

AN INVESTIGATION OF THE NATURAL AND ARTIFICIAL ENVIRONMENTAL PROBLEMS OF CONVERTING URBAN SETTLEMENTS INTO INDUSTRIAL AREAS

Yaşar Bahri ERGEN^{1*} , Mustafa ERGEN² 

¹ Siirt University, Faculty of Fine Arts and Design, Department of Urban and Regional Planning, Siirt\TURKEY

² Siirt University, Faculty of Fine Arts and Design, Department of Architecture, Siirt\TURKEY

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Highlights

- The industrial investments that are necessary for a nation's development should consider the interaction between the natural environment and the living space regarding environmental problems.
- An analysis of this area's natural structure and its interaction with the building of thermal power plants shows that natural environment and urban living spaces are primarily damaged.
- The inclusion of industrial areas into the physical plans should be done after this process within a plan decision stage

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Abstract

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Site selection for industrial areas that have been formed or intended to be formed despite several disadvantages in order to create a workforce employment or a national economic resource in related settlements after the formation of the cities in Turkey disregarding the environmental problems has a negative effect on the environment and the people living in cities, which is one of the important national issues to be discussed. In Turkey, fragmented planning system that lacks a planning integrity creates environmental problems, which may harm natural areas and habitats. Although urban settlements can be limited by threshold analysis, which is the basic theory of planning, the rule of minimum intervention in the environment is neglected in industrial and mining areas. This study aims to examine the investments, which do not cause environmental problems due to national economic development and regional, urban or rural planning, and take the current facilities under control.

KENTSEL YERLEŞMELERİN SANAYİ ALANLARINA DÖNÜŞTÜRÜLMESİNDE DOĞAL VE YAPAY ÇEVRE SORUNLARININ İNCELENMESİ

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Endüstriyel alanlar için yer seçimi bir çok dezavantajı içinde barındırmasına rağmen örneğin iş gücü istihdamı ya da ulusal ekonomik kaynaklar, Türkiye'de kentleşmenin oluşmasından sonraki yerleşim dezavantajı durumları karşısında endüstri alanları oluşturulmuştur ya da oluşturulmak niyetindedir. Göz ardı edilen çevresel problemler çevre üzerine ve toplumun yaşamına negatif etki yaptığı tartışılan en önemli ulusal konulardan birisi olmaktadır. Türkiye'de, parçalı planlama sistemi planlama bütünlüğündeki eksikliklerden dolayı çevresel problemler yaratmakta ve doğal alanlar ile habitatlara zarar verebilmektedir. Kentsel yerleşmelerde planlamanın temel teorisi olan eşik analizi ile sınırlı olabilmektedir, endüstriyel ve maden alanlarında çevreye minimum müdahale kuralına uyulmamaktadır. Bu çalışmanın amacı kırsal, kentsel bölgesel planlama ve ulusal ekonomik gelişime bağlı neden olduğu çevresel problemlerin ve güncel imkanların kontrol altına alınmasını sağlamayı araştırmaktır.

1. Introduction

Urbanization involves a process that is related to population growth and corresponds to the enlargement of the settlements in urban areas. Regarding the analysis of the urbanization process, it is commonly known that the growth of population in a given urban settlement depends on economic investment. Industrial investments are thus an important input for the phenomenon of urbanization. Industrialization creates employment opportunities for the labor force when realized in a planned manner but turns out to be a source of environmental problems for urban areas and natural sites in its vicinity when it is unplanned. Obviously, partial planning practices in Turkey that are planned but have no planning integrity cause environmental problems, leading to negative outcomes for natural sites and living spaces. For instance, the rule about making minimum intervention in the environment in industrial and mining areas is ignored even though it is commonly known that urban settlement can be limited by means of threshold analysis, which is the main theory of planning.

A country's development brings out the need for economic planning in addition to the utilization and improvement of natural and technological resources. For this reason, the political power that rules the country should primarily decide on a development plan, and make an economic plan for technological resources as well as the natural resources that are located over and under the ground. If, for instance, making investments in the natural environment is a countrywide need, it should be a prerequisite to obtain optimum benefit with minimum intervention and the support of technology. It is clear that there is no planning in Turkey that follows these criteria. When industrial investments are to be made for national development, the type of industry should be analyzed regarding its harm to the environment. Also, the raw material sources of the industrial product and the product's relation with the production labor force should be determined by means

of country planning, which is the upper scale plan. Since this subject is not improved in the ministries of the state and determined by planners after bidding on the free market in plans with 1/100,000 or similar scales that include the direct physical plan, this issue creates the first stage of environmental problems.

