various people and educational installations, are not coordinated with each other. The level of understanding of environment as a whole entity is not developed.
- The juristic regulations are not complete and in use.

If necessary legal framework strengthened by heavy sanctions in case of nonimplementation is not put in place, the damage will indeed be great for future generation in Turkey (Bentley, 2000).

In order to diminish the effects of the environmental problems and in order to take adequate precautions for the consequences, the reasons and the results of the pollution should be well known and precisely analyzed. Konya is one of leading cities in Turkey in many different areas such as cultural and historical heritage, industry, abundant resources for different types of agriculture and tourism. Besides all these magnificent properties, Konya suffers from different environmental problems no different then the other metropolises of Turkey. The purpose of this study was to identify the environmental problems and their reasons and provide solutions as well. These solutions aimed to provide guidelines for development and transformation of Konya into a modern city. The modernity intended by these solutions provides the means of a comfortable and healthy environment for the people of Konya. The research and the recommendations conducted about Konya may also be used as a model for other cities.

MATERIALS AND METHOD

This study was carried out in the city of Konya city and its surrounding and environmental problems, their reasons and the negative implications in there were examined.

The course of this study is based on three main parts:

- An analysis of the natural and socio cultural potential of the city;

- A demonstration of variety, source, dimension, implication and the cause of the environmental problems;
- A discussion and recommendation of possible measures necessary to decrease the negative effects of environmental problems in the city centre.

During this research, some important previous studies, related statistics, field surveys performed in the city together with domestic and international researches about environmental problems were used as supporting materials.

RESULTS

Study area generally features

Location: The city of Konya is located between $36^{\circ}41'$ and $39^{\circ}16'$ east meridians and between $31^{\circ}14'$ and $34^{\circ}26'$ north parallels. The city is located approximately in the middle of Anatolian peninsula, surrounded by the cities of Ankara from North, Karaman from south, Afyon and Isparta from west, Aksaray and Nigde from east, Antalya from southwest and Adana from southeast. Konya is the largest province in Turkey (38257 km^2) (Anonymous, 2005a). During the History of the city, Konya maintained its importance as one of biggest stops of the legendary Silk Road, where the convoys stop for trading and resting. Today, the center role of the city did not change, it still is an important intersection of the two main highways of Turkey: one lies in the east-west direction and the other one lies in the north-south direction (Fig. 1).

Natural structure: The average height of the city from the sea level is 1024 m. The highest point of the city is "Alaeddin Tepesi" with the height of 1080 m. "Aslim Batakligi", which is located in the northeast part, is the lowest point of the city with the height of 975 m.

Konya is located on the north and northwest part of the Great Konya Basin, which is known as the store of cereals of Turkey (production; 1557061 tone/year wheat, 1151570 tone/year barley, 48000 tone/year oats, 35685 tone/year ryes) and is formed of abundant soils of first and second class (Anonymous, 2003a).

The climate of Konya is typical terrestrial climate which is mostly known of the hot, semiarid summers with cold, rainy and snowy winters. According to the long-term (1939-2004) statistical values the lowest monthly precipitation is in July and August with 6.9 and 4.9 mm, respectively. The highest precipitation is observed in December and January with 41.6 and 36.7 mm, respectively. The annual average of total

