LOCAL CLIMATE CHANGE GOVERNANCE:

THE CASE OF TURKISH METROPOLITAN MUNICIPALITIES

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ANKARA YILDIRIM BEYAZIT UNIVERSITY

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Approval of the Institute of Social Sciences

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PLAGIARISM PAGE

I hereby declare that all information in this thesis has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work; otherwise I accept all legal responsibility.

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ABSTRACT

LOCAL CLIMATE CHANGE GOVERNANCE:
THE CASE OF TURKISH METROPOLITAN MUNICIPALITIES

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The necessity of cooperation among stakeholders at each administration level is increasingly emphasized to be able to thoroughly tackle challenges posed by global climate change. Particularly the mitigation and adaptation policies and strategies followed by local governments with the involvement of both public and non-public institutions are believed to be playing a crucial role in developing countries. To this end, this study elaborates how and why local climate change protection policies and strategies are carried out by local governments in developing countries in the case of the metropolitan municipalities' initiatives in Turkey. In order to conduct such a research, both qualitative and quantitative research methods are adopted; thus in addition to studying the strategic plans and annual action reports of municipalities as part of a content analysis, a regression analysis is conducted to identify the determinants of the adoption of such policies and strategies. This study concluded that the local climate change mitigation activities are predominantly implemented by provision modes in the urban infrastructure and transportation areas. Moreover, it is shown that stress factors – causing changes in the parameters of global climate change – and socio-economic conditions are determining factors in local climate change initiatives. However, it is found that risk factors – as an indicator of the vulnerability level – have been found not having an exploratory role. Future studies may include assessment of provincial and distinct municipalities, the non-public actors, use more variables, and conduct in-depth interviews with corresponding experts to achieve further clarification.

Keywords: Climate Change, Governance, Local Governments, Mitigation, Adaptation

ÖZET

YEREL İKLİM DEĞİŞİKLİĞİ YÖNETİŞİMİ:
TÜRKİYE BÜYÜKŞEHİR BELEDİYELER ÖRNEĞİ

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Küresel iklim değişikliğinin neden olduğu zorluklar ile mücadele edebilmek için her bir yönetim kademesinde paydaşlar arasındaki işbirliğinin gerekliliği giderek daha çok vurgulanmaktadır. Özellikle kamu ve kamu dışı kurumların katılımıyla yerel yönetimlerin izlediği azaltım (*mitigation*) ve uyum (*adaptation*) politika ve stratejiler gelişmekte olan ülkelerde önemli rol oynadığı düşünülmektedir. Bu amaçla, bu çalışma Türkiye'deki büyükşehir belediyelerinin girişimleri örneği ile gelişmekte olan ülkelerde yerel yönetimler tarafından iklim değişikliği koruma politika ve stratejilerin nasıl ve neden yapıldığı sorusu üzerinde durmaktadır. Bu çalışmayı yapmak için nitel ve nicel araştırma yöntemi kullanılmıştır, dolayısıyla belediyelerin stratejik planları ve yıllık faaliyet raporları içerik analizi kapsamında incelenmiş, bu tür politika ve stratejilerin benimsenmesinin belirleyicilerini tespit etmek için regresyon analizi yapılmıştır. Bu çalışma ile yerel iklim değişikliği azaltma faaliyetleri çoğunlukla kentsel altyapı ve ulaştırma alanlarındaki tedarik (provision) modu ile gerçekleştirildiği sonucuna ulaşılmıştır. Ayrıca, küresel iklim değişikliği parametrelerinde değişikliğe neden olan stres faktörlerinin ve sosyo-ekonomik koşulların yerel iklim değişikliği girişimlerinin belirleyici faktörleri olduğu gösterilmiştir. Ancak, hassasiyet (*vulnerability*) düzeyinin bir göstergesi olarak risk faktörleri ise açıklayıcı bir role sahip olmadığı bulunmuştur. Gelecekteki çalışmalar daha fazla açıklık sağlanması bakımından il ve ilçe belediyelerinde değerlendirmesini, kamu dışı aktörleri, daha fazla değişkenin kullanılmasını ve ilgili uzman kişilerle detaylı görüşmelerin yapılmasını da kapsayabilir.
Anahtar Sözcükler: İklim Değişikliği, Yönetişim, Yerel Yönetimler, Azaltım, Uyum

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TABLE OF CONTENTS

CHAPTER III

CHAPTER VI

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

C-40-Climate Leadership Group

CBCCWM - Climate Change and Air Management Coordination Committee

CCASAP-Climate Change Adaptation Strategy and Action Plan

CCC - Cities Climate Catalogue

CCI - Clinton Climate Initiative

CCP - Cities for Climate Protection

CDM - Clean Development Mechanism

COP - Convention of Parties

FAO - The Food and Agriculture Organization of the United Nations

GDP - Gross Domestic Product

GHGs - Greenhouse Gasses

ICLEI - Local Governments for Sustainability

ICSU - The International Council for Science

IEA - International Energy Agency

INC - Initial National Communication

IPCC - Intergovernmental Panel on Climate Change

KENTGES - Integrated Urban Development Strategy and Action Plan

LULUCF - Land use, Land-use change, and Forestry

MCCAS - Municipal Climate Change Action Score

MEAU - Ministry of Environment and Urbanization

MLG - Multi-Level Governance

NCCAP - National Climate Change Action Plan

NCCSP - National Climate Change Strategy Paper

NGOs - Non-Governmental Organizations

NRC - National Research Council

OECD - Organization for Economic Co-operation and Development

RQ - Research Question

TSI - Turkish Statistical Institutions

UCLG - United Cities and Local Government

UN - United Nation

UNCED -United Nations Conference on Environment and Development

UNDP - The United Nations Development Programme

UNEP - The United Nations Environment Programme

UNESCO - The United Nations Educational, Scientific and Cultural Organization

UNFCCC - United Nations Framework Convention on Climate Change

UN-Habitat - United Nation Human Settlements Program

USCM- US Conference of Mayors

USEPA - The United States Environmental Protection Agency

WCP - the World Climate Programme

WHO - World Health Organization

WMCCC - World Mayors Council on Climate Change

WMCCC - The World Mayors Council on Climate Change

WMO - World Meteorological Organization

CHAPTER I

INTRODUCTION

1.1. Background and Problem Outline

The scientific and philosophical progress after the Age of Enlightenment, fundamental changes in social sphere following industrialization period led to the existence of the modern society. Due to substantial change on the economic, social, cultural, philosophical, and political pattern in the society, production and consumption activities increased, the relationship between human and nature was distorted in favor of the first one, and ecological balance began to be deteriorated. Because of population growth, excessive consumption of resources and difficulty of rebalancing of the ecological system, industrialization, technological progress in particular after second half the 20th century, the requirements of new legal and administrative arrangement for the environmental problems was accepted by many nations in the world. Studies indicate the modernity and the mechanical view of nature as the major cause of the global environmental problems.

In particular, the end of 18th and beginning of 19th centuries could be considered as a peak period for transient and non-systematic reactions in the western countries such as UK, USA and Germany for global environmental problems such as air pollution, deterioration of natural resources, extinction of species and habitats, change in food chain and natural beauty etc. At that time, the first use of the concept of `ecology` by the German biologist, Ernst Haeckel, in 1866, significant progress on the understanding of the interaction between nature and human with academic studies also accelerated awareness on environmental problems in the societies. Enlightenment and philosophical progress put forward by European intellectuals had also a significant impact on dissemination and consolidation insight of conservation and preservation of the environment in industrialized countries.

Global climate change among environmental challenges was acknowledged by nations in particular since the 1980s. After that time, climate change has been regarded as one of the most fundamental global environmental problems affecting negatively ecosystem, the well-being of all species on the earth, urban life, economic development pattern, social health, technological development, agriculture, forestry, food chain, water resources and other vital humankind`s activities. That is to say, due to rapid industrialization efforts and population growth, urbanization, increasing fossil fuels usage, changes in land-use pattern, increasing consumption actions, deforestation and many other human-caused changes have made climate change as a threat to humankind and all living species on the Earth. In the case of not taking the necessary precautions, it has already proved by comprehensive scientific studies that it will bring about serious and irremediable dangerous to humankind and ecosystems within the medium and long term.

Increasing scientific evidence in the literature indicates that world's climate is predominantly changing due to the rise of greenhouse gasses (GHGs) in the atmosphere, mainly resulted from human-made production and consumption activities (IPCC, 2007a). Although there is still fierce debate on uncertainty and ambiguity of effects and scale of climate change, most studies indicate that rise of GHGs concentration in the atmosphere and alteration of the world climate systems have adverse impacts on human`s physical, chemical and biological, and socio-political environment in many ways. The main evidence of the climate change on human life and natural ecosystems are significance change in the average temperature and precipitation pattern, rising sea levels and melting of glaciers and snow plates, influence on public health.

At the beginning, scholars claimed that global climate change problem necessitates international and national actions to reduce GHGs emission in which people could cope with its potentially devastating impacts. However, after a while, limitation of international and national legal and administrative instruments for dealing with global climate change problem was argued. Thus, scholars had begun discussing requirement of different administrative and political response to climate change trouble, and necessity of power and responsibility transformation from central to subnational authorities such as local and regional institutions. The reason of that was a consideration that international negotiations and efforts only

endorsed nations to take actions for dealing with climate change problem, while GHGs emission emanated from social and economic activities held at each administrative level such as a local, regional, national and international level. That consideration led decision-makers and practitioners to give more interest for climate change protection at the local level (Bulkeley & Kern, 2006: 2237).

Similarly, many scholars in academic realm assert that proper political and executive response to eradicated and long-standing climate change problem necessitate local authorities` engagement including public and non-public organizations (Gustavson et al., 2008:59). In particular, local governments as a public institution have been accepted as a significant role in combating global climate change trouble recently (Demirci, 2015:76). To this end, in academic realm, though a wide range of studies have analysed climate change issue at national and international scale until recently, there has been growing number of works exploring local climate change initiatives, cities` engagement in climate network and main obstacles encountered in that process (Gustavson et al, 2008:59).

At present, several promises for local governments' involvement in climate change policies and strategies exist in the literature. First one is associated the argument of their power, responsibility, and flexibility on decision-making in policy process on several sectoral areas which have a significant contribution to GHGs emissions such as energy, water, transportation, building, infrastructure, waste management and recycling, land-use planning. Scholars also assert that local government has several advantages such as small area operation and adaptation quickly to new policy cycle, compare to the national government (Collier & Lofstedt, 1997: 27, Dodman 2009: 198, Sippel & Jenssen 2009:3, and Puppim de Oliveira, 2009:253). Another argument base on the notion that local governments are more appropriate political jurisdiction for being able to ensure cooperation between public, non-public stakeholders, citizen participation, essential community mobilizations and engagement to support local climate protection actions (Coenen & Menkveld, 2002: Sippel & Jenssen, 2009:3). Another one is associated with fundamental thesis such as the following principle of decentralization, good governance, sustainability, subsidiarity, deliberative and participatory

approaches proposed in the international negotiations such as Maastricht Treaty in 1992, and Local Agenda 21 (Czako, 2011: 4).

Based on all of these premises, it is possible to assert that role and importance of local government, coordination and cooperation with other stakeholders within the city in dealing with global environmental problems was acknowledged as new management inquiry, political debate, and scientific analyses. In this regard, in particular, local governments in developing countries such as Turkey have a very important duty and responsibilities to provide local goods and services in metropolitan cities. In particular, scholars claim that the engagement of local governments on climate change protection initiatives would also ensure that those nations` international and national climate policies and strategies become successful.

Despite various works in the literature, it is not possible to claim that the academic studies regarding local climate protection activities have reached to an adequate level. For last two decades, most of the studies concerning cities and climate change governance have been conducted only in developed countries. That is to say, most of those focus on climate protection strategies, plans, and problems encountered in the front-runner cities which are economically powerful and become a member of the transnational networks in developed countries such as the USA, European countries. Moreover, most of those studies were conducted with a small-sampled case study. What is more, governance modes, the level of institutionalization, the capacity of knowledge, technical and financial condition, political leadership, the state of the stakeholder's activities are only several issues inquired in these studies. However, it is very difficult to make inferences for cities in the southern, low -income or developing countries based on the findings obtained from these studies. On the other hand, most of those studies focus on only mitigation or adaptation actions with a specific urban sector. However, both adaptation and mitigation actions should be considered as complementary to each other for elimination of obstacles, actors, motivators, and benefits encountered.

Another significant gap in the literature is the situation of the actors on the implementation of their plans and strategies regarding local climate change governance. The literature clearly

indicates that the multi-actor and multi-sector perspectives for local climate protection and the inclusion of non-public actors and community are necessary. Nevertheless, it seems quite difficult to determine the certain boundary between the public and non-public actors, and their support and contribution to the issue of climate governance with such small case studies. In particular, some scholars also argue that local governments could be regarded as significant actors in some sectors such as energy, land-use planning, and transportation in a wide range countries, while some claims that non-public organizations have played a crucial role in areas based on findings of their comparative analysis (Bulkeley & Newell, 2010). To this end, public and non-public actors' engagement with climate change policies and strategies should be examined in separate studies to reach much clearer and rational picture.

Most of the studies conducted with qualitative research methods only for mitigation plans and strategies carried out in industrialized countries concerning local climate change protection (Broto & Bulkeley, 2012). Unfortunately, the number of studies including quantitative research design is very limited. Even though it is possible with quantitative research to explain the relationship between climate change plans, strategies and city characteristics (for instance, as in the studies of Krause, 2011; Pitt and Randolph, 2009; Zahran et al., 2008), essential attention to quantitative research on this subject has not been given by social and political scientists. Furthermore, it is well-known that some cities make a crucial endeavor to implement plans and strategies for dealing with climate change protection in their local area, though they encounter some obstacle and barriers. In this regard, the city governments that have a significant desire to deal with the climate change problem have general characteristics apart from others (Clinton, 2008:18). These main features could be referred as socio-economic, political, governance forms and stress and risk factors (Clinton, 2008:18). Therefore, more investigation of those characteristics should be evaluated to identify main factors for local governments' engagement in climate change protection.

More case studies in comparative perspectives need to be conducted on local climate change governance, in particular for municipalities in developing countries. Scientific investigation of the local climate change protection policies and strategies for these countries would also provide significant support to those countries` national and international targets and

commitments. To this end, comprehensive qualitative and quantitative studies involving both mitigation and adaptation initiatives in sectoral basis would be useful framework because developing countries such as Turkey that are expected to play an active role and responsibility in global climate change regime in the future. More holistic studies on local climate change governance would also provide significant gains for those countries to take actions early and overcome barriers encountered in advance. Consequently, because the role of local governments and their horizontal and vertical cooperation with other actors are being evaluated as new political and scientific debate in Turkey at present, that study would help to shed light on unclear and unresolved points.

1.2. Contributions of the Study

As the remarkable contribution of the thesis is to provide a synopsis of insight about of how local mitigation and adaptation actions with a case study of municipalities in metropolitan cities in Turkey are being carried out**.** There are two significant contributions of this study to the literature on the "local climate change governance". Firstly, it supports determining the type of the governance modes framework for local climate change protection (including mitigation and adaptation initiatives) and major factors on the adoption of such policies and strategies, which has been ignored by scholars in the literature so far. A second significant contribution is associated with capturing of the `big picture` for cities which have no commitment and targets in developing countries, which will be crucial to global climate regime in the future, with the mixed research method rather than a case study.

The findings of this study also provide significant outcomes for decision-makers, planners, and practitioners of municipalities especially in developing countries such as Turkey for determination and implementation of necessary political and strategic initiatives to fight against climate change. Similarly, the study makes significantly contributes to national and international non-governmental organizations working on energy, environment and climate change regarding determination and dissemination of the road map for local climate change activities. In addition to local governments, the study makes significant contributions to other

relevant public and private institutions and the academia in relation to identification of necessary steps for carbon reduction and determination of particularities which occurred in the past and have been ignored up until now.

In addition, this study presents serious achievements in the determination, dissemination, and consolidation of climate change protection policies and strategies at each administrative level, which are in accordance with sustainable development principle and environmental, economic and socio-cultural structure in Turkey. In particular for GHGs emission reduction and adaptation, the research provides significant contribution to local governments (in particular metropolitan municipalities which have significant administrative and legal responsibilities) in Turkey to be involved in the process local climate protection initiatives, and to strengthen technical and institutional capacities, to obtain financial support and to prepare local sector-based action and strategy plans, and to raise awareness on that issues as well.

1.3. Research Objectives

Even though Turkey has not declared any commitment for emission reduction (not historical responsibility), it has performed significant efforts at the national and international arena to play a dynamic role in the determination of framework of the global climate change regime, in particular since 2000`s. Moreover, some local governments in Turkey have already performed climate protection activities on a voluntary basis, in particular for last decades. It is also possible to see the distinct transformation on major motivations for local climate protection initiatives from volunteerism to strategic management in Turkey as parallel to progress in the world. In this regard, the Turkish government has started to enact various important regulations at the national level to support local-level climate protection initiatives such as financial and technical endorsement, and necessary local climate action plans recently.

In this respect, the main aim of this study is to comprehend the extent of climate change policies and strategies adopted by local governments in developing countries, in particular in metropolitan cities, through modes of the climate change governance framework. Besides, this

thesis was conducted to increase understanding of major factors on the adoption of appropriate local climate change actions by metropolitan municipalities such as social-economic condition, climate stress factors, and vulnerability indicators in the city to support determination, dissemination a and consolidation of local, national and international climate policy practice.

1.4. The Research Questions in the Thesis

The concept of "local climate change governance" and "major factors" which have an impact on achievement and commitment to the local climate change policies and strategies are main curiosities of this study. Therefore, this study determines the extent of which local government in particular metropolitan municipalities in Turkey have experience for dealing with climate change regarding "modes of climate governance framework" and to distinguish "major factors" which increase local climate initiatives in that manner.

In this regard, in the study, the main research question- *how and why local governments in metropolitan cities in Turkey engage in climate change protection actions* is being investigated. However, it should be noted that specific derivative questions outside of this main question could be put forward. For instance, fundamental sub-questions could be summarized as following;

Research Question (RQ) 1: Which mode of governance is mostly used by local governments in their actions regarding climate change protection in metropolitan cities in Turkey?

RQ-2: Which climate change protection approach adopted by the metropolitan municipalities in Turkey is prevalent?

RQ-3: Which is the most common urban area that local governments are implementing carbon reduction initiatives in Turkey?

RQ-4: Which metropolitan municipality is carrying out more effective and comprehensive climate change protection initiatives in Turkey?

RQ-5: Which factor (or factor cluster) is most influential in the local climate change protection activities carried out by the metropolitan municipalities in Turkey?

Similarly, based on the theoretical framework of local climate change governance and significant gaps in the literature, a great variety of testable hypotheses involving distinct methodological sense were formed. The acceptance or rejection of the hypothesis was carried out with appropriate research method at the end of the study.

1.5. General Structure of the Dissertation

In general, the thesis is structured in six chapters. The framework of the conceptual, theoretical and case inquiry that will form the fundamental basis for the research question is explained in the first three chapters after introduction. Each chapter has been tried to be discussed in depth in such a way as to be integral and comprehensive to each other.

Chapter 1 is an introduction to the thesis which includes rationalization of the thesis, research problematic, the research aims, questions and outline of the thesis. First of all, it presents brief information concerning historical background of global climate change issue in harmony with the research question and theoretical background of the thesis and importance for today ‘societies and academic realm in general. Afterward, research question has presented with the main purpose and originality of the thesis. The basic and derivative research questions are also set out in a clear manner in this part. Finally, it present general framework of the study including short summary of the each chapter

Chapter 2 presents the conceptual framework of the research. It examines technical and social dimensions of the climate change problem with the main conceptual discussion in depth and an academic manner. For instance, some significant points concerning the science of climate change were highlighted such as differences between the concepts of the `weather` and `climate`, `climate change` and `global warming`, `greenhouses gasses effect`. It also discusses major causes of the global climate change as a natural and anthropogenic factor.

Furthermore, it discusses the main influence of the climate change on human life and ecosystems such as significance change in the average temperature and precipitation pattern, rising sea levels and melting of glaciers and snow plates, impacts on public health. Also, the second part of that chapter mainly focuses on a social dimension of the global climate change problem instead of technical and scientific extent. For this purpose, in particular, it provides an explanation of the framework of "climate change governance". Afterward, a short history of global climate change regime from the first World Climate Conference in 1979 to 21st Convention of Parties in 2015 in the scope of the fight against climate change problem is presented in the last part of that chapter.

Chapter 3 focuses on literature review and theoretical background of the research questions. The theoretical framework of this thesis is "local climate change governance" and "major factors for adoption of local climate change initiatives". To this end, firstly leading cause for assessing climate change at the city level is being questioned in this chapter regarding scale issue. In this regard, the association between urbanization, and several characteristics of cities in the scope of the climate change was discussed. Afterward, specifically, the major influence of climate change on cities such as temperature variation and urban heat-island, precipitation pattern change, storm, drought and water scarcity, sea level rising and flooding risk on coastal areas are discussed in this chapter. Moreover, three theoretical backgrounds for the first tier of the research question (how) is explained as, "multi-level of climate change governance", "transnational climate change governance" and "modes of climate governance". It also presents a theoretical explanation for the second tier of the research question (why) as major factors in the adoption of local climate protection policies and strategies. It also discusses two main approaches (mitigation and adaptation) for dealing with climate change protection initiatives in sectoral bases (urban development and design, built environment, urban infrastructures, transportation, and carbon sequestration) in the city areas. Ahead of empirical analysis of research questions, basic measurable hypotheses created based on literature review have been listed in this chapter. Finally, it scrutinizes positions of stakeholders, primary barrier, and motivators in the climate policy process and harmonization of the local climate protection actions with national initiatives.

In Chapter 4, climate change policies and strategies in Turkey, which are followed at the international, national and local level, are discussed as the case study. In this chapter, main initiatives of Turkey concerning climate protection at the international, national and local level are evaluated to reveal the outline of the current situation based on a variety of official climate policy documents. In this context, firstly it evaluates general outline of Turkey position at international stage regarding climate change and its target and commitments. Furthermore, it has tried to explain institutionalization, legal and administrative practices to tackle with climate change and capacity condition of the stakeholders at the national level. Finally, some example of climate protection initiatives to be held at the local level in Turkey is discussed to form the basis for empirical analysis of the research.

Subsequent chapter 5 (local climate change governance in Turkish Metropolitan Municipalities) begin with an explanation of analytical framework and methodological approaches used in the thesis. It provides a significant explanation concerning the mixed research method used in the thesis consisting of the two approaches (qualitative and quantitative). For instance, it put forward comprehensive information regarding data sources, data collection, and data analyzing techniques required for conducting research. In this context, a model and a table describing independent and dependent variables are presented to clarify methodological approach in the research. In addition, an assessment regarding the reliability and validity of the study is set out. Finally, the main limitations and assumptions of the study are presented at the end of that chapter. This chapter secondly brings into comprehensive finding and discussion of the research. General findings of the analysis in the first part of the study are presented and evaluated municipalities of local climate protection actions and governance modes in metropolitan cities in Turkey with document analysis of the strategic plans and annual action report in the post-Kyoto period. In the second stage of this part, the results of the empirical analysis are presented concerning major factors that impact on the local climate protection initiatives adopted by metropolitan municipalities in Turkey. In this regard, seven different models are put forward based on the result of the statistical analysis run by the software of the SPPS program.

The study is concluded in a chapter of 6 (Conclusion) by harmonizing theoretical explanation with empirical findings, discussions, and recommendations for future research. In this section, climate protection initiatives conducted by metropolitan municipalities in Turkey are evaluated based on predetermined themes concerning local climate change. Moreover, taking into account main limitations and assumptions of the thesis, a variety of the suggestions and recommendations for future studies and crucial actors including public and non-public authorities on climate change policy in Turkey are presented in that part of the study.

CHAPTER II

SCIENCE AND POLITICS OF CLIMATE CHANGE

In this chapter, science and socio-politics aspects of the climate change are explored. In the first, basic conceptual explanation of climate change science is presented. In particular, scientific evidence for climate change phenomena that are significantly accepted by scholars in literature, and skeptical arguments on that topic are interrogated. In the second, historical development, social and political aspects of the global climate change regime are mainly explained. Overall, the main purpose of this section is to clarify theoretical premises concerning climate change science and governance clearly and adequately using the technical and political concepts to eliminate controversial arguments in an academic manner.

2.1 Conceptual Debates in Climate Change Science

It is argued that the main reason of inconsequential debates on climate change science in the society and the academic realm is associated with the scientific knowledge and ambiguity. For instance, is World's climate changing, or not? Alternatively, the question of whether human production and consumption activities are the biggest triggering factors for it, is fake, or not? If not, is it normal change that has been observed and supported by scientific evidence, and a just regular phase which has to be gone through in the cycle of our planet? These questions encountered by almost all people cause serious conflicts due to the lack of scientific knowledge and incomprehensibility. That situation confuses everyone being either a relevant expert or not and makes it difficult to find a certain solution to deal with climate change. Since essential trait of the concept of climate change is complex, continuous and requires interdisciplinary studies such as economics, politics, environment, sociology, history, etc., each debater evaluates it based on their perspective, which causes the loss of integrity and non-multi-consciousness.