2. Country Planning And The Issue Of Planning Integrity

Country planning is an obligation for the development of any country. Therefore, the dilemma of cost and benefit should be delicately balanced within this obligation. Investments are necessary for the development of countries. If it is a must to make these investments as types of industry, then the foundation of the planning should be the balance between the economic revenue of the investment and the value of the expenses that are to be made to obtain this input. An industrial investment affects two primary areas by the selection of location:

- 1-the natural environment
- 2-urban settlement areas (e.g., villages, towns, counties, provinces) in the investment site

This interaction is important due to the problems it did and will create as well as the economic contribution it will make. Thus, it is necessary to work on both of these subjects when conducting environmental impact assessments for industrial investments. This study should be conducted for the entire country by the state that prepares development plans and should be followed as strictly as the constitution rather than conducting it for the private sector individually. This necessity was brought by the foundation of the republic, while it was deviated later from the objectives above during its survival to date, with the step made on February 17, 1923 being forgotten. Apparently, two relevant decisions, which are among the most important decisions of the Turkish Economic Congress that was held in İzmir between February 17, 1923 and March 4, 1923 (Anonymous, 2009, s. 6) and made Turkey one of

the first countries to implement planned development were:

1. to establish industries using raw materials that grow or can be grown within the country, and
2. to transition from handcraft and small-scale manufacturing to factories and large businesses.

These decisions shaped the economic development strategy of the nation. Industrial investments were initiated in accordance with these decisions. The relevant Turkish Economic Congress decisions, which initiated this process, began to be implemented in physical areas across the entire nation, and investment, the main element of urbanization, led to labor force and employment. An evaluation of the practice that was made in context of country planning shows that urbanization was implemented in a planned manner, and economic development was ensured by adapting it to the settlement where it was located with the assistance of correct industrial area selection and without creating any type of income. For instance, the Malatya Fabric Factory, the İzmit Paper and Cardboard Factory and the Karabük Iron and Steel Factory were established in 1937 (Anonymous, 2018a). In 1935, the Nazilli Printed Cloth Factory was established. The Alpullu Sugar Factory, the Uşak Sugar Factory and the Kayseri Airplane Factory were established in 1926 (Anonymous, 2018a). The first rolling mill that manufactured construction iron was established in İstanbul. The Bakırköy Cement Factory was established in 1926 (Anonymous, 2018a). These industrial investments were organized in a highly planned manner like a town regarding raw materials, settling the labor force (public housing units) and other components.

Since the industrial investments that were required by the domestic economy during the foundation of the republic were implemented in a planned manner, the investments were located in harmony with the natural

environment and in a way that created opportunities rather than problems for urban settlement areas.

Apparently, the permissions that are given for industrial investments today after environmental impact assessments are themselves a main source of environmental problems because this practice gives a decision whether to make the investment by making a so-called assessment of the impact on the environment, yet it is the greatest mistake that the investor has this report written. Nevertheless, investment, selecting the location of the investment and the investment's interaction with its environment are important as the main sources of planning. It is commonly known that these issues are ignored today. The reason for this is that investment is regarded only as daily revenue, while this is a harmful practice that will destroy humanity, gives permanent damage to the nature, but is still necessary due to its benefits to people. Therefore, the political power of a country should definitely put into writing a self-determined economic development model, and then write a Physical Plan for National Investments in accordance with the joint studies of government units and universities on the relevant subjects. Environmental impact assessments should be conducted in line with these studies, and investors should apply to make investment considering these appropriations.

3. Labor Force Employment And Environmental Problems In Urbanization

Urbanization is the artificial rearrangement of a natural site. Thus, it is a necessity of planning to form the residential area in urbanization with sensitivity towards the natural and artificial environments. The interaction of urbanization, population, residential areas and labor force employment is the foundation of this planning. However, this rule is always ignored, which leads to environmental problems due to careless intervention into the natural environment or the unplanned and careless use of the artificial environment in the stage of

business. It is commonly known that Turkey is rich in transportation opportunities and resources, and is one of the top countries in the world regarding underground resources. In the modern day, certain industrial investments, including hydroelectric plants, stone quarries, marble quarries, and gold, boron, silver and iron mines, nature is being damaged primarily due to mistakes regarding location selection in environmental impact assessment reports as previously explained (Figure 1).



