Vizyoner Dergisi

Süleyman Demirel Üniversitesi Vizyoner Dergisi, Yıl: 2022, Cilt: 13, Sayı: 36, 1132-1149.
Süleyman Demirel University Visionary Journal, Year: 2022, Volume: 13, No: 36, 1132-1149.

ISSN: 1308-9552

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

CLIMATE CHANGE ADAPTATION POLICIES OF METROPOLITAN MUNICIPALITIES IN TURKEY

TÜRKİYE'DE BÜYÜKŞEHİR BELEDİYELERİNİN İKLİM DEĞİŞİKLİĞİNE UYUM POLİTİKALARI

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ABSTRACT

Climate change, which is one of the most prominent global security problems of today, adversely affects the natural and socio-economic environment from the decline in biodiversity to food security, from rising sea-water levels to water scarcity. The global, national, and local effects of climate change make the preparation of policies related to this issue more crucial and necessitate global, regional, and local approaches to these policies. The study focuses on the local level management process of the adaptation process to climate change. Establishing and putting into action local cohesion policies is an extensive field of study. In the study, strategic plans and organizational charts of metropolitan municipalities are examined to determine their awareness of climate change. The frequency and context of the words "global warming, greenhouse gas, and climate change" are evaluated in the scanning conducted in the 2020-2024 strategic plans. It is ascertained at the institutional level that local policies are an emerging field on climate change. However, it would be possible to see the contribution of the work of these units in the fight against climate change in the coming years.

Keywords: Climate Change, Adaptation, Urban Policy, Metropolitan Municipality, Sustainability.

JEL Classification Codes: Q58, Q54.

ÖZ

Günümüzün en önemli küresel güvenlik sorunlarından biri olan iklim değişikliği biyolojik çeşitliliğinden azalmasından gıda güvenliğine, deniz suyu seviyesinin yükselmesinden su kıtlığına kadar doğal ve sosyo-ekonomik çevreyi olumsuz şekilde etkilemektedir. İklim değişikliğinin küresel, ulusal ve yerel düzeydeki etkileri, iklim değişikliği politikalarının hazırlanmasını daha önemli hale getirmekte ve bu politikalara küresel, bölgesel ve yerel yaklaşımları zorunlu kılmaktadır. Çalışmada iklim değişikliğine uyum sürecinin yerel düzeydeki yönetimine odaklanılmıştır. Yerelde uyum politikalarının oluşturulması ve eyleme geçirilmesi kapsamlı bir çalışma alanıdır. Makalede büyükşehir belediyelerinin iklim değişikliği konusundaki farkındalıklarının tespit edilebilmesi için stratejik planları ve teşkilat şemaları incelenmiştir. 2020-2024 stratejik planlarında yapılan taramada "küresel ısınma, sera gazı ve iklim değişikliği" sözcüklerinin yer alma sıklığı ve bağlamı değerlendirilmiştir. Yerel politikaların iklim değişikliği konusunda gelişmekte olan bir alan olduğu kurumsal düzlemde tespit edilmiştir. Fakat bu birimlerin çalışmalarının iklim değişikliği ile mücadeledeki katkısını gelecek yıllarda görmek mümkün olacaktır.

Anahtar Kelimeler: İklim Değişikliği, Uyum, Kent Politikası, Büyükşehir Belediyesi, Sürdürülebilirlik.

JEL Sınıflandırma Kodları: Q58, Q54.

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Makale Geliş Tarihi / Received : 15.04.2022
Makale Kabul Tarihi / Accepted : 26.10.2022

https://doi.org/10.21076/vizyoner.1103978

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GENİŞLETİLMİŞ ÖZET

Amaç ve Kapsam:

Günümüzün en önemli küresel güvenlik sorunlarından biri olan iklim değişikliği biyolojik çeşitliliğinden azalmasından gıda güvenliğine, deniz suyu seviyesinin yükselmesinden su kıtlığına kadar doğal ve sosyo-ekonomik çevreyi olumsuz şekilde etkilemektedir. İklim değişikliğinin küresel, ulusal ve yerel düzeydeki etkileri, iklim değişikliği politikalarının hazırlanmasını daha önemli hale getirmekte ve bu politikalara küresel, bölgesel ve yerel yaklaşımları zorunlu kılmaktadır. Hükümetlerarası İklim Değişikliği Paneli (IPCC) tarafından yayımlanan bilimsel raporlarda bu değişimden yakından etkilenecek ülkelerden birinin de Türkiye olduğu belirtilmiştir. Akdeniz Havzası'nda bulunan ülkelerden biri olan Türkiye'de; kuraklık, aşırı hava olaylarında artış başta olmak üzere iklim değişikliği kaynaklı çok sayıda olumsuz etkilerin görülmesi beklenmektedir. Bilimsel veriler Türkiye'nin iklim değişikliğiyle mücadelede izleyeceği politikaların önemini belirgin bir şekilde ortaya çıkarmaktadır. Türkiye'de iklim değişikliğine uyum konusuna olan ilgi, uluslararası sözleşmelerin ve bilimsel çalışmaların artması ile başlamıştır. İklim değişikliğiyle mücadeleye yönelik hazırlanan belgelerde ise özellikle planlama ihtiyacı vurgulanmıştır. Bu planlar sadece merkezi yönetimin bakış açısıyla yürütülmemekte konu ile ilgili farklı aktörlerin de sürece dâhil olması gerekmektedir. Çalışmada bu aktörlerden biri olan belediyelerin iklim değişikliğine uyum politikaları analiz edilmiştir.

Yöntem:

Makalede büyükşehir belediyelerinin iklim değişikliği konusundaki farkındalıklarının tespit edilebilmesi için stratejik planları ve teşkilat şemaları incelenmiştir. 2020-2024 stratejik planlarında yapılan taramada "küresel ısınma, sera gazı ve iklim değişikliği" sözcüklerinin yer alma sıklığı ve bağlamı değerlendirilmiştir. Türkiye'de iklim değişikliğine uyum politikalarının yerel düzeyde gelişiminin ele alındığı bu çalışma üç ana başlıkta kurgulanmıştır. Çalışmanın ilk bölümünde iklim değişikliğinin küresel düzeyde ve Türkiye özelinde doğal ve sosyo-ekonomik çevre üzerine etkilerine yönelik yapılan bilimsel çalışmaların bulguları tartışılmıştır. Özellikle küresel düzeyde faaliyet gösteren kuruluşlar, iklim değişikliğinin yaratacağı sonuçları takip etmekte, yayınlandıkları raporlar ile konunun önemine yönelik farkındalık sağlamaktadır. Yapılan bu araştırmaların bulgularını iyi analiz etmek, iklim değişikliğine uyum politikalarının içeriğinin belirlenebilmesi için bir ihtiyaçtır. İkinci bölümde iklim değişikliğine uyum politikalarının önemi ele alınmış, uyum sürecinin aktörleri arasındaki ilişkiler açıklanmıştır. Üçüncü bölümde ise özellikle son yıllarda iklim değişikliğinin sonuçlarının belirginleşmesi ile birlikte bilimsel çalışmalar ile gündeme taşınan konunun Türkiye'de yerel düzeyde nasıl bir politika haline getirildiği büyükşehir belediyeleri kapsamında incelenmiştir. Çalışmada iklim değişikliğine uyum sürecinin küresel, ulusal ve yerel düzlemde üç boyutunun bulunduğu, bu farklı boyutlardaki çalışmalar arasında koordinasyonun gerekliği olduğu ileri sürülmekle birlikte araştırma konusu haline getirilen boyut yerel düzeydeki politikalarıdır.