As James E. Hansen (2009) stated a long time ago, everyone has a different inference on this issue as there is some difference between what climate change scientists read and comprehend and what politicians and decision-makers understand and declare on the issue of climate change (p76). Consequently, to analyze these discussions on climate change and to figure out main problematic sufficiently, and to achieve targets and commitments on that issue, the main concepts should be well comprehended and used in an appropriate manner beyond any doubt.

2.1.1 Climate and Weather

Firstly, regarding the conceptual debate on climate change, the difference between "climate" and "weather" should be explained. "climate" and "weather" are two terms that are commonly substituted for each other by mistakenly. The two fundamental criteria to comprehend the difference between these terms are time and a given area. When the both criteria are taken into consideration, "climate" is defined as average weather condition which does not change for many years in an extensive geographical area regarding its characteristics (Philander, 2012: 262; NASA, 2006; 6). The term "weather" is a term which is used for weather conditions that can be measured as temperature, atmospheric pressure, humidity, wind speed, and direction, cloudiness, and precipitation occurring in the micro and short period (Philander, 2012: 1463). The concept of the climate, compared to the weather, is more general term since it is used to define an extensive area and long-term weather conditions (NASA, 2006: 6). What period is regarded as a certain long time of period such as 50-100 years and by region is hundreds of km^2s (Yalçın et al., 2005: 3).

2.1.2 Climate Change

The concept of 'climate change' is closely related to the energy cycle (energy budget balance) which has a pivotal role for world climate system and biological activities in the earth. More clearly, formation and development of the world climate are mainly determined by solar energy cycle. The balance between the amount of input that reaches the earth in the form of

short radiation waves from the sun and the amount of output which expands in the shape of long radiation waves from the land determines the earth's climate system (Maslin, 2004:4).

In recent years, even though there is a substantial ambiguity in modeling and digitizing of earth energy balance with certain values, there are a broad range of studies such as Wild et al., (2013) that have gained acceptance for the concretization of the issue. Furthermore, radiations that reach to the earth and leave it have different characteristics. While radiations are in the form of visible and ultraviolet have a short wavelength, radiation reflected from the Earth is infrared and mostly in the form of heat (Mann, 2009:194). While 47 % of total radiation is coming as the short wavelength reaches to the earth, respectively 23% and 29% of it either is absorbed or reflected back to space. Consequently, it is considered that net amount which constitutes earth temperature and energy flow, is approximately 20% absorbed by especially lands and oceans (Wild et al., 2013: 3108). Other technical and scientific argument is that average amount of solar radiation is 1370 watt per square meter (WMO, n.d), and solar radiation that the world absorbs from the sun is 240 v/m^2 on average (Wild et al., 2013: 3112).

The phenomenon of the climate change whose causes are called as either internal or external, natural or anthropogenic, is a term which defines the situation of changing the earth's energy balance as a consequence of differentiation of chemical and physical structure of atmospheric layer which is significant one regarding continuity of human life. IPCC (2007: p30) defines climate change as "any change in climate over time, whether due to natural variability or as a result of human activity." To be more precise, it defines a significant observed change in climate long termed variables such as temperature, precipitation and the wind pattern which covers large geographic areas.

There have been two significant reasons of changes in variables of climate regarding both anthropogenic activities occurring only after the industrial revolution, and natural compellers occurring in the past and at present (Mann, 2009:194). Considering recent scientific improvements and findings, it can be said that the most accepted consideration among climate scientists is the main reason behind the increase in earth's temperature and change in global

climate is greenhouse gas which had increased high level as a consequence of human activities especially after the 1750s (IPCC, 2013; 11, and Lerner &lerner, 2008: 200).

2.1.3 Climate Change and Global Warming

Another aspect of the problematics which is commonly confused in the society is associated with differences between two concepts; "global warming" and "climate change". Indeed, the concepts of "climate change" have a longer history than global warming. While concepts of climate change were firstly used in the study "'The Carbon Dioxide Theory of Climatic Change" by Gilbert N. Plass in 1956, Global warming was utilized in the study titled "Climatic Change: Are We on the Brink of a Pronounced Global Warming?" by Wallace Broecker in 1975. (Leiserowitz, et al. 2014: 6). In addition, Global warming refers to an increase in the average temperature that will cause a change in the climate system, as a consequence of a change in chemical properties of the atmosphere due to the human activities, especially after the industrial revolution (Mann,2009: 193; Leiserowitz, et al. 2014: 6). On the other side, "climate change" is a broader term used to define atmospheric phenomenon such as temperature, precipitation, humidity, drought observed in a particular geographical area and period (Mann,2009:194, USEPA, 2016-a.).

In the literature, while climate change is two-dimensional matter of debate as natural events experienced in the past and at present, and anthropogenic effects including human activities in particular after the industrial revolution, it can be said that global warming is a term that defines more of an anthropogenic global average temperature change (Mann,2009: 194). It is observed that, in the scientific and political discussions, these both concepts are used interchangeably to emphasize the aspects that need to be underlined at the point of perception and solution which are tried to figure out for the problem.

2.1.4 Greenhouse Effects

Another important concept that is needed to be highlighted is "Greenhouse Effects". One of the main factors to be continued life activities is the presence of atmospheric layer[1] (Burch & Harris, 2014:39). That layer consists of three main gasses such as Nitrogen (%78) Oxygen (21%) and Argon (about %1). The rest are mainly Water Vapor (H_2O), Carbon dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O). The rate of O_3 (ozone) is quite less than one percent. Even though the amount of those gasses in the atmosphere is low, they are quite important regarding continuity of life on earth. The physical and chemical structure of atmosphere layer has undergone significant change due to the natural and anthropogenic forcing factors in the course of time.

Greenhouse gasses[2] (GHGs) are defined as small atmosphere components that can absorb the radiation in the form of invisible infrared from the earth and formed by natural and anthropogenic factors (IPCC, 2013). GHGs which include Water Vapor (H_2O), Carbon Dioxide (CO_2), Methane (CH_4), Nitrogen Oxide (N_2O), Ozone (O_3), Perfluorocarbons (PFCs), Hydrofluorocarbons (HFCs), and Sulphur hexafluoride (SF_6) are necessary for continuity of all living creatures.[3] These gases are found in certain amounts in the atmospheric layer, and they reflect a certain amount of long waves or infrared radiation or cover up the earth like a blanket absorbing the heat to ensure that average global temperature and other climate factors stay at the necessary levels of the continuity of the life of living creatures, and it is called

[1]All of the vital activities occur in the layer called as Biosphere. This layer is divided into several broad division as atmosphere (air), the hydrosphere (water), and the lithosphere (rock and soil) Atmospheric layer consists of 4 different layers in compliance with the criteria such as temperature change, chemical composition, density, movement. Distances of these layers are, Thermosphere (85-600km), Mesosphere (50-85 km), Stratosphere,(17-50) and Troposphere (6 to 17 km) (Philander, 2012: 94).

[2]The concept of greenhouse gas effect had first been suggested by French physicist Joseph Fourier in 1824. Irish John Tyndall in 1850, Swedish Svante Arrhenius in 1896 have developed that term in their studies.(Fleming 1999:72)

[3] CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 are recognized as greenhouses gases which should be reduced to certain level to deal with climate change in scope of international agreements (Iwata, 2012: 326).

"Greenhouse Effect" (Philander, 2012:642)[4] To be more precise, the rate of GHGs are expected to be normal levels in order that the life of living creatures can continue on the earth. (Philander, 2012:642). As a consequence of reaching high levels of the amount of the GHGs in the atmosphere, the primary climate variables in particular and long-term geographical area are changed (a unidimensional increase of average earth` temperature levels). That is defined as Climate Change that we speak to every day (Kaya, 2007: 19).

In the atmospheric level, the potential of GHGs regarding affecting the degree of the global warming (GWP)[5] and length of life, differ from each other. GHGs which are significant regarding GPW values are CO_2 (1), CH_2 (28), NO_2 (265) and F-gases range between 23-500 (IPCC, 2007a). According to fifth evaluation report of IPCC, when the situation of GHGs are evaluated on their lifespan, it is not possible to indicate CO_2 with a single numerical value, its loss in the atmosphere never takes place and change place between lands, oceans, and atmosphere in the natural cycle. It is also indicated 12 years for CH_4, 121 years for NO_2 and F-gases it ranges between a couple of weeks and thousands of years. (IPCC, 2014-a:87).

According to fifth evaluation report of IPCC, the ratio of the amount of GHGs differs from each other as well. Among the human-made GHG gasses, CO_2 takes the first place with around %78 followed by CH_4 with %16, NO_2 with %6, 2 and F with % 2. It has been asserted that the effect rate of those gasses on global average temperature increase is CO_2 by 70%, CH_4 by 17%, N_2O by 6% (European Commission, 2015).

CO_2 is the most important gasses among the natural GHGs regarding the climate change and important activities. CO_2 has been absorbed or emitted as plant and animal aspiration, volcanic

[4] "The Principle of Goldilocks" is needed to be highlighted while explaining the greenhouse gas effect. It means "Venus is too hot, Mars is too cold, and Earth is just right. According to a study held by NASA, surface temperature of Mars is $53C^0$ on average, and it is under the required level for continuity of vital activities. In addition, the surface temperature of Venus is $450C^0$ and it is over the normal levels. Earth is a planet located between these two planets, where the average surface temperature is 13 C^0 and which is in the natural cycle limits and compared to the other planets, whose atmospheric gases are on the optimal level which all of the living creatures are able to maintain their lives (Curry, 2012)

[5] GWP is a time dependent index used for comparing the radioactive forcing of a specific greenhouse gas with regard to that of CO_2 (USEPA, 2016-b)

events and ocean-atmosphere exchange in the standard carbon cycle. Hence, it has been claimed by the studies that fluctuations of carbon in the atmosphere are mainly because of natural activities. (USEPA, 2016-c). However, it is indicated that the reason for the 64% of global average temperature increase is CO_2 which increased as a result of human activities especially after the industrial revolution (European Commission, 2015). Indeed, according to research held by US Geological Survey, the amount of CO_2 per year emitted as a result of natural events in particular volcanic activities is 135% less than human activities (USEPA, 2016-c).

The main activities for CO_2 emission are burning of fossil fuels (petroleum, coal, natural gas), change in land use, destruction of forest areas and carbon-rich soil, the manufacture of cement from limestone, solid waste, geological and chemical decomposition (Philander ed. 2012). By 2013, the amount of CO_2 in the atmosphere has increased by 40% since the industrial revolution (280 parts per million by volume –ppmv- in the 18th century to 396 ppmv in 2013), (USEPA,2016-c). Every year approximately 30 billion tons of CO_2 is emitted into the atmosphere due to human production and consumption activities. For last decade, 2 ppmv CO_2 has been emitted per year. (IEA, 2014: 7).

On a global scale, each country emits certain amounts of greenhouse gas depending upon the factors such as economic development and growth rate, population, per capita income, land use, and climatic conditions, etc. (IEA 2014: 11). Therefore the spatial and temporal distribution of CO_2 emission on earth is different. The main reason of that is especially energy usage and production activities differ among the countries. Around 82% out of total CO_2 emission has been emitted only from the countries that are located in Asia, Europe and America continents (IEA, 2014). It can be said that industrialized nations are much more responsible than developing and low-income countries by emitting approximately 22 billion tons of CO2 per year. According to 2012 data, regarding total energy-related emission amounts, China, USA, European Union countries and India take the first rank (IEA, 2014). The first 5 countries in terms of their share in the total CO^2 emission and percentages rate, in turn, are China (%28), The United State (%16), India (%6), Russian (%5) and Japan (%3.8) (Statista, 2016). Moreover, regarding top five emitter countries in the world per capita

emission, the United States is first with 16,1; China and India are among in top five countries with 6.1 and 1.6 tons in turn (IEA,2014: 11).

Another GHG that causes the greenhouse effect and resulted in human activities is Methane (CH_4). Methane gas that emitted through human activities such as solid waste landfills, agricultural activities, coal mining, leakage from natural gas pipelines and oil systems, livestock, wastewater treatment, rice cultivation, biomass and fossil fuel combustion, has recently shown a significant increase as well. Another effective gas among the GHGs is Nitrous Oxide (N_2O) emitted as a result of natural biological activities, industrial and farming, fertilizing, fossil fuel combustion, and chemical industry. It is detected that the amount of NO_2 in the atmosphere has risen by 18% in parallel with human production and consumption activities especially after the industrial revolution (USEPA, 2016-c)

Other necessary gasses among natural GHGs causing global warming are human-made gasses such as in particular Water Vapor (H_2O), Ozone (O_3), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Since Water Vapor is another greenhouse gas which is abundant in the atmosphere, it can be controlled by the earth temperature (through evaporation and precipitation), it is not very influential in term of climate change. Ozone gas has been emitted as a result of the chemical process, industrial production, and transportation activities and indicated as one of the anthropogenic gasses which are harmful to human health and ecological environment and cause climate change (USEPA, 2016-c). Other gases which are generally known as F-gases and created by human activities such as variety of industrial activities including semiconductor manufacturing, electrical transmission, and distribution, aluminum and magnesium production have adverse effect on human and environmental health since their duration of staying in the atmosphere and their heat holding capacities are more than that of the other gases (USEPA, 2014).

2.2 Causes of Climate Change

There exists sufficient proof that the climate change arises from the transformation of earth energy balance due to various forcing elements (anthropogenic and natural). In the literature of climate science, such compelling elements causing transformation of energy balance are classified under different groups. According to the most common approach, it is called as binary classification including that the main compelling factors in changing the energy balance are variation caused by the world's travel on the orbit around the sun and fluctuations resulting from the sun's loop and the compelling natural factors covering the fluctuations in the global climate's system and the volcanic activities, and human activities causing changes in the amount and rates of GHGs which are crucial for the earth atmosphere formation, (European Commission, 2015). Another classification is a categorization of the factors causing climate energy balance change as a change of greenhouse gasses, change in the amount of energy reaching earth, change in the amount of energy reflection of atmosphere and the earth (reflectivity and radiative forcing). Consequently, the causes of climate change are differently classified based on internal and external factors, natural and human-caused with regards to their formation, and short and long termed for their influence periods. However, because the natural or human-caused classifications are the most common in literature, this trait will also be followed here.

2.2.1 Natural Causes

The Earth climate system is affected by the natural factors that influence on the solar energy amount reaching or leaving the earth. The primary ones of these forcing factors causing climate change are the shifts in the orbits of world and sun, which causes fluctuations in the amount of radiation, and the volcanic activities (Cabuk, 2011, and USEPA, 2016-c)

The change occurring once in 11 years in the sun and the change in the angle of the rays reaching the earth affect the solar energy density even slightly. Variations in the tilt and axle of the earth similarly cause the change of solar energy amount reaching the earth. Moreover,

volcanic activities are another forcing factor which is reported to cause climate change among others. Particularly due to the volcanic activities, a significant amount of sulfur dioxide and CO_2, as well as other volcanic gasses, other aerosols and ashes, cause changing the chemical structure of the stratosphere (USEPA, 2016-c). Sulfur dioxide (SO_2) injected into the atmosphere as a consequence of these natural events cause serious cooling of the global climate change while volcanic CO_2 gas could create a significant effect in increasing the weather temperature.

To sum up, it is argued that the forcing factors are effective in the global energy balance and the global climate changes based on available data given by international organization such as World Bank and OECD. The effect of these natural factors causing a variation in earth energy balance differs to the extent of years and geographic regions. However, as claimed by the many academic studies, natural forcing factors are inadequate in explaining the climate change of the last century, particularly for the rise of global average temperature (USEPA, 2016-c). In the last thirty years, only a 0.1% change was observed in the earth-sun heat transmission by the natural forcing factors which mean that it is a weak climate forcing factor in the last century (Hansen, 2009: 49).

2.2.2 Human (Anthropogenic) Causes

There is also significant evidence of serious human-induced factors changing the structure and chemistry of layer of the atmosphere in the scientific literature. The increase of GHGs as a result of industrialization, transportation, urbanization, burning fossil fuels, cutting of rain forests, changes in land use signify us the importance of these internal factors (Cabuk, 2011). Indeed, in the 4^{th} IPCC synthesis report (2007), it is stated that "climate change is already going on and the substantially human activities have contributed to this process as well." The serious evidence is available that these variations in the global climate variables have occurred as a result of industrialization efforts.

The world population growth, one of the major triggering factors in the increase of the CO_2 being more efficient in compelling elements of the core causes of global climate change (others are economic growth and development), is significant. Depending on population growth, especially in developing countries, the gradual increase of human production and consumption activities, and the increasing need for the fossil-based energy consumption are taken place as the most important determinants of CO_2 increase in the atmosphere (Onozaki, 2009). According to UN data, the world population which was 980 million in 1800 has reached to 7.3 billion by 2015. According to the projections made for the population growth, the total population of the world is estimated to be 8.5 billion by 2030, 9.8 billion by the 2050s and 10.7 billion by 2080s (U.S. Census Bureau, n.d). These projections signify that if appropriate technical and political measures are not taken in advance, CO_2 emissions will not be controlled in the future and not to reach the targets and commitment determined.

CO_2 emission rates in the atmosphere do not conform to the country economic growth and development tendencies. To be more precise, there is a close relationship between the economic development, and growth, and the demand and supply for energy. Indeed, total primary energy supply in the world has doubled in the last 40 years while the rate of fossil fuel in total energy supply remained same with a rate of 80%. Upon comparison of the fuels with regards to CO_2 emissions, coal can be referred as the worst fossil fuel (IEA, 2014: 9). If the total primary energy supply percent are ranked by the year 2012, Oil (32%), Coal (29%), natural gas (21%) and others (18%) were first, while Coal was (44%), then Oil (35%), Natural gas (20%) and others (1%) in terms of CO_2 emissions (IEA, 2014: 9).

Regarding the production and consumption of energy, industry, and transportation come first among those causing greenhouse gasses with a rate of 71%. Emission of GHGs from the energy consumption occurs as CO_2 (IEA, 2014:7). Agricultural activities, industry, change in the use of lands and destruction of forests are other human-induced activities causing greenhouse gasses (IEA, 2014:7). Furthermore, a big amount of energy based GHGs emissions, around 70 percent are caused by Annex 1 countries, and around 75% of it only consists of CO_2 (IEA, 2014:7).

Another factor that causes climate change resulted from human activities is a change in land use. Human-induced change in the land use like deforestation, reforestation, desertification and urbanization also causes shifts in the input and output of the solar energy which has placed a crucial role in conserving, storing and maintaining the CO_2 amount in the atmosphere. The trees in the forests store the CO_2 in their bodies and lead the earth` amount of CO_2 within the normal limits. Because of the land use change in the particular transformation of the forests into agricultural or pasture lands, the amount of thermal radiation from Earth surface (surface albedo) and evapotranspiration rates are shifted (WMO, n.d.). The change in the land use pattern and density also affects the amount of aerosol transferred to the atmosphere by humankind, which therefore causes climate change (due to earth climate cooling). Indeed, land use change, reduction or loss of especially forestry areas due to human actions, desertification and urbanization cause the CO_2 amount increase and change of solar energy from the earth. Therefore it is reported among the main factors causing climatic system's change. It is claimed that around 90% of the emissions due to land use change occur in South America, Asia and African countries (Maslin, 2004: 22).

2.3 Main Evidence and Effects of Climate Change

There also exist important scientific proofs that the climate change has an influence on social life, socio-economic conditions, and ecosystems in various ways. Especially after the 1950s, a remarkable increase in the GHGs emissions and average world's temperature, heating of atmosphere and oceans, reduction in the snow and ice covered areas, sea level rise, change in the precipitation regime, a distinct changes in the society, negative impacts on human health and the ecosystems are evaluated among the most significant proof of climate change (IPCC, 2013).

Scientific evidence indicates that many regions have been experienced hot airwaves, extreme rains, melting of the ices, rise of sea level and many other extreme incidents, which lead to increase vulnerability level of human and natural systems at a certain interval. That change in the climate system shows its effects in all continents and countries in the form of drought,

flood, extreme rains, erosion, desertification, water and food famine, change in the ecosystems, change in the residential areas, roads and infrastructure, human health problems and many other socio-economic problems (IPCC, 2013; Philander, 2012:274)

Due to the fact that relevant evidence and their effects on the society and the ecosystems become more distinct after 20^{th} century, the number of scientific studies focusing climate variables (surface temperature, atmospheric water vapor, precipitation, severe events, glaciers, ocean and land ice, and sea level etc.) has actually increased significantly. Such studies include long-term variability in the atmosphere, ocean, cryosphere and land surface the before and after the industrial revolution, and determination of the world sensitivity towards those change, climate system examinations, paleoclimate archives and theoretical studies as well as the future-oriented climate simulation models with certain confidence intervals and possibilities.

2.3.1 Temperature

First of all, the temperature is a major evidence of the climate change phenomenon. Global average temperature values being influential on the social life and the ecosystem are a yardstick which is commonly used in the scientific studies in determining the proof and degree of the climate change. The severe degree of global warming values causes diseases, deaths, and economic losses which make hard for the plant and animals to adapt to new living areas and put their lives in danger.

The change of the amount of GHGs in the atmosphere (particularly CO_2) has gone parallels with global average temperature change. Indeed, in the last 800.000 years, the amount of CO_2, CH_2, and NO_2 in the atmosphere have significantly increased (IPCC, 2013). It was determined that a 35% increase has occurred in the greenhouse emissions amount in a period of 1990-2010 in the world (USEPA, 2014). The amount of CO_2 almost forming 80% of greenhouse gasses have increased by 42% in line with other gasses in the same period. It is expected that

doubling the CO_2 amount in the atmosphere causes a climate forcing factor which corresponds to 2% increase of the radiation emitted by the sun (Hansen, 2009).

The long and direct scientific investigations with high technology indicate that the average temperatures of the land and oceans have increased 0.85 degrees in a period of 1880-2012 and a big part of that change was caused by human activities (European Commission, 2015). Furthermore, based on the studies covering 1981-1998 and including the amendments, it is projected that average temperature values of the earth have increased around 0.3 to 0.6 degrees. Only for 1983-2012 years, this period is claimed to be the hottest period for last 1400 years (IPCC, 2013). Following the industrial revolution, each decade's temperature averages have increased compared to the previous one. In particular, the hottest ten years occurred after 1998 (USEPA, 2014). In the reports conducted by IPCC, the average global surface temperature is estimated to increase 1.8 degrees with the best scenario and 4 degrees with the worst scenario until the end of 21st century (IPCC, 2013). According to the other comprehensive studies in this regard, it is reported that the temperature risk value should be 2 C^0 and any condition above that level may cause serious destruction in the global environment and social life (USEPA, 2014).

Distribution of average global warming increase has not taken with same proportion geographically. In particular, areas located within 40-70 north latitudes are the locations that are experienced with highest temperature changes (Maslin, 2004: 59). It is estimated that the global surface temperature increase will be observed in the continents in the Northern Hemisphere, and in the oceans in the Southern Hemisphere and North of Atlantic Ocean (Cabuk, 2011: 19). Besides, seasonal distribution of the global warming increase is also different. In winter, the temperature increase is higher in Canada, Alaska, and Northern Europe, while the increase is greater in Mediterranean and Middle East in summer (NRC, 2012).

Depending on the change in the global temperature level and the climate variables, many economic sectors such as agriculture, industry, tourism and insurance are claimed to have adverse effects of those changes (Cabuk,2012: 21). The agricultural sector is the much more

sensitive sector to the climate change. The agricultural sector will have low product yields due to land erosion and low farm productivity rate, and thusly food security will be negatively influenced (Cabuk, 2011: 29). The increase of global temperature leads weed and pest proliferation. The change in the precipitation pattern cause short-run crop failure and long run production decrease, thusly it was determined that although it has a positive effect for products in some regions, it causes significant losses in some areas (Nelson et al. 2009). Wheat, maize, and soybean are reported among the most affected food from the climate change (IPCC, 2014). Especially, the wheat, maize and rice species in the warm and tropical regions are estimated to have the most adverse effects. With regards to food access, utilization, and food price stability, climate change affects the food security in a negative way. According to the projections made for 2050, available calorie will decrease so that, at least 7 billion US dollar investment is required to be done in the agricultural sector considering the climate change as well (Nelson et al., 2009).