Figure 1. The Destruction of Natural Areas,
Source: Biber, 2013

These problems harm both the natural environment and human beings that are to be served by the industry, forming areas of environmental problems (Figure-2)

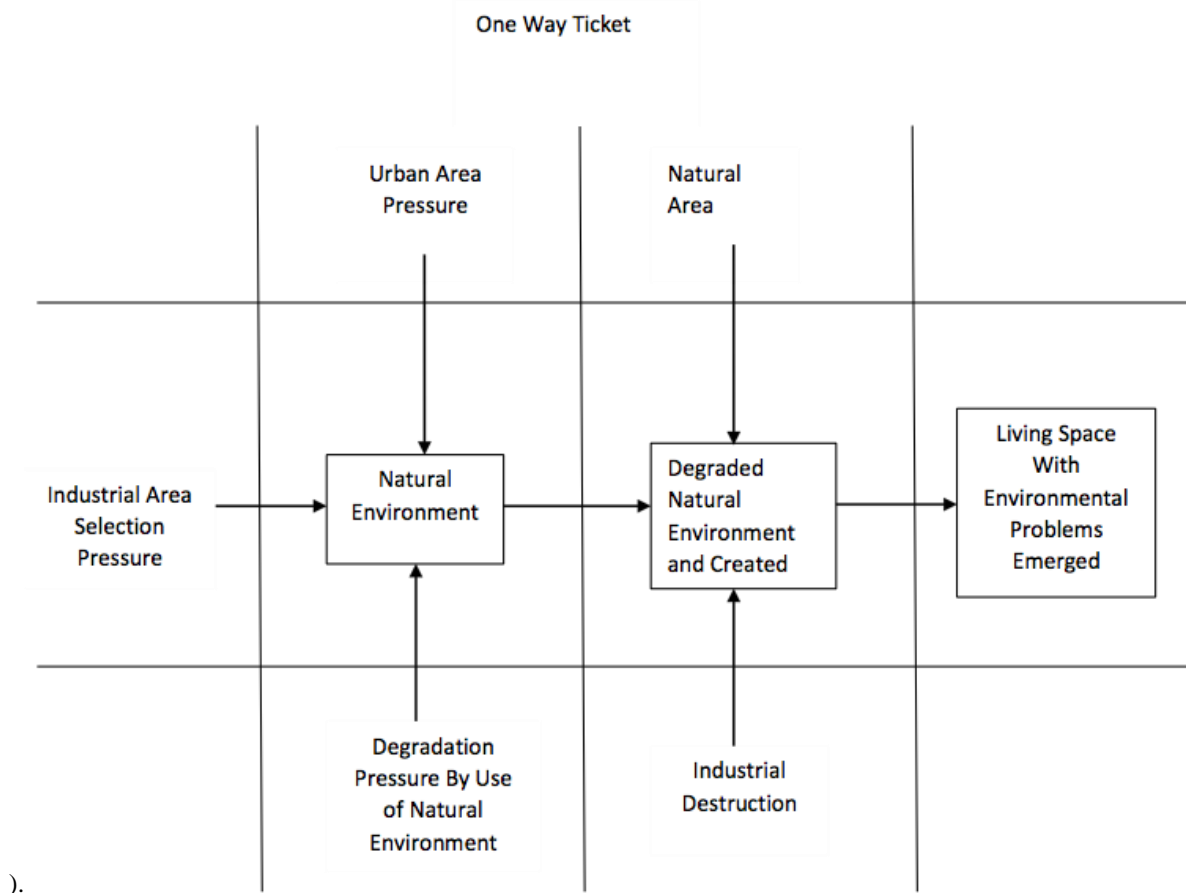


Figure 2. Process of Urbanization and Environmental Problems

This cycle reminds one of the rhyme about the road with no return since it was built up on a balance with the ecosystem in the natural structure (the flora and the

fauna) in a process of millions of years. It can also be destroyed in a very short period of time. The unplanned interventions into the environment in Turkey that are

based on income should always make us recall the similar interventions in the African continent that made living beings almost disappear.