Bulgular:

Araştırmanın ilk bulgusu, Türkiye'de merkezi yönetimin iklim değişikliğine uyum politikalarının iki alanda salınım gösterdiğidir. Bunlardan ilki iklim değişikliğine yönelik uluslararası örgütlerin çalışmalarını takip etmek ve hazırlanan sözleşmelere taraf olmayı içeren süreci yürütmektedir. Diğeri ise ulusal düzeyde iklim değişikliği ile mücadele ve uyum politikalarını belirlemektir. Bu süreçte, yerel yönetimlerin iklim değişikliği politikaları merkezi yönetim politikalarını tamamlayıcı niteliktedir. Yerel düzeydeki politikalar, merkezi yönetimin belirlediği çerçevenin yanında yerel yönetimlerde görev yapan yetkili kişilerin konuya farkındalığı ile de ilişkilidir. Stratejik planlarda yapılan araştırmanın ilk bulgusu, kalkınma planları gibi üst düzey politika belgelerinde iklim değişikliği ve küresel ısınmanın yer almasının belediyelerin stratejik planlarında konuyla ilgili hedeflerin belirlenmesinde etkili olduğudur. İkinci bulgu, küresel ısınma konusundaki küresel farkındalığın sera gazı emisyonlarına odaklanmasına rağmen incelenen stratejik planlarda sera gazı emisyonlarına yönelik tespitlerin ve hedeflerin sınırlı yer almasıdır. Teşkilat yapılarına yönelik araştırmanın temel bulgusu ise iklim değişikliği konusunda 30 büyükşehir belediyesinin 23'ünde bir idari birimin kurulduğudur. Bu birimlerin 4'ü daire şeklinde örgütlenirken, 19'u çevre koruma dairesinin bir şubesi olarak çalışmaktadır. Diğer bir bulgu ise belediyelerin iklim değişikliği konusunu genellikle temiz enerji yönetimi ve atık meseleleri ile ilişkilendirmesidir.

Sonuç ve Tartışma:

İklim değişikliğinin kentler üzerine etkilerini yönetmek birçok aktörün birlikte yapacağı çalışmalarla mümkündür. Çünkü bu etkiler tarımdan, yerleşim alanlarına, istihdamdan göçe oldukça kapsamlı ve maliyetlidir. Günümüzde nüfusun çoğunluğunun büyükşehir belediyeleri sınırları içerisinde yaşadığı göz önüne alındığında büyükşehir belediyelerinin iklim değişikliğine uyum politikalarının ana aktörlerinden biri olduğu görülmektedir. Bir sorun ile mücadelede sorunu tespit etmek, sorunun kaynaklarını belirlemek, çözüm önerilerine ilişkin alternatifler geliştirmek, bu alternatifleri uygulayacak örgütlenmeyi sağlamak gibi birçok aşama bulunmaktadır. Çalışmada bu adımlardan stratejik plan düzeyinde planlama ve teşkilat şemaları kapsamında örgütlenme üzerinde durulmuştur. Birçok farklı değişken ile büyükşehir belediyelerinin konuyu yönetme tarzı incelenebileceği gibi bu çalışmada politika belirleme ve uygulama aşamasına odaklanılmıştır. Çalışmanın sonucunda Türkiye'de büyükşehir belediyelerin iklim değişikliği konusuna yönelik farkındalığın yıllar itibariyle giderek arttığı tespit edilmiştir. Belediyelerin iklim değişikliğine uyum politikaları arasında önemli farklar bulunsa da özellikle merkezi düzeyde Çevre, Şehircilik ve İklim Değişikliği Bakanlığının kurulması belediyelerin konuya ilgi duymasında itici bir güç olmuş ve belediyeler arasında koordinasyonun sağlanmasına katkı sağlamıştır.

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1. INTRODUCTION

This study, which is addressed the development of climate change adaptation policies in Turkey at the local level, is structured under three main headings. In the first part of the study, the findings of scientific studies on the effects of climate change on the natural and socio-economic environment at the global level and in Turkey are discussed. In particular, organizations operating at the global level follow the consequences of climate change and raise awareness of the importance of the issue with the reports they publish. It is crucial to analyze the findings of these studies well to determine the content of climate change adaptation policies. In the second part, adaptation policies to climate change are discussed, and the relations between the actors of the adaptation process are explained. In the third part, the results of climate change, especially in recent years, and how the issue, which has been brought to the agenda with scientific studies, has been made into a policy at the local level in Turkey has been examined within the scope of metropolitan municipalities. In the study, it is claimed that the adaptation process to climate change has three dimensions at the global, national and local level, and the relationship of these different studies with each other is important, but the dimension that has been made the subject of research is the policies at the local level.

Climate change adaptation policies of the central government in Turkey show swingings in two areas. The first of these is the process that includes following the work of international organizations on climate change and becoming a party to the prepared conventions. The other is to determine the struggle and adaptation policies at the national level. Climate change policies of local governments are complementary to central government policies. Policies at the local level are related to the sensitivity of the authorized persons working in the local governments, as well as the framework determined by the central government. In the study, policies at the local level were evaluated within the scope of metropolitan municipalities, which is one of the local government institutions, and policy suggestions were made as a result of the findings obtained by scanning the strategic plans and organizational charts of thirty metropolitan municipalities.

2. EFFECTS OF CLIMATE CHANGE

In order to prevent activities that cause climate change or to adapt to the consequences of climate change, it is first necessary to determine in which areas the effects of climate change will occur. Risk assessments to be submitted to policy makers and practitioners are very important in the successful implementation of climate change adaptation policies. In the study, the effects of these changes at the global level and on Turkey are discussed.

2.1. Global Impacts of Climate Change

Increasing greenhouse gas emissions due to human activities lead to the warming of the world. If greenhouse gas emissions are not reduced significantly below current levels over the next few decades, there will be further global warming in the centuries to come. Earth is about 1.1 degrees warmer today than in the late 1800s. The last decade (2011-2020) was the hottest period recorded (United Nations, 2022a). Many calculations on climate change show that the alteration in the earth's surface temperature between 1850 and the end of the twenty-first century is highly likely to exceed 1.5 degrees. According to the World Meteorological Organization, temperatures are expected to rise between 3 and 5 degrees celsius by the end of this century if the necessary measures are not taken (BBC News, 2020). If the increase in global temperature exceeds 1.5 degrees, it will deepen the climate crisis.

Climate change has many adverse effects on human health, natural ecosystems, and the economy, from melting glaciers to drought, from decreasing biodiversity to migration (OECD, 2007, p. 1). One of the most important effects of climate change is on water resources. Changes in the precipitation regime cause an increase in the number and severity of disasters such as floods and overflows on the one hand and drought and water scarcity on the other hand.

