

EXAMINATION OF USE OF WATER AND SOIL RESOURCES IN TERMS OF URBAN SUSTAINABILITY

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Cities are the organization of “collective consumption” and of welfare delivery and are the major consumers of renewable and non-renewable resources. The rapid urbanization process and its chaotic problems such as drastic urbanization and ecological challenges have been phenomenal. As the population rapidly rises in the world, the requirements for water resources also increase for various reasons at the same time. On the other hand, global warming, greenhouse effect and degradation of forests make worse the situation. However, these negative consequences show how we are going to face the tragic problems for the next two or three decades. While the term of sustainability is defined and connected only with the environment now it is explained with a comprehensive term undertaking not only the environment but also the social, economic, cultural and governance aspects of cities. Sustainability has been discussed at various meetings for years such as the UN meeting “the Earth Summit” which took place in Rio in 1992 and emphasized that cities should be liveable in terms of costs, social equity and the ecology, which are the three major principles of sustainable development, but concrete and applicable results have not been achieved yet. In this study use of basic resources in particular water and soil will be analysed and examined based on sustainability and its major components such as economic, sociologic, ecologic within the limits of the paper. The study will also be evaluated through the balance of protection and use of resources considering certain samples in the context of Marmara Watershed in Turkey and Istanbul in particular. Literature reviews, quantitative and qualitative information, reports prepared by the institutions, statistics, and observations have been chosen and used as the method. Solutions and proposals will also be suggested based on the findings.

Keywords: Urbanization, Ecosystem, Watershed planning, Water resources, Sustainable use, Tragic problems.

1 INTRODUCTION

Deterioration and pollution, as a result of pressure on the natural resources of the world's population increases in natural resources, has necessitated all countries, especially UN, to take precaution. Human and Environment Conference held in Stockholm in 1972 can be considered as the first study in this regard. In the following years on a global scale, many international meetings were held under the leadership of the UN and many important decisions were held. In 1992, important leading decisions were taken in this regard at Rio Conference and an action plan called Agenda 21 was

adopted which aims progress and environmental protection for actualizing of the sustainable development concept and the expression of the highest level of the global reconciliation and analytic commitment. The EU member countries have also started necessary works and have taken binding decisions for member countries. Within this framework, necessary works were initiated in Turkey, which was aimed at environmental protection for sustainability.

In 1963, Eastern Marmara Region Planning Work, which is the first regional plan for Marmara Region, has not been approved by any institution. The plan remained as the planning work of Istanbul Metropolitan Municipality. The issues such as, Istanbul's growth is inevitable and this should be encouraged, are indicated in the plan target. The second regional plan called Marmara Regional Plan, has been initiated after the 1999 Marmara Earthquake. The main objective of this plan can be specified as; elimination of damage caused by the earthquake in the region, balancing the migration, land use planning; issues such as agriculture, industry, trade, tourism considering the seismic risk of settlements, control urban growth in order to protect the environment and place values. In the following years, İstanbul Development Agency (İSTKA) was established and prepared regional development plan 2010-2013, approved by the Ministry of Development, for İstanbul. As the basis for these plans, it is anticipated that Istanbul is having high value-added economy, finance and trade centre; innovation in the industry, a structure producing high technology and high added value, accessible education for all as a social goal, improving income distribution, supporting the children, elderly and disabled. In terms of the physical planning, sustainable urban development, urban identity compatible with the original design and quality of spatial planning were foreseen (İSTKA 2012). Despite the measures in the National Development Plan prepared by the State Planning Organisation (SPO), excessive migration, rapid population growth, unplanned industrialization and settlements, inadequate infrastructure are experienced in Istanbul as the largest city. Primarily, encouraging reverse migration and the prevention of migration, it is necessary to ensure equitable income distribution and to spread the prosperity to the base of community in the country. This means that the problems of Istanbul are solved in Agri, Mus, Sirmak, etc.

In this article, water and land resources in Marmara basin in terms of sustainability and urbanization will be discussed as the special case of Istanbul. Therefore, existing studies and reports of the basin were reviewed. Furthermore, some observations were made and the necessary data were collected. Finally, it was examined whether the problems in the basin and the existing solution methods are adequate in terms of sustainability and the balance of protection and use and some proposals were made.

2 BRIEF INFORMATION FOR MARMARA BASIN

Marmara Basin in Northwestern Turkey is like a strip that surrounds the Sea of Marmara. Its surface area is 2,338,525 hectares. It involves 8 provinces as Istanbul, Kocaeli, Bursa, Tekirdag, Kırklareli, Yalova, Balıkesir ve Canakkale (Figure 1).

The basin is an irregular and complex. Its population is 22,065,168 in 2014. Density is 514 people per km². It's higher than Turkey's average of 101 people per km². Regarding the climate it receives precipitation in all seasons and average is 600-700 mm. It shows climate transition feature. About half (51%) of the basin is

highest unemployment rates are in Istanbul, Kocaeli and Yalova with the sequential values of 11.2%, 11% and 10%. The lowest unemployment rate is in Balikesir with 6%. On the other hand, as the highest employment rate is in Tekirdag with 51.6%, the lowest rate is in Balikesir with 44%. When the population growth rate and density between 2007 and 2014 are examined by considering Turkey's average (13.3%), it's seen that the highest population growth rate is in Tekirdag with 36.2% then Yalova comes with 28.6%; the lowest population growth is in Kirklareli with 9.2% (Table 1). If density is examined, it's seen that the most thickly populated province is Istanbul with 2,767 people per km². The population density in other provinces except Balikesir, Canakkale and Kirklareli is higher than the average of Turkey, which is 101 people per km² (TUIK 2015).