Urbanization definitely has the most important part in the formation of environmental problems since it requires population growth, housing areas for the residence of this growth, and working areas due to the employment of the labor force. These activities are all complementary. It is known that urbanization requires intervention in the natural environment, and if the use of the natural environment is not balanced, this forms

the source of environmental problems. It is possible to control the living environment by minimizing intervention in the environment through making this development in a planned manner. However, national economic policies become the source of the greatest environmental problems if they are not adapted to the environment. National development plans are closely related to environmental problems by population growth and movements, the use of resources above and under the ground, the selection of work sites for the labor force, especially industrial sites, and the phenomenon of urbanization (Figure 3).

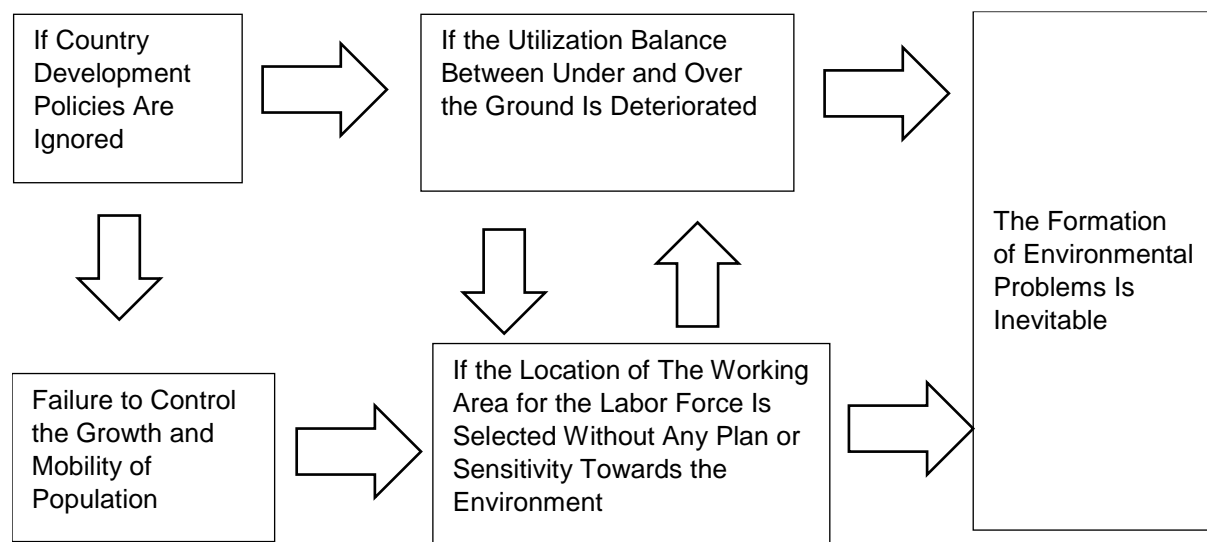


Figure 3. Country Development Policy - Environmental Problems

Figure 3 shows that harm to the natural and artificial environment is inevitable as a result of the transformation of urban settlement areas into industrial sites, and the lack of a national development plan that is sensitive to the environment or failing to follow this type of plan.

4. Materials And Methodology

4.1. Materials

Zonguldak-Bartın-Karabük TR81 Area (the ZBK Area) is located in Western Black Sea area of the Black Sea Region. As Map 1 shows, the 1/100,000 scale Environmental Organization Plan of Zonguldak-

Bartın-Karabük TR81 Area was designed as a plan that was not a country-based regional energy area. This area (Figure 5) was determined as the area for energy since this area was not decided as the national large energy area within the first 1/10,000 scale Environmental Organization Plan (2003) and there was a change of plan in 2004. The investments were initiated with a minor change of plan without an integrity of planning, and then, “*The Zonguldak Province Environmental Organization Plan With 1/25,000 Scale that was confirmed on 6 July, 2017 was displayed on 19 July, 2017 on the bulletin board of Environment and Urbanization Provincial Directorate on the fourth floor of the Zonguldak Governorship Building as well as the*

website of the Zonguldak Environment and Urbanization Provincial Directorate (www.csb.gov.tr/iller/zonguldak) for 30 (thirty) days.” (Zonguldak Governorship Environmental and Urban Planning Directorate, 2017). The Environmental Organization Plan was subjected to a revision in 2017, and the area was described as an energy area in the plan (Figure 6). The area is mainly surrounded by forest areas, and its topography has steep slopes. The land structure of the area is rough and involves natural thresholds, which entails certain costs and insurmountable limits. Topography, sea and land are the most important natural thresholds that should be considered in industrial investments.