What is more, about fifty-eight million people make their life through fishery in the world and 84% of such people lives in Asian and African countries, the fish consumption per person has reached to 29 kg in 2012 from 10 kg in 1960. Therefore such facts make the fishery sector another one which is affected by the climate change (FAO, 2014). Additionally, human-induced stress factors such as climate change, deforestation, overload harvesting, and change in the land use as combined effect have affected the fish populations regarding number and diversity and force them to extinction (Hamilton & Tol, 2004). As a consequence of extinction of many fish populations, it is sufficient proof for how the climate change will influence the fishery sector. Similarly, because tourism sector covers many different holiday types, and each of them is related to various climate conditions (snow reliability, water availability and thermal comfort landscape, biodiversity, beach erosion, and deterioration of monuments, etc.), it is another sector affected by the climate change (Amelung & Moreno, 2009). Finally, residential and commercial sectors will also affect by climate change because the energy demand for heating or cooling will increase (IPCC, 2014).

2.3.2 Precipitation

Another crucial evidence for climate change is related to precipitation pattern. Global precipitation rates have not been registered as frequent as temperature but are also considered as the climate variable and social risk factors (Maslin, 2004). In general, climate change causes the severity and frequencies of precipitation pattern. In particular, Due to global temperature increase, more water evaporates from the oceans to the atmosphere and causes the terrestrial areas to have more rain with the air movement. A one-degree increase in average earth`s temperature increase is considered to cause 5-10% increase in the intensity of precipitation (NRC, 2012: 24). In this regard, it was observed that eight years of 10 years that the extreme one-day precipitation incident was high, has taken place since 1990 (NRC, 2012). Comparing the 1900 and 2014 years, it was observed that 50% increase has occurred in extreme one-day precipitation rates (USEPA, 2016-d). With regards to rainfall, particularly Antarctic continent comes first with a rate of growth 5-20% in the period after 1990.

Comprehensive academic reports prove that heavy precipitation has significantly grown in the last decade. There exist proofs that annual rates of precipitation have substantially increased in the northern hemisphere in the USA, Russia, and China in particular, while significant decreases arise in the southern hemisphere in the sub-tropical regions (Maslin, 2004:53). Extreme precipitation causes product losses, land erosion, floods, and abnormal water quality as well as the loss of lives and property (USEPA, 2016-d). Depending on the change in the precipitation pattern, the flow of surface water is being shifted. Those causes flood and erosion in some coastal and low-level areas (NRC, 2012). Due to significant changes in the precipitation, water deficits, low quality of water in the accessible resources, and reduction in the amount of potable water arise as well (European Commission, 2016).

2.3.3 Sea level and Ice Covers

Another evidence for impacts of climate change is associated with the sea level rise and melting of ice covers. It was identified by the tide gauge and satellite instrument methods that

significant rises are observed in the global relative and absolute sea levels due to the increase in the available ocean water and expansion of them in appropriate temperatures due to global warming. Indeed, it was observed that annually 0.06 increases have occurred in a period of 1883 and 2013. After 1993, this figure reached to around 0.11-0.14 values. Indeed, the rise in sea level occurs differently in different regions depending on the status of the land use, while it rises in some parts, it is lowered in some (USEPA, 2016-e).

Additionally, considering today's socio-economic conditions in the world that around 1 billion people live areas that located 25 meters above sea level, the rise in sea levels will probably put great masses of people and economic activities under risk (Hansen, 2009). Because the effects of rising sea level occur immediately, not gradually, economic losses will be higher. Weat lands in the low rates, erosion, road erosions in the coasts, a mix of salt water with the fresh water, the infrastructure in the living areas in the coasts are at risk due to such changes (Hansen, 2009: 143).

The thickness of the ice layers on earth and their effects on the sea levels thereof are basic risk indicators of human-based climate change (Hansen, 2009: 60). While the formation of the ice layer requires thousands of years, melting takes very shorter, and so the effects get higher. Current technological and scientific development proves that the snowy areas in the Greenland tend to melt day by day. Significant proves indicates that Greenland has lost 20% of its total snow accumulation since 1950 (Maslin, 2004). Based on the investigations on Greenland and West Antarctic by satellite in 2005, it was determined that around 200 cubic kilometer ice melt has occurred. Following the same trend means that globally 10 cm rise in the century will be available, which is enough to put the lives on earth to danger (Hansen, 2009:130).

For several reasons such as coastal flooding, submergence, and coastal erosion, significant problems arise at the low level and coastal regions. Considering other risk factors like population increase, urbanization, and economic development, impacts of climate change becomes higher in such regions. Accordingly, it is estimated that significant losses will be observed in the agricultural areas and therefore food problems will arise (Cabuk, 2011:21). Lastly, melting of snow and ice due to the heavy rains in many continents affects the

hydrological cycle, which has adverse effects on amount of water resources with regard to quality and quantity (IPCC, 2013).

2.3.4 Society and Health

Because climate change triggers current diseases and stress factors, it also has a substantial impact on the human health. In the projections of the 21st century, it is estimated in particularly the developing and poor-income countries that the climate-related health problems will raise. For instance, diseases and injured ones due to hot air flow, increasing food deficits in the poor regions, and a decrease in working areas and labor force, growth in food and water borne diseases are some of such adverse impacts. Shortly, it is possible to claim that adverse effects will suppress the positive ones regarding society health. It is also estimated for the 21st century that climate change will make it difficult to cope with economic development, food security and struggle against poverty and be more influential on cities and regions where the migration and residential area changes will be higher.

Indeed, The influence of climate changes on society ‘health is less than other disease risk and stress factors. However, extremely hot and cold weathers cause significant increases in a number of deaths due to the meteorological disasters. In this regard, an increase of the water-borne illness and disease vectors are observed due to the local temperature and precipitation changes (IPCC, 2014b). Besides, it is expected that rural people in developing and low-income level countries are affected by climate change because they are mainly dependent on the natural resources (European Commission, 2016). Especially in sub-tropical regions, surface and underground waters decrease significantly. However, increasing temperatures, nutrition, sediment, and pollutant in some areas also affect the water quality and reduce the fresh water resources because of damages in water recovery facilities (IPCC, 2013).

As a result of the research conducted by World Health Organization, in 2000, it was determined that 77.000 people died because of poor nutrition, 47.000 of diarrhea, 27.000 people of malaria and 2000 people died in floods due to the climate change. the projections

also signify that the effects will increase and cause significant losses (Wilson et al. 2004) Climate change especially have worsened the living conditions of the poor and having direct influences on the residential areas and livelihood as well as the indirect effects on food price and food security (IPCC, 2014-b).

2.3.5 Ecosystems

Climate change also affects the ecosystems and habitats in a negative way which mainly serves water and food for human, animal, plants and other living creatures. Climate change makes it hard for the plants and animals to adapt themselves to the new changing conditions due to the variation of climatic variables (European Commission, 2016).

The influence of climate change on the biologic diversity goes from organism to biomass (Bellard et al., 2012). The preferred measurement when measuring the effects of climate change on plant and animal diversity is called the " the transposition rate of the isotherms" (Hansen, 2009:146). This measurement shows when what range and how a certain species will leave its living habitat due to the climate changes and whether this will risk the necessary conditions of living organisms (Hansen, 2009:146). Climate change is also particularly influential on genetic structure, psychology, phenology, dynamics, distribution, interspecific relationships, community productivity, and ecosystems service and biome integrity of the living organisms (Bellard, 2012).

Geographical living range, seasonal activities, migration and abundance amounts and interspecific relations of many terrestrial and water organisms are affected by the climate change. Furthermore, plant and animal species expose to extinction in some regions regarding number and diversity (IPCC, 2014-b). Plants and animals living on top of the mounts and high levels that are rich regarding biological diversity are thrown out of the living areas (Hansen, 2009). The study conducted by European Environment Agency on 122 bird species in 2010 indicates that 80% of the bird's species have been affected by the climate change and this rate

may increase in time (IPCC, 2014-b). Desert ecosystems and living organisms are also adversely affected by changes in climate variables (Fischlin et al., 2007).

The effect of an increase in global warming on forests is observed through the stress on trees which causes fires, sensitivity against disease and pesticides (USEPA, 2010). The number of fires increases due to the change of climate variables, in particular, global warming. That causes loss of life and property, air pollution, destruction of natural habitats of animal and plants.

Climate change also affects the land and freshwater ecosystems regarding their composition, structure, and functions. Habitat modification in land and freshwater species cause the extinction of some species in combination with the other stress factors such as pollution, over-exploitation, and invasive species. The projections conducted show that marine biodiversity is negatively affected in the sensitive regions and the sustainable fish production becomes hard due to the extinction of some fish species. Ocean acidification, pollution, eutrophication and marine ecosystems with the lack of sufficient oxygen negatively affect the psychology, behaviors, and population of many species from planktons to other animal species (USEPA, 2010).

All in all, estimating the exact rates of climate change globally is difficult. As stated above it is a fact that the increasing global temperature will have serious impacts on the environment, water, food, and health which will cause significant economic losses. The cost of struggle with climate change is around 1% of Gross Domestic Product (GDP), and this will reach up to 20% unless appropriate measures are taken (Cabuk, 2011:21). Around 5.5 million people have been affected by the flood disasters having occurred in between 1980-2011 and the economic loss of those incidents was over 90 million Euros which proves the importance of the matters (European Commission, 2016).

2.4 Social and Governance Aspects of Climate Change

Beside natural science perspective and its scientific discussion and assessment, the phenomena of climate change are being discussed as socio-politics aspects in the literature. In particular, climate change as the political debate has increased due to the escalation of human-made production and consumption activities and the rise of fossil fuel usage after the industrial revolution and urbanization resulted in increasing GHGs ratio in the atmosphere and caused the deterioration of the ecological balance. Decision makers and practitioners, along with new scientific findings, have begun to take an interest in the impact of climate change on ecosystems and human life, and contribution of humanity to this process. To this end, a variety of international scientific institutions and non-government organization such as United Nation (UN) and Local Governments for Sustainability (ICLEI) alerts governments to take the necessary measures. Afterward, climate change has taken place first rank on the political agenda since the end of 1980 (Dessler, 2012: 12).

At present, it is not possible to claim that only one political solution and approach for dealing with climate change problem exist in the literature. As Giddens (2008) propose, there have been three different causes for lack of political solution. Firstly, some who have one skeptic approaches for the climate change problem states that scientific evidence of human activities and contribution on the climate change issue are sufficient. Secondly, some argue that impacts of climate change on human life and ecosystems are exaggerated too much by scholar and politicians despite agreeing with GHGs rise in the atmosphere. The third group of people accepts main arguments of climate change; argue it has not an important priority among many other political issues such as nuclear proliferation and poverty etc. (p6).

In this regard, comprehending social and political features of the climate change problematic would increase the effectiveness of normative and practical solution that will be implemented. First of all, the political tools and mechanisms to be applied for dealing with climate change must be consistent with the cross-boundaries understanding. Due to the fact that impacts of climate change on human life and ecosystem change spatially and temporally, political responses would also vary according to de facto factors (Fröhlich & Kneiling 2013: 15).

Moreover, climate change is a problem that makes it necessary coordination, regulation, and institutionalization among different political and administrative levels from global to local. In particular, mutual local-scaled climate change protection policies and strategies are importance for countries` commitment and participation in international initiatives on that issue. Furthermore, climate change is a matter covering environmental and social aspects that necessitate each sector to determine necessary and appropriate measure in advance. Achieving appropriate climate change strategies and activities in each area have also increased the chance of success due to the increasing effectiveness of implemented initiatives (Fröhlich & Kneiling 2013: 17).

Climate change is considered as a global problem that necessitates strategies and actions in cooperation and coordination of many related policy areas and actors including public, private, NGOs, media, etc. Each actor has different political and strategical measure and affected level from climate change within their expertise. Furthermore, it is an environmental problem that requires long-term planning, regulation, and actions decided by not only the current generation but also by future generations. Because of the complexity of impacts and the long-term policy implementation, uncertainties would be inevitable (Fröhlich & Kneiling 2013: 18).

Due to the fact that possible consequences of climate change are complex, uncertain and the long termed ecological and social problem which requires coordination at all administrative levels and different stakeholders, It could be assessed with the concept of "governance" (Fröhlich & Kneiling 2013: 21). In a narrow sense, the concept of "governance" describes the multi-level relationship between the stakeholders. By the idea of governance, it is possible to evaluate the comparative policy tools and mechanisms, institutionalization that has normative and practical output carried out by each stakeholder about climate change (Fröhlich and Kneiling 2013: 21). Due to a fundamental difference in disciplinary perspectives for a political scientist, sociologist, and anthropologist, etc., it is not possible to find one consensual definition for " governance" in the literature. Indeed, based on the most fundamental definition, it is referred as a process of dealing with major causes and devastating impact of climate change including all kind of stakeholders (Pohlmann, 2011: 5).

In particular for last two decades, there has been a significant change in role and function of the government. Many actors besides the government have played a crucial role in decision-making and implementation process of public policy. (Rhodes, 1996). In this context, the concept of the governance has been proposed to manage society in more efficient and democratic manner in the 1990s (Peters & Pierre, 1998). Theory of governance is sorts of the predefined form of the public administration in a sense. The main objective of those has been evaluated with many different models in the literature in order to understand better changing, complex and pluralistic society and to solve problems in an efficient and democratic manner (Üstüner, 2000).

The identification and analyzing of local climate change policies and strategies carried out by actors have increasing importance in recent years and offers significant gains for the literature. With the concept of "governance", it is possible to assess what kind of regulation approaches applied concerning climate change and to categorize local level policies and strategies. No doubt, climate change governance is not new regulatory approach. That is to say; it is a new form of the existing regulatory approach regarding climate change problem that has particular characteristics (Fröhlich & Kneiling, 2013: 21).

2.5.1 A Brief History of Global Climate Change Regime

Before discussion of literature background of local climate change governance, it is needed to mention the short history of global climate change regime. First, scientific developments (in particular with advanced computer modeling systems and improved scientific knowledge), environmental problems and disasters in the years of 1960s and 70's, global climate change problem has been discussed by associating some other political issues (WMO, n.d). For the first time as international and political manner, climate change were discussed at first world climate conference on 12 -23 February, 1979 in Geneva with participation of international organization such as WHO, WMO, FAO, UNESCO, UNEP to assess climate systems and

change in social and political sphere (Zilman, 2009: 143)[6]. The World Climate Programme (WCP) and its research branch the World Climate Research Programme (WCRP) were established at the end of the world climate conference that aimed at acquiring essential knowledge and data concerning the physical basis of the global climate regime, their projections, human activities` contribution, determination of vulnerability and frangibility of socio-economic areas against potential climate change impacts (Zilman, 2009: 144)[7].

[6] Climate change issues have been raised for the first time in 1896 by Swedish chemist Svante Arrhenius. İn Mauna Loa, Hawaii, the scientist determines increases significantly the CO^2 emissions in the atmosphere with remote sensing methods (Keeling curve) has led to significantly increased of the subject's awareness in the scientific world in the 1960s (Bodansky, 2001: 24)

[7] Several international conferences that had significant impact on establishment of global climate change regime and other environmental issues held in 1970s could be summarized as the United Nations Conference on Environment, Stockholm, 1972, the UN World Food Conference, Rome, 1974, the UN World Water Conference in Mar Del Plata, Argentina, 1976; the UN Conference on Desertification and the UN Economic and Social Council.

Table 1 history of global climate change regime in period of 1979-2015

- The First World Climate Conference	1979
- Establishment of Intergovernmental Panel on Climate Change (IPCC)	1988
- The Second World Climate Conference	1990
- The First IPCC Assessment Report (FAR)	1990
- UN General Assembly established Intergovernmental Negotiating Committee (INC) For A Framework Convention on Climate Change	1990
- United Nations Framework Convention on Climate Change was adopted	1992
- United Nations Conference on Environment & Development (Rio De Janeiro, Brazil)	1992
- UNFCCC Enters Into Force	1994
- The Second IPCC Assessment Report (SAR)	1995
- The First Conference of The Parties (COP 1) In Berlin, Germany (Berlin Mandate)	1995
- Kyoto Protocol was adopted with The Third Conference of The Parties (COP 3) In Kyoto, Japan	1997
- The Seventh Conference of The Parties (COP 7) results in The Marrakesh Accords, Marrakesh, Morocco	2001
- Third IPCC Assessment Report (TAR)	2001
- Johannesburg Summit	2002
- The European Union Emissions Trading Scheme was launched	2005
- Kyoto Protocol Enters Into Force	2005
- The Eleventh Conference of The Parties (COP 11), Montreal, Canada	2005
- Twelfth Conference of The Parties(COP 12) Held In Kenya, The Subsidiary Body For Scientific And Technological Advice (SBSTA)	2006
- The Fourth IPCC Assessment Report (AR4)	2007
- The Thirteenth Conference of The Parties (COP 13) adopted The Bali Road Map, Bali, Indonesia	2007
- The Fourteenth Conference of The Parties (COP 14)In Poznan, Poland	2008
- The Fifteenth Conference of The Parties In Copenhagen(COP 15), Copenhagen Accord, Copenhagen, Denmark	2009
- The Sixteenth Conference of The Parties (COP 16), Cancun Agreements,	2010
- The Seventeenth Conference of The Parties (COP 17), The Ad Hoc Working Group On The Durban Platform For Enhanced Action And Momentum For Change	2011
- The Eighteenth Conference of The Parties (COP 18), Doha Amendment, Doha, Qatar	2012
- Fifth IPCC Assessment Report (AR5)	2014
- Un Secretary-General's Climate Summit,	2014
- The Twentieth Conference of The Parties (COP 20), Lima, Peru	2014
- The Twenty-First Conference of The Parties (COP 21), Paris, France	2015

Sources: (UNFCCC, 2014)

In Willach city, Australia, in October 1985, establishment of Advisory Group on Greenhouse Gases (known as IPCC) at the end of Willach Conference titled as "International conference on the assessment of the role of carbon dioxide and other GHGs in climate variations and associated impacts" was set out by ICSU, UNEP and WMO, which have led to increase awareness among scientists, politicians, public and other decision makers concerning development of the global climate change regime, and resolve uncertainty of its impacts on ecosystems, social life ,and regional and international GHGs change in the atmosphere (Bolin, 2007: 38).

On the other side, A series of global environmental issues that have occurred since the 1980s, such as the depletion of the stratospheric ozone layer, deforestation, biodiversity loss, ocean pollution and international trade in hazardous wastes, have raised the interest of policy makers and the public sector on the global climate change issue (Bodansky, 2001: 27)[8]. Thusly, the established of a structure of intergovernmental by WMO and UNEP and the founding of the IPCC in Geneva in November 1988 aimed at political assessment aspect of climate change besides scientific evidence was subject to be brought the issue into agenda of the United Nation (Bolin, 2007: 47). In this regard, it is possible to claim that non-governmental organizations (NGOs) (especially environmentalists) were active on the problem of global climate change, while government involved the issue much afterward (Bodansky, 2001: 28). The aim of IPPC created by the General Assembly` decision in United Nation with participation of several representatives of the countries, scientists, non-governmental, international and intergovernmental experts was to evaluate scientific, technical, and socio-political aspect of climate change, to determinate scope and impacts, to assess main political respond as mitigation and adaptation with formal report (Türkeş et al., 2013: 9)[9].

[8] Tenth World Meteorological Congress in May 1987 in Toronto, Canada was another political and scientific initiative to raise awareness and scientific knowledge regrading global climate change regime.

[9] Main reports prepared by IPPC, except for special purposed reports: 1th Assessment Report in 1990, 2nd Assessment Report in 1996, 3rd Assessment Report in 2001, 4th Assessment Report in 2007 and, 5th Assessment Report in 2014. prepared each reports consist of main documents prepared by the first, second and third working groups, summaries for policy makers, more comprehensive technical report and the synthesis report including combination of each of the main report (Türkeş et al, 2013,:p9). These main comprehensive reports led to take concrete political initiatives concerning global climate change regime.

With the sponsorship of WMO, UNESCO, UNEP, FAO and ICSU, another important political initiative on global climate change policy was taken in the second world climate conference on 29 October to 7 November 1990, in Genève. Assessments reports that were taken to review progress made within the scope of WCP program, and initiatives was carried out by intergovernmental negotiating committee could be evaluated as a crucial step in determination global climate change regime at the time (Zillman, 2009: 145).

2.5.2 Rio Summit and the United Nations Framework Convention on Climate Change (UNFCCC)

After the establishment of the IPCC in 1988, First assessment report and the intergovernmental Convention carried out by Intergovernmental Negotiating Committee, another most important step at international level concerning the global climate change was held on United Nations Conference on Environment and Development (UNCED) conference at Earth Summit by United Nation on June 2-14, 1992, in Rio, Brazil (Zillman, 2009:147). At the end of Rio Conference that hold participation with 178 states senior representatives and 2,400 NGO representatives, 3 basic agreement (Agenda 21, The Rio Declaration on Environment and Development, The Statement of Forest Principles) and 3 major conventions (The United Nations Framework Convention on Climate Change, The Convention on Biological Diversity, and United Nations Convention to Combat Desertification) were decided (United Nation, 1997). Rio conference that referred as continuation of a previous Stockholm conference in 1972, mainly focused on social, economic aspect of global environmental issues, sustainability dimension, highlighted importance participation of not only the state and but also non-state actors such as civil society, and private companies for dealing with climate change problem (Cabuk,2011:40). To this end, at the Rio Conference, there had been consensus on the issue of necessity balance between environmental damage, growth and development, and the basic needs and better living standard for future generations (Cabuk, 2011: 40).

After the Rio Conference in 1992, UNFCCC that indicates the radical change in a variety of sectors such as industry, energy, water, transport, agriculture, and forestry is international environmental agreement hold in on March 21, 1994 (Arıkan 2006: 7). The aim of this conference was defined as "…stabilization of GHGs concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system" (UNFCCC, 1994). The convention necessitated necessary action and strategies for GHGs emissions reduction and sharing responsibility for developed and developing countries concerning climate change (Türkeş, 2001:14). At the UNFCCC, it was highlighted that extreme amount of GHGs emission in the atmosphere resulted from production and consumption activities in developed countries, and while GHGs release per capita in the developing countries has low, it will more if taking into account future growth and development trends in these countries (Duru, 2002).

The basic principles adopted by the Convention can be summarized as following in the Article 3: "The principle of equity, common but differentiated responsibilities, The precautionary, The rights and obligation, promoting sustainable development, a common concern of humankind, free trade and cost effectiveness" (Brunnée & Streck, 2013).

The most important and controversial issues in the UNFCCC agreement is associated with Annex parts that encumber responsibility and duties for the countries. The conventional framework pin down countries to reduce GHGs to corporate each other's in the issue of scientific activities, technology transformation and financial needs, to protect sink areas (such as lakes, rivers and forests) by taking into account of the development level of countries within main principle of "common and differentiated responsibility" (Ministry of Foreign Affairs, 2011 and Brunnée & Streck, 2013:593). Within that framework, the countries were classified into three different groups as Annex I and Annex II, non-Annex I (UNFCCC, 2014). Annex-I countries were necessitated to limit greenhouse gas emissions, to protect the sink areas, and submit national climate protection reports to the UNFCCC Secretariat (Historical Responsibility). In addition, The Annex-II has responsibility for giving technological and financial support to developing countries, in addition to the requirements of Annex I responsibility (funding responsibility). Finally, the non-Annex countries consist of all countries which are vulnerable to the adverse impact of climate change, apart from Annex I

and Annex II (İktisadi Kalkınma Vakfı, 2013: 42). As a result, it is possible to claim that global political, economic conditions and scientific evidence and obtained the data led to the formation of different negotiations groups after the conventional framework.

2.5.3 Kyoto Protocol

Other significant political initiatives concerning global climate change regime were held Kyoto protocol that signed in December 1997 but adopted 2005 at the 3rd convention of parties (COP-3) in Kyoto, Japan. According to the Kyoto protocol, it was emphasized that UNFCCC was inadequate on greenhouse gas emissions reduction, and propose much more innovative and powerful responsibility to countries, and to ensure less than 5% of GHGs from 1990s level between the years of 2008-2012. According to the Kyoto protocol, reduction level, and responsibilities are determined and described the activities and coordination methods for each country. At the protocol, quantified emission limits and reduction objectives or necessary policies and measures were emphasized in a narrow sense (Bodansky, 2001: 35).

Kyoto Protocol consists of two additional lists with the 28 article determined in the UNFCCC. Annex I countries that have GHGs reduction responsibility compared to 1990 was included in Annex B in the Kyoto protocol. However, some countries such as Turkey and Belarus was not included in Annex B, while they included in the Annex I categories within UNFCCC that were not obliged to 5.2% emission reduction during period 2008-2012 (Cabuk, 2011: 65). As a result, it is possible to realize that after UNCCC and the Kyoto Protocol, the countries on the issue of the global climate change regime were needed to determine more concrete commitments and targets.