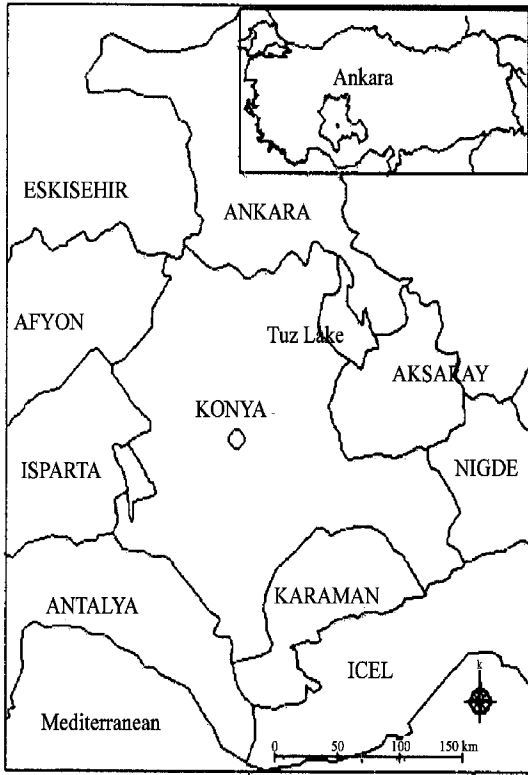


Fig. 1: Location map of Konya city

precipitation is 319.2 mm/year. The average value of relative humidity is 59%. The northern winds are dominant in Konya. The average value of the wind speed is 2.1 m/s (ACIR, 2005).

Steppe vegetation is dominant in Konya and its vicinity. The flora of the province consists of Irano-Turanian species and Anatolian endemic species (Çetik, 1985).

Sociocultural structure: The city, which hosts one of the most historical human settlements in Anatolia (B.C. 1400-1200), is one of the most important centers of the Hittite civilization. Afterwards, there have been several civilizations such as the Frigs, Persians, Romans and Byzantines, who invaded and ruled the city for centuries. The city also became a holy center in the very first years of Christian religion (A.C.47). Catalhoyuk is an ancient settlement, which is located at 35 km north of Konya. This settlement has a history, which goes back to the B.C. 7000 and known as the first place in the history of human being where soil is used for agriculture. After the archaeological excavations at Alaeddin Tepesi, which is located at the center of the city, the archaeologist discovered that the city was also an important center of

the Frig civilization. After the downfall of Byzantine Empire, the city was taken by the Anatolian Selcuklu Empire (1076-1308) and declared as the capital of the empire. After the end of Anatolian Selcuklu era, the country was divided into several states. The Karamanogullari state (1308-1466), the largest of all the states at that time, became the new owner of the city. They did not move the capital to anywhere else and Konya continued to serve as the Capital of this new state (Konyalı, 1964).

History of the region and cultural past has effect on the improvement of sociocultural structure on the city. Main effect on the social structure of the city is 70000 university student which Selcuk University of Konya have the highest student capacity in the country. Students and lectures coming from different areas have given different dimension to the social structure of the city. Agricultural population is still important for the working life. Improving industrialization, commercial activity and emigration to the Konya are increasing the population of the city centre (Çelik, 2002).

Mevlana Jelaled-din Rumi is one of the most important philosophers of Turkish Islamic Mysticism. His grave is in Konya Mevlana Museum housed in the first lodge of the Dervis sect. Every year many domestic and foreign tourist come to visit the museum (in 2004 1 400 000 tourist) and to attend to Mevlana Mention Celebration (10-17 December)

The population of the city was about 56462 in 1940, which increased slightly to 119841 in 1960 and finally showed a high rate of increase and reached 742690 in 2000 (Table 1). The density of the population is 57 people/km². Konya is the 2nd most crowded city in the Interior Anatolian region and 7th overall in Turkey (SIS, 2000).

Study area environmental problems

Air pollution: Clear air is a basic condition for health. Air pollution cause respiratory problems, adverse effects on pulmonary function, leading to increased sickness absenteeism, increased use of health care services, premature birth and even mortality (WHO, 2004).

Air pollution is the most important problem in the main city centres. The sulphur dioxide (SO₂) concentration increase on some winter days over 200 mg m⁻³ and also particle matter (PM) in the air is parallel to SO₂ concentration on the same days. i.e., Konya come first as

Table 1: Population growth of Konya city between 1940 and 2000 (SIS 2000)

Year	Population	Year	Population
1940	56462	1980	329139
1950	64464	1990	513346
1960	119841	2000	742690
1970	200464	2020 projection	1311200

Table 2: Areas left for the settlement and the classes of land use capability according to the years in Konya (ha) (Önder and Polat 2000)