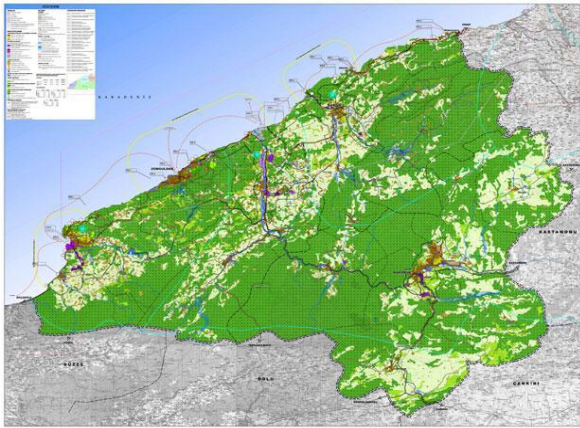


Figure 4. Zonguldak-Bartın-Karabük TR81 Region 1/100000 Scale Environment Plan (Source: General Directorate of Spatial Planning, Ministry of Environment and Urban Planning, 2017: 2)

4.2. Methodology

The environmental problem in the living space caused by the transformation of urban settlement areas into industrial investment areas began with the current industrial area selection, and this is a planning mistake that needs to be known and is a great deal not be known. The material related to this issue is Zonguldak Çatalağzı Thermal Power Plants Area that was taken under preservation and is anticipated to become a large industrial plant. It is an important example for demonstrating how environmental problems occur. This area is full of steep slopes and limited to an area

between the Black Sea and the forest. Çatalağzı Işıkveren settlement was selected in 1948 as coal-based thermal power plant, which is consistent with the coal capacity in the area. This was planned as an investment that would be based on national resources, and give minor harm to the natural structure. Yet, this area was announced as a thermal power plants area by the state (Environment and Urbanization Ministry) in 2003 and 2004 through a change of plan without conducting any analysis and research or considering the integrity of the plan (Figure 5). Currently, the area is hosting thermal power plants that are above its capacity, and the fuel sources of the thermal plants are based on foreign sources rather than domestic ones. Since this area is currently full to capacity, the building of an additional power plant is undoubtedly dependent on the excavation of a sloped area of millions of cubic meters. This destruction of nature is also anticipated to be performed by certain interventions including a change in the natural structure beyond the establishment, and the excavation the physical area. The appropriateness of this addition is provided by the environmental impact assessment report being written by the investment applicant, which is a document of unplanned location selection. Zonguldak Çatalağzı Doğancılar District (Figure 8) was determined to be appropriate by the environmental impact assessment report. It is clear that the harm that would be given to the environment and living being, especially humans, is being ignored by the decision to remove the sloped topography by excavation and bringing this district to sea level.

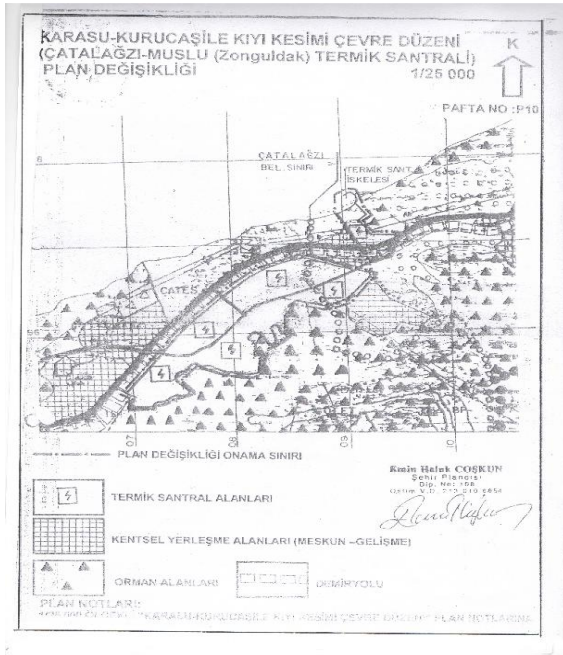


Figure 5. Zonguldak Çatalağzı Energy Area Plan Change (Source: Çatalağzı Municipality, 2005)