Table 2 List of Annex B countries within the Kyoto Protocol and reduction commitments

No	Party	Quantified emission limitation or reduction commitment (percentage of base year or period)
1	The United States of America	93
2	United Kingdom of Great Britain Northern Ireland, France, Germany, Italy, Russian Federation	92
7	Australia	108
8	Austria, Belgium, Bulgaria	92
11	Canada	94
12	Croatia	95
13	The Czech Republic, Denmark, Estonia, European Community, Finland, Greece	92
19	Hungary	94
20	Iceland	110
21	Ireland	92
22	Japan	94
23	Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands	92
29	New Zealand	100
30	Norway	101
31	Poland	94
32	Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland	92
39	Ukraine	100

Sources, United Nation (1997)

As shown in the table 2, while there has not any commitment based on the 1990s for New Zealand, the Russian and Ukraine, Iceland by %10, Australia by 8%, the US by 7%, Canada, Hungary, Japan, and Poland by 6%, Croatia by 5% and Norway by 1% is projected to reduce GHGs emission based on the Kyoto protocol. 8 percent reductions have been agreed for other countries compare to 1990s base year. While Turkey and Belarus were included in the Annex I countries, but not Annex B countries categories within Kyoto Protocols; three has not been any certain responsibility and commitment.

On the other hand, in the Annex-A categorized counties in The Kyoto Protocol, There has been explanation concerning main GHGs such as-Carbon dioxide (CO^2); Methane (CH_4); Nitrous oxide (N_2O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride in (SF_6) and the main sectors as energy, industrial processes, solvent and other product use, agriculture, waste, and emissions sources. Moreover, the corresponding protocol proposes three flexibility mechanism for developing countries such as Emission Trading, Joint Implementation Mechanism, and Clean Development Mechanism to reduce the cost of emission reduction activities (Cabuk, 2011:73; Bodansky, 2001: 36).

- **Emission Trading:** Kyoto Protocol signed in 1997, has been offering concrete targets and timetable for the countries of the parties. Significant flexibility mechanisms in the Kyoto protocol is the emission trading. Furthermore, based on 17 articles at the protocol, in each party countries within Annex-II perform much more emission reduction proposed in the Annex-B, those of countries could be able to trade these surpluses emission amount to other Annex-II countries (MEF, 2007).

- **Joint Implementation Mechanism:** Bases on article 6. in the corresponding the protocol, even if countries in the Annex-I invest project in another Annex-I country, it acquire emission reduction credit, and use this credit for target determined earlier for those countries. Similarly, the country where the project takes place could count this emission reduction credit from its committed amount.

- **Clean Development Mechanism**: 12. article in the Kyoto protocols indicates "to assist parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to help the parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments". To this end, any Annex I countries` emission reduction activities and projects in the non-Annex I countries would have Certified Emission Reductions Credit. In this regard, any project carried out in the Non-Annex 1 countries was evaluated by international authorized organization whether emission reduction credit is deserved or not (Yamin, 2004).

2.5.4 Conventions of Parties (COPs)

On global climate change regime, another significant political initiative is Convention of Parties (COPs) as a decision-making body and institutionalization arrangement of the UNFCCC as seen table 3 below. Within COPs, several agreement bodies were formed such as the Bureau and the Secretariat, the subsidiary bodies committees, working groups, and expert bodies. The Secretariat of COP is held in Bonn each year. In particular, COPs meeting evaluates necessary political respond to deal with climate change problem, countries` performance, and commitments, and determination of next steps on climate change negotiation (İktisadi Kalkınma Vakfı, 2013: 38). In another word, after signed UNFCCC, countries that become party member for the UNFCCC have met at COPs meetings with highest decision-making body, once each year to decide international and national political responds to global climate change (UNFCCC, 2006). The sub-group studies in the COP throughout the year in view to assessing the extent and development of the national communications and emission inventories to achieving the target (UNFCCC, 2006).

Table 3 Overview of Conference of Parties (COP) from 1995 to 2015

Conference of Parties	Year	Outcomes
- COP-1, Berlin, Germany	1995	Berlin Mandate
- COP-2, Geneva, Switzerland	1996	The Geneva Ministerial Declaration,
- COP-3, Kyoto, Japan.	1997	Kyoto Protocol
- COP-4, Buenos Aires, Argentina	1998	Buenos Aires Plan of Action
- COP-5, Bonn, Germany	1999	
- COP-6, Hague, Netherlands	2000	Bonn Agreements
- COP-7, Marrakesh, Morocco	2001	Marrakesh Accords.
- COP-8, Delhi, India	2002	Delhi Ministerial Declaration
- COP-9, Milan, Italy	2003	New Emissions Reporting Guidelines
- COP-10, Buenos Aires, Argentina	2004	Buenos Aires, Argentina
- COP-11,Montreal, Canada	2005	
- COP-12, Nairobi, Kenya	2006	
- COP-13, Bali, Indonesia	2007	Bali Action Plan
- COP-14, Poznan, Poland	2008	
- COP-15, Copenhagen, Denmark	2009	Copenhagen Accord
- COP-16, Cancun, Mexico	2010	Cancun Agreements
- COP-17, Durban, South Africa	2011	
- COP-18, Doha, Qatar	2012	Doha Amendment
- COP-19, Warsaw, Poland	2013	REDD+
- COP-20, Lima, Peru	2014	
- COP-21, Paris, France	2015	

Sources: Environmental and Energy Study Institute

On March 21, 1995, in Berlin, the first party conference (COP-1) meeting was held that aimed at elaborating, implementations, the reporting and review procedure and financial mechanism regarding climate change. The most important outcomes of COP-1 (regarded as the Berlin Mandate) were the establishment of the special committee for monitoring procedures and the legal tools, and evaluation of the Global Environment Facility (GEF) as a financial mechanism of the UNFCCC. A secretary of the UNFCCC in the Bonn was established to ensure joint activities and necessity of much more countries participation on political respond to climate change problem (Bodansky, 2001: 35). Furthermore, in the COP-1, the second municipal leaders' summit was held with the participation of the more than 150 mayors to argue local

government importance. In this regard, the communique argued possible support mechanism for dealing with global climate change.

In July 1996, a 2nd convention of the parties (COP-2) was held to evaluate progress on the political and technical progress on global climate change regime. The most important outcome of the COP-2 was Geneva Ministerial Declaration as seen Table 3. The most significant result of the declaration was to highlight the necessity of the party's concrete demonstration and willingness on climate change problem even if not having a full agreement (Bodansky, 2001: 35).

Party countries were met at 4th COP meeting in Baunes Aires in 2-13 November 1998 to determine the details and liabilities related to the implementation of the Kyoto protocol. The main agenda of the meeting was to review necessary financial mechanisms, commitments and responsibility of the each country, transferring and development of technology, flexibility mechanism, in particular, Clean Development Mechanism and possible policies and measures for dealing with climate change (Tangen, 1999: 178).

The fifth convention of party meeting (COP-5) was held to discuss main the principles adopted for Annex II, general guidelines for critical national communication reports, capacity building, transfer of technology and flexible mechanisms with the 22 new decision in October-November 1999, in Bonn, Germany (UNFCC, 2014-a). The undecided or controversial article of the COP-5 was concluded at Bonn Agreement in 2000, the city of the Hague, Sweden. In the agreement, capacity building, land-use change and forestry (LULUCF) and appropriate mechanisms to compliance for developing and transition economies countries were evaluated. In the city of Marrakech, Morocco, in November in 2001, some article that was not decided yet in previous party meeting and implementation of the protocol mechanisms was agreed at the conference seventh party conference (COP-7). At the end of COP-7, parties accepted Marrakech Accord and led to the proper ground for World Summit on Sustainable Development in Johannesburg (Den Elzen & De Moor, 2002).

From October 23 to November 1, an 8th convention of the parties (COP-8) in 2002 was met, resulting in Delhi Ministerial Declaration on Climate Change and Sustainable Development. However, it did not bring a major change regarding global climate change regime (UNFCCC, 2014-a). Furthermore, at the COP-8, mayors proposed a declaration regarding the local government to have more rational and active responsibility, and evaluate a realistic manner for necessary measures and activities to protect the local climate and environment which had significant inference for global climate change policy (LGCRS, 2006-b).

In December 2003 in Milan; 9th conference of the parties (COP-9) was held for implementation of the decisions of Kyoto Protocol and UNFCCC and to review much more concrete initiatives such as institutionalization and effectiveness of the climate protection actions. In particular, especially with the new GHGs emission inventory reports guidelines, it made possible to determine the CO_2 emissions of the various land use changes and forestry in a reliable manner. Moreover, the new regulations and development for CDM mechanisms that were one of the Kyoto flexibility mechanisms such as reporting carbon-absorbing on forestry management project, etc. were considered as one of the achievements of that conference.

An incomplete article at the Marrakesh Accords and several policy and measures option of the climate change was reevaluated at the 10th convention of the parties (COP-10) in December 2004 in Buenos Aires, Argentina. The main agenda of the meeting could be summarized as technology transfer and development, carbon emissions from land-use change and deforestation, financial mechanisms, the national communication reports, capacity building, adaptation policies and measures, training and awareness enhancement, and new strategies and plans to tackle climate change problem in the future (UNFCCC, 2014-a), What is more, through different actions and organization, a number of representatives of the local government also participated in the COP-10 conference. For instance, on December 13, the Mayor of Buenos Aires signed a declaration of Anibal Ibarra that indicates significant of the local government initiatives to deal with global climate change besides central government and NGOs (LGCRS, 2006-b).

On November-December 2005 in Montreal, Canada, 11th convention of the parties (COP-11) was held to evaluate the progress of the countries on the climate change (Cabuk,2011:86). The main agenda of the meeting could be summarized as a five-year work plan for the preparation of the vulnerability and adaptation to the effects of climate change, and determination of the Joint Implementation Projects Advisory Board of the Kyoto Protocol, election of committee member for the Kyoto Protocol, joint implementation compliance, new responsibility and commitment of the Annex-I, the Kyoto Protocol Adaptation Fund Operation etc. (Cabuk,2011: 86). In addition, concerning local climate protection policies, Fourth Summit of Municipal Leaders on Climate Change was held in December 2005, Montréal, Canada with 300 participants from about 37 countries that aimed at making further commitments on climate change, evaluates the latest knowledge and best practices, exploring opportunities, and networking with other local governments from around the World (LGCRS, 2006-b).

In November 2006, in Nairobi, Kenya, 12th convention of the parties (COP-12) was held to evaluate mitigation GHGs emission and adaptation for the influence of the climate change. As important outcomes of that meeting were Nairobi work program on impacts, vulnerability, and adaptation, adaptation fund under the Kyoto Protocol. At this conference, a financial mechanism such as CDM and further projects for developing countries for a deal with climate change problem and different decision regarding operation procedures of the Kyoto Protocol's Compliance Committee were discussed (UNFCCC, 2014). Some crucial outputs of the COP-12 concerning the importance of local governments to deal with the global climate change problem were the conference of the "Position of Local Government and Municipal Associations and Cities - the key to addressing climate change" and African Local Government Statement on Climate Change (LGCRS, 2006-b).

13th convention of the parties (COP-13) was held in December 2007 in Bali, Indonesia to ensure consensus on `Bali Road Map` and strengthen the functioning of the international climate change policies. The corresponding the plan consisted of four different basic points such as much more commitments for Annex-I countries, adaptation fund, technology transfer and emission reduction from deforestation and the financial mechanism. Moreover, at the COP-13 conference, parties were agreed with on binding agreement for local governments'

involvement to deal with climate change. The corresponding conference of the World Mayors and Local Governments Climate Protection Agreement underline that mayors and local governments accept the challenge and responsibility to take action for combating the severe impact of global warming (LGCRS, 2006-b).

14th convention of the parties (COP-14) was carried out in Poznan, Poland in 2008 that aimed at the launching of the adaptation fund for developing countries, enhancing financial mechanisms such as CDM and some achievement concerning adaptation, technology, REDD, disaster management (UNFCCC, 2014). Another important outcome of the COP-14 conference was Local Government Climate Sessions (LGCS). In this session, representatives of the local, central government and international organization highlighted the importance of the local authorities` engagement on climate change initiatives. In Poznan, the draft text of the "Cities, Local Authorities and Climate Change" was prepared and Bonn Climate Change meeting was opened for discussion (UNFCCC, 2014-b).

15th. Conference of Parties (COP-15) was another international event held with the participation of 115 state leaders to create a new comprehensive international climate change regime during the first period of the Kyoto Protocol (2008-2012) on December 7-19, 2009 in Copenhagen, Denmark in 2009. The most important outcomes of that conference were Copenhagen Accord that did not contain legal obligations for the parties (Parker et al., 2012). In addition, Parties reached an agreement maximum 2 °C increase in temperature compared to pre-industrial level. Developed countries accepted to support developing countries with different financial mechanisms such as Copenhagen Green Climate Fund by 2020 (around 100 billion dollars). Developing countries also accepted submitted biennial progress reports to the Secretaria concerning the reduction of the carbon emission (Ramanathan & Xu, 2010).

In 2009, Copenhagen, another important decision taken at the 15th convention of the parties was referring to a more active place for local and regional governments besides central governments after 2012. In this regard, Copenhagen agreement included significant information concerning the local administration Climate Roadmap in the process (ICLEI, 2016-a). In particular, "Climate Change Local road map" and other important highlighted

point facilitating local government to deal with climate change at the international arena was evaluated as significant progress for local climate change governance. However, it is possible to state that at the 15th COP, an effective and comprehensive post-2012 climate agreement could not be established. "Copenhagen Accord" as the product of the COP-15 mainly lays the basic principles in the fight against global climate change, but not making any reference to the local government and climate change issue (Cabuk, 2011: 77).

The "Cancun Agreements" were formed at the 16th parties of the Convention (COP-16) in the city of Cancun, Mexico. The important point of that agreement could be summarized as the necessity of max. 2^0 C temperature rises compared to pre-industrial level, technology transfer, establishing green climate fund and financial support, more inclusive and functioning mechanism for adaptation such as Cancun Adaptation Framework (Kartha & Ericson, 2011). Another significant outcome of that conference regarding climate change and local governments were the Mexico City Pact and carbon Cities Climate Registry for local government (MRV) climate action, Recognition of Local Governments (LGs), Citywide programs in Clean Development Mechanisms (LGCRS, 2006).

November-December in 2011 in the city of Durban-South Africa, 17th parties conference (COP-17) was held to highlight a new and better consensus and global climate change agreement after 2015. In this regard, a working group titled as "the Ad Hoc working Group on the Durban Platform for Enhanced Action (ADP)" was established. Other important outcomes of that conference were summarized as preparing an advanced framework for reporting of emission reductions for developed and developing countries, launching the green climate fund, administrative, financial and institutional matters, national adaptation plans (UNFCCC, 2014). Regarding local government and climate change, the decision of the “cities and local governments continue to push forward at a faster and more ambitious level” could be evaluated remarkable progress to deal with climate change.

Principal outcome of the 18th convention of the parties (COP-18) in November-December 2012 held in Doha-Qatar, were establishment timetable of the new universal climate agreement after the year of 2015, to complete Bali action plan, perform more adaptation

actions for the countries that had high vulnerability and reduce emission actions, adoption of the Doha amendment to the Kyoto Protocol, and acceptance the time period of from 1 January 2013 to 31 December 2020 as second period of the Kyoto Protocol (UNFCCC, 2014). At the Doha Conference, ICLEI was main focus providing the articulation of local governments in the fight against global climate change (LGCRS, 2006-c).

Main outcomes of the 19th convention of the parties (COP-19) held on November 2013 in Warsaw were further development of the Durban platform, the green climate fund and long-term finance mechanisms, Warsaw framework for REDD+, the Warsaw international mechanism for loss and damage (UNFCCC, 2014) Warsaw Dialogues are a compilation of events related to local and subnational governments at UN Warsaw Climate Conference (LGCRS, 2006-c). Main implications for subnational governments and climate change at the COP-19 can be summarized as following: sharing best practice among parties concerning mitigation and adaptation actions of the subnational governments within urban areas, recognition of the subnational and local government as " stakeholders" of the global climate regime, carrying out workshop to increase the importance of local government with campaign of the "Urbanization, and Cities day", significant opportunity to advance further in the engagement of local and subnational governments in the Paris 2015, Nantes Declaration of Mayors and Subnational Governments on Climate Change" (ICLEI, 2014).

20th convention of the parties (COP-20) was held on December 2014 in Lima-Peru with the participation of over 190 countries, discussed general principle and guidelines of new universal climate change agreement after 2015, the possible contribution of the countries on such proposal agreement. The significant result of that conference was to emphasize the importance of adaptation actions for "cut and curb" GHGs emission with National Adaptation Plans (NAPs), developing financial mechanisms, ensuring monitoring progress and operation of companies and investors with regard to emission reduction with scope of the "New climate action portals" in the Lima Climate Action, performing Measurement, Reporting and Verification of emission reductions with Multilateral Assessment for developed countries, providing more funding opportunities for REED, activated of the "Lima Information Hub", transferring technology to deal with climate change in particular for developing countries,

emphasizing the importance of issue of the Gender and Education and Awareness-raising to fight against climate change (Asselt et al, 2014, and Arikan, 2015).

On December 2015, in Paris- France, a 21st convention of the parties (COP-21) was carried out with the participation of 195 countries and decided "Paris agreement" to highlight the importance of the low carbon, resilient and sustainable future regarding climate change. The importance of 1.5 C^0 threshold limit compare to the pre-industrial era, and 2 C^0 thresholds by the end of this century was underlined. The main agenda of that conference were to reach concrete mitigation goals and target, to develop transparently and accounting system to review the achievement of countries` adaptation and mitigation actions, much more adaptation initiatives and measures, improvement, and provision of recycling for loss and damage caused, resilient future, the necessity of the key financial support mechanisms (UNFCCC, 2015).

At the COP-21, several important decisions were made as further increase of the targets and goals, submitting national plans and Nationally Determined Contributions (NDCs) every five years to achieve long-term goals, to provide more technology and financial support (for instance about 100 billion dollars) to developing countries. Similarly, Lima to Paris Action Agenda (LPAA) was one of the most significant results of the COP-21 meeting (UNFCCC, 2015). Some technical issues such as the completion technology, adaptation, action for climate empowerment and capacity building and the first round of international assessment and review process (IAR) could be evaluated as a significant result of the COP 21 (Boyd et al., 2015 and Asselt et al., 2014). About local climate governance, Advocacy Base of Local Governments and Municipal Authorities (LGMA), Constituency including Climate Summit for Local Leaders, Cities and Regions Pavilion – TAP 2015, Special meetings of LGMA, UNFCCC Blue Zone Activities were another significant progress at this meeting (LGCRS, 2016-b).[10]

[10] Based on the reference scenario, Turkey declared to take important step towards low carbon development in order to achieve 2 C^0 global scale by reducing greenhouse gas emissions by 21 (about 246 Mt CO_2e) % by 2030 in the report of Intended Nationally Determined Contributions in 2015.

CHAPTER III

LOCAL CLIMATE CHANGE GOVERNANCE

Initially, solution for the devastating impact of the climate change had been sought with international negotiations and national regulations, but it has been acclaimed that international and national commitments will not be able to solve the problem without the engagement of sub-national authorities (Betsill & Bulkeley, 2006:141)[11]. To this end, for tackling with such a salient global environmental problem which is regarded as complex and global phenomena and to make possible urgent transformation to a low-carbon society, the importance of all government level 'involvement (local, regional, national and international) in decision-making process concerning climate change policies and strategies have accepted as a new academic field and mainstream policy areas for scientists and practitioners with parallel to discussion of the sustainable development principles, in particular since the 1992 Rio World Summit (Collier & Lofstedt, 1997:25). However, in spite of growing interest for local government`s engagement for dealing with climate change that leads to moving from rhetorical framework to the implementation process, the studies have been still fragmented and not reach to desired level (Burton &Dredge, 2007: 141).

For dealing with devastating impacts of climate change, studies point out that political response should be taken at the local level due to regarded as main cause and source of the problem directly and indirectly, and local government can have the political right and ability to mobilize essential support on the issue. It is also argued that efforts and initiatives with respect to climate change and environment taken at the local level would obviously strengthen national and international level predefined targets and commitments (Betsill & Bulkeley,

[11] An academic presentations was given at the international conference based on that chapter, titled as "Local Climate Change Governance; Three Case Studies of Front-Runner Cities in Turkey", 3rd Contemporary Urban Issues Conference, DAKAM (Eastern Mediterranean Academic Research Center). İstanbul, November 19-21, 2015

2006:141). In this regard, the localized and participatory approaches of 'think globally act locally' has importance in the global climate governance literature (Collier & Lofstedt, 1997:25). Similarly, Betsill (2001) argues that city governments should be included to deal with the devastating impact of climate change. Otherwise, countries could not meet national and international commitment determined in the international negotiations (p:394). So, based on studies conducted in that field, in particular for last 20 years, it is possible to realize that "local climate change governance" is regarded as a new scientific research area and vital part of global climate change governance.[12]

The main question is why climate change problem requires subnational governments to be involved in besides of international and national targets and commitments in the agreements such as the UNFCCC and the Kyoto Protocol in tackling with that global problem? The answer to that question is bound up with several premises. First, it is associated with arguments that urban areas are places in which over half of the world`s populations lives, and main social, economic and technologic development activities have been held accounted for majority part of GHGs emission (United Nations Population Fund, 2007:90, OECD, 2010: 30, and Czako, 2011: 4).[13] The second ground is closely linked with premises that local authorities have partially independent power and responsibility on energy, transportation, building, infrastructure, water and waste management, land use planning (Collier & Lofstedt, 1997: 27; Rayner & Malone, 1997: 333; Dodman 2009:198, and Sippel & Jenssen 2009: 3). Another reason is based on the premise that local government is most appropriate political jurisdiction to ensure cooperation between civil society and private sector, citizen participation for reduction GHGs emission in certain areas, and providing support for mobilization and engagement of all actors and stakeholders to support to climate change policies and locally

[12] See Betsill 2001, Bulkeley & Betsil 2003, 2005, Bulkeley & Kern 2006, Betsill & Bulkeley 2007, UN-Habitat, 2011; World-Bank, 2010, and OECD,2010 that are some of the pioneer resources that help to draw boundaries of the main problematic in this study.

[13] According to International Energy Agency (IEA, 2008) `s report, about 67 % of world energy consumption in 2006, took place in urban areas, it seems to reach 73 % level (around 2/3 the world total energy consumption) in the future. On the other hand, there is no consensus on city contribution to the amount of total GHGs emissions due to fact that some of the methods take into account of production activities, some of which only consumption activities, and lack of detailed harmonized data at urban scale. It is still estimated that the amount of average city emissions are accounted for a value between about 30-80% of the total world (Satterthwaite 2008, 539 -543).

tailored response though it could be changed based on nature of each community such as demography, geographic position, culture, socio-economic condition, etc. (Coenen & Menkveld, 2002: 111, Betsill & Bulkeley, 2006: 141, Sippel & Jenssen, 2009: 3, and UN-Habitat 2011: 58). Furthermore, due to the fact that threshold level of the vulnerability in the cities is low, it is expected that its infrastructure, water, and building systems would be affected by devastating impacts of climate change so much. Therefore, it necessitates much effort for policies and strategies, technology innovation and social change in these areas (Corfee-Morlot et al. 2009:17, and as cited in Sippel & Jenssen, 2009: 3-4). Finally, climate change actions at the local level would be appropriate jurisdiction based on subsidiarity principle proposed in the international negotiation for EU context such as Maastricht Treaty in 1992, which necessitate political action at the lowest authority level as much more close to the individual as possible (Czako, 2011: 4).

The importance of the local government 'involvement and city level social-economic and political respond to global environmental problems such as climate change to achieve goals and target determined has increased significantly since Brundtland report in 1987. Specifically, that report addresses the significance of local authorities, city-level actions, initiatives, and their problems faced in sustainable development policy, rather than directly to climate change issue (the Brundtland Commission, 1987). Moreover, further emphases and recognition of the necessity and role of local actions in achieving sustainable development targets and aims were given in the Rio conference of the United Nations Environment and Development in 1992 (UNCED, 1992). Afterward, such a large contribution and discussion on local climate governance and city-level climate initiatives in that manner were highlighted in the reports and projects led by UN-Habitat, World Bank, and OECD (Czako, 2011: 36). Then, establishment of the International Institute for Environment and Development (IIED) in 1971, Local Governments for Sustainability found as International Council for Environmental Initiatives (ICLEI) in 1990, The Global Report on United Nation Human Settlements Program (UN-Habitat) in 2011 titles as Fifth Urban Research Symposium, several reports of the Organization for Economic Co-operation and Development (OECD) also contributed the climate governance literature significantly respectively in terms of institutionalization and scientific manner of the climate change in the local context (Rosenzweig, *et* al., 2011: xvi,

Czako, 2011: 36).Unfortunately, based on these comprehensive studies, it is hard to claim that academic works conducted on local climate change actions, policies and strategies have reached to desired maturity level so far, and they are still fragmented and not comprehensive.