When the migration rates between the years 2013-2014 are examined, it's seen that the highest migration rate is in the province of Tekirdag with 24.3% and Istanbul can't employ the migration increment with the rate of 1%. Kirklareli comes with the rate of 2.5% and net migration rate is lower in Tekirdag, Balikesir, and Yalova (Table2).

Table 1. Population growth between the years 2007-2014 in the Basin (TUIK 2015).

Growth Rate of Population by Years, 2007-2014 (%)							
Provinces	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Total	13,1	14,5	15,9	13,5	12	13,7	13,3
Balikesir	10,6	8,6	10,7	1,7	5,5	1,7	22,4
Bursa	27,5	16,9	21,3	17,7	13,5	19,5	16,8
Canakkale	-2,8	6,2	26,2	-8,1	14,8	17,3	18,7
İstanbul	9,8	17	26	27,4	16,8	21,8	15,2
Kirklareli	11	-11,2	-1,2	22	3	-1,9	9,2
Kocaeli	35,8	21,3	24,5	26,3	20,4	25,1	27,4
Tekirdag	56,5	16,1	18,7	39	26,7	25,7	36,2
Yalova	82,6	25,6	6	13,6	25,2	38,5	28,6

Table 2. Movement of migration between the years 2012-2014 (TUIK 2015).

Provincial in-migration, out-migration, net migration, rate of net migration, 1980-2014						
Period	Province	Total Population	In-migration	Out-migration	Net migration	Rate of net migration
2013-2014	Balikesir	1 189 057	57 551	39 918	17.633	14,9
	Bursa	2 787 539	80 717	65 027	15.690	5,6
	Canakkale	511 790	27 429	20 540	6.889	13,6
	İstanbul	14 337 018	438 998	424 662	14.336	1
	Kirklareli	343 723	14 553	13 678	875	2,5
	Kocaeli	1 722 795	79 697	55 060	24.637	14,4
	Tekirdag	906 732	52 994	31 266	21.728	24,3
	Yalova	226 514	14 680	11 064	3.616	16,1
2012-2013	Balikesir	1 162 761	38 710	39 688	-978	-0,8
	Bursa	2 740 970	75 518	61 744	13.774	5
	Canakkale	502 328	24 766	18 238	6.528	13,1
	İstanbul	14 160 467	437 922	371 601	66.321	4,7
	Kirklareli	340 559	14 120	13 297	823	2,4
	Kocaeli	1 676 202	71 159	54 742	16.417	9,8
	Tekirdag	874 475	45 313	31 681	13.632	15,7
	Yalova	220 122	14 670	9 808	4.862	22,3

3 ISTANBUL

Istanbul connects Europe and Asia continents. The city was the capital of Byzantine, Roman and the Ottoman Empire and in terms of history, architecture, culture trade, industry and economy. After 1950's, making investments here has accelerated the migration and has led to excessive population growth. Today, Istanbul shows unplanned, disorganized and irregular settlement and industrial growth. A provincial land asset is 520,042 Ha. There are 39 district municipalities and one metropolitan municipality. It is the largest city in Turkey with intensive industries and transportation networks and urban settlements as well as tourism. Of the industry 74% is in the Europe and the rest is in Asia. There are eight organized industrial zones. According to ISO 2010, 8,177 corporations are on the European side while there are 2,735 on the Asian side (TUBİTAK-MAM 2010).

3.1 Land Use

Arable lands along E5 highway which are located Kocaeli-Istanbul and Istanbul-Edirne were occupied by industrial, commercial and residential areas. Out of purpose land use, which are I, II, III, IV classes have reached 57,778 Ha. It is 52% as of total agricultural land (Haktanır *et al.* 2000) and the green areas were used for residential purpose due to improper development plans. While the ratio of green space to total urban areas is 1.5% in Istanbul, it is 41% in Hong Kong, 38.4% in London and 14% in Berlin (Kural 2015). Due to residential and industrial requirements, basins that provide water to Istanbul are under great pressure. The ratio of residential and industrial area to total basin area in Elmalı is 26% while that is 12% in Buyukcekmece and in Omerli 10%. Moreover, the intensive residential area is seen in Kucukcekmece basin (Axelle and Menekşe 2013).

3.2 Water Resources

There are no large rivers supplying water to Istanbul. The groundwater level is also limited due to excessive exploitations together with salinization problems. The surface water resources of the province small streams and streamlets. Because these streams can't provide the water requirement of the province, a project has been prepared to deliver 1,047 m³/year water with a pipeline system from Melen River to Istanbul and necessary works are under progress (Figure 3).



Figure 3. Water resources system of Istanbul (DSI 2014).

3.3 Wastewater Management

The management of clean water and wastewater system is carried out by General Management of Water and Sewage (İSKİ) in Istanbul. According to a survey conducted by TUBİTAK-MAM sewage system in Istanbul is on a large scale connected to the wastewater treatment system. The entire industrial zones are connected to industrial wastewater treatment system in Istanbul. Individual industrial companies are under control of the Ministry of Environment and Urban Planning.

4 RESULTS & DISCUSSION

From the years experienced of foundation of the Republic and World, it reveals that the prosperity of the nation-wide distribution can be achieved by a comprehensive land reform especially in East and Southeast Anatolia where mostly the poor and landless farmers live. Naturally, this may help solve the other social problems arising in the region. Another important measure is to change the mission thus reduce population density of Istanbul. 5% of the Turkey population live in the city, which is an unbearable load. Therefore, within a plan, the industry companies in the city must be distributed to the appropriate geographic regions throughout the country. Naturally some technical and economic supporting measures must also be provided for them. However, it is important that the necessary transport links and infrastructure facilities be provided for these companies.

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