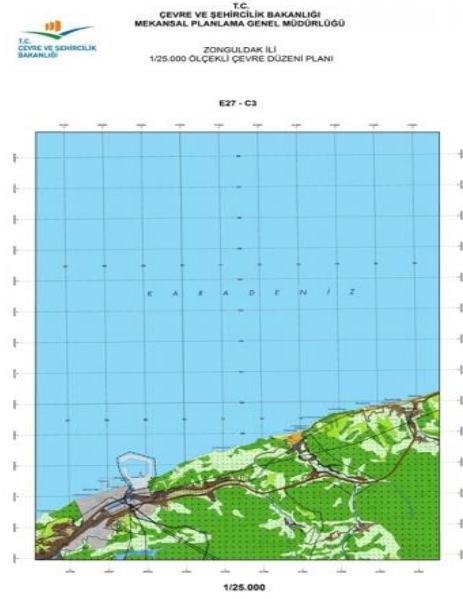


Figure 6. Zonguldak Environment Plan (Source: Zonguldak Governorship Environmental and Urban Planning Directorate, 2017)



Figure 7. Topographic Map of Zonguldak Çatalağzı Energy Area (Source: Çatalağzı Municipality, 1990)



Figure 8. Zonguldak Çatalağzı Doğancılar Neighborhood



Figure 9 .Ömerağzı Sea ve Forest

This means that investments in the development of the country must also have an EIA report for such investments before the country, region, city and rural area planning.

5. Discussion

The Environmental Organization Plan Change in Zonguldak Çatalağzı Energy Area, which ignored the planning hierarchy, is a bad decision. To prevent damage to the natural and urban environment by the four thermal energy power plants that are currently active, it is obligatory to solve the problems created by:

1. warming that can lead to a change in climate,
2. noise that has a negative effect on living beings,
3. ashes and particles produced by the burning of coal.

The change in the plan addressing the thermal power plants as the energy area is a change that was made without visiting the area because considering a 100-meter high hill as non-existent together with its natural vegetation cover and reflecting it as a sea-level area shows that even SWOT analysis was not conducted. It is a fact that no threshold analysis was conducted in the area with on-site research and detection since it is necessary to determine in threshold analysis the areas

that are and are not suitable for construction, which were completely ignored. It is a mistake that the environmental impact assessment reports of the area were not written before the change of plan was made to select the area as an energy area, and it is a planning mistake to have environmental impact assessment reports written for each thermal power plant by the private sector.

6. Conclusion

An analysis of this area's natural structure and its interaction with the building of thermal power plants shows that natural environment and urban living spaces were primarily damaged:

- 1-The natural structure of the area was destroyed, and the average area of green space per person was reduced by these practices while it was already the lowest in the world (Table 1).

Table 1: Green Space Standarts in the Countries around the World (m² for per person) (Aksoy, 2001; Öztürk ve Özdemir, 2013)

	Green Zone Nearby to Urban	Urban Park	Neighbourhood and District Parks	Playground	Sport Area	Total
Sweden	48,1	23.8	-	5.6	10	87.5
America	60	13-20	3.9	-	-	77.84
United Kingdom	8	40	20	-	10	78
Italy	18	11.6	5.5	3.2	7.5	45.8
Netherland	30	9	-	-	6.5	45.5
Poland	17.5	5.3	15	-	7.5	45.3
France	10	10	4.2	3.5	8	35.7
Turkey	-	3.5	2	1.5	3	10

2-The energy area that was located in integration with urban areas destroyed living beings and urban population. In this stage, the harm to be given to the environment in the entire future is being described. This damage starts from the close environment and is not possible to compensate. It is a commonly known fact that the rates of green spaces in urban areas is almost zero and is being slowly eliminated by these practices (Table 2).

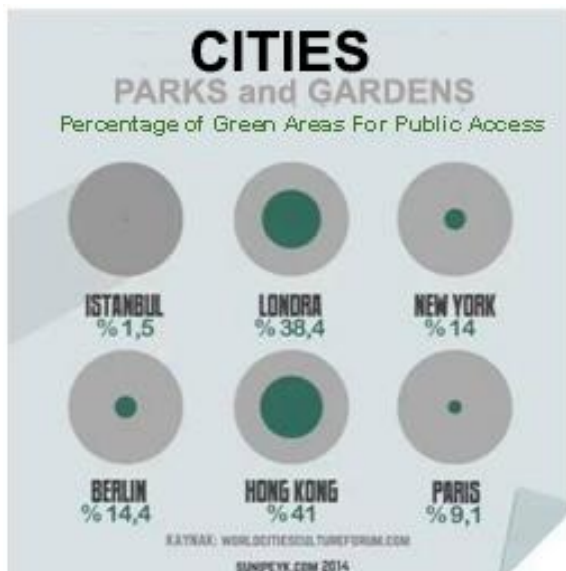


Figure 10. Comparisons of the ratio of the green area in the world to cities (Source: Anonymous, 2014)