Major political and strategic response of the local authorities against climate change, and historical trends of evaluation of the local governments' interface, inspired a number of the studies in the literature. Historically, two main climate mainstreaming approaches -mitigation and adaptation - for tackling climate change at the local level were firstly emerged in several pioneering cities such as Chicago, Toronto, Leicester, Newcastle, Heidelberg, Munich, and Frankfurt in North America, Canada, and Europe after 1992 Rio World Summit (Bulkeley, 2010:231). Simultaneously, several nation-states in their administrative border have started to implement policy measures and strategies for subnational authorities to be involved in the process of climate change in the urban context. Especially municipality authorities in developed countries made efforts on mitigation and adaptation strategies for local-level carbon abatement on their agendas and started to join into transnational networks (Bulkeley, 2010: 230). Although the number and diversity of municipalities being a member of these transnational networks were limited initially, it is possible to observe a severe increase involvement of local government based on several factors such as geographic position and income level for the last ten years. Interestingly, we should be kept our mind that priorities of local government in that period consisted of some issue such as energy efficiency and sustainable development, rather than climate change (Bulkeley, 2010: 230).

A number of climate change networks established at the national and international areas were set up to provide support for local authorities including public and non-public actors and their corporation in climate change actions, in particular for local governments. Another remarkable point is that engagement of local authorities to such climate change networks and their actions or initiatives demonstrated differences in a certain manner between in the period of 1990s to 2000s. What is more, by 2000s, local authorities becoming a member of these networks to obtain support in climate change governance differentiated from ones during 1990s. Especially, metropolitan and global cities in the middle and low-level national income and

developing countries began to give their interest for climate change governance after the 2000s, compare to early experienced cities in developed countries (Bulkeley, 2010).

It is possible to confirm similar currency for local authorities` respond types in climate change after the 2000s. For instance, Bulkeley et al (2009) claims that adaptation actions and strategies were new and marginal approaches at local level climate change initiatives compare to mitigation efforts, while several reports and symposiums conducted by World Bank and UN-Habitat proposed that vulnerability assessment and adaptation initiatives at local level are as important as mitigation efforts, especially for low- and middle-income countries (Bulkeley, 2010:233). Finally, it is possible to argue that engagement of local authorities on climate change issue has gained political discourse ground and interest so far in particular after the 2000s (Bulkeley, 2010: 232-234).

With regard to climate change problem and its possible influence, international norms through the transnational municipal networks such as Cities for Climate Protection (CCP) of the ICLEI, C40, and the Climate Alliance, etc. are also important factor that determines which extent and how local governments engage with climate change policies, and what kind of role will be subject to them on international climate change regime (Bulkeley et al 2009: 11). In addition, sufficient knowledge on the extent of which economic activities at the local level affect the climate change also partially determine local governments' engagement on the climate change regime (Bulkeley et al. 2009: 12). In this regard, another important issue is associated with lack of data concerning energy consumption and emissions and not reliable data for informal settlement in some cities (Bulkeley et al. 2009: 12). Moreover, different emission inventories and emission estimate methods are obstacles for comparison one cities with another (Alber & Kern, 2008). In this respect, in particular, municipalities have comprehensive and reliable emission and energy efficiency -consumption data without subject to high financial costs and time for collecting (Bulkeley et al., 2009: 11).

It is also acclaimed that developments in the science of climate change have also impact on the development of the mitigation and adaptation strategies and policies committed by municipalities. In other words, consensual principles and targets determined at the

international agreements concerning climate change and its devastating impacts also determine the extent of which local governments' engagement on the issue and their responsibility (Bulkeley et al. 2009: 11). Thusly, it is possible to claim that academic studies have also provided a significant support for local authorities 'involvement in climate change through time. In this regard, academic inertia has made positive contributions as actors on local climate change governance. For instance, an article published by Collier in the journal of local governance in 1997 was one of the more severe and pioneer study written on this subject. Collier (1997) tried to find out a solution for the extent of which local authorities contribute to the reduction of global GHGs emission, how to measure and audit the progress in this regard. In addition, students` service learning courses at Penn State University led to great contribution to social change at local level within the Center County Community Energy Project (3CEP), and a project given to staff at the University of Waterloo concerning energy efficiency could be given another example for academic pioneer works on local climate change governance (as cited in Betsill, & Bulkeley, 2006).

All in all, a large body of research concerning local climate change initiatives and governance has been accumulated since the 1990s in the literature. We still know little about local climate initiatives for developing countries such as Turkey that are expected to increase their GHGs emission significantly in the future, in particular, due to dependency on fossil fuel based growth. Given a few case study example in the world, it is a clear fact that some municipalities in the cities implement strategic climate plans and set on the more concrete emission reduction targets to fight climate changes. On the other hand, some municipalities are still avoided from determining directly emission reduction commitment, and aim at energy efficiency and reduce energy consumption rather than climate change (Bulkeley et al. 2009: 11).

3.1 Climate Change, City, and Urbanization

Urban areas need to be comprehended correctly in the framework of climate change governance before discussion of local government's linkage with the issue. Urban areas are acclaimed as an engine of the economic development, and all production and actions that

result in significant amount of GHGs emission in the atmosphere. To this end, urban areas and its characteristics need to be taken account in the evaluation of local climate change actions due to the fact that it varies from one country to another according to political, economic, social, and demographic and employment form.

Indeed, it is not possible to find a precise and common definition for the concept of "urban area" in the literature due to different methods and criteria used such as population size, functional, and administrative units. Based on consensual studies, urban areas could be defined as a special manner of human settlement at given time and place including certain features such as heterogeneity, competition, a labor of division, specialization, diversification (Tekeli, 2011:16). In other words, it is a human settlement where there is population growth, more non-agricultural activities, goods-services production and consumption activities allocated to ensure the fulfillment of human needs, involved certain economic and social order (Keles, 2012). It refers to administrative borders for enabling usage of statistical data in the study of climate change governance in the urban context, as the same determination was applied in that study.

Urbanization is another sophisticated global problem that will continue to be discussed as well. It is explained as an increase in the rate of nation` population size which lives in the cities` centers and migration from the rural population to urban areas, apart from urban population growth and physical expansion of cities (Satterthwaite *et* al., 2010:2810). It refers to certain changes in urban areas in a direction and features of the settlement such as population growth (Tekeli, 2011:201). Keles (2012) define it as “a political, social and demographic accumulation process, a certain change in social sphere involving division of labor, specialization, and organizing and envisaging certain types of human relation and behavior change through industrialization and economic developments”.

The most important factor that requires consideration of climate change governance in the urban context is associated with population growth and urban population level due to leading to higher economic and social activities, more demand for goods and services delivered, which cause higher level GHGs emissions directly and indirectly (Kahn 2009:162& Czako, 2011: 5).

In this respect, the population living in urban areas for the first time reached 50 percent of the total population in the 2000s, which this rate is expected to reach 60 percent by 2030 (Kahn, 2009:162, Corfee-Morlot et al., 2009:15 & United Nation, 2014). Around major part of the total urban population live in the big cities with over 10 million dwellers in the world.

Population growth in the cities is estimated to be much more in particularly for low and middle-income, and developing countries (Kahn 2009:162& United Nation, 2014). Urban population has risen 70 % in a period of 1994-2014 and reached to 3.9 billion already. It is also estimated to reach 6.3 billion by 2050 (UN, 2014:26). It is projected to observe the rough proportion of world`s population in megacities in which over 10 million dweller lives in the city centers will increase 12% by 2015, and the number of megacities will be 27 apart from 19 (Corfee-Morlot et al. 2009:15). According to IPCC (2014) report, "Among the 611 cities with more than 750,000 inhabitants in 2010, 47 of those had populations that had grown more than 20-fold since 1960; in 120, the growth was more than 10-fold". On the other side, rural people compares to urban areas is more stable and estimated just 0.3 billion decreases in 2050 as seen in figure 1 (United Nation, 2014: 26). The proportion of urban and rural population varies from country to country and city to city based on their demographic, social, economic and cultural characteristics.

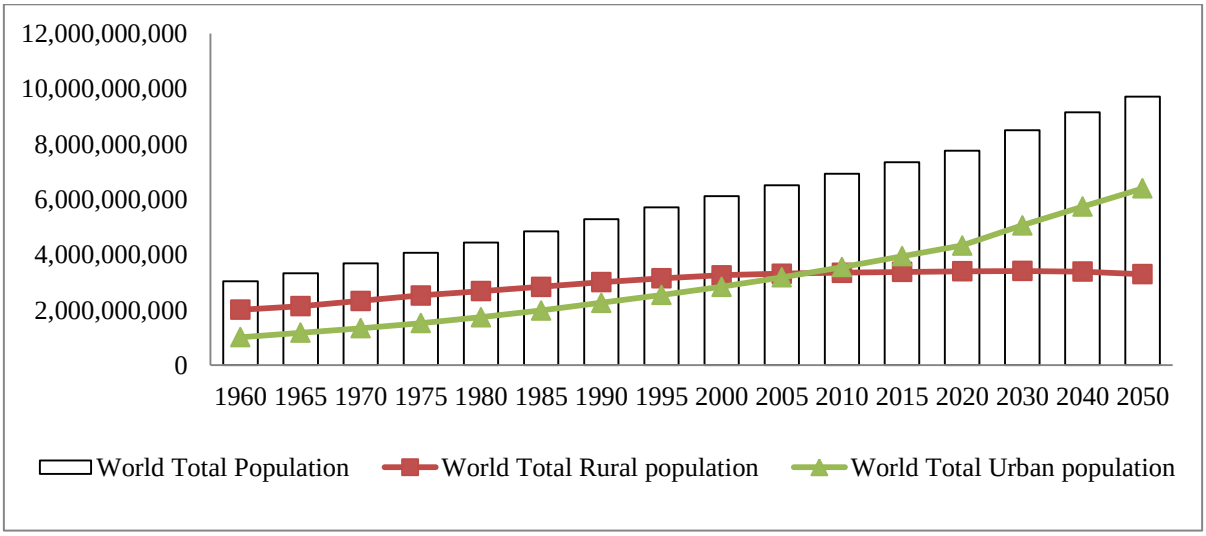

Figure 1 The world total, urban and rural population growth in the period of 1960-2050 based on data by World Bank in 2016

Urbanization and urban population growth are closely associated with the concentration of national economy activities and GHGs emissions. Cities are regarded as the engine of the global economy due to the fact that GDP of the nations, the most investment, and economic activities, innovation and development concentrated on these areas (Corfee-Morlot et al., 2009:15, Satterthwaite et al., 2010). For instance, around 1/3 to 2/3 of the total national output of economic activities is being carried at urban areas among OECD countries (OECD, 2010: 44). Though such urban agglomeration provides several benefits in terms of economy such as high-level GDP level, labor productivity, and employment level compare to national average, it would present negative externalities such as high level emission intensity, environmental stress, increasing pressure on resources and vulnerable to influence of climate change due to rapid and unplanned population growth (Corfee-Morlot et al. 2009: 15). Similarly, although per capita rates of total GHGs emission rates compare to rural areas are lower, cities are placed in which the major part of the global total energy usage mainly from fossil fuels and GHGs emission were taken place.

Indeed, the largest cities are located in higher economy countries (Satterthwaite et al., 2010). Based on projections, it is estimated that much more energy consumption in cities will be in developed countries such as the USA, and Europe with respectively 87% and 75% by 2030 (Corfee-Morlot et al., 2009: 17). More interestingly, the largest increasing rate in energy usage will mainly be in the developing countries, which has necessitated investigation in a comprehensive research. For instance, urban population growth and urban transition in smaller city areas in low-income and emerging economies such as Africa, Asia, and Latin America, apart from Europe and America, will be much more. However, weakness of institutional structure, limited finance, and capacity to deal with climate change and vulnerability will be more precise and devastating so that much more mitigation and adaptation activities and strategy at an urban level should be carried out in these areas (Romero-Lankao &Dodman, 2011: 114).

Due to the fact that there has not been any international framework to measure city contribution to global GHGs or limited such as IPPC` methodology, it is not possible to

measure or inventory precise figures of total emission at urban areas (Lankao, 2008: 47). Though there has not been a precise consensus in the extent to which level city contribution to global total GHGs emission based on their development cycles, it is well-known that urban centers are still evaluated as main significant trigger and driver to increase global GHGs at a certain rate based on consistent measures of cities. Population affluence measured by GDP per capita, technology capacity, government structure, and socio-economics equity are some of the factors which determine urban emission level based on their development cycles (Lankao, 2008: 82). Furthermore, city contributions to climate change could be determined by several factors such as urban structure, sectorial type, population size, culture, development pattern, the number of households and their average income, social, and cultural pattern (Anand & Kallidaikurich, 2011: 26). In particular, for a sectoral share in total urban emission, it is possible to claim that it varies based on three basic criteria: its economic bases, its forms and to lie out and structure of transportation systems (Lankao, 2008: 82).

Kern and Alber (2008, p172) argue that respond type of each local government also vary from each other based on several criteria. First one is associated with the perception of climate change impacts (significant change of temperature and precipitation pattern, flooding, sea-level rising, etc.) on the local areas by citizens and urban policy makers. Secondly, legislative and executive competence and capacity of local governments are also significant factors that determine political respond to deal with climate change. Moreover, national and international regulations are other crucial points that ensure and initiate local government' involvement on climate mitigation and adaptation policies and strategies in their administrative border, in particular when lack of knowledge, technical and financial obstacle. Thusly, participation into transnational climate networks has also played a significant role in local authorities` engagement with climate change.

3.2 Impacts of Climate Change on Urban Areas

Some of the scholar asserts that climate change also has certain potential and distinctive impact on urban areas apart from widespread influence discussed earlier. Urban areas are

associated climate change in many ways, as being the principal causes of climate change and sources of local actions and initiatives aimed at dealing with its devastating impacts. The significant increase in average temperatures of the earth, widespread melting of glaciers and snow stock, raise sea levels, drought, and water scarcity, and change of frequency of weather events such as typhoons and storm are some of the devastating consequences of global climate change on cities (IPCC, 2007b). While socio-economic activities in city centers based on their development cycle cause a significant increase in urban GHGs emission, physical (infrastructure, waste and water systems, and green areas, etc.) and socio-economic structure of the urban areas are also vulnerable to climate change`s impacts (Anand & Kallidaikurich, 2011: 26). According to the IPCC (2007) reports, the influence in urban areas could be summarized as the urban heat island (UHI) effect, water and air pollution, water quality and scarcity, epidemics and diseases, weaken infrastructure, irregular urban growth, and development pattern. Some of this negative change in cities could be forecasted with new technology and methods in advance while no possibility to predict some (OECD, 2010: 64).

3.2.1 Vulnerability and Resilience of Cities

`Vulnerability` and `resilience` are two concepts that should be specified in detail to comprehend climate change impacts on urban areas. Firstly, cities are more sensitive and vulnerable to adverse impacts of climate change compared to the countryside due to having several features such as mixed and intensive transport and communications network, unplanned urbanization, high density of built infrastructure, elder and poorer population density, etc. (OECD, 2010: 65). Tens of thousands urban areas have differential characteristics which influence vulnerability threshold of climate change such as population size and growth rate, total land use area, socio-economic output, development cycles, quality and coverage level of infrastructure, services delivered, ecological footprint, and total GHGs emission (IPCC 2014: 545). Thusly, each urban center has different vulnerability level and much more noticeably affected by climate change with respect to its physical and socio-economic aspects (Corfee-Morlot et al., 2009: 19).

Based on some pioneering scholar's works, it is possible to realize the necessity of assessment of urban vulnerability and sensitivity and form properly adaptation and mitigation policies and strategies at the local level in advance. Vulnerability as a concept is defined as "the degree to which systems are susceptible to and unable to cope with, adverse impacts "(IPCC, 2007:48). Vulnerability level of the urban areas is determined by several key criteria such as magnitude, time, reversibility, the potential for adaptation, distributional aspects, likelihood and 'importance' of the impacts. (IPPC,2007: 50). In other words, it is the inability to predict obvious change caused by climate change, unable to cope with its effects, not recovery its systems (Hardoy & Pandiell, 2009). Vulnerability and risks are associated with the poverty and inadequacy of the local governments. For instance, the population's lives in areas at risk in which is a lack of local government capacity on knowledge, need infrastructure will expose to the devastating impact of climate change such as death, injury, and loss of poverty (Hardoy & Pandiell, 2009: 203).

Vulnerability level at each urban areas differs from each other (vary from country to country as well) based on many factors such as governance and administration systems, geographical situation, urban characteristics, infrastructure, transport and construction types, population density, social and economic condition (Cabuk, 2010: 22). For instance, coastal areas could be more sensitive and vulnerable and affected by impacts of climate change. Similarly, poor population is more vulnerable to the devastating consequences of climate change in both developed and developing countries due to lack of capital and financial capacity to respond it in advance (Corfee-Morlot, 2009: 18-19). Consequently, comprehensive and integrative assessment of the vulnerability level of the cities seems to be essential for implementing successful climate change policies and strategies to meet predefined national and international targets and commitments (Cabuk, 2010: 22)

Secondly, the `resiliency` that is another important concept concerning local climate protection actions has the meaning of the anti-sense notion of vulnerability. Despite fact that concept of the vulnerability indicates for a particular social group, the concept of resiliency is used for favorable political, socio-economical, environmental management for preventing the impact of the hazards on these groups including urban infrastructure, transportation types,

energy consumption and land-use protection management (Satterthwaite et al., 2014:548, Brown et al., 2012). Resiliency means predicting of effects of climate change in advance and minimizing the risk of each city's physical, economic, institutional, and socio-political and environmental management systems (Gasper et al., 2011). The level of flexibility, redundancy, responsiveness, learning capacity, and safe failure and interdependence among sectors are just the most basic key characteristics of resilience in cities: (Satterthwaite et al., 2014:548). Resiliency level for a city is determined by many factors such as quality level of buildings, effective land use planning, and the quality and coverage of infrastructure and services delivered early warning systems and public awareness. (UN-Habitat, 2011 and as cited in Satterthwaite, 2009:9). Resiliency levels of cities in high and middle-income countries are high due to appropriate standard and measure applied while vulnerability is for low-middle income and developing countries vice versa (Satterthwaite, 2009:9).

Based on the IPCC (2014)`s 5th reports and the document published by OECD (2010), impacts of climate change on urban areas could be classified into four main categories: *temperature and Heat-Island impact, precipitation pattern change and storm impacts, sea level rise and coastal flooding risk, drought and water scarcity.*

3.2.2 Temperature and Urban Heat-Island Impact (UHI)

That climate change has significant impacts on urban areas, needs to be evaluated in detail to determine and implement proper climate protection policies and strategies. Due to increase in global average temperature[14], the number of hot days, frequency, and severity of the heat waves has obviously increased in urban areas (OECD, 2010:70). Urban areas are expected to face about 0.5 more temperature degrees compare to rural areas due to many factors such as having large surfaces cover with energy-absorbing materials as concrete, stone, asphalt, high-density building formation, less density of green areas, low shade and humidity level (Corburn, 2009). Therefore, the most cooling systems, improvement of air and water quality,

[14] According to IPPC (2007), average of world` temperature has increased 1 degrees in last 100 years

coping with energy problems, resolving water access problem, and dealing with other health problems are needed to be taken by local authorities (Corburn, 2009).

UHI is defined as increases times and frequency of surface temperature in urban center based on flux level of air circulation and thermal radiation (OECD 2010:70). Due to UHI, urban centers are 3.5-4.5 degrees hotter compared to the surrounding area, and it reaches one higher degrees value every ten years. It is also possible to experience in specific place even 10 C^0 higher degrees depending on urban agglomeration. UHI is likely to cause human health as being sources of heat-related health problems such as heat stroke, infectious disease, allergies, injury and death as well (Anand & Kallidaikurich, 2011: 26) and, air pollution (Blake et al., 2011), high energy demand for cooling in warm season, and other health problems such as epidemic and vector diseases (as cited in Satterthwaite et al., 2014). For instance, Robine et al., (2008) point out that high air temperature caused 70 000 death in Europe in 2003. Moreover, about 3-8 percent of total energy consumption resulted from UHI in the USA. With UHI, local air circulation is affected, solar influx, near surface air masses and photochemical smog formation is increased. Consequently, UHI and high-level heat wave resulted in an increase in the number of patients with chronic respiratory disease and lung disease due to air pollution with ozone, and acid aerosol allergens and different emission particles in urban areas (Bernard et al., 2001).

3.2.3 Precipitation Pattern Change and Storm

Another crucial influence of climate change on urban sites is extreme weather events and changes in precipitation pattern such as storm, hurricane, typhoon, etc. Indeed, the hydrological cycle is affected by climate change resulted in alteration of precipitation patterns, the amount of snowfall, runoff and river flows which is to end up with the risk of flooding (Anand & Kallidaikurich, 2011: 28). Similarly, the IPCC (2007) report based on regional and national data indicates that average rainfall amount and a number of heavy rainy days in the northern part of the 30 northern latitudes will be increased, while decreasing in tropical and to equator regions.

Due to the fact that climate change causes alteration of the surface hydrological cycle with respect to quality and quantity manner, surface runoff exceeds the capacity of drainage infrastructure, sewage and water recharge in urban areas (as cited OECD, 2010:70). High surface runoff results in flooding and pollution of the surface and groundwater resources causing public health problems as well (OECD, 2010:70). Therefore, it is claimed that there is a significant relation between most intense rainfall and the emergence of a deadly and highly costly flood. In this regard, a crucial rise in the frequency and intensity of precipitation was recorded between the years of 1950-80 (OECD, 2010:71). Thus, it makes necessary to remove exceeded runoff with the most appropriate strategy and management approach in accordance with existing infrastructure from the urban center without causing pollution of the surface and underground water resources.

3.2.4 Drought and Water Scarcity

Drought and water scarcity are another adverse influence of climate change problems on urban sites because of declining frequency and intensity of rainfall and snowfall in some areas (Anand & Kallidaikurich, 2011:29, and Ozut, 2010: 24). By changing of rain and snowfall patterns which are the main source of water flow, water resources are likely to increase in some specific place, while diminishing in some region which might have a severe impact on the area needed much more demand for irrigation and domestic use (Anand & Kallidaikurich, 2011:29). Sewage, microbial chemical agents, and biotoxins matter polluted into the ground and surface water reduces the number of available water resources as well. Similarly, increases in the demand for water to be used in domestic industry have increased for last two decades (as in the OECD, 2010). For instance, over half of the urban dwellers in Asia, Latin America, and Africa continent have problems of accessibility to water resource and sanitation (Ruth& Coelho, 2007). Food shortages with drought, frequent water and electricity cuts, diseases related to pollution are a variety of problems faced by dwellers in urban areas with respect to climate change (OECD, 2010).

3.2.5 Sea Level Rising and Flooding Risk on Coastal Areas

Rising sea level resulted from climate change also causes a severe impact on urban centers such as flooding, rising salinity level and erosion in highly populated urban centers located in coastal areas. IPCC (2007) claims that 1.3 to 2.3 mm increase annually in the sea level in the period 1963-2003 was taken place. Considering average annual increase recorded in the previous year, the average sea level rise will be about 18 cm in 2040, and it is up to 48 cm in 2100 (IPPC, 2007). In addition, destruction amount of 1mm sea level rise in coastal areas varies from region to region. For instance, it is reported that about 0.3 mm rise in the sea level would have resulted in 15-30 meters rise on coastal area in New Jersey while it is up to 120 meters in California (as cited in OECD, 2010).

When urban statistics was taken into account in the coastal area, it is possible to realize the importance of sea level rise on human life. There have been 3351 cities located in low-coded coastline in the world (as cited Ozut, 2010). About 2000 of these cities are exposed to the threat of rising sea levels (Arnold et al., 2003). At present, around 40 million people living in cities are exposed to a flood risk per 100 years, and it is expected to rise 150 million people by 2070. In 2007, the cost of that flooding damage was about 400 billion dollars, and it is calculated up to 35 trillion in 2070 (Nicholls et al., 2007).

The cost of flooding damages and economic loss resulted from sea level rises might be higher than predicted by current scientific report due to the fact that coastal areas are a place where more people lives, and great economic and industrial activities are taken place compare to top urban centers (Hallgate et al., 2013). Erosion, collapse of urban settlements and land -usage, loss of property and life, high coastal protection costs, resettlement expenditure, drinking water quality, salinization of groundwater at estuaries, underground water level rise and drainage problems, degradation of ecosystems and vegetation systems, urban business , quality of life ,and other socio-economic losses are just some of consequences of floods, storms, hurricanes resulted from sea level rise in coastal cities (as in Ozut, 2010, Hanson et al., 2011).

Flood and high-level precipitation also have serious impacts on human health in spite of providing an appropriate environment for the spread of vector and water-borne diseases such as malaria, cholera, and diarrhea resulted in death and mental and physical stress. In addition, its effect would be much more in slum areas where has overcrowded, poor drainage and infrastructure in developing countries (Anand & Kallidaikurich, 2011: 27).