Years	1943	1964	1965-1970	1971-1980	1981-1990	1991-1999	Total	2020 Projection
Soil Class								
I-IV	544	1728	2784	5040	9504	6085	25141	11147
V-VIII	-	-	384	768	2640	2352	6144	4359
Total	544	1728	3168	5808	12144	8437	31285	15506

the most air polluted city with a concentration of 452.5 mg m⁻³ of SO₂ and 168.5 mg m⁻³ PM, it was the third most polluted city according to the SO₂ ratio (320.5 mg m⁻³) and the 1990-91, 1993-94 winter seasons, respectively. The city was ranked fifth based on the smoke-based pollution during the 2002-03 winter season in Turkey (Anonymous, 2003b). These are above the maximum allowable limits (150 mg m⁻³) indicated in the Turkish Regulation on Protection of Air Quality (Anonymous, 1999).

The reasons of the air pollution in Konya can be explained as follows:

Unorganized and uncontrolled urbanization; with the inadequate width of the streets, boulevards and avenues, unbalanced distribution of open and green areas, the short distances between the buildings and the inadequate basic facilities, the unorganized parcelling cause air pollution especially in the centre of city.

Industrialization; there are eight industrial districts; three of them are organized industrial districts. First, second and third organized industrial districts with TUMOSAN (Turkish Motor Industry and Corp.) are all located at the north of the city. Chrome-magnesite, sugar and cement factories and Meram Industrial District are all in the city center. The northern winds are dominant in the city during the whole year and there winds carry the ashes and the polluted air towards the city center. The emissions that come from the plants and factories, which passed the EIA pre-research and EIA inspection generally, inside the city are the main reasons of the air pollution.

Vehicles in traffic; motor vehicles are a factor for air pollution and their number in the city is approximately 184 160. Motor vehicles emit various types of air pollutant resulting from incomplete fuel combustion and from fuel evaporation including hydrocarbons, carbon monoxide (CO), nitrogen oxide (NO_x), SO₂ and particulates. The lower use of unleaded gas also increases the pollution coming from motor vehicles.

Heating, the height of the chimneys and the inadequateness of the filters; the uses of low quality fuel in the city, the application of wrong burning methods, the out-of-standard boilers and the non-periodic cleaning of boiler and chimneys, the lack of chimneys filters are the other reasons of the air pollution .

Agricultural land loss and soil pollution: Soil is dynamic living systems that are the interface between agriculture and the environment. High quality soils promote the

growth of crops and make farming systems more productive (Abdal and Suleiman, 2002). The most important and essential input in agriculture is the soil. According to scientific experimentations, it needs 250 years for 1 cm thick I. Class soil and 9000 years for 60cm depth soil to be produced under normal conditions (Taysi, 1984). The economies of the most developing countries depend proportionately more on primary industries than do developed ones. They usually have a greater proportion of their population involved in agriculture. Thus, degradation of environmental resources has the potential for being more highly destructive of productive assets in developing countries (Karaer and Gürlük, 2003).

The main reason behind the environmental problems related to soil is the misuse of the soil and agricultural lands in the city.

Due to its some favourable topography, soil and climatic conditions, the Great Konya Basin has a significant agricultural potential. Konya is surrounded by abundant agricultural areas and very productive soil from the east and south. Agriculture is excessively important in human beings life, especially in Konya. It not only provides necessary cereals, but also creates job opportunities for people around the city. Agricultural products are used as the raw material in some industrial plants and compose one of the biggest chunks of the national export.

The areas left for the city settlement cover about 544, 1728, 10704 and 31286 ha in 1941, 1964, 1980 and 1999, respectively. 25 141 ha of these areas (80.36%) are I-IV class agricultural fields and the soil loss is projected to increase 11 147 ha in approximately 20 years (Önder and Polat, 2002) (Table 2).

Excessive use of fertilizers and pesticides which cause the destruction of micro-organisms in the soil or a cessation of their activity, in agricultural activities and urban and industrial wastewater discharges into the drainage channels contribute directly or indirectly to pollution of the soil in the region. Trace elements, harmful toxic components and heavy metal residues and nitrogen, phosphate and potassium reduce the quality of the soil, resulting in reduced crop yields.