Climate change also has the potential to affect social and environmental determinants of human health, particularly about clean air, access to safe drinking water, adequate food, and shelter. Between 2030 and 2050, approximately 250,000 additional deaths per year are expected due to malnutrition, malaria, diarrhea, and heat stress caused by climate change. In addition, it is estimated that the direct damage costs of climate change to health will be between 2 and 4 billion USD/year by 2030 (World Health Organization, 2021). This situation shows us that the devastation to property, infrastructure, and human health caused by climate change also brings burdensome costs to society and the economy. Particularly sectors that are directly dependent on certain temperatures and precipitation levels, such as agriculture, forestry, energy, and tourism, are affected by this situation (Eurepoean Commission, 2022a).

One of the substantial effects of climate change is migration. Since the world is a system where everything is interconnected, changes in one area affect changes in all other areas. Today, conditions such as the sea-level rise and saltwater intrusion due to climate change have reached a point where entire communities are forced to relocate, and prolonged droughts put people at risk of famine (United Nations, 2022a). As a result of these evolvements, climate-based migration movements are increasing day by day. According to the World Bank data, 143 million people will migrate from Sub-Saharan Africa, South Asia, and Latin America, which will be closely affected by climate change, until 2050 due to climate change (Parliament, 2021). In addition to the expectations for the future, climate-related migrations are also among the events that are experienced today. As a matter of fact, migration to New Zealand and Australia has started as a result of the rising sea level in small island states such as Tuvalu, Tonga, Fiji, Samoa, and Kiribati (Akalın, 2013, p. 214). The negative impacts of climate change will affect countries whose livelihoods are dependent on natural resources and which have limited resources to combat climate change.

Climate change is one of the biggest obstacles to sustainable development; therefore, taking action to mitigate the impacts of climate change is important to create sustainable cities. The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 has 17 Sustainable Development Goals (SDGs). These goals are an urgent call for action by all countries - developed and developing - in a global partnership. Goal 13 is specificially about climate change and aims to take urgent action to combat climate change (Sustainable Development, 2022). The all other goals such as clean water and sanitation, affordable and clean energy, sustainable cities and communities are also related to climate change targets. If the necessary precautions are not taken to combat climate change at local, national and global levels, all SDGs will failed.

2.2. Effects of Climate Change on Turkey

The Mediterranean Basin, which includes Turkey, is among the regions that will be most affected by climate change. Turkey's total surface area is 785,347 km^2, and agricultural lands constitute 31.1 percent of the country's land use. Turkey's population is approximately 84.3 million (2020), and 87.9 percent of the population lives in urban areas and 12.1 percent in rural areas. Turkey's economy is driven by agriculture, industry, and service sectors, including tourism. Turkey is vulnerable to the effects of climate change resulting from extreme weather events and temperature rises. The consequences of climate change on terrestrial, marine and freshwater ecosystems increase the overall pressure on the environment (Climate Change Knowledge Portal, 2022). In particular, the increase in temperatures and the decrease in precipitation have a major negative impact on the countrys water availability, which is necessary for food production and rural development. This situation is expected to increase further the social and regional disparities between the Eastern and Southeastern provinces and the rest of the country (UNDP, 2022).

One of the effects of climate change on Turkey is the increase in the number of natural disasters, especially floods. According to the disaster risk map prepared by the Disaster and Emergency Management Presidency (AFAD), 107 floods/overflows, 66 forest fires, 16 snow/snowstorms, and 39 landslides occurred in Turkey in 2021. While heavy rainfall and landslides occurred in the Black Sea Region, forest fires were observed more frequently in the Aegean and Mediterranean (AFAD, 2022). The rate of economic losses resulting from floods and landslides in the gross domestic product is historically among the highest in Turkey when compared to other countries. Increasing temperatures and decreasing precipitation lead to water shortages, especially in the southern and western parts of the country. This situation will be exacerbated by the increase in water demand needed in the agricultural sector. By 2030, it is estimated that around 20 percent of surface water will be lost in some basins. The consequences of climate change will also affect the land use and land cover of the catchments. The coastlines of Turkey, especially in the Central and Eastern Black Sea, the North Aegean Sea, and the Eastern Mediterranean, are adversely affected by coastal erosion and flooding. Along with water scarcity, there will be decreases in water quality (UNDP, 2022).

Climate change is an important threat, especially for cities. Cities are areas that trigger climate change and are affected by the consequences of climate change. The climate crisis, especially drought, extreme weather events, and heatwaves, threatens both the daily life of cities and the sustainability of cities in the long run. One hundred cities with the largest carbon footprints worldwide are responsible for 18-20% of carbon emissions. In this ranking, Turkey's first and second most populated cities, Istanbul ranks 26th and Ankara 80th. According to a study of fifteen coastal towns in Europe, Istanbul and Izmir are two of them with high levels of vulnerability to the risks of climate change. Among the coastal cities, Istanbul ranks first among the cities that will suffer the most. The impact of climate change on cities will also bring economic loss. It is estimated that the loss will occur in Istanbul will be

200 million dollars in 2030 and 10 billion dollars in 2100. The cost of climate change on the İzmir economy is expected to be 132 million dollars in 2030 and 5 billion 800 thousand dollars in 2100 (Uncu, 2019, p. 18, 27).

3. THE IMPORTANCE OF CLIMATE CHANGE ADAPTATION POLICIES

Policies for climate change should start with defining, understanding, and determining the causes of this change, and should include strategies to combat the problem. Myers states that the best way to deal with a problem is to recognize and understand it, and to tackle the source of the problem when symptoms of the same problem appear instead of waiting (Myers, 1997, 176). In this context, within the scope of a climate policy, there are many different sub-headings such as detecting the developments that cause climate change, determining the content of adaptation to climate change, ascertaining the risks arising from climate change, and planning practices for ecosystems and societies to gain resistance against the effects of climate change (Şahin, 2014, p. 6, 14, 16).

In the fight against climate change, there are two policies that are not completely independent from each other and complement each other, namely mitigation and adaptation. The risks it carries for the natural and socio-economic environment of the effects of climate change necessitate the establishment of policies to reduce greenhouse gas emissions that cause climate change. Climate change mitigation policies mean preventing and reducing the release of heat-trapping greenhouse gases into the atmosphere to stop the world from warming further (WWF, 2022). Another prominent policy in the policies regarding climate change is adaptation. Adaptation means making arrangements so that natural and human systems are least affected by the consequences of climate change. In another definition, adaptation can be explained as "*the process of strengthening, developing and implementing strategies in this area in order to combat the effects of climate events (of risks), provide benefits and manage the effects*" (Global Balance Association, 2016, p. 11). Adaptation to climate change can also be defined as taking action to prepare for and adapt to both the current effects of climate change and the anticipated impacts in the future (European Commission, 2022b).