In general, the industrial investments that are necessary for a nation’s development should consider the

interaction between the natural environment and the living space regarding environmental problems, and select locations based on a cost-benefit analysis. The inclusion of industrial areas into the physical plans should be done after this process within a plan decision stage since the area that was selected as the subject of this study was determined to be used as an energy area in common. Clearly, natural areas are the source of life for all living beings. Nevertheless, forest areas are required for the preservation of the ecological balance because (Anonymous, 2011):

- Forests lower the temperature 5 to 8 degrees in summer and increase it 1 to 3 degrees in winter. They fix the rate of moisture.
- One hectare of spruce tree forest absorbs 32 tons of dust, while this value is 68 tons for a beech forest and 40 tons for a pine forest.
- Approximately 50 species of birds live in an area of leaved trees.
- Forests have eight times more humus (dark organic soil that is formed by the decomposition of plants) than an area with no trees.
- A 25-meter tall beech tree produces 1.5 kg of oxygen per hour.

- A 100-year-old beech tree absorbs in an hour the carbon dioxide released by 40 people.
- It also absorbs 30,000 liters of water per annum and prevents erosion.

In accordance with these aspects, it is necessary to write the environmental impact assessment reports first to produce the planning data, and then proceed to the planning stage if a nation is to select a location for industrial areas and especially determine a countrywide development objective related to energy production areas.

Zonguldak Çatalağzı Area, which was selected as the example in this study, was selected due to the presence of a thermal power plant without the preparation of a national development plan, and the lack of this plan paved the way for future environmental problems. Radiant ash mountains are rising (Anonymous, 2013) from power plant that is evidence of unplanning approaches in the area. Obviously, this decision being made without an environmental impact assessment report is the result of having no plan rather than the result of planning (Figure 11).



Figure 11. Thermal Power Plants in Zonguldak Çatalağzı Energy Area (Source: Kocaaslan, 2015)

The four thermal electricity plants in this area clearly damage the environment due to an increase in the rate of ashes, waste problems and a change in the climate that is caused by warming. It was previously mentioned in this study that the thermal electricity plants in the area that cause this environmental problem have a

Table 2: Contaminating Parameters and Their Health Effects (Anonymous, 2018b)

CONTAMINATOR	MAIN SOURCE	HEALTH EFFECT
Sulfur dioxide	Burning fossil fuels	Respiratory system diseases
Nitrogen oxides	Vehicle emissions, high temperature combustion	Ophthalmologic and respiratory system diseases, acid rain
Particulate Matter	Industry, fuel burning, agriculture, and secondary chemical reactions	Cancer, heart problems, respiratory system diseases, increased infant mortality rates
Carbon monoxide	Incompletely burnt fuels, vehicle emissions	Reduction in the capacity to carry oxygen after getting combined with the hemoglobin in blood, death
Ozone	The transformation of nitrous oxides that are generated by traffic as well as volatile organic compounds (VOCs) due to sunlight	Respiratory system problems, irritation in eyes and nose, asthma, reduction in bodily resistance to disease

negative effect on the forest areas which are necessary as the ecology of the environment. Without precautions, this type of establishment will have higher for the living beings in the natural environment as well

contaminating parameters and health effects as shown in Table 3 and a negative effect on living beings

To conclude, air pollution can be identified as the most important and dangerous type of impact by the environmental problem in natural and urban areas. This is due to the fact that air pollution is the most ignored type of environmental pollution, yet this is until it harms living beings. After it reaches the level of damage, it has very high compensation costs. Clearly, the environmental problem created by air pollution upsets the natural ecological balance by affecting the flora and fauna in natural areas and causing problems in human health in urban areas. The factors of this environmental problem in these two significant impact areas are:

- urban plan and type of settlement
- human activities in the city
- geographical conditions
- climatic and meteorological factors.

Conflict of Interest:

The authors declared that there is no a potential or existing conflict of interest between their scientific work and their personal situation.

Authorship:

All authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. The authors declared that only the abstract of this material was published at the Ecology Symposium 2018 in Kastamonu. Furthermore, each author certifies that this material or similar material will not be submitted to or published in any other publication.

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