Water pollution: Throughout history water has always been considered to be a critical natural resource on which mankind's very survival depends (Biswas, 1997). Water is

essential for life and plays a vital role in the proper functioning of the Earth's ecosystems and is undoubtedly the most precious natural resource that exists on our planet. The pollution of water has a serious impact on all living creatures and can negatively affect the use of water for drinking, household needs, recreation, fishing, transportation and commerce (USEPA, 2005).

Tuz Lake is located in Konya Province boundaries. With a 110 000ha surface, Tuz Lake is Turkey's second largest lake after Lake Van and the second biggest lake in the world for salt reserve (Anonymous, 2005b). Because Tuz Lake has a very specific ecosystem and rich biodiversity, it's described as are of the 200 important ecological areas in the world in terms of biodiversity by the World Wildlife Fund (Tüysüzoglu, 2004).

Water waste, all the household, sewage and industrial waste of the buildings, factories and plants in and around the city, are drained to the lake with rudimentary discharge canal without any kind of treatment in Konya.

A project for a water waste refining system has just started and EIA studies are carried out but studies have not been completed properly in these areas. The "Konya Waste Water Treatment Project" which is supposed to build a refinement plant at the Aslim district in the North of the city, has not commenced yet (Anonymous, 2003c).

Visual pollution: Visual pollution generally refers to those elements of the landscape or townscape that the community finds unattractive, including buildings, business signs, stoplights and street signs, telephone and utility poles, graffiti, weeds, litter, unorganized urbanization and lack of green area (Önder and Konaklı 2002).

The plants in the city, which are unorganized and built without the consideration of the green and open areas, illegal constructions, the billboards that are hanging all over the buildings, other commercial boards, the unorganized stocking of the solid wastes, different kind of outer paintings of the buildings, the balcony covers which are added to the building afterwards and the groups of buildings those are not built with the green areas beneath, are the main reasons of the visual pollution

Solid waste: Municipal waste is the comprehensive waste produced in people's daily life. In the process of collection, transport and disposal, the harmful compound in the wastes will cause to air, soil and water, not only seriously influencing the urban sanitation quality, but also threatening and becoming one of the social hazards (Balch, 2003; Liwei *et al.*, 2005).

One of the most environmental problems in Konya is solid waste 883 tons of solid waste and 3.1 kg of medical waste are produced daily in Konya District. Most of this waste have considerable economic value and can be recycled reused (Anonymous, 2002). Since there is no attempt or organization to recycle, hazardous wastes constitute remarkable threat to human health. On the other hand, the organized initial classification of these wastes during the collection step and recycling them properly not only provide an economic income to the city, but also saves the environmental resources in a profitable way.

Solid waste of the city is disposed to Aslim Landfill area (30 ha), which is 7 kms outside the city, for about 25 years. The city, not only does not have a healthy and hygienic disposal area, but also the solid wastes are not collected and stored properly. The existing disposal site has potential to cause adverse impact on the surrounding environment that may create problems for human health potential impacts include water pollution by inflow of sand, silt leachate and run off from the disposal site into groundwater; air pollution by the landfill fire and blasts of the gases, unattractive smells; soil pollution by diffusion of ash and leachate; the surrounding agriculture land harm by reproduce insect pests and harmful gas.

Noise pollution: Noise pollution is by now worldwide recognized as a major problem for the quality of life in urban areas. Noise effects include various impacts on mental and physical health and disturbance of daily activities (Piccolo *et al.*, 2005).

According to the researched carried out by World Health Organization (WHO), 0 dB is the threshold value of the human hearing system. The voices between 0 and 30 dB do not have any harm. The noises, which are between 30 and 60 Db, might result in physiological problems depending on the person affected. The consequences of the noise levels between 60 and 85 have an effect of on physiological, physical and ontological. The noises over 120 dB causes pains in the ear and heavy distortion of nerves (WHO, 1980).

The most important noise source in the city is motor traffic, with around in the city center. The growth in construction activities in Selçuklu district which is urban grow area and three organize industry has also cause a considerable increase in noise pollution (Gür and Önder, 2000), (Table 3).