There are many sub-elements in climate change adaptation policies. For example, providing financial resources to be obtained adaptation, taking technical measures, and conducting scientific studies are some of these factors. It should be noted that the process of adapting to each new phenomenon is complex and variable. As a matter of fact, in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), it was emphasized that adaptation studies to climate change are of great importance in terms of managing the effects of climate change (Ministry of Environment and Urbanization, 2012, p. 2-3). Considering that climate change will affect many areas of life, it necessitates the implementation of adaptation policies on a larger scale. This situation requires states at the national and local levels to take comprehensive steps towards harmonization. For example, roads and bridges may need to be built or adapted to withstand higher temperatures and stronger storms. In some cities on the coastline, the establishment of systems to prevent flooding on the streets and in transportation, studies to limit the landslides and overflows caused by melting glaciers in mountainous regions, and the relocation of some communities to new places can be listed among the adaptation measures (United Nations, 2022b).

To be integrated climate change adaptation into all relevant public policy areas should be a priority. In other words, adaptation to climate change requires integrating climate change risks into all sectors, apart from legal, institutional, and policy changes, and adopting more flexible, preventive, and forward-looking approaches. Failure to take measures to reduce greenhouse gases will cause the effects of climate change to be felt more severely. In addition, the long-term postponement of harmonization efforts will affect countries financially. Integrating climate change adaptation into all policy areas will not initially be an easy process financially for countries. Underdeveloped countries and regions, in particular, are likely to need continued financial and technical support to help increase their capacity to adapt (OECD, 2007, p. 5, 7).

The parties to the United Nations Framework Convention on Climate Change and the Paris Agreement recognize that adaptation is a global challenge facing everyone, with local, national, regional, and international dimensions. Climate change adaptation is an essential component of the long-term global reaction to protect people, livelihoods, and ecosystems. Integration policies should be addressed in a gender-sensitive, participatory, and fully transparent approach, taking into account vulnerable groups, communities, differences in countries, and ecosystems. It is also significant that local people's knowledge guide this process in order to integrate cohesion policies into existing socioeconomic and environmental policies and actions (United Nations, 2022c).

The method adopted in the preparation of these policies is as important as the scope of climate change adaptation policies. As a matter of fact, While preparing policies for climate change, approaching the issue from a material point of view based only on cost-benefit analysis means not understanding the effects of climate change sufficiently. Instead of policies based on such economic evaluations, short, medium and long-term developments should be foreseen, and the local, regional, national and global effects of this change should be considered together (Göçoğlu & Aydın, 2018, p. 216-217). This inclusive approach also diversifies the actors in the preparation of policies for climate change because the success in adaptation policies does not depend only on the policies of the governments. The success of policies is directly related to the active and continuous participation of many stakeholders such as national, regional, local, multilateral and international organizations, public and private sectors, civil society, and the effective management of information.

4. THE IMPORTANCE OF METROPOLITAN MUNICIPALITIES IN CLIMATE CHANGE ADAPTATION POLICIES IN TURKEY

The formulation and implementation of climate change adaptation policies require a multi-actor structure. The central government, local government, non-governmental organizations, private sector, and universities are among the actors in the process of preparing policies for adaptation to climate change in Turkey**.** International and supranational organizations such as the United Nations and the European Union lead the formulation of climate change policies (Göçoğlu & Aydın, 2018, p. 11). The work of these global organizations is closely followed in the climate change adaptation policies prepared in Turkey. In addition, while the Ministry of Environment, Urbanization, and Climate Change stands out in the institutional structure for climate change, many ministries have duties and authorities in process management.

In climate change policies, ensuring the balance between the policies of central governments and international and local policies has a strategic position. Establishing the law and policy framework regarding climate change, providing guidance to support local governments and businesses in order to make effective adaptation decisions, informing the public by researching the effects of climate change, and making preparations for natural disaster management can be listed among the adaptation policies of the central government (environment.govt.nz, 2022). Besides the central government, other actors of cohesion policies are non-governmental organizations and universities. Non-governmental organizations are involved in this process with their work to raise awareness and universities with their scientific data. Considering that the majority of the factors that cause climate change are caused by companies within the private sector such as industry and commerce, the private sector should also be an important stakeholder in the determination of these policies.

The work of the actors involved in climate change adaptation policies is not unrelated to each other. To explain this situation through the phenomenon of climate-based migration, international agreements are effective in determining the legal status and rights of immigrants. On the other hand, within the scope of the management of national borders, the policies of the central government may have a restrictive or accepting content in the admission of people who want to relocate as a result of climate change. The responsibilities of local government units begin in the settlements of climate-related immigrants or communities within the country. Different stakeholders such as non-governmental organizations, especially municipalities, can carry out studies to ensure the adaptation of these people who have settled in the cities to urban life. Universities can provide support to the problems that may be experienced in cultural and social fields in this process, in the light of scientific data. As can be seen in this example, cooperation between the actors of climate change adaptation policies is necessary for the successful execution of the fight against the climate change process. The key among these actors is the central government. Central governments may have different approaches to climate change. The results of this change can be evaluated by the central government as a comprehensive issue from the country's economy to the social and political structure, and plans can be made according to this evaluation. Oppositely, short-term policies such as increasing green areas can be adopted by considering the problem within the scope of simple measures with a reductionist approach.

Although climate change is a global problem, its effects are also felt at the local level. Therefore, one of the significant parts of climate change adaptation policies belongs to the local level. From energy to infrastructure, from water resources management to transportation, densely populated metropolitan municipalities, which have significant effects on climate change, also have a great potential to increase resilience to climate change. The fact that there is a reciprocal relationship between the city and climate change increases the strategic importance of city

administrations in climate change adaptation policies. While climate change is a crucial risk factor for the sustainability of cities, urban activities are also essential sources of greenhouse gas emissions. Especially considering that more than half of the worlds population will live in urban in the coming years, it is inevitable that policies should be created to make city administrations resistant to climate change. Today, it is seen that states take into account the climate policies developed by local governments in their national policies (Talu, 2021).

There are fifty-one provincial municipalities and thirty metropolitan municipalities in Turkey. While the rate of people living in city and county centers in Turkey was 92.8 percent in 2019, this rate became 93 percent in 2020 (TurkStat Address Based Population Registration System Results, 2020). Considering the proportion of people living within the borders of metropolitan municipalities, the need for adaptation policies against the problems to be experienced in cities caused by climate change emerges, and the importance of metropolitan municipalities to create policies that will reduce greenhouse gas emissions and enhance resilience to the climate crisis, and prepare budgets for these is increasing (Tesev, 2021, p. 2).

4.1. Research Method

In the process of adaptation to climate change, the policies of the central government alone are not sufficient. While providing central government coordination between global and local developments, it is also prominent to transfer authority and duty to local governments on this subject. Awareness of municipalities, one of the local government units, regarding adaptation to climate change policies will be realized as a result of this transfer. In the study, two examination tools were chosen to determine the level of awareness. The first of these is the strategic plans of the municipalities, the other is the organizational structures. Strategic plans are most main documents in terms of ascertaining the current situation of municipalities and determining their future targets. These documents, which were prepared by taking into account the upper policy documents prepared by the central government, since these documents constitute the initial stage of climate change adaptation policies at the local level, were considered significant and examined within the scope of the study. The organizational structure they create enables municipalities to achieve the goals they set. Departments or branch offices are the visible faces of municipalities in the implementation of municipal policies. Secondly, the administrative units of the municipalities were evaluated within the scope of adaptation to climate change in order to understand how to implement the targets determined in the strategic plan.