3.3 Climate Change Governance at the Local

Urban areas are needed to be managed efficiently and wisely by city governments for coping with global climate change threat which requires multi-actor and multi-sector, integrated management approach. To comprehend local climate policies and strategies in detail, the concept of governance is most common reference terms including public and non-public authorities and imposing cooperation and capacity of self- governance at all level of administration (Demirci, 2015:77). In other words, a proper strategic and political respond to climate change' local impacts that necessitate interrelationship and social coordination among all actors at each level of government could be outlined under the concept of "governance" (Fröhlich & Knielingen, 2013:9). Approaches of "governance" rather than "government" and good public policy are regarded as a necessity for cities to ensure proper infrastructure, land-use planning, energy and transportation systems and all social and economic sectors to be much more competitive and sustainable manner (Anand & Kallidaikurich, 2011:33). With such approach, it is possible for cities to be provided a high-level life of quality, and protected the environment and minimized the impact of climate change. Governance approach is also relevant to global climate change regime that requires multiple modes of governance, process, and institutionalization across a variety of government scale (Betsill & Bulkeley 2006:144).

It is not possible to find an accurate description of the concept of "governance" in the literature due to having different interpretation and perspectives by scholars. (Fröhlich & Knielingen, 2013:13). In a broad sense, governance defines as "involving processes through which collective goals are defined and pursued in which government is not necessarily one or

most important factor" (Betsill & Bulkeley 2006: 144). That is to say, it refers to the social process in which the mutual internal relations and coordination across a variety of stakeholders are taking place, involves recognition of supra or sub-national states and non-state actors (Betsill & Bulkeley 2006: 144). In a narrow sense, it refers that there is no borderline between the community and government, involving non-public and public actors in the solution process, much more harmonized and flexible management approach, rather than strict, hierarchical administration at each administrative level (Fröhlich & Knielingen, 2013: 13).

Based on the definitions provided in the literature, it is possible to claim that governance is a normative and analytical concept including several characteristics such as complex, uncertainty, multi-level, and multi-actor (as cited in Fröhlich & Knielingen, 2013: 10). Furthermore, being goals of public goods and services differentiates the concept of governance from other cooperative activities (Pohlmann, 2011: 5). It is considered as a process involving button-up approach, being coordination between the public and non-public actors such as business, industry, NGOs, civil society in pursuit of common goods (Pohlmann, 2011: 5). Thus, it also refers approaches which non-public authorities are principal actors instead of state involvement. However, central administration units, and their roots at the local level, and local government becomes relevant actors of governance in countries which have high-level centralization tendency on public policy, in particular, environmental and climate change policy. Thusly, local governments are regarded as one of the notable actors that have significant legislative and executive responsibility among public authorities in local public policy. Civil society, NGO`s, private sectors and companies, universities and media are also regarded as not- public authorities in this manner.

In this regard, “Climate change governance” is seen as a management process involves cooperation at a certain level between stakeholders with some participatory principles concerning causes and results of climate change (Pohlmann, 2011: 5). Several main features stand out in conceptualizing and analyzing the concept of the “climate change governance” such as being normative and practical problems - solutions, societal bases, scientific uncertainty, justice and equity concerns, multi-level, multi-actor and multi-sectorial bases,

extended time period, global implications as some those characteristics are similar to other public policy areas (Meadowcroft, 2009: 5).

The most famous controversy concerning "climate change governance" is an association with the notion which administrative level would be the most appropriate for dealing with global climate change, as called as "politics of scale". Some researchers' in particular international scientist and economists argue that it should be accepted as global problems and required scale up approaches, and most suitable unit to respond is international level due to the fact that it requires global orchestrated and competitive movement process in a global era. However, some such as development scientists still claim that it needs to be addressed at the local level with scale-down approaches because international level actions are weak and ill-suited level for mobilizing entire society (Gupta, 2007: 132).

Indeed, debates on climate change governance go parallel with the discourse of public policy for last decades such as discourse of government, governance, globalization, decentralization, centralization, policy engagement, pluriformity, and harmonization (Gupta, 2007: 132). What is more, in political science literature, there has been clear tendency towards discourse of governance that implies networks, partnership, steering and enabling role of the state, cooperation among all actors including state and non-state actors for democracy and legitimacy in public policies from government that refers state, hierarchy relation and management, command and control mechanism of the state in particular with public communities (Gupta, 2007: 132). In this sense, all government level, in particular, local governments have played a critical role in orienting society to low carbon development paths (Meadowcroft, 2009: 3).

Betsill and Bulkeley (2006) also argues that climate change problem which has sophisticated require multi-level cooperation response including international, national and local so that political and strategic initiatives should be taken at each level coherently, which is claimed as rational premises for many studies in the literature. In this regard, climate change governance involves coherent and holistic initiatives horizontally and vertically at each government level, apart from the more state-centric policy approach, which refers to the concept of the "multi-

level governance". In other words, the framework of multi-level governance is needed to be addressed to comprehend the main background of local climate change governance in detail and to implement successful local climate change strategies and policies.

3.4.1 Multi-Level Governance of Climate Change

Comprehensive and effective local climate action requires some horizontal and vertical relation in public policy domain that could be conceptualized as multi-level governance (MLG) in the literature. MLG is a new concept in the political, and international science literature has been used as an alternative framework to interface central government with other stakeholders at an international, national and local level for implement and design of public policies and strategies (Corfee-Morlot et al., 2009: 25). It has been proposed as a framework to comprehend human-environment interactions and to describe long-term, complex ecosystems management, protection policy cycle on natural resources, environment, and climate change to decide tools and instruments for cooperation among stakeholders both vertically and horizontally (Bronodizio et al., 2009: 254). Hooghe and Marks, (2003) mainly argue that it is sorts of conceptual framework involving cooperation and collaboration between the public and non-public organization in policy-making and implementation at the international, national and local level, improvement of coordination between stakeholders, build capacity, and determination of tools for vertical and horizontal cooperation.

In the beginning, although it was used for EU regional development policy, its scope and cover were extended (Bulkeley & Betsill, 2013: 149). Put it differently; that conceptual framework was regarded as an issue of the weakening of the effectiveness and power of the nation-state in policy-making process in the EU, supranational and sub-national authorities determined as administration authorities that have significant power in the multi-level management system (Bulkeley & Betsill, 2013: 149). Similarly, OECD already started to use that concept for cooperation performance of nation-state, region and local authorities for financial support and assistance. Indeed, the main purpose here is to strengthen the

relationship between each administrative unit vertically and horizontally for forming successful policies implemented (Corfee-Morlot, 2009: 25).

The concept of MLG is also closely related to the discourse of the globalization, decentralization, uniformity, and community engagement and local right and sovereignty, legitimacy and democracy (Gupta, 2007: 132). It refers weakness of central governance regarding power and legitimacy (Brondizio et al., 2009). In one side, multi-level governance understanding refers wiping out the powers of modern state monopoly on public policy decision-making, similarly for public actors, hierarchal relation, command, and control role of government, transfers that power to supranational, national and sub-national government levels with partnership, coordination, network and enabling role of the government. On the other side, it indicates multiple actors' structure including market, public and private sector, NGOs, media on the decision-making process of public policies (Gupta, 2007: 132). In sum, it is claimed that first aspect of the concept of MLG refers multi-level structure, the second aspect of it means governance attitude (Dede, n.d).

Hooghe and Marks (2003) makes a clear distinction between types of multi-level governance. Type I is defined as "the multiple tiers at which governance takes place, typically differentiating between administrative units (e.g. cities, states, countries) where governments are central governing authority" (Betsill and Bulkeley, 2007: 449). Type-II is referred as "networks between public and private actors across levels of social organizations". In fact, the type I focuses more ties of authority (subnational or supranational, etc), while Type II focuses more new spheres of authority emerged. (Betsill and Bulkeley, 2006: 150). Type II emphasis mainly on a private and social institution which mentioned for the transnational social network at different authority level in type I (Gustovson, 2009).

Based on the extensive literature on that issue, it appears that climate change governance at municipal level could not be evaluated separately from national and international context, and not be isolated from actions and policies undertaken national and international level. Thusly, effective urban climate governance requires actions and initiatives through vertical and horizontal coordination process by not only local public authorities but also by the not-public

organization at the different level of governance (Czako, 2011: 39, Corfee-Morlot et al. 2009: 26 & Gustavson et al.,2008: 59). To this end, the concept of multi-level governance presents a flexible explorative framework to climate change governance in two main dimensions; vertical and horizontal including the relation between local, national and international stakeholders and public and non-public actor's cooperation in mitigation and adaptation policy issue (Corfee-Morlot et al., 2009: 26).

Besides to horizontal dimension, vertical collaboration is also crucial for local climate protection policies and strategies. In general, vertical dimension refers the extent of which there has been coordination for climate change initiatives among supranational, national, regional, and local government level. Kern and Alber (2008) argue that scope of action of the local governments on climate change protection mainly rest on their legislative and executive duty and responsibility within multi-level systems. What is more, while there have been compulsory duties for local governments for GHGs reduction targets and aims at the national and international agreements in some countries, it is still conducted on a voluntary basis in some nation, that seems a reason of existence of some pioneering cities on that issue (p182). For instance, the capacity of knowledge, financial support, certifications, and several mandatory requirements for local governments in USA, UK, Germany, and Canada are some of the instrument for local climate protections policies and strategies (Kern &Alber, 2008: 185-188).

On the other hand, the horizontal dimension of MLG is regarded as a corporation; information transmission and mutual learning between public and non-public actors at each level (Corfee-Morlot at al 2009: 26). Indeed, horizontal collaboration for GHGs reduction is associated with foreign policy of local government (Kern &Alber, 2008: 184). For instance, local actors at sub-national level join into supranational climate network institutions and organizations such as ICLEI, the Climate Alliance, the C-40 Cities, and the US Mayors Climate Protection Agreement, etc. for cooperation, knowledge transfer and coalition (Aall et al., 2007). Besides to transnational networks, it represents a collaboration between public and non-public actors at the same level on certain policy and strategy for energy efficiency, air pollution, and water resources, etc. In particular, in metropolitan areas, an effective climate mitigation and

adaptation policies require large-scale measures covering the regions of multiple municipalities (Demirci, 2015:85). For instance, collaboration within regional scale for climate protection policies has played a significant role throughout Europe and the USA. The Sonoma County Regional Climate Protection Authority established in 2009, California, The German metropolitan region of Hanover, Metropolitan region in the city of Portland could be given as an example of cooperation among several local authorities to support mitigation and adaptation climate protections projects and policies at the region (Kern &Alber, 2008: 183).

Even though MLG contributes significantly to climate change governance literature in rhetoric, it has several difficulties in practice. Gupta (2007) in his case study with Italy, France, Netherlands, and China explains how optimal level responsibility and authority sharing would be possible at the different government level. He found that harmonizing and implementation of the strategies and policies applied are quite difficult in practice (Gupta, 2007:136). That devolution, decentralization and transferring responsibilities to local authorities do not match up with financial resources provided by time and scale is a first crucial challenge. Integration of strategies and policy applied to other policies is another difficulty of MLG faced in practice.

3.4.2 Climate Governance Beyond the City: Transnational Network

The another crucial theoretical framework concerning local climate change governance is transnational climate governance. The significance of local government' engagement with global climate change protections networks has become a priority in international and political science literature, especially since the beginning of the 1990s. At the time, local government started to work together to implement policies and strategies for energy-saving and local sustainability, but recognition of the importance of local government besides the national and international administrative level was limited (Zimmermann et al. 2010: 83). In particular, meeting of Rio summit in 1992 was taken international attention to the role of local government on earth` ecological, social and economic development path. For instance, the discourse of "Local Agenda 21" was one outcome of that conference. Thusly, major factors

determining of common tendency of local governments for participation into some of the transnational networks to form collective respond to climate change within or across urban borders at multi-level governance systems had increasingly acclaimed by scholars as a new research issue in global environmental politics, in particular since establishment of the first world's climate change campaign initiated by ICLEI in 1993 (Czako, 2011: 41).

The importance of collaborations and cooperation among local authorities or non-public organizations to integrate climate protection principles to the non-urban world through being a member of such transnational advocacy networks was seen essential for mutual learning and sharing experience recently (Tolly, 2008: 343). Indeed, the participation of the local organizations into some transnational networks and global networks as a result globalization efforts provides a significant contribution to climate change governance and politics literature because of cities global influence, communication, entrepreneurship and technical leadership, which is an important component of governance and politics (Tolly, 2008: 344). Thusly, climate-cities networks between local authorities and non-public authorities such as business, NGO vertically and horizontally were supported at national, and the international arena and the number of cities that are members of these networks have significantly increased (Czako, 2011: 40).

Similarly, local government climate conference meeting at international level (in particular as parallel to a conference of parties –COPs) have been crucial to highlight the importance of local government on climate change protection since 1995. In that way, when parties come together annually to discuss climate change protection policies and strategies at international conferences, representatives of local governments were also invited to that conference to evaluate the role of local climate protection actions (Zimmermann et al. 2010: 84). Briefly, main objectives of these conferences were explained as

> "Local governments are active, and the same is requested from national governments… local governments can do much more for climate protection, but require improved framework conditions to act even more effectively…"

In particular, local government climate session in 2007 (COP 13), in Bali, Indonesia was important one of the UN conference held by the participation of largest share of local government representatives across the World and brought tangible outcomes for establishing local government climate roadmap. In addition, 19th conference of parties (COP-19) was crucial events regarding global advocacy among local governments on climate change. Similarly, at the meeting of World Summit of Regions for Climate in 2014 in Paris, France, "Paris Declaration" was adopted to underline the importance of bottom-up approach for making possible of low carbon economy across the world. Finally, climate summit in 2014 argued the necessity of all sorts of cooperation among cities, sectors, industries, stakeholders for achieving a significant cut in GHGs emission. Consequently, main progress for the local government climate change conference could be summarized as in following table 4.

Table 4 the history of local government and climate change advocacy conference

Year	Local government climate events
1995	The Second Municipal Leaders' Summit On Climate Change, COP 1 in Berlin, Germany
1995	The Third World Mayors' Summit, in Saitama, Japan
2002	Mayors' Meeting, COP 8 in Delhi, India
2004	Mayors' Meeting, COP 10 in Buenos Aires, Argentina.
2005	The Fourth Municipal Leaders' Summit On Climate Change, COP 11, in Montréal, Canada
2007	Local Government Climate Sessions, COP 13, in Bali, Indonesia
2008	Local Government Climate Sessions, COP 14, in Poznan, Poland,
2008	The launch of The European Covenant of Mayors.
2009	Copenhagen Mayors' Summit, in Copenhagen, Denmark
2010	Local Government Climate Launch, COP 15, in Copenhagen, Denmark
2010	Resilient Cities Congress Series Launch
2011	World Mayors Summit On Climate in Mexico City
2011	African Mayors Climate Change Declaration
2012	Durban Local Government Climate Convention
2013	Local Government Climate Roadmap
2013	Cities Days, COP 19, in Warsaw, Poland
2014	Paris Declaration and COP 20, in Lima, Peru
2014	Climate Summit 2014, catalyzing action

Sources ICLEI, (2016b) and Zimmermann et al. (2010:84-85)

Corresponding transnational climate networks, it is needed to distinguish two confusing concepts in the literature as well. Within international and political science literature, transnational advocacy networks, global civil society are two ambiguous concepts concerning global climate change (Betsill & Bulkeley, 2006: 147). While transnational climate advocacy network highlights the importance of knowledge, information, and values for local government which provides scientific and political consensus on climate change issue, global civil society focuses mainly on governance perspectives and involvement of non-state actors in international areas (Betsill & Bulkeley, 2006: 147). To this end, transnational local government networking in multi-level government systems has been regarded as a new political authority in climate governance and global environmental politics (Betsill & Bulkeley, 2006). It has also been differentiated from other governance types such as global governance in many aspects (Andonova et al., 2009: 69). Apart from global governance, it is defined as different activities of public and non-public in their national and political jurisdiction. Andonova et al. (2009) provide significant typology concerning transnational governance networks with its main types as public, private and hybrid forms and their impact and functions, for instance, information sharing, capacity building, and implementation of local climate change protection policies and strategies.

Besides significant contributions to national and international climate governance, transnational climate governance networks provide many other advantages for local public authorities for dealing with climate change. Andonova et al. (2009) claim that information, knowledge, and norms sharing, providing of financial, managerial and technical resources, and capacity building and implementation, and rule-setting are some of those advantages contributing local government outside of intergovernmental arena (p63). Such transitional city networks also help local authorities to overcome barriers encountered such as lack of knowledge, limited resources capacity, financial and technological constraint, etc. at the local level (Monni, & Raes, 2008: 744). Gustavsson et al. (2009:63) also put forwards that sharing of knowledge and experience; mutual learning, financial and resource flow are some important outcomes of the city network. In addition, Granberg and Elander (2007) indicates that city networks create a positive image for investors, which bring new investment and market opportunities for cities to overcome financial barriers to climate change policy actions.

All in all, a various transnational climate protection networks emerged in the early 1990s before Rio World Summit in 1992 that put climate change protection policies and strategies into political agenda at the international and national level (Kern & Alber, 2008:184). Those city networks were created in the international arena as parallel to parties negotiations for creating new global climate change regime. Even though the mission of that city networks is identical as providing essential support for climate protection strategies and policies, the main reason for the establishment of that differentiates from each other (Kern & Alber, 200: 184). In addition to that, either or both main two critical missions are followed by those city networks: capacity building and advocacy (Ozut, 2011: 35). Some local efforts to strengthen local capacity with information, inventory, financial and technical supports, etc. also increase the capacity of advocacy at the international level for corresponding local authorities, or vice versa (Ozut, 2011: 35). In this regard, it is possible to list some crucial transnational local government advocacy networks as following;

3.4.2.1 Local Governments for Sustainability (ICLEI)

ICLEI is an international association established in 1990 in New York for providing essential support for local government to create comprehensive policies and strategies for sustainable development and climate protection (Zimmerman et al.,2010: 86). Main actions conducted by ICLEI could be compiled under three major titles such as mitigation, adaptation, and advocacy. Moreover, Cities for Climate Protection (CCP) was a campaign started in 1993 to maintain mitigation and adaptation actions of local governments including more than 1000 participant from across the world while "Cities Climate Catalogue-CCC" and "Local Government Climate Roadmap" were formed for climate advocacy (Ozut, 2011: 31).

CCP proposes five level framework for the local governments to reduce urban GHGs emission (Demirci, 2015: 86). CCC also invited all community levels including cities, town, village, etc. to present their tangible targets and achievements across the world. It is also closely linked with local government roadmap principles that underline the importance of all level of

government on climate protection and enables framework condition in this manner. Local government climate change is an international network created in respond to Bali Action Plan with a broad participation of local governments across the world that aims at design and implement new global climate regime after 2015 with recognizing, engaging and empowering of local government in that new agreement (ICLEI, 2016b)

3.4.2.2 United Cities and Local Government (UCLG)

UCLG was established in 2004 to ensure cooperation among local and regional government with the international community on the issue of solidarity, self-government, democracy, decentralization for increase local authorities influence at the international governance (UCLG, 2016). Given of local climate change, UCLG signed Compact of Mayor agreement in 2014 for reduction of GHGs emissions at the municipal level (Demirci, 2015:86). It maintains actions in collaboration with other transnational climate networks such as ICLEI and gives clear support for several advocacy networks such as Local Climate Action Roadmap and World Mayor and Local Governments' Climate Protection Agreement (Ozut, 2011: 32).

3.4.2.3 Climate Leadership Group (C40)

C40 is a network formed by a group of world's largest cities and aimed at tangible target and commitments for climate change problems in collaboration with much advocacy climate networks such as ICLEI and Clinton Climate Initiative (Zimmermann et al..2010: 86). At the initial stage, it was established as C20 in 2005, by 2016, 86 cities from a variety of countries across the world that is account for about one-fourth of total Global Domestic production has participated into the C40 networks for addressing climate change. Cities across the world participate in C40 networks for financial and technical supports for tackling similar challenge and opportunities at local climate protection policies and strategies. It maintains its action under seven issue; adaptation and water, energy, finance and economic development, measurement and planning, solid waste management, transportation, and urban planning and development (C40 Cities, 2016).

3.4.2.4 Climate Alliance

It is established in 1990 in Germany to highlight the necessity of European municipalities` responsibilities to manage ecosystems in the southern hemisphere to increase the scope of actions for climate protection (Zimmermann et al..2010: 86). Climate Alliance being referred as world's largest city networks that consist of about 1700 municipalities from across the Europe has several tangible targets and commitments such as Carbon emissions reduction at least by 10 % every 5 years, considerable progress on energy efficiency and conservation, widespread usage of renewable energies and climate justice (Climate Alliance, 2016)

3.4.2.5 Covenant of Mayors

It is a world urban climate and energy initiatives launched by European Commission after adoption of the 2020 EU Climate and Energy Package in 2008 that was to endorse local and regional authorities to achieve EU climate and energy target and commitments in a voluntary base and to adopt integrated approach for dealing with climate change (The Covenant of Mayors, 2016). The member of that agreements assumes at least 20 % GHGs emission reduction by 2020 through local sustainable energy and climate action plans and policies in EU (based on The new integrated Covenant of Mayors for Climate & Energy launched in 2015, 40 % carbon reduction by 2030 was acclaimed) (Demirci, 2015: 87). Based on button-up approaches, it supports local government to implement their climate protection actions in three pillar areas such as mitigation, adaptation, and secure, sustainable, and affordable energy (The Covenant of Mayors, 2016).

3.4.2.6 Energie-Cités

It is another association established with the participation of more than about 1000 cities across 30 countries in 1990 in France for local authorities in EU for ensuring local sustainable energy policy and energy transition (Zimmermann et al., 2010:86). Main objectives of the association are explained as; enhancing of local governments' capacity on sustainable energy, increase influence of subnational government on EU on the issue of energy, environment, and

urban policies, and ensuring exchange of experience, and implementation of joint projects (Energy-cities, 2016)

3.4.2.7 Eurocities

It is another climate network for EU cities launched in 1986 in Brussels, Belgium, to bring together about 130 largest cities from 35 countries (Zimmermann et al..2010:86). That climate network reinforces local governments in multi-level systems in EU with a broad range of working groups, forums, projects, activities and events that aimed at mainly sharing knowledge and exchanging ideas in the issue of several thematic areas such as culture, economy, environment, knowledge society, mobility, social affairs and cooperation (Eurocities, 2016)

3.4.2.8 World Mayors Council on Climate Change (WMCCC)

It is an alliance committed by mayors of local governments in 2005 after entered into force of Kyoto protocol in Japan on the issue of climate change and the related other policy matters of global sustainability. Two main objectives are to strengthen political leadership and to ensure political advocacy force on the issue of global sustainability. It has maintained actions through several projects in coordination with ICLEI for obtaining essential financial and technical support (WMCCC, 2016).

3.4.2.9 Clinton Climate Initiative (CCI)

Former president of Bill Clinton launched CCI in 2006 to provide support to individual cities through scalable projects for local climate change policies and strategies to reduce GHGs emission (Kern &Alber, 2008:192). It provides assistance for local government on the issue of climate change, economic development, girls and woman, global health and health and wellness (Clinton Foundation, 2016)

3.4.2.10 US Conference of Mayors (USCM)

USCM is a non-partisan cities organization established by about 1407 mayors of in the US that aimed at support urban policies, increase federal-cities relation, tailor federal regulation to urban needs, provide support to mayors on leadership and managements, and create forum for sharing ideas and information among mayors of the cities (USCM, 2016). With regard to climate change, USCM signed climate protection agreement in 2005 by about over 1000s mayors of US cities (Demirci, 2015: 87) that could be evaluated significant gains for local governments to tackle climate change.

3.4.3 Modes of Local Climate Change Governance

Another important framework that mainly explains theoretical background of local climate actions and strategies as in that thesis are associated with "modes of climate governance".[15] The literature reveals that there has been a range of different mitigation and adaptation strategies, mechanism and policy instruments which could be grouped into different modes of governance for each policy sectors as energy, transport, land-use planning, urban infrastructure, and waste, etc. The capacity of local climate change actions or initiatives depends on the extent of the actors' attitude or tendency on their climate activities (UN-Habitat 2011:107). In this respect, Alber and Kern (2008:5) and Bulkeley and Kern (2006) argues four different modes of governance for local climate protection policies and strategies; *self-governing, enabling, provision and regulation*.

Indeed, these modes of governance were emerged as a result of the transition in the perception of the state` intervention on policy domain such as transformation from formal government, hierarchical relation to the involvement of not- governmental and private actors, flexible form of partnership, cooperation, networking, sharing responsibility, service provision and decentralization (UN-Habitat 2011: 107).

[15] The first tier of the thesis scrutinizes local climate change governance initiatives with qualitative research methods in metropolitan cities in Turkey.