According to measurements performed in residential and industrial areas and along traffic routes was above the maximum allowable limits (70 dBA) indicated in the Turkish Regulation on Control of Noise Pollution and represents high risks against public health (Anonymous, 1999).

Table 3: The noise values recorded from the different locations in Konya (dB) (Gür and Önder 2000)

Locations	Noise values	Locations	Noise values
Form intersection	81-91	Girls high school	76-86
Meram street	80-90	Public hospital	70-80
Bus terminal	80-90	Birth hospital	74-84
Nalçac1 street	77-82	Cultural park	78-80
Municipal building	81-91	I.organized industrial district	80-90
Gazi primary school	77-87	II.organized industrial district	100-110

RECOMMENDATIONS

Human beings constantly derive benefits from environment to provide their needs and the environment has basically been used to expand the habitat and to improve the quality of life (Sudarmadi *et al.*, 2001). The uncontrolled and uncoordinated usage of environmental sources resulted in many environmental problems. Especially in urban settlements continuous demand for housing and infra-structural development and urban activity have put great pressure on the city environment (Li *et al.*, 2001). Urban development alters soils, water flow, water quality and air quality. The future of our cities depends on our ability to conserve and use our resources wisely (Botkin and Beveridge, 1997).

Beginning with 1980's, educational, commercial and industrial developments in the city of Konya and its surroundings resulted in an accelerated immigration from towns towards the city center. As a result Konya faced environmental problems such as air pollution, water pollution, agricultural land loss and soil pollution, noise pollution, visual pollution and rapid growth and its effects created an urgent need for environmental control.

Some important recommendations are proposed for the reduction and control of environmental problems and their negative effects, because the protection of the environment is not only important for a better life for mankind, but also impact economic development:

- Environmental education has a very strategic and important role in preparing people to solve global environmental problems. People need continued education, especially in the environmental area, because the environment has been advancing rapidly (Sudarmadi *et al.*, 2001). In order to have well-educated and concerned people about the environmental issues, environmental issues should be included into the national education syllables. This integration is helpful, necessary and even mandatory. Present program should be revised to include classes and programs in all of the schools including the primary schools.
- Environment and related issues are concerns of all the educational facilities at any level. The top level politicians, executives, administrators and all the other entrepreneurs should also be educated about the environment. One of the basic properties of the environmental education is the need for a close

relation between the inter-discipline and inter-professions. Inter-discipline education requires different views and approaches to the same topic.

- Environmental planning is considered not to be a luxury but a base stone for developmental planning. Hence, before starting any project a study to evaluate the environmental impacts has to be conducted, as part of the other feasibility studies.
- Industry plays a vital role in the progress of societies. It provides for the possible improvement of welfare. Yet industry negatively impacts on environment as it exhausts the natural raw resources and produces pollution; pollution that can affect these resources remaining. This has created environmental imbalance (Abdul-Wahab and Al-Araini, 2004). To assess potential environmental impact of an industrial plant, EIA needs to be carried out and the industrial plants that do not have EIA should be warned.
- Storage facilities for solid wastes should be built in the city. The necessary actions should be taken to integrate the solid waste storage facility, which is very close to the city, to the nature.
- The waste water recycling project should be exercised and a recycling center should be built to reduce water pollution in the Tuz Lake.
- Environmentally friendly products should be made cheaper to encourage people to use them and people should be educated to a level that they can realise the long term advantage of using these products nationwide.
- Protecting soil properties and assets, like protecting air and water quality, should be a fundamental goal of national environmental policy (Abdal and Suleiman, 2002). In order to minimise the misuse of the productive agricultural land due to the uncontrolled and disorganized urbanization, national land use and conservation policies need to be developed, considering the suitable management practise and capabilities of soil and legislative together with socio-economic factors and detailed soil and land use and quality maps need to be prepared along with appropriate modelling.
- To prevent the visual pollution, enough green areas and parks should be built, the municipal should collect the wastes in an organized way and commercial boards and other billboards should be regulated and controlled.