Within the context of evaluating the adaptation policies of metropolitan municipalities to climate change in Turkey, strategic plans and organizational charts accessed from the official websites of thirty metropolitan municipalities[3] were scanned.

4.2. Findings Related to Strategic Plans

In the 9th article of the Public Financial Management and Control Law No. 5018, the strategic plan is defined as "Public administrations shall prepare strategic plans in a cooperative manner in order to form missions and visions for future within the framework of development plans, programs, relevant legislation, and basic principles adopted; to determine strategic goals and measurable objectives; to measure their performances according to the predetermined indicators, and to monitor and evaluate this overall process" (Public Financial Management Control Law No. 5018). In Municipal Law No. 5393 and the Metropolitan Municipality Law No. 5216, the municipalities were given the task of preparing strategic plans. In this section, the keywords climate change, global warming, and greenhouse gas were scanned in the strategic plans of thirty metropolitan municipalities, and it was mentioned how the issue of climate change is included in the relevant strategic plans.

- While the weaknesses and strengths of the municipality were evaluated in the external stakeholder survey in the *2020-2024 Strategic Plan of Adana Metropolitan Municipality*, climate action was determined as the weakness (p. 91). The Plan includes the objective of *Preparing an Action Plan for an Adana Compatible with Climate Change* (p. 173). In the PEST analysis section, it was determined that global warming negatively affects human processes, and the opportunity for this situation to the municipality is stated as providing the opportunity to benefit more from renewable energy sources. At the same time, the threat that temperature

[3] Adana, Ankara, Antalya, Aydın, Balıkesir, Bursa, Denizli, Diyarbakır, Erzurum, Eskişehir, Gaziantep, Hatay, İstanbul, İzmir, Kahramanmaraş, Kayseri, Kocaeli, Konya, Malatya, Manisa, Mardin, Mersin, Muğla Ordu, Sakarya, Samsun, Şanlıurfa Tekirdağ, Trabzon, Van.

increases may adversely affect agricultural lands was also included. The question "What should be done in the face of this situation?" was answered as "*planning in the zoning area should be integrated with all other plans (disaster, transportation, tourism, etc.), taking into account environmental impact assessments and potential risks.*" (p. 127).

- In the PEST analysis section of the *2020-2024 Strategic Plan of Ankara Metropolitan Municipality*, it has been determined that excessive precipitation due to climate change causes flood disasters. A warning was given to be careful about activities that will cause climate change (p. 119). The question "What to do" was answered as "*Cities ready for climate change should be established, studies should be carried out to reduce the impact of climate change on the lives of Ankara residents, Ankara Metropolitan Municipality should avoid practices that will trigger climate change*" (p. 121).In the Strategic Objectives and Targets section, the objectives of creating a city that protects the ecological balance, support biodiversity, is based on effective waste management and renewable energy policies, adopts sustainable environmental management, and is aware of the negative effects of climate changes with nature and animal-friendly management approach have been determined (p. 133).
- In the SWOT analysis section of Antalya Metropolitan Municipality's 2020-2024 Strategic Plan, global warming and climate changes were determined as threats from the external environment (p.54). In order to make Antalya an environmentally and nature-friendly city, it was emphasized as a need for local governments to make the necessary contribution to the role of responsibility and stakeholder within the framework of climate change. (p. 76).
- Climate change has been identified as a problem in the PESTLE analysis section of *Aydın Metropolitan Municipality's 2020-2024 Strategic Plan*. The negative impact of this problem on the municipality was determined as the untimely rainfall affecting the agricultural areas, and the question of "what should be done" was answered as "*supporting alternative agricultural products, increasing projects for local product variety*" (p. 59).
- In the *2020-2024 Strategic Plan of Balıkesir Metropolitan Municipality*, climate change is also listed among the activities of Balıkesir Metropolitan Municipality. Determining the measures to be taken by researching the causes of climate change, building national gardens and increasing the number of green areas in order to adapt to climate change, providing environmental awareness training on zero waste and climate change, carrying out activities to combat climate change, and preparing a climate change action plan are among the targets. (p. 195).
- In the *2020-2024 Strategic Plan of Bursa Metropolitan Municipality*, it is stated that climate change is dangerous, and indicators should be created to monitor climate change (p. 58).
- In the *2020-2024 Strategic Plan of Denizli Metropolitan Municipality*, the problem of natural disasters caused by global warming has been identified in the PESTLE analysis section, and the preparation of climate change action plans (CCAP) has been indicated as a strength. It has been suggested that necessary legal arrangements be made in order to reach the 21% reduction target of greenhouse gas emissions by 2030, which was determined by CCAP (p. 56).
- In the *2020-2024 Strategic Plan of Diyarbakir Metropolitan Municipality*, it has been determined as a target to expand the use of renewable energy sources and to reduce the effects of climate change (p. 100). In this context, it is aimed to prepare a climate change action plan.
- According to the *2020-2024 Strategic Plan of Erzurum Metropolitan Municipality*, it was aimed to prepare the Erzurum Climate Action Plan and to create a climate inventory. Organizing climate action plan workshops and using the results of the workshops as data were determined as another target (p. 145). In the PESTLE analysis, it takes place that the decrease in agricultural income as a result of global warming is a threat (p. 115).
- In the *2020-2024 Strategic Plan of Eskişehir Metropolitan Municipality*, being sensitive to climate change is among the vision of the municipality. Accelerating climate change and increasing global warming due to the growth of carbon footprint have been identified as threats. While it is aimed to enhance Eskişehir's sensitivity to climate change, activities such as extending the amount of green space, increasing energy efficiency and renewable energy capacity, organizing campaigns to raise the sensitivity of the city to climate change, saving energy consumption, and maintaining energy production from waste are planned to achieve this goal (p. 50). In addition, developments in technological resources were evaluated as an opportunity in the adaptation process to climate change.