Modes of the climate governance are a useful framework for the better analysis of local climate actions and initiatives. With this useful governance framework, it is possible to compare or classify local climate actions and figure out how local climate change initiatives are being governed, and biggest obstacles encountered at the local level. (Czako, 2011:22). In practice, each mode that has different governing capacity might be suitable for a distinct policy domain, but each one also could be applied to many different local climate policy instruments. Main modes of local governance could be summarized as following;

Self-governing; it indicates the capacity and competence of that local government apply climate change principle in their organizations, institution, strategic and innovative operations, mainly driven by both environmental and economic concerns. It is the most common mode of governance used in climate change mitigation initiatives due to the fact that local government has a high-level capacity of making their decision and controls their production and consumption patterns with innovative and strategic investments in an easy way. It is also made possible to mobilize the community for supporting local climate change and related activities in particular specific sectors such as energy, building, and transportation with those modes of governance (Alber &Kern, 2008:7). Main advantages of self-governing of climate change are being under direct control of municipalities and provide quick and cost-saving approaches to reduce GHG emission in municipal borders. The main limitation of this mode of governance is associated with short time financial return and accounted for a small portion of GHG reduction. Concentration on energy efficiency, and renewable energy and behavior change and demand reduction mechanism in almost all sectors are just some the initiatives adopted by municipal authorities with respect to self-governance modes (UN-Habitat, 2011, 108).

Kern and Alber (2008:176) assert that energy efficiency is a crucial area for actions by local self-governance. For instance, in Sweden, about 95 % of local governments work to implement of energy efficiency principle in their official building. Beside to energy efficiency, whether energy meets from renewable energy sources is another significant focus area for action in the cities. Moreover, transportation is another significant sector for energy efficiency action for local government. A common approach for local government to `greening their

fleets is to purchase new transportation vehicles and cars using biogas or natural gasses. Consequently, due to the fact that small part of total energy consumption and GHGs emissions (1-5%) are taking place in the municipal building, other types of climate governance modes should be complemented by that governance for reaching significant effects (Bulkeley&Kern, 2006).

Governing through enabling; it is used to explain the capacity which local authorities' endorsement for the community and non-public actors to pursue climate change principles in their actions and organizations using convincing and encouragement methods and volunteer actions. That mode of governance has several different dimensions including education, awareness campaign and supporting activities local government policies and strategies with respect to climate change (Alber &Kern, 2008: 8). It also provides cooperation, collaboration, and partnership between public-private actors, and their external ties with other related actors in climate change issue. This mode of governance does not require municipal authorities for finding financial and political investment. It is also present a range of benefits to municipal authorities to share experience and capacity with other urban actors including non-public organization. Dependency on voluntarily collective action and difficulty of effectiveness evaluation are some of the main limitations of this mode of governance (UN-Habitat, 2011: 108).

Governance by provision includes all kinds of initiatives such as the external partnership between the public and private organization, consortium, commission and other related regulation and plans that is mainly driven by financial and environmental concerns. For instance, in the city of Leicester, UK, local governments conducted several energy education projects at the public schools to increase awareness on the issue of development of renewable energy sources and promote energy usage from `green` sources (Kern & Alber, 2008:176). For instance, the London Climate Change Agency (LCCA) and London Energy Partnership (LEP) in the UK could be given as an example for such joint venture and public and private partnership to implement sustainable energy project among all stakeholders and organization in London. Similarly, Stuttgart's Climate Protection Programme in Germany is another example for such regulations, in particular for transportation and other energy-related sectors.

Governing by provision; demonstrates the capacity which local governments provide necessary infrastructure and services to using financial and resources mechanisms to be followed climate change principle by non-public shareholders. In particular energy sector is most suitable for such governance modes by the necessity of proper condition on private investors. Low carbon infrastructure, changing carbon intensity in its utilities for household and business actors in the reduction of GHG in the municipal border are just some of the advantages of this governance modes, while the lack of financial constraints and dependency on capital condition is one of the limitations (UN-Habitat, 2011: 108). As a rule of thumb, liberalization and privatization efforts in energy and transportation sectors decrease the significance of those modes of governance (Kern &Alber, 2008: 178). For instance, the Power Industry Act in 1998 in Germany restricted the executive capacity of local government on generation and transmission of electricity.

Several examples could be given for local government` engagement with carbon reduction through provision across the world. For instance, South Korea pursuits for the sustainable city through The New Town Development Plan that involves social inclusion, self-sufficiency, connectivity, green space and smart resource management (Lee et al., 2015:1). Similarly, Mexico City initiated climate action plan in 2008 for GHGs reduction and to reach target and commitment of 50 % reduction below 2000 level by 2050 through private-sectors incentives and green residential and public building projects. As a leading example, 236,000 square feet of green roofs was installed by Mexico City government in public building for absorbing air pollution in the federal district. The city government of Los Angeles in the USA that is the largest publicly own municipality's pursuits to provide electricity for entire population through renewable energy sources in 15 districts. Finally, some modernization efforts of train lines and bus infrastructure in some states in the USA could be given for local government efforts for carbon reduction through a provision on a voluntary basis.

Governing authority (regulation); this mode of governance indicates perception of setting out capacity which emergence of urban climate governance principle could be possible using direct authority, compulsory and legal measures, in particular on urban transportation and

development policy. In another word, local governments have broad legal authority, executive power, and legitimacy on implementing and obligation of common principle in their strategic planning and non-public actors` strategies and actions in particular energy, transport, building and land using sectors. Providing an effective and visible reduction in GHG emission at urban scale is main advantages of this mode of governance, as difficulties encountered by municipal authorities in implementing and monitoring of this mode of governance in their climate change is a major limitation (UN-Habitat, 2011, 108).

For instance, solar thermal collector of hot water supply through regulation of cites government could be given as an example in Barcelona, Spain (Kern &Alber, 2008:178). Similarly, several municipalities in USA pursuit local mitigation and adaptation actions for predefined carbon reduction in transportation and energy saving in the building through regulation and standards. In addition, recently adopted regulations for new buildings concerning energy efficiency and road-user charging in the transportation plans in the UK are another example for that mode of climate governance.

Local authorities might deploy these four modes of governance in their policies and strategies separately or simultaneously at given time in their mitigation and adaptation initiatives (UN-Habitat, 2011: 108). Self-governing is most common and dominant approach adopted by local authorities, as regulation is the least among urban climate governance initiatives. self-governing and enabling are dominant approaches in general in developed countries to demonstrates visible and short-term scale climate change commitment, while provision mode is more common in developing countries to be adapted in their infrastructure and services against climate change possible impacts (UN-Habitat, 2011: 108). A regulation mode is one deployed commonly in municipal climate initiatives. It is also possible to notice different version or combination of each mode of governance as quasi-modes on local climate actions in practices. For instance, another mode of the governance claimed by Bulkeley et al. (2009) is associated with cooperation and collaboration between public and non-public actors in information provision, awareness raising, voluntary activities and project implementation.

Besides of these basic modes schemes of urban climate governance, new three modes of governance mechanism in the literature are emerged in addressing non-public and private authorities, agency and their climate experiences such as *voluntary: public-private provision mobilization* (UN-Habitat, 2011: 107). *A voluntary mode* demonstrates self-governing and regulation modes similar principles for public and private organizations and represents soft regulation mechanisms. *public-private provision mode* is widely used for service and infrastructure provision by the public and private organization under clean development mechanism, *mobilization mode* is intended to integrate private actors with others by means several mechanisms such as education campaign and awareness raising projects (UN-Habitat, 2011: 107).

Table 5 Local climate initiatives in multi-level governance framework

Climate governance in multi-level administrative scale	Horizontal cooperation between local government and other related public and non-public organizations and agencies Vertical coordination of all actors between governance level including international, national, and local	
Two main climate change governance approaches followed by local authorities	Local government` sectoral measures on climate change governance	Modes of climate governance framework
Mitigation and Adaptation Strategies	Urban development and design Built environment Urban infrastructures Transport Carbon sequestration	Self-governance Provision Regulation Enabling

Sources: Czako (2011:20) and UN-Habitat (2011)

In this regard, firstly question interrogated in the thesis is which mode of governance is mostly used by local governments in their actions regarding climate change protection in metropolitan cities in Turkey?

3.5 Major Factors on Adoption of Local Climate Change Protection Initiatives by Local Governments

Besides of three main theoretical explanations regarding local climate change governance, it is needed to mentioned major factors on the adoption of local climate initiatives by local governments. Although some local governments in the fighting against climate change face several internal and external obstacles, they still carry out specific plans and strategies on a voluntary basis. In recent years, climate change protection initiatives are evaluated as a strategic issue incompatible with other urban political objectives. In this regard, the local governments that have specific initiatives for tackling climate change characters have the general characteristics regarding both their inside institutional dynamics and structure of city and society that provides good and services delivered. Moreover, some features of the cities that are the front-runner in climate protection initiatives is different from other cities (Clinton, 2008: 18). These features could be classified as socio-economic conditions, stress (cause GHG emissions) and risk factors (associated with vulnerability level of the cities) (Clinton, 2008: 18).[16]

In another word, literature argues that several factors have a significant impact on the engagement of local governments with climate change and the level of achievement as in other environmental policies. In other words, local governments which perform carbon reduction actions in their administrative border differ from one which has no commitment and achievement in the way of certain characteristics. For instance, "public attitudes" towards local climate change protection, sustainability, renewable energy, and green building policies in society could cause pressure for local governments to determine and adopt necessary policies and strategies (Betsword & Hanak 2013: 666). In addition, "individual leadership" and "willingness of the experts" in the department (political championship) could be effective in the adoption of local climate change measures and policy (Betsill, 2001; Collier & Lofstedt, 1997, and Betsword & Hanak 2013: 666).

[16] The second tier of the thesis scrutinizes major factors on determination and implementation of local climate change actions adopted by metropolitan municipalities in Turkey.

Similarly, co-benefits such as energy efficiency, economic gains, traffic congestion and air pollution could increase the willingness of local government to deal with climate change at the local level. In addition, the existence of compulsory legal mechanism at the national or international level could have an impact on the adoption and maintain the climate activities by local governments (Betsword & Hanak, 2013: 666). Finally, The presence of certain interests groups in the society could have a significant impact on acquisition of local climate change initiatives by local authorities (Sharp et al., 2010: 5) However; there has been consensus on that measurement of those factors in practice is quite difficult. Moreover, these factors sometimes might have a strictly limited impact on the determination of climate change initiatives acquisitions for local authorities.

Considering all of those, a variety of socio-economic factors such as political affiliation of the mayors of municipalities, education attainment, municipal cost for environmental services, median income, participation into local NGOs, electricity consumption per capita, employment rate, have significant and measurable impact on local government climate change initiatives (Boswell et al., 2010; Pitt, 2010). Due to the fact that these measurable factors greatly affect social capacity and economic conditions of the society which is closely associated with environmental consciousness of the local communities, these vital factors influence local governments` decision on climate change mitigation and adaptation policies and strategies. Similarly, Zahran et al. (2008) address these socio-economic factors as "environmental leanings" and "civic capacity" and argues their impact on the achievement and commitment of local sustainability and climate change initiatives.

For instance, Krause (2011) in his study with "Municipal Climate-Protection Index" argues that there has been a relation between some factors such as total population, education level, income level, political attitudes and local climate change activities undertaken at the local level. Even though there has been a different emphasis on each factor in the literature, it is clearly seen that educational attainment is a major impetus for the acquisition of local climate change policies, strategies, and plans. (Clinton, 2008: 26). Similarly, Krause (2011) also indicates that “median income” should also be taken into account due to being a significant indicator for raising environmental awareness and engagement of local community on climate

change projects (p56). Furthermore, Robinson and Gore (2005), claims that local government which have delivered service for more population and which have much more experiences on the issue of local planning on complex and uncertainty problems might be a pioneer on that matter. On the other hand, local authorities in the fast-growing cities might be stagnant on local climate change actions due to possible constraints for their economic growth and development (Senbel, 2011: 32).

Additional to factors mentioned above, several local condition factors, particularly "political attitudes" determine commitment level of local government in the climate change protection. In other words, "Political affiliations" account for differing political preferences towards measures and policies to reduce local emissions across urban areas. For instance, in this content, Kahn (2011) alerts "how political ideology can affect urban development with study in liberal cities in California limiting new housing supply, demonstrates the importance of political preferences in any model" (as cited in Millard-Ball 2012: 15).

Institutional capacity, financial and technical condition level of local governments might be significant barriers to fight against climate change. In other words, regarding with sufficient experts and income level creates possible flexibility for climate change actions for local government. Moreover, Local climate change initiatives are associated with the condition of cities` involvement in transnational municipal networks (Kern and Bulkeley, 2009). Belonging to transnational municipal networks often requires taking certain forms of action, strategies, and plans to deal with climate change problem.

Krause (2011) also explains demand and supply side effective factors on local climate change achievement and adoption. For instance, the political representation gives an idea about a particular policy stance of local communities which might be important factors for determination of local governments` commitment to climate change protections. In addition, experiencing weather-related causality and physical characteristic conditions could increase the public consciousness for climate change so that local governments would face significant pressure to take necessary actions on sustainable, climate-friendly policy and strategies in their administrative borders. In sum, major socio-economic factors in the first cluster used in the

analysis in this thesis could be categorized as political affiliation of the mayors of municipalities, education attainment, the municipal cost for environmental services, median income, participation into local NGOs, electricity consumption per capita, employment rate.

Hypothesis 1: Socio-economic factors are more likely to explain why some municipalities have performed climate change mitigation and adaptation initiatives much more.

Zahran et al (2008) also theorize ICLEI`s involvement of metropolitan municipalities and their main motivators in his most cited study. In this context, he clearly indicates "climate change stress" as the most important factors for local climate achievement. For example, he argues that high levels of carbon-based employment, low density, and alternative energy usage are regarded as an effective factor in the adoption of climate change activities for the local government. Based on his finding, air pollution, and waste could also be evaluated as environmental stress factors in the same manner. The number of motorized vehicles on the road, energy consumption, and population density are being assessed as significant local climate stress factors. For instance, it is expected to observe less energy consumption in high population density areas, which is more desirable for local climate change actions. Similarly, it is noteworthy that the number of vehicle and electricity consumption resulted in more climate stress by high GHG emissions. In addition, Senbel (2012) argues that local government provided service in low-density population acts keeping away from emission reduction target owing to the possible high number of vehicle on the road and incompatible transport systems (p.32).In sum, all factors in this cluster refer local geographic condition in a sense way.

Zahran et al. (2008b) argue that carbon intensive industry, transportation patterns, and energy consumption which resulted in high GHG emission increase social interest and awareness so that local government could be asked to implement climate change policy and strategies in their administrative borders. Put it differently; these factors are some that influence the local community` physical environment. For example, the higher population density is, the more car on the traffic are, which resulted in more amount of GHG emissions? Similarly, the air pollution creates negatives impact on the physical environment of the communities, which increase environmental concerns and willingness level of local climate change commitments

(Clinton, 2008: 27). In sum, major climate stress factors in the second cluster could be categorized as car dependency, air pollution, waste, population density.

Hypothesis 2: Climate stress factors are more likely to be most influential *on the determination of local climate change achievement by metropolitan municipalities in Turkey.*

Precipitation, extreme weather, and climate histories are regarded as effective factors for local climate change involvement and achievement (Zahran et al., 2008a: 455). Similarly, some climatic factors such as temperature, precipitation could cause social pressures for local governments for taking the necessary measures to climate change problems (Zahra et al., 2008a). Similarly, the geological location of the city is also an important factor in determining the effectiveness of the local climate change actions. For instance, being located in the coastal area could be effective in this sense. However, it should be kept in our mind that being locations in coastline are not enough evidence to indicate the high-level vulnerability of the city regarding climate change (Clinton, 2008: 31). In sum, major local climate risk factors in the third cluster could be categorized as temperature and precipitation deviation, coastal Proxy.

Hypothesis3: Vulnerability level (associated with climate risk factors) in the cities are more likely to have played a significant role to identify and implement local climate change actions in Turkey.

3.6 Basic Approaches for Dealing with Climate Change

There are two basic approaches that nature and human systems resort to in combating the major effects of climate change: *mitigation and adaptation*. Two of these approaches are complementary to each other. There is also interrelation between two prevalent approaches. For instance, it is expected that comprehensive and effective mitigation policies and strategies adopted by nations require less necessity for adaptation efforts or vice versa.

3.6.1 Mitigation Approaches and Options

The first of two-pronged approach to deal with climate change at the local level is mitigation which has a sense of "avoiding the unmanageable," (URS, 2009: 3). According to critical climate change negotiations such as UNFCCC in1992, Kyoto Protocol in 1997, the Copenhagen Accord in 2009, the primary goal was to keep GHG emission amounts in the atmosphere at a level which will not affect human life through certain policy, strategies, measures, and time planning (UN-Habitat, 2011). For that purpose, mitigation policies and strategies have become dominant approaches recognized by scholars at national and international areas at the initial stage. However, the literature clearly reveals that mitigation activities at local administrative scale and initiatives adopted by local governments are also essential besides international and national scale and efforts.

Devastating impacts of climate change could be controlled by mitigation policies and strategies that have been implemented timely and effectively in medium and long-term and avoided from its potential negatives influence (Corfee-Morlot, 2009: 13). In this regard, the IPCC (2007) defines mitigation as "technological change and substitution "…. with respect to climate change, mitigation means implementing policies to reduce GHG emissions and enhance sinks". In the narrow sense, it is defined as reducing the growth rate of GHG emission in the atmosphere at a reasonable level with capture and storage methods or enhances sink (UN-Habitat, 2011). In a broad sense, it is defined as human intervention reducing GHG emission caused by human activities, and minimize its negative impact and trigger sources of climate change. That is to say; it is sort of manner which requires changing in entire demand and supply side chain with essential policy initiatives in urban areas (Anand & Kallidaikurich, 2011: 32).

The literature argues that though there has been ambiguity on city`s contribution to total global GHG emission, several studies still claims that it vary from city to city based on basic economic sectors, morphology, welfare, political attitude on climate change (Dodman, 2009). Therefore, local government' political response, measures, and strategies locally tailored differ from each other's across the world. Local governments mainly pursuit climate change

mitigation principles with their executive and legislative power in transportation, construction, land use, energy efficiency, waste and water management, alternative energy source, and campaigns to mitigate impacts of climate change based on specific geographical, climatic and economic and cultural conditions, and set policies and strategies in this manner (Corfee-Morlot, 2009: 31).

The report published by UN-Habitat in 2011 with a huge number of scientists, presents significant frameworks for local climate change actions to conceptualize, compare municipalities` performance and creates scientific consensus on it. Based on the main outcomes of this report, major measures, and strategies which are adopted or developed by local governments could be addressed under five different sectors such as; *urban development and design; the built environment; urban infrastructure, transport; and carbon sequestration* as seen table 4 (UN-Habitat, 2011: 92). This framework mainly addresses municipality's political responds and strategies to tackling hazardous impacts of climate change, not for other public and non-public actors including NGO, Private Corporation, and agencies. As some urban sectors are interlinked with others, local climate policies and strategies in a specific sector can enhance or undermine the effectiveness of the other sectoral policies as well (OECD, 2010: 108).

The report published by UN-Habitat (2011) also provides comprehensive dual typology to measure municipalities political response to climate change in urban areas. Based on GHG emission sources resulted from municipalities their activities, or community, are explained as `reactive and opportune` and two main mitigation approach applied are mentioned as `ad hoc and strategic` approaches manner as seen in the following table (UN-Habitat 2011:92). `The ad-hoc basis` is most common approaches in particular for the cities which have distinct GHG emission target. A strategic approach to GHG emissions reduction would be convenient under appropriate, institutional and political financial condition for municipalities. For instance, milestone systems (1-5) promoted by significant transnational organization campaigns such as CCP of ICLEI and model systems of the Climate Alliance's Climate Compass (1-5) were determined in a similar bass. In strategic mitigation approaches, managerial approaches only include local authorities and long-term climate target, plan, and measure, while comprehensive

approached involves non-public and privates actors (UN-Habitat, 2011: 92). Consequently, it is possible to assert that there have been a variety of different mechanisms and measures taken by municipalities on adaptation and mitigation climate political respond at urban areas as well.

Table 6 Comprehensive political response adopted by local governments for the protection of climate change in urban areas (UN-Habitat, 2011)

	Ad hoc basis	Strategic basis
Municipal authorities	reactive	managerial
Community	opportune	comprehensive

To this end, the second question in the thesis is which climate change protection approach adopted by the metropolitan municipalities in Turkey is prevalent; mitigation or adaptation?

3.6.1.1 Urban Development and Design

GHG emissions created in urban areas have a relationship with urban design and development that mainly depends on its location and density, so it is necessary to take into account of these factors in urban mitigation activities. In particular, mitigation actions of municipalities mainly concentrate on energy efficiency mechanisms in urban areas. A variety of strategies and initiatives has supported to mitigate emission at an urban area to deal with such changes faced by municipal authorities. These could be summarized as appropriate low carbon *land-use planning, energy efficiency activities for urban expansion, informal settlement, and suburban development, reuse of brownfield land, new residential areas initiatives* (UN-Habitat, 2011: 95).

For instance, energy consumption pattern and efficiency schemes are mainly determined by urban sprawl rate and informal urban settlement. In particular urban sprawl, the rate has a significant role in determining the extent of which urban respond to GHG emission due to the requirement of energy usage based on increasing distance from home, work, and life activities and motorized transportation (UN-Habitat, 2011: 94). In addition, informal urban settlement

and an increase in slum population have a significant impact on the degree to which adequate access to favorable and reliable energy sources in their shelter and extent to which energy usage in a sustainable manner (UN-Habitat, 2011: 94).

In particular, land-use zoning policies and spatial planning in the cities have a long-term and comprehensive effect on sectors to address climate change. For instance, land-use zoning policies determine the extent to which set of land use for specific targets such as residential, commercial, industrial or mixed that is closely associated with energy efficiency. Similarly, it determined the degree of segregation among land use that is interlinked with travel distance (OECD, 2010: 111). For instance, mass-transit oriented development in the city of Toronto in Canada determines the degree to which travel distance among residents, works and retails that encourage the use of transportation. Similarly, land using policies have a significant impact on renewable energy production and delivery of waste and water services (OECD, 2010: 111).

In order to address climate change, several different urban development projects are being conducted by local governments such as master-planning, urban densification, and mix-used development for dealing with urban expansion problem and ensuring energy efficiency schemes, in particular, developed countries, as local governments in developing countries have limited juridical and executive capacity on implementation and control of such comprehensive projects (UN-Habitat, 2011:94). Indeed, it is challenging task to implement mitigation initiatives through only urban development planning by municipal authorities by virtue of encountered several challenge such as institutional blockage within municipalities, political opposition, lack of sufficient power and responsibility, less financial support and fund, lack of sufficient capacity and expertise and limited impact on citizen` behaviors (Corfee-Morlot et al. 2009:40).

In this regard, another question investigated in the thesis is whether local governments are more likely to adopt climate protection initiatives on the sector of urban development and design in metropolitan cities in Turkey or not?

3.6.1.2 Built Environment

The literature also reveals that much more policy approaches are concentrated on sectors of built environment among other urban mitigation activities due to having the biggest contribution of GHG emission in urban areas. Indeed, a major share of electricity and final energy usage are being consumed for the building including public, domestics, commercial and industrial places. More energy efficient should be taken into consideration in building materials, systems and design (UN-Habitat, 2011:96). In this regard, Policy approaches for built environment could be classified into four main categories; economic policy approach as taxation and energy pricing; regulatory approach as code and standards; informational approaches as energy awareness campaign and audit; and voluntary mechanisms as energy star and carbon trust standards (UN-Habitat, 2011:96). *Energy-efficient material usage and building design, taking advantage of alternative energy and water technologies and supply, implementing energy demand reduction program* are just some of the policies and strategies implemented by municipal authorities for built environment to mitigate GHG in urban areas (UN-Habitat, 2011:96).

In this regard, another question interrogated in the thesis is whether local governments are more likely to adopt climate protection initiatives on the sector of built environment in metropolitan cities in Turkey or not?

3.6.1.3 Urban Infrastructures

Literature reveals that there has been a variety of difference policy mechanisms to mitigate GHGs emissions through urban infrastructure which is tightly associated with waste, energy and water networks, and systems` adopted by municipal authorities in cities. *Usage alternative and renewable energies use landfill sites for energy recovery, the provision of alternative water resources, incentives less water and energy usage, waste management and recycling, more energy efficient systems usage in urban infrastructure and energy water demand*

reduction are some major actions and political initiatives adopted by local governments with respect to urban infrastructure (UN-Habitat, 2011:96).

So, another research question investigated in the thesis is whether the urban infrastructure is pivotal urban areas in which local government implements climate change actions through main modes of governance in metropolitan cities in Turkey, or not?

3.6.1.4 Transportation

The sector of transport has recognized increasingly by scholars much more recently for urban mitigation strategies and policies due to having a high-level share of the fossil-based GHGs emission (about accounted for 23% of the world average amount) (UN-Habitat, 2011). Emissions from urban transportation vary from cities to cities based on several factors such as urban density, public transportation capacity, private car ownership, and median income level. For instance, the higher urban density and low-level public transportation capacity in the city are led to higher emission per person (Newman, 2006). In addition, there has been a relation between urban income level and private car technology and ownership which has a high share of GHG emission at urban center (Dodman, 2009). In particular for developing the country, emission level resulted from transportation is limited, but the share of it has increased significantly at a high rate.