- In order to protect from noise pollution, the open markets, bazaars, recreation and amusement facilities, schools and parks inside the city should be surrounded by trees and other plants, which will not be unorthodox to the architectural body of the city. The industrial districts and plants should be surrounded by green areas.
- When urban land-use decisions are given, the appropriate professional disciplines, especially the landscape architectures, should be involved by the municipality. The planning authorities should include ecological factors in planning to provide a healthy and clean environment.
- In any kind of application studies, the professional staff including the landscape architects should be involved.
- For fresh and healthy air, the number and quality of the green areas and parks should be increased.
- Local administrations should be concerned about providing the means (e.g., books, brochures, seminars.) for the education of the local people which will be a good starting point for people to understand the importance of the environmental problems.
- Printed and electronic media (including the internet) is the main source of information about environmental issues (Sudarmadi *et al.*, 2001; Fien *et al.*, 2002). The mass media should therefore be used more intensively to facilitate the transmission of environmental information and promote more positive environmental attitudes.
- Finally, in order to produce the effective solutions for environmental problems, establishment of a national approach towards the problems and it is crucial to work towards an integral dimension in which social, political, economical.

REFERENCES

- Abdal, M.S. and M.K. Suleiman, 2002. Soil conservation as a concept to improve Kuwait environment. *Arch. Für Nat.-Lands.*, 41: 125-130.
- Abdul-Wahab, S.A. and A. Al-Arairni, 2004. Environmental considerations in urban planning. *Intern. J. Environ. Studies*, 61: 527-537.
- ACIR, 2005. Air Conditioning Industry Report. The research report on Konya's air conditioner industry. Konya.
- Anonymous, 1998. Environmental Pollution'99. Turkish Environmental Cognizant Publish:131, Önder Publisher, Ankara.
- Anonymous, 1999. Turkish Environment Legislations. Turkish Environment Foundation Publications, No: 134, Ankara.
- Anonymous, 2002. Solid waste and medical waste inventory study in Konya province. T.C. Konya Governorship Environmental Office, Konya.
- Anonymous, 2003a. Konya Agriculture Master Plan. Konya Agriculture Province Office, Konya.
- Anonymous, 2003b. Konya Province Environment State Report. Konya Governorship Province Environment Direction Publication, Altunnar Publisher, Konya.
- Anonymous, 2003c. Konya Wastewater Inventory. Konya Governorship Province Environment Direction Publication, Konya.
- Anonymous, 2005a. Turkish Republic Konya Governorship. Available online at: www.konya.gov.tr
- Anonymous, 2005b. Tuz Lake. Private Environment Conservation Publication, Available online at: <http://212.174.147.185/Bolge-Goster.asp?Bolge-10=16>
- Balch A., 2003. Waste management in California: An Analysis of Diversion Policy and Programs Ph.D Thesis. University of California, Santa Cruz., pp: 449.
- Bentley, J., 2000. The 1st National Environmental Pollution Control Symposium. Opening Speech. METÜ. Ankara.
- Biswas, A.K., 1997. Water development and the environment. *Water Resources Development*, 13-2: 141-167.
- Botkin, D.B., C.E. Beveridge, 1997. Cities as Environments. *Urban Ecosystems*, 1: 3-19.
- Buchwald, K., 1980. Umwelt und Gesellschaft zwischen Wachstum und Gleichgewicht', Buchwald/Engelhart (Hrsg.) *Handbuch für Planung. Gestaltung und Schutz der Umwelt. Band 4*, BLV, 1-32, München, Wien, Bern.
- Cooklin, C., M. Keen, 2000. Urbanization in the Pacific: Environmental change, vulnerability and human security. *Environmental Conservation*, 27: 392-403.
- Çelik, C., 2002. Urbanization and Religion. Çizgi Publisher, No. 41, Konya.
- Çepel, N., 2003. Ecological problems and solutions. TÜBİTAK Book's Seri: 180, Ankara.
- Çetik, R., 1985. Interior Anatolia vegetation and ecology. S.Ü.Publish No. 7, Konya.
- EEA, 1998. European Environment Agency, State of the European Environment. Copenhagen.
- Fien, J., I. T-C. Poh-Ai, D. Yencken, H. Sykes and D. Treagust, 2002. Youth environmental attitudes in Australia and Brunei: implications for education. *The Environmentalist*, 22: 205-216.
- Geoh-Chin, T., C. Kim-Eng Lee and G. K. Chuan, 1998. A survey of environmental knowledge, attitudes and behaviour of students in Singapore. *Intl. Res., Geograp. Environ. Edu.*, 7: 181-202.