- In the *2020-2024 Strategic Plan of Gaziantep Metropolitan Municipality*, updating the climate change action plan is included in the environmental management activity area list of the municipality (p. 42). While the global climate change causing warming in the city's climate was seen as a threat, the preparation of the Gaziantep Climate Change Action Plan was stated as the strong side of the municipality (p. 37)
- In the *2020-2024 Strategic Plan of Hatay Metropolitan Municipality*, the aim of taking preventive measures for the causes and effects of global climate change has been determined (p. 7). In addition, it is aimed to enhance the quality of life within the scope of the green city vision, and to widen the number of green areas within the context of adaptation to climate change (p. 72).
- According to the *2020-2024 Strategic Plan of Istanbul Metropolitan Municipality*, it is aimed to protect the environment by expanding the fight against climate change. In the SWOT analysis, the negative effects of global climate change and transportation-related greenhouse gas emissions on air quality were identified as threats. While emphasizing the urgent need to take action to combat climate change and its effects, it is aimed to strengthen global socio-economic resilience against the threat of climate change in the post-2020 period with the Paris Agreement. The plan also includes determinations such as that the environmental service quality is not at a sufficient level within the scope of climate change, Turkey's greenhouse gas emissions have increased more than most of the OECD member countries in the past ten years. In response to the question of "what should be done" against all these developments, many activities, especially, reducing greenhouse gas emissions, are listed in the plan in line with the climate change action plan.
- In the *2020-2024 Strategic Plan of Izmir Metropolitan Municipality,* it is emphasized that climate changes caused by global warming threaten the ecological balance. Objectives such as supporting the molding of public opinion against this threat, creating nature and energy fields compatible with climate changes are listed. Although it is stated in the plan that there is a high level of social awareness about the problems that will be caused by climate change, the fact that the danger of climate change is not taken into account by the authorized institutions is seen as a risk factor. In the plan, the evaluations like "local solutions for climate change will be insufficient unless global policies are produced", "it is necessary to increase social sensitivity towards climate change and to influence the country's policies", "awareness should be raised about the importance of the effect of polluting emissions created by industrial activities on climate change" are noteworthy.
- In the *2020-2024 Strategic Plan of Kahramanmaraş Metropolitan Municipality,* global warming and climate change were identified as the problem area in the PESTLE analysis, and in the SWOT analysis, the negative change in global climate conditions was identified as a threat. In addition, the unpredictable increase in vector breeding areas and populations due to climate changes have been seen as a risk for a healthy environment. It is aimed to prepare a climate change action plan.
- In the *2020-2024 Strategic Plan of Kayseri Metropolitan Municipality,* the occurrence of climate change is identified as a problem area in the environmental factors section of the PESTLE analysis (p.26), while in the SWOT analysis, climate change and migration due to global warming are under the heading of threats to the external environment. (p. 28). In the part where the PESTLE analysis is evaluated, it is emphasized that there should be studies on climate change.
- In the *2020-2024 Strategic Plan of Kocaeli Metropolitan Municipality*, it is stated in the environmental analysis section of the PESTLE analysis that global warming and climate change will have effects such as "infrastructure problems of global warming and climate change, low agricultural production, deterioration of ecological balance, impact on social life, economic lossesUnder the title of “What Can Be Done”, there are subjects such as “increasing infrastructure investments suitable for climate change, preparing a sustainable energy action plan suitable for climate change, taking necessary measures to protect water basins, lakes, and ponds and increase their reserves, providing awareness training” (p. 57. In the SWOT analysis, global warming and climate change are stated as threats. Preparation of climate change adaptation and mitigation plan is one of the activities determined (p. 70).
- In the PESTLE analysis of *Konya Metropolitan Municipality's 2020-2024 Strategic Plan,* global climate change is included under the title of threats to the municipality (p.80). In the SWOT analysis, perceiving the threats by people that may occur as a result of global warming and realizing the importance of afforestation studies are stated as an opportunity for the external environment, and flash floods and large fires due to global warming and changing climatic conditions are stated as one of the threats to the external environment (p.88-92). The plan includes objectives such as "creating an environmentally friendly city in Konya, my city, under

the principles of the voluntary municipality" and "ensuring that all kinds of measurements, inspections and controls are carried out to prevent air pollution" (p. 127).

- In the PESTLE analysis of the *2020-2024 Strategic Plan of the Malatya Metropolitan Municipality*, abnormal situations in climate change due to global warming are indicated as an environmental threat.
- In the PESTLE analysis of the *2020-2024 Strategic Plan of the Manisa Metropolitan Municipality,* the decrease in water resources due to global warming has been identified as a problem in the environmental factors section (p. 44). In the SWOT analysis, the decrease in water resources takes also place as a threat (p. 46). The relationship between climate change and water resources is included in the strategy development-objectives section. In the table of the analysis results of the national water plan, it is emphasized that the principle that groundwater reserves are a strategic resource should be adopted, taking into account the impacts of climate change (p .24).
- Although the concepts of global warming, climate change, and greenhouse gases are not used in the *2020-2024 Strategic Plan of the Mardin Metropolitan Municipality*, it has been determined that the word disaster is used in 51 places in the document. In the SWOT analysis, it was determined that the city did not have an emergency disaster action plan, there were deficiencies in disaster-related tools, materials, and human resources, and the buildings that were at risk of disaster were not identified. Additionally, in the plan, the emphasis was placed on the necessity of creating an emergency disaster action plan for the city (p. 68).
- In the SWOT analysis of the *2020-2024 Strategic Plan of the Mersin Metropolitan Municipality*, the weakness section includes the fact that the climate change action plan was not prepared (p.58), and the public's lack of awareness about climate change is in the threats section (p. 61). Raising awareness on climate change is among the activities and projects (p. 72). According to the information given in the plan, the completion rate of the Mersin Climate Change Action Plan is 60 percent for 2021. Another determination made in this regard is the inadequacy of the personnel about the climate change action plan. The plan is aimed to be completed in 2023 (p. 74).
- In the *2020-2024 Strategic Plan of Muğla Metropolitan Municipality,* organizing training on combating climate change is among the activities to achieve the goal of creating a healthy, balanced, and natural environment (p. 46). Making action plans to reduce and adapt to climate change is one of the aims of the plan (p.48). It also includes the number of training meetings organized to raise awareness of climate change. The starting value of the plan period is 3 for 2019, 3 for 2020, 3 for 2021, 10 for 2022, 11 for 2023, 12 for 2024. In the plan, the number of competitions/events, etc., related to the reduction of climate change and energy efficiency are also included in the performance indicators section. Accordingly, the initial value of the plan period is 1 for 2019, 1 for 2020, 1 for 2021, 3 for 2022, 5 for 2023, 7 for 2024. The number of training organized to increase the capacity for adaptation to climate change, the starting value of the plan period is 2 for 2019, 2 for 2020, 2 for 2021, 7 for 2022, 8 for 2023, 9 for 2024. Organizing a series of training related to climate change is among the activities and projects. In the plan, the determination of the non-governmental organizations and city councils regarding the necessity of increasing the awareness and capacity of the citizens about climate change and also making suggestions regarding the inclusion of the issue of climate change in the strategic plan was emphasized. Deficient awareness about climate change mitigation and the necessity of increasing their capacity for adaptation are among the needs in the province (p. 48). One of the annual budget estimates regarding the aims and targets in the 2020-2024 Strategic Plan is related to climate change. The cost of making action plans to mitigate and adapt to climate change calculated as 4,000,000,00 in 2020 4,500,000,00 in 2021 5,000,000,00 in 2022 6,000,000 in 2023 and 7,000,000 in 2024 TL. The total cost is 26,500,000,00 TL (93).
- In the PESTLE analysis of *Ordu Metropolitan Municipality's 2020-2024 Strategic Plan*, the damage to the technological infrastructure due to sudden changes in climatic conditions has been included as one of the threats for the municipality (p. 72). In the SWOT analysis, natural disaster risks such as floods, overflows, and landslides due to climatic conditions, yield losses due to climate change, and economic losses are alined among the threats (p. 82).
- In the PESTLE analysis of the *2020-2024 Strategic Plan of Sakarya Metropolitan Municipality*, climate change and global warming are included as one of the environmental factors (p. 50). In the target cards included in the plan, the impact of global warming and climate change, the increase in maintenance works and costs, and the problem of climate change are among the risks (p. 103, 153).