Urban transport emissions have the lowest rate in Asian developing countries as China and India, it is estimated that more increase will be in these countries due to high urban sprawl urban income level, increase in social mobility, travel rates, private car ownership which would rise in congestion and air pollution (UN-Habitat, 2011: 100). Therefore, the new and improved public transport system, more energy-efficient vehicles, fuel switching, usage cleaner technological innovation, utilization of non-motorized vehicles and social campaigns for demand management, several regulation as physical restraint, parking restraints and speed restrictions are some of which could be addressed by urban mitigation strategies and policy , in particular in developing countries (UN-Habitat 2011: 101). Major studies assert that

diffusion of public transportation, non-motorized transportation, public awareness campaign and clean technology implementation are regarded as most common policy mechanisms adopted by the local government to mitigate GHGs emissions resulted from transportation in urban areas. Coordination and cooperation between regional, national and international stakeholders with local authorities including the public and non-public organization in urban transportation emission reduction are essential for policies to be implemented successfully as well due to limited municipal authorities` control power and legitimacy on transportation systems by themselves.

Another research question investigated in the thesis is whether transportation is major urban areas in which municipalities have a focus on much more for climate change protection actions in metropolitan cities in Turkey, or not?

3.6.1.5 Carbon Sequestration

Carbon sequestration is one of the important policy instrument adopted by municipal authorities addressed among urban mitigation strategies and policy respond. It could define as protecting carbon sinks areas such as forested area and river environment or enhancing existing carbon sinks with reforestation to reduce the amount of GHG in the atmosphere or capture and store it with the new technology. Usage of methane gasses captured from the landfill could also be addressed by carbon sequestration initiatives adopted by municipal authorities City-based carbon markets, and finance is popular in developed and developing countries through international policy instruments such as CDM to increase urban carbon capture and storage initiatives among municipal authorities. The most common approaches implemented by authorities for carbon sequestration in the urban areas are tree-planting, restoration for the preservation of carbon sink initiatives, carbon-offset scheme. Carbon capture and storage are not very frequent activity in urban areas due to technological limitation and high cost (UN-Habitat, 2011: 104).

The literature indicates that there has been limited information concerning the assessment of local climate policies and strategies implemented by local government and their collective impacts to reduce GHGs emission within or across urban areas. It is also a difficult task to compare and evaluates municipal authorities` performance and effectiveness due to depending on self-reporting and lack of common methodology, and fragmented and short-time scaled data for cities within the transnational municipal network and outside of such networking. How decision on mitigation actions and initiatives adopted by local government has been made and which kind of economic, social and political factors have impact on decision for adopting mitigation policy respond, and which sort of barriers, drivers, challenge, and motivators encountered on these policy process for municipal authorities, instead of evaluation of such initiatives effectiveness are some of the inquiry which has increasing recognition by several crucial studies (UN-Habitat, 2011: 106).

In this regard, another question assessed in the thesis is whether local governments are more likely to adopt climate protection initiatives on urban area of carbon sequestration in metropolitan cities in Turkey, or not?

3.6. 2 Adaptation Approaches and Options

The second approach adopted by municipalities for local climate protection initiatives is adaptation called as "managing the unavoidable" (URS, 2009: 3). Adaptation is defined as “initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects" (IPCC, 2007). Aims at the implementation of adaptation measure at urban areas timely and effectively is to adapt and protect human life and human habitat infrastructure from the unavoidable influence of climate change (Corfee-Morlot, 2009: 13). It includes all kind of actions adopted by all actors, population group and individual and household to avoid anticipated climate impact and to decrease vulnerability for it (UN-Habitat 2011: 137). The adaptation initiatives implemented successfully and effectively by municipalities provide strong resiliency threshold in urban areas. Adaptation capacity has

meant the opposite of vulnerability of urban areas for the devastating impact of climate change.

Aforementioned, local adaptation policies and strategies also rest on municipal authorities due to having a range of limitation of community-based adaptation. In fact, a partnership between community-based actors with all level of governments has much more impact on adaptation strategies at urban scale (UN-Habitat 2011:137). Thusly, the central government has played a significant role in the adoption of local adaptation policies and measures by municipalities.

Indeed, major stages of local climate change adaptation policies and strategies in the cities are started with a comprehensive assessment of climate change risk and vulnerability of the cities. Then, identifying adaptation options and integrating with other existing priority policies and implementation with the specific project are rest of stages of urban scale adaptation action plans as seen in figure 2 below (UN-Habitat, 2011). There have been a variety of different mechanisms and strategies implemented by local governments in climate adaptation actions including infrastructure, health, and financial measures.

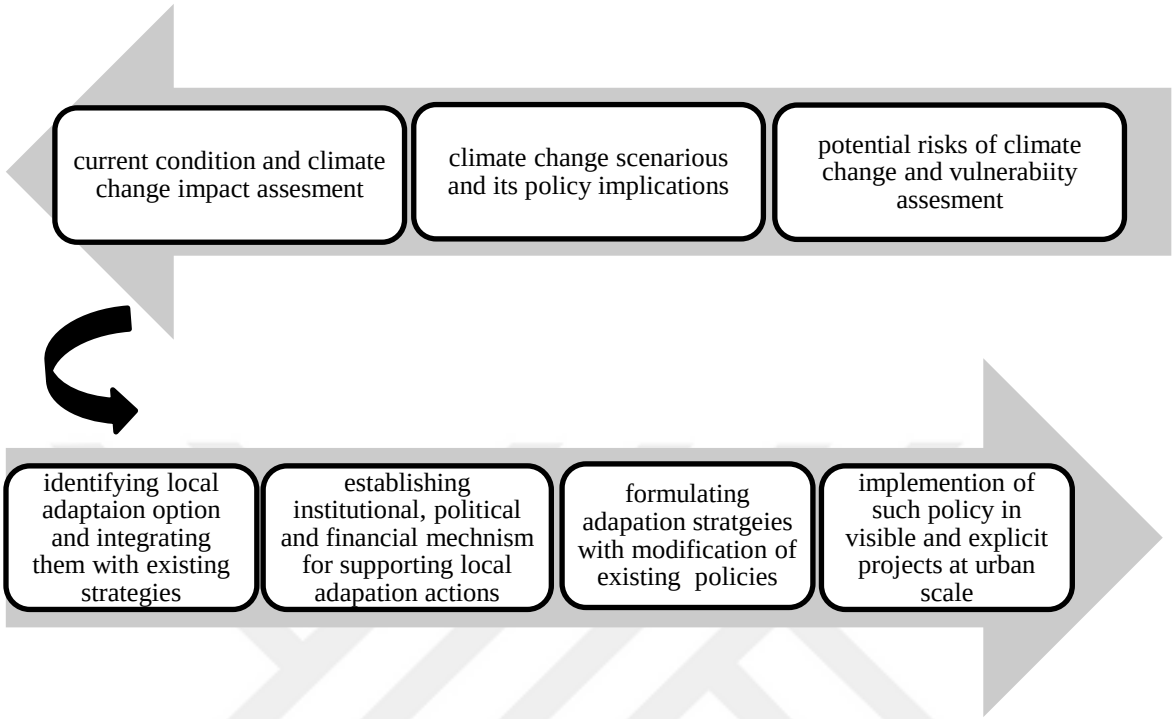

Figure 2 Major stages for adaptation strategies in tackling climate change at urban areas

Main adaptation initiatives implemented by municipalities under three main sector-based management categories (freshwater management, storm and floodwater management, and public health management) could be summarized in detail as following; developing ground water and surface water reservoirs, enhancing existing fresh and ground water infrastructure, develop wastewater treatment systems, provides water efficiency through tax, bill and codes , reduce leakage rate in water systems, drought management plan, public awareness campaign, increase capacity of storm water collection systems, and preserves ecological buffers, require flood resistance structure, early warning systems, protection of open space, green space in urban areas, provides favorable condition for built environment, prepare healthcare systems, appropriate cooling service and design for increasing urban air temperature, standard and measure for energy and water resources use, precautionary measures against fires and floods, the implementation of the zone policies, green infrastructure, building code and standard for extreme weather conditions, appropriate behavior change (UN-Habitat, 2011: 152).

The IPCC's report suggests that mitigation activities will not be adequate in alone to eliminate the influence of climate change, even in the best-case scenario (as cited in Klein et al., 2007). Climate mitigation and adaptation policies should be implemented simultaneously to address the impact of climate change. However, though local governments are expected to give much more attention to floods, typhoons, etc. which have long-term effects, they focus on overall emissions reduction activities. However, adaptation and mitigation activities are complementary to each other and have some similar obstacles, motivators, and benefits (Betsill, 2007). The best motivation in that matter is to associate adaptation policy and strategies with other local policy areas (Betsill, 2001). Another important point needed to attention is that local governments concentrate much more on mitigation activities in developing countries due to obtaining semi-benefit, instead of reducing emission (Betsill and Bulkeley, 2007:354). For instance, they receive climate change strategies and policies in their agenda for dealing with air pollution and traffic congestion in southern countries (Dhakal, 2004, and 2006).

Due to difference vulnerability and capacity level, local climate adaptation actions varies from city to city, as well region to region and countries to countries (Thomas & Twyman, 2005).Thus, implementation of adaptation strategies in the urban areas differs from each other as well. Especially coastal cities in the developing and low-income countries are more sensitive and risk group against the negative impact of climate change compare to others (Sippel & Jenssen, 2009: 3)[17]. Cities` development and experience levels, geographic location, and poorest sections of society differentiate local adaptation policies for each site (Sippel & Jenssen, 2009: 6).

Local mitigation and adaptation policies have different motivators and problems encountered. Firstly, while results of the mitigation actions are received on a global scale, adaptation activities are taken place at cities scale, (Sippel & Jenssen, 2009: 6). City-level adaptation actions are so rare, but mitigation initiatives and policy are not very widely successful (Sippel & Jenssen, 2009: 4). Adger et al. (2005: p924) also claim that local adaptation activities are in

[17] According to the US National Science Foundation study, approximately 600 million people is living in low coastal zone, and approximately 360 million of those is in the city (as cited in URS, 2009:5)

compliance with bottom-up approaches due to requiring personal preference and division of labor at the local level while mitigation initiatives are much more comprehensible for the top to bottom approaches by means of transnational and national network (as in URS, 2009:3).

Another question investigated in the thesis is whether adaptation is the most common climate protection approaches adopted by municipalities among climate change protection actions in metropolitan cities in Turkey, or not?

3.7 Some Experiences for Local Mitigation Policies and Strategies Adopted by Local Governments across the World

The necessity for engagement of local governments in the process of climate protection has begun to be comprehended by nations, especially after 2000s years. Indeed, in some developed and developing countries, some local governments have already become pioneering at that issue even though there is no legal obligation. Some benefits such as providing new employment opportunities, energy and water efficiency and saving, and preventing air pollution and traffic congestion etc. are lead local governments to undertake climate change protection initiatives.

3.7.1 The United States of America

The numbers of local governments in the USA are leading to address climate change in the cities via signing agreements and setting specific commitments for reduction GHGs emission. For instance, San Francisco becomes the first city in the USA that mandates rooftop solar panel in the new building based on new legislation (Chow, 2016). Similarly, several municipalities in the California require renewable energy production from a solar panel in the new building in 2013. In addition, the city of Berkeley launched new financing mechanism for renewable and solar technology implementation in 2008 could be another example of local mitigation policies adopted by local government. Furthermore, the city of Los Angeles that

has challenged with high transport emissions, car ownership, urban sprawl and less desire to public transportation launched two significant mitigation policies for reduction GHGs; Green LA and Climate LA in 2008 (Schroeder, 2011:8). Green LA action plans aim at the reduction of GHGs emission by 35 percent by 2030 via specific fifty predefined measures besides to other existing measures on water and energy policies in the cities. Similarly, the Climate LA document includes near- term actions and milestones determined in Green LA action plans to reach city commitments (Schroeder, 2011: 8).

With regard to urban development and design, several cities in USA such as Portland, Oregon and British Columbia have started to implement passive housing projects that include specific characteristics such as insulation of the walls and ceilings, special design for the pane of windows and doors, and circulation systems for fresh air in the house (Freeman, 2016). For instance, Onion Flat, a company in Philadelphia constructs several large complex passive housing projects that can be evaluated as a good example for local mitigation actions. In addition, Climate Positive Program supported by Clinton Climate Initiatives and local governments for development of large-scale urban projects in the USA is another example of city-scale mitigation policies (CPDP, 2016).

Moreover, some local governments in the USA joined to Energy Star program for energy use and efficiency and cost effective investment on that issue. In the same way, the U.S. Department of Energy Weatherization Assistance Program supports local government and non-government organization to provide weatherization services for house energy use since 1976 (EERE, 2016). Property Assessed Clean Energy enacted by the State of Texas in 2013 has authorities' local government to finance improvement of water conservations, energy efficiency and renewable energy usage in the commercial, industrial and residential properties. City Car Share programs in several US cities such as San Francisco, Oakland, and Berkeley for prevention GHGs emission in the cities. Furthermore, in the city of Tucson, Arizona has started to projects concerning gray water systems for sustainable water use. Addition to that, East Bay Municipal Utility District provides water and sewage treatment services in the San Francisco Bay and obtains 4.5 MW of Power from Anaerobic Digestion use (EPA, 2016).

Consequently, it is possible to expand examples for local climate change policies and strategies followed by municipalities in the USA.

3.7.2 The United Kingdom

Despite of fact that there has not been any compulsory duty proposed by central government for local governments for climate change protection in the UK, several municipal governments perform best practice in voluntary bases and partial financial autonomy to decrease GHGs emission to certain level that could be well evident for local climate action in the multi-government systems (Bulkeley & Kern, 2006: 2238). For instance, Best Value Performance Indicators for energy use in council building and Home Energy Conservation Act (HECA) could be evaluated two distinctive evident for local climate protection policies in the UK (Bulkeley & Kern,2006: 2238). In particular, several local authorities in the UK introduce HECA for energy efficiency and conservation in housing stock in compliance with local agenda principle, sustainable development and housing plans and strategies (HECA, 1995).

Moreover, Nottingham declaration is another significant evidence for local authorities to deal with climate change in the UK. Over hundreds of local councils in the UK signed the voluntary declaration to tackling climate change effectively in cooperation with another local stakeholder, which help to reach national climate target and commitments on climate change. In addition, several local governments as in London have worked for achieving a set of criteria through Local Air Quality Management program and reduction of GHGs emission in the UK (City of London, 2015). In 2005, the report published by Carbon Trust and Energy Efficiency Scheme in 2007 in the UK set comprehensive measures, standards and local carbon framework for local authorities and business sectors to reduce carbon emission significantly. Similarly, congestion charging that was introduced into force in 2003 is another significant evident in the city of London-the largest city adopted congestion charging schemes for local climate protection actions and to reduce at least 16 percent CO2 emission from road transportation (C40 cities, 2011).

3.7. 3 Germany

Even though there has not been compulsory duties and responsibilities for local government engagement's climate protection actions in Germany, many municipal governments that is referred as founding and active members of transnational networks and international climate conference to persuade carbon reduction principles through local transport and resources policies such as transportation, electricity and gas, waste, disposal of sewage (Bulkeley & Kern, 2006: 2240) as a voluntary task.

To this end, local government in the Heidelberg, Frankfurt, and Munich performed local climate policies and strategies such as energy saving the program, carbon auditing and another related action plan, in particular on the sector of energy and transportation since the 1990s (Bulkeley & Kern, 2006: 2240). Similarly, the city of Berlin is shown as a home that Western Europe's largest urban heat network is located. In addition, recently the combined heat power CHP) systems with new act has been empowered through local action and planning plans adopted by municipalities ın Germany. In this regard, municipalities have encountered several obstacles for decentralization of CHP such as lack of financial and technical capacity, insufficient knowledge, and lack of support from central regulation. In Germany, several city governments such as Hamburg and Berlin have started the Clean Energy Partnership that found in 2002 by Germany Federal Transport Ministry for low emission and mobility (CEP, n.d)

3.7. 4 Sweden

Sweden central government launched two important program covers municipalities regarding local climate protection actions for the transition towards a sustainable society, in particular, to improve ecological efficiency at the local level in 1997: The Local Investment Program (LIP) and Climate Investment Program (KLİMP).While LIP aims at environmental and energy efficiency concerns, KLIMP adopted in 2003 mainly focus on the specific concern of the climate change and set measures and standards for reduction of GHGs emission. Similarly, Sweden is leading a country that shifts toward sustainable energy systems through with new

technologies such as in bioenergy, Fuel cell, solar and wave energy, and aims at using renewable energy in its energy mix-portfolio. For instance, local governments give clear support for obtained at least 10 percent of total transportation fuel from renewables by 2020. In addition, the climate forum held by the city government of the Malmö could be evaluated local climate protection initiatives adopted by the local government for enhancing knowledge of climate change in Sweden (Glanberg, 2009: 12). All in all, based on the survey conducted by Swedish Society for Nature Conservation (SSNC) in 2005, it is possible to claim that most of the front running municipalities in Sweden aims at GHGs emission reduction through eco-cars, non-fossil fuel and eco-friend product (Berlin Partner, 2016).

3.7. 5 Brazil

Several studies point out that local government has played a significant role in the development of the local mitigation and adaptation policies and strategies to deal with climate change in their administrative and national border in Brazil since the 2000s (Puppim de Oliveira, 2009:256). For instance, several municipalities in Brazil such Sao Paulo, Belo Horizonte, Feira de Santana, and Rio de Janeiro, established several policies and concrete targets through inventory, planning and implementation actions to reduce GHGs emission for last five years (Barbi & Ferreira, 2013: 50). “Policies for Sustainable Construction”, "Local Renewables Initiative”, “Green and Healthy Environments” and “Fostering Sustainable Public Procurement in Brazil” are some of the projects adopted local government linking with energy efficiency, low carbon technology, renewable energy use. (Barbi &Ferreira, 2013: 50).

Some cities in Brazil such as Rio de Janeiro and Sao Paulo that are highly vulnerable to climate change also maintain theirs for tackling climate change through transnational networks to exchange experience and knowledge such as ICLEI and C40. Similarly, the Guidelines of the City of São Paulo Action Plan for the Mitigation and Adaptation to Climate Changes adopted by municipalities in São Paulo could be evaluated as an important step in this manner (C40 cities, 2012). Moreover, Bandeirantes Landfill Gas to Energy Project is another example of local climate protection initiatives through green power generation implemented by

municipalities in Brazil. All in all, other related actions such as energy efficient and low cost material for sustainable housing, solar water heaters in municipal ordinance, promoting the use of natural gas in households, energy-from-waste projects, physical restraint, parking restraints, establishment of low emissions zones, promote pedestrian mobility, creation its own 'carbon market' and support for usage of renewable energy such as biofuels are just some of policies and strategies adopted by municipalities in Brazil to deal with climate change problem.

3.7. 6 China

China, the largest GHGs emission producing country in the world, has top-down climate change governance systems, and local governments have a specific position of implementation of the national climate measures and priorities at the local level. However, it is still possible to provide several examples of local mitigation and adaptation actions adopted by local governments for tackling the devastating impact of climate change in China. For instance, Eco-city projects in Dongtan, Pro-eco program in Nanjing, solar water heaters in the district of Yinzhou, the street-lighting system in Beijing are just some of the initiatives linking in local climate change protection. In particular, Beijing, the 20th largest cities in the world, has a specific government agency in charge of climate change and related policies (Zhao, 2011:6). Similarly, The Beijing Energy Saving and Environmental Protection Centre established in 1982 has provided significant support for local governments on the issue of energy efficiency and planning policies in China (Zhao, 2011: 6). Moreover, Green Lighting Program launched in 2004 in Beijing, Taiyanggong Combined Cycle Gas Turbine (CCGT) Trigeneration Project, The Guanting Wind Farm projects, parking restraints, establishment of low emissions zones, etc. are other related local climate actions implemented by local government in China (Zhao, 2011)

3.8 Stakeholders in Local Climate Governance

A variety of stakeholders including public and non-public authorities and working groups in the cities as listed in the following table have played a significant role to address devastating impacts of climate change at the local level (as cited in Sippel & Jenssen, 2009:4).[18] Local-level stakeholders recognize problems of climate change in advance. The capacity of appropriate, sustainable and successful political responds at that level is high compared to other interested parties at national and international levels (Pohlmann, 2011:20). The main reason for that, each stakeholder's perception of the problem of climate change can be different so that different suitable political solutions could be proposed in policy making process. Carter (2009:3-4) argues there are many benefits for stakeholders to be involved political decision-making process of climate change at local levels such as learning and awareness rising, enhancing legitimacy, building stakeholder networks, resource savings, strengthening decision-making. Thusly, each stakeholder engages in the planning and implementation process of local climate change actions to exchange necessary knowledge and experience, to link them with other related urban prior policies, and to propose sector-tailored goals that increase likelihoods of success (Carmin, 2009:p.III). On the other hand, implementation of prospering local climate change policy that required complex and multi-stakeholders approaches is tough in practice compared to other local-level activities (Fleming & Webber, 2004:770). Indeed, it is not possible to evaluate influence all of those stakeholders listed in the following table on the development and implementation of local climate protections policies and strategies, but public authorities' in particular local governments, residents, and NGOs need particular attention by a scholar on that issue.

[18] The concept of actors has different meaning from stakeholder. Actor means parties which affecting or influencing climate policy in a way, stakeholders includes all people, institutions that are likely to be affected or not affected, or affecting. All parties will be affected to an extent, the use of concept of `stakeholders` regarding climate change is thought to be more rational

Table 7 Major stakeholders of local climate mitigation and adaptation policies and strategies

	Mitigation		Adaptation
✓	Public authorities including LG	✓	Public authorities including LG
✓	Academic institutions, scientists	✓	Building and planning professionals
✓	Banks	✓	Community-based groups
✓	Building communities	✓	Consultants
✓	Business sector and organizations	✓	Firms and companies
✓	Charities	✓	Health working groups
✓	Civil society groups	✓	Meteorologists
✓	Consumer counseling	✓	Public authorities including LG
✓	Energy efficiency professionals	✓	NGOs, civil society
✓	Energy suppliers	✓	Police, Fire Emergency services
✓	Housing associations	✓	Research organizations- universities
✓	Media	✓	Tourism industry
✓	Transport utilities	✓	Water, waste water, waste management organizations
✓	Waste utilities and managers		
✓	Water suppliers	✓	Residents
✓	Residents		

Source: as cited as in Sippel & Jenssen (2009:31

First and foremost, among the stakeholder presented in the table above, in particular, local governments have played a significant role in carbon management policies in the cities. Local governments cannot be considered as an executive body of government that maintains its action only in one sector. Indeed its responsibilities cover several sectors from land using policies to waste management (Fleming & Webber, 2004:763). In particular, local governments have improved climate change protection actions in its operations and buildings that could be a leading role for entire society. In addition, they have significant legislative and control power in the management of properties, vehicle fleet, building control, transportation management, land-use, and waste and recycle management, energy efficiency, education and other economic development policies that have an influence on carbon management in the cities (Fleming & Webber, 2004: 763). On the other hand, quality and capacity of local government have a significant influence on development and implementation of climate adaptation policies and strategies. In particular, municipalities in developing countries is responsible for the decision on infrastructure, drainage systems, disaster and flooding management, solid waste collection, provision of water, public health and other city

development and housing planning linked to risk and vulnerability of the cities (Tanner et. al. 2009:19). Local government has also played a crucial role in technical support and knowledge exchange for other city-level stakeholders to deal with the devastating impact of the climate change.

Secondly, residents as stakeholders have also an important position in local climate change policies and strategies. Resident`s thought and perceptions are closely linked with participation level in local-scale climate change activities. For instance, in particular, high welfare and liberal thinking city residents are more sensitive in the local-scale policy areas such as environment and climate change compare to a low level and conservatives (Salon, 2014: 74). In addition, the residence perception`s impacts on local policy process are much more noticeable in the small town. Thusly, local organizations and groups of decision-making at the cities have given significant efforts to engage the community in their climate plans and strategies. For this purpose, two common and dominated strategies are proposed in the literature: to change individuals' behavior and attitudes with several movements called as `education campaign approaches`, and to involve much communities with certain subsidies and tools called as `involving communities approaches` (Bulkeley et al., 2009: 28).

Finally, though non-public organizations have played a significant role in a deal with climate change initiatives at the local level due to having different perception towards to climate problems and of the solution, more interestingly, limited studies have given attention to these actors (Pohlmann, 2011: 19). The main reason that importance of non-state actors has gradually risen in recent years is associated with philosophical paradigm change that involves the main transmission from central government to decentralized and participatory approach. Non-public authorities perform innovative, long lasting and cooperative activities which could not be implemented by government itself on climate change policy and strategies at the local level. For effective and comprehensive local climate change policies, the joint action with non-state organizations and governments facilitate to be overcome the problem of the resources and capacity (Bulkeley et al., 2009: 27). Overall, the main