- Gür, K. and S. Önder, 2000. Some biological measures to be taken in order to reduce the impact of noise pollution in Konya. 3. GAP Engineering and Architecture Congress Proceeding Book, pp: 286-294, Urfa.
- Hall, P. and U. Pfeiffer, 2000. Urban future 21: A Global agenda for twenty first century cities. E. and F.N. Spon: New York.
- Karaer, F. and S. Gürlük, 2003. The Agri-environment-economic relationships in the developing countries. Dogus University J., 4: 197-206.
- Kemp, D., 1998. Environmental Dictionary, London, UK, pp: 201.
- Konijnendijk, C.C., 2000. Adopting forestry to urban demands role of communication in urban forestry in Europe. Landscape and Urban Planning, 52: 89-100.
- Konyalı, I.H., 1964. Konya history. Yeni Kitap Publisher, Konya.
- Li, X., C. Poon and P. Liu, 2001. Heavy metal contamination of urban soils and street dusts in Hong Kong. Applied Geochemistry, 16: 1361-1368.
- Liwei, Z., Z.Hualin and X. Yougming, 2005. Current situation and management counter-measures of municipal waste in China. Available online at: www.sb.se/at/Sardina_99/s99%20Y/Yougming.pdf.
- Opocu, S.A., 2001. Environmental impact assessment in developing countries: the case of Ghana, Environmental Impact Assessment Review, 21: 59-71.
- Önder, S. and A.T. Polat, 2002. The mis-use of the agricultural lands in Konya and necessary of land use planning. Agriculture and Water Protection, Development and Management in Water River Basin Symposium, 18-20 September 2002, pp: 631-634, Hatay.
- Önder, S. and N. Konaklı, 2002. Visual pollution and a research on studying at sample of Konya city. S.Ü. Agric. Fac. J., 16: 28-37, Konya.
- Öztan, Y., 2004. Culture and perception of environment. Living Environment and Landscape Architecture, ISBN: 975-96507-3-8 Tisamat Publisher, Ankara.
- Piccolo, A., D. Plutino and G. Cannistraro, 2005. Evaluation and analysis of the environmental noise of Messino. Applied Acoustic, 66: 447-465.
- SIS, 2000. State Institute of Statistics. Interim result of the 2000 general population census. Office of the Prime Minister Republic of Turkish State Institute of Statistics. Available online at: www.die.gov.tr
- Sudarmadi, S., S. Suzuki, T. Kawada, H. Netti, S. Soemanti and A. Tritugasawati, 2001. A survey of perception, knowledge, awareness and attitude in regard to environmental problems in a sample of two different social groups in Jakarta, Indonesia. Environment, Development and Sustainability, 3: 169-183.
- Taysi, I., 1984. Growth land in Turkey and concerned legal studs. Preventing of the Mis-use of the Agricultural Land Seminars. Environment Undersecretary of the Office Prime Minister, Republic of Turkey, Seminar Serial: 8, pp: 98-115. Ankara.
- Tüysüzoglu, B., 2004. Tuz Lake. Science and Technique Journal. June, pp: 52-56, Turkey.
- USEPA, 2005. Water pollution. US Environmental Protection Agency, Available online at: www.epa.gov/ebtpages/water/html
- WHO, 1980. World Health Organization. Noise-World Health Criteria-12. Publication- Genova.
- WHO, 2004. World Health Organization. Health aspects of air pollution results from the who project. WHO Regional Office for Europe. DK 2100. Copenhagen Denmark.
- Zetter R. and A. Hassan, 2002. Urban economy or environmental policy? The case of Egypt. J. Environ. Policy and Planning, 4: 169-184.