- In the *2020-2024 Strategic Plan of Samsun Metropolitan Municipality,* planning the studies within the scope of the climate change action plan, making preparations for implementation, and carrying out the institutional and social awareness studies are among the activities and projects planned (p. 46). Changing the precipitation regime of climate change is also stated among the risks (p. 48). Conducting studies to reduce the effects of climate change is among the needs (p. 88).
- Climate change is not included in the *2020-2024 Strategic Plan of Şanlıurfa Metropolitan Municipality.*
- In the *2020-2024 Strategic Plan of Tekirdağ Metropolitan Municipality,* the preparation of climate change action plans has been determined as one of the services in its field of activity (p. 34). In the SWOT analysis, the effects of severe weather events due to climate change on urban infrastructures are among the threats (p. 50). It is stated in the target cards that climate change action plans will be made to create a sustainable environment (p. 59). Joint management of issues related to climate change is among the findings (p. 61).
- In the SWOT analysis of *Trabzon Metropolitan Municipality's 2020-2024 Strategic Plan*, the rise in floods and landslides caused by the changing precipitation regime due to climate change and the growth in the pest population are among the threats to the external environment (p. 63). Climate Change Adaptation Strategies and Preparing an Action Plan are among the targeted activities and projects (p. 77).
- In the *2020-2024 Strategic Plan of Van Metropolitan Municipality,* conducting work on climate change is stated as one of the services within the sustainable environmental management activity (p. 33). In the PESTLE analysis, developments due to global climate changes and the increase in climate vulnerability are identified among the threats to the environment (p. 40). Preparing a workshop and an action plan for climate change are the targeted activities and projects planned.

As a result of the data obtained from the internet pages of thirty metropolitan municipalities, the following findings were reached:

1. The inclusion of climate change and global warming in top policy documents such as the development plan has also been effective in determining the targets related to the subject in the strategic plans of the municipalities. This situation shows that the general targets set by the central government are decisive in the development of local policies regarding climate change.
2. Global awareness of global warming has focused on greenhouse gas emissions. However, in the strategic plans examined, the determinations and targets for greenhouse gas emissions were very limited.
3. The degree to which municipalities see themselves as responsible for climate change differs. While climate change takes place as a threat in the SWOT and PESTLE analysis section, the preparation of climate action plans has been evaluated as a strength in the process of managing this change.

Calculating the costs of activities in the adaptation process to climate change is vital in order to create resources to cover this cost. As in the strategic plan of Muğla Metropolitan Municipality, municipalities should make a more detailed analysis on the subject.

Table 1. Frequency of Use of the Words Global Warming, Greenhouse Gas and Climate Change in the Strategic Plans of Municipalities

Metropolitan Municipality	**Usage Frequency**		
	Global Warming	**Greenhouse Gas**	**Climate Change**
Adana Metropolitan Municipality	2	-	1
Ankara Metropolitan Municipality	-	-	12
Antalya Metropolitan Municipality	1	-	2
Aydın Metropolitan Municipality	-	-	1
Balıkesir Metropolitan Municipality	-	-	19
Bursa Metropolitan Municipality	-	-	4
Denizli Metropolitan Municipality	1	1	5
Diyarbakır Metropolitan Municipality	-	1	14
Erzurum Metropolitan Municipality	1	-	-

Metropolitan Municipality	Usage Frequency		
	Global Warming	Greenhouse Gas	Climate Change
Eskişehir Metropolitan Municipality	7	-	34
Gaziantep Metropolitan Municipality	-	-	3
İstanbul Metropolitan Municipality	1	9	30
İzmir Metropolitan Municipality	3	-	28
Kahramanmaraş Metropolitan Municipality	1	-	4
Kayseri Metropolitan Municipality	3	-	6
Kocaeli Metropolitan Municipality	3	-	4
Konya Metropolitan Municipality	3	-	4
Malatya Metropolitan Municipality	1	-	1
Manisa Metropolitan Municipality	4	-	12
Mardin Metropolitan Municipality	-	-	-
Mersin Metropolitan Municipality	2	1	14
Muğla Metropolitan Municipality	-	-	13
Ordu Metropolitan Municipality	-	-	2
Sakarya Metropolitan Municipality	3	-	4
Samsun Metropolitan Municipality	-	3	5
Şanlıurfa Metropolitan Municipality	-	-	-
Tekirdağ Metropolitan Municipality	1	-	5
Trabzon Metropolitan Municipality	1	-	3
Van Metropolitan Municipality	-	-	1
Total	38	15	231

Note: These data were obtained as a result of scanning the strategic plans of 30 metropolitan municipalities accessed from their web sites.

Thirty cities in Turkey with a population of 750,000 and above have the status of metropolitan municipalities. Metropolitan municipalities provide urban services in a wide range from transportation to water resources management. On the other hand, these settlements with a large population cause a large amount of greenhouse gas emissions due to their activities. For this reason, it is crucial for metropolitan cities to identify the risks stemming from climate change and to set targets through strategic plans. In 30 strategic plans, global warming was used 38 times, greenhouse gas was used 15 times, and climate change was used 231 times. The metropolitan municipalities that use the word climate change the most in their strategic plans are Eskişehir, İstanbul, and İzmir, respectively. The fact that the effects of climate change are a part of the daily lives of cities shows that it should be included more in a strategic plan to be prepared after 2024.

4.3. Findings on Organizational Structures[4]

In order for the metropolitan municipalities to reach the targets in the strategic plans and to manage the climate change adaptation process successfully, it is necessary to establish relevant units in their organizational structures. Leaving these units to the sensitivity of the municipalities to the issue will negatively affect the adaptation process.

For this reason, the central government should encourage local governments in this regard. The central government in Turkey carries out studies in this context. Birpınar, Deputy Minister of the Ministry of Environment, Urbanization and Climate Change, explained this situation as "Based on the importance of the local in the fight against climate change, in order to carry out the works at the local level in coordination with the central level, the norm staff regulation of our Ministry on the establishment of climate change units in our local governments was published in the Official Gazette and entered into force in April 2020" (Birpınar, 2020, p. 7). Considering that it

[4] There are different denominations such as management schemes, administrative structure, organizational structure, and institutional structure on the websites of municipalities.

is significant to establish specialized units in the organizational structures of municipalities in the management of the adaptation process to climate change, web sites of 30 metropolitan municipalities were scanned. In the examination, the criterion of moving the expression of climate change to the unit title was taken into account.[5]

Table 2. Management of Climate Change in the Organizational Structure of Municipalities

Metropolitan Municipality	Climate Change Management
Metropolitan Municipality of Adana	X
Metropolitan Municipality of Ankara	Climate Change and Adaptation Branch Manager
Metropolitan Municipality of Antalya	Climate Change and Clean Energy Branch Directorate
Metropolitan Municipality of Aydın	Climate Change Department
Metropolitan Municipality of Balıkesir	Environmental Protection and Climate Change Branch Directorate
Metropolitan Municipality of Bursa	Department of Environmental Protection, Control and Climate Change
Metropolitan Municipality of Denizli	Climate Change Branch Directorate
Metropolitan Municipality of Diyarbakır[6]	X
Metropolitan Municipality of Erzurum	X
Metropolitan Municipality of Eskişehir	Climate Change and Adaptation Branch Directorate
Metropolitan Municipality of Gaziantep	Department of Environmental Protection, Zero Waste and Climate Change
Metropolitan Municipality of Hatay	Climate Change Branch Manager
Metropolitan Municipality of Istanbul	X
Metropolitan Municipality of Izmir	Climate Change and Environmental Protection Control Department
Metropolitan Municipality of Kahramanmaraş	X
Metropolitan Municipality of Kayseri	Department of Environmental Protection and Climate Change
Metropolitan Municipality of Kocaeli	Department of Environmental Protection and Climate Change
Metropolitan Municipality of Konya	Department of Climate Change
Metropolitan Municipality of Malatya	Environmental Protection, Disinfestation and Climate Change Branch Directorate
Metropolitan Municipality of Manisa	X
Metropolitan Municipality of Mardin	Department of Energy Management and Climate Change
Metropolitan Municipality of Mersin	Climate Change and Clean Energy Branch Directorate
Metropolitan Municipality of Muğla	Environmental Management and Climate Change Department
Metropolitan Municipality of Ordu	Department of Environmental Protection and Climate Change
Metropolitan Municipality of Sakarya	Climate Change Branch Directorate
Metropolitan Municipality of Samsun	Department of Environmental Protection and Climate Change
Metropolitan Municipality of Şanlıurfa	X
Metropolitan Municipality of Tekirdağ	Department of Energy Management and Climate Change
Metropolitan Municipality of Trabzon	Department of Environmental Protection and Climate Change
Metropolitan Municipality of Van	Zero Waste and Climate Change Branch Office

Note: These data were obtained as a result of scanning the websites of 30 metropolitan municipalities.

According to Table 2, climate change management is organized in an administrative unit in 23 of 30 metropolitan municipalities. While 4 of the municipalities are organized as departments, 19 of them work as a branch of the environmental protection department. In the case of the absence of climate-related units on the website of

[5] In municipalities, there are units such as Waste Management Branch Directorate, Environmental Protection and Control Department, Environmental Inspection Branch Directorate, Green Areas Branch Office, Disaster and Risk Management Branch Office indirectly related to climate change.

[6] Different from the organizational structures of other municipalities, Diyarbakir Metropolitan Municipality has a *Renewable Energy and Ecology Branch Directorate* in its organizational structure. It is noteworthy that the concept of ecology is in the organizational structure of a municipality.

metropolitan municipalities, efforts were made to reach municipal officials. As a result of the interviews, it was learned that some municipalities' departments or branch offices are in the establishment phase.[7] Municipalities have generally associated the issue of climate change with the affairs of clean energy management and waste. Some municipalities, such as Ankara Metropolitan Municipality, have considered climate change within the scope of adaptation. Although it is very prominent that the issue of climate change takes place in the organizational structure of municipalities, it is also crucial as well that these units have authorized personnel. Beyond compliance with top policy documents, local action policies and other studies developed by these units for the adaptation process to climate change should also be examined.

5. CONCLUSION

The interest in adaptation to climate change in Turkey started with the increase of international agreements and scientific studies. In Turkey, it has been observed that determinations and targets for climate change have been included more broadly in high-level public policy documents over the years. It is very considerable to emphasize the concept of planning in documents arranged for combating climate change. These plans need to be prepared at both the central and local levels. There are many stages in dealing with a problem, such as identifying the problem, identifying the sources of the problem, developing alternatives for solution proposals, and providing the organization to implement these alternatives. In the study, planning at the level of strategic plan and organization within the scope of organizational charts are emphasized. As well as the management style of the metropolitan municipalities can be examined with many different variables, this study focuses more on policy determination and implementation. Considering that the majority of the population lives in metropolitan municipalities today, it becomes even more significant to make the climate change adaptation policies of metropolitan municipalities an object of investigation.

The concept of adaptation to climate change in Turkey is a new field that develops at the policy level. In this context, international developments are followed closely, and the results of scientific studies are frequently included in the documents. As a consequence of the study, it has been determined that the awareness of the metropolitan municipalities on the issue of climate change has increased over the years. Although there are substantial differences between the sensitivity of the municipalities to the issue and making it a policy, the presence of the Ministry of Environment, Urbanization and Climate Change at the central level encourages them to be interested in the issue. On the other hand, organizing at the ministry level regarding climate change will also contribute to the coordination between different municipalities. It is suggested that municipalities should consider the following issues in their policies regarding the adaptation process to climate change:

1. The implementation of climate change adaptation policies at the local level requires a very big financial resource. Metropolitan municipalities should clarify their work on the provision of this resource. The amount of budget allocated to climate change by the central government should also be increased.
2. Since local governments are the closest units to the local people, they have the advantage of finding faster and more effective solutions to the problems caused by the climate crisis. Action plans at the local level should be prepared within the framework of the information presented by scientific data in line with possible risks.
3. It is crucial to establish and plan adaptation policies before the impacts of climate change in cities become devastating. The issue of climate crisis should be included in a detailed way in the strategic plans of municipalities. As long as the adaptation to climate change is at the center of strategic plans, it will be successful.
4. In-service training should be given to increase the awareness of metropolitan municipality personnel on climate change.
5. Top managers of municipalities should determine the necessary policies for the building of cities that are resistant to the devastating influences of migration and economic losses caused by climate change.

[7] In the interview having with the officials of the Istanbul Metropolitan Municipality Environmental Protection and Control Department, it was given the information that the climate change and adaptation branch directorate will be established at the assembly meeting to be held in March. Similarly, due to the lack of information about branch offices on the website of Eskişehir Metropolitan Municipality, officials were contacted. Authorities stated that the climate change and adaptation branch office has just been established and that the necessary arrangements have not yet been made on the websites.

6. Metropolitan municipalities should develop collaborations in researching good practice examples of local units working on climate change in different parts of the world.
7. Since the effects of climate change affect the geography of the country, coordination should be ensured between municipal works. Different unions such as the Union of Municipalities of Turkey should assume leading roles in this regard.
8. To raise the sensitivity of the townspeople to climate change, different stakeholders of the city and the units in the municipalities should organize joint events. Participation of local people should be considered in the fight against climate change because the adaptation policies, where local risks are taken into account by the municipalities and public participation is ensured, will be successful.

DECLARATION OF THE AUTHORS

Declaration of Contribution Rate: The authors have equal contributions.

Declaration of Support and Thanksgiving: No support is taken from any institution or organization.

Declaration of Conflict: There is no potential conflict of interest in the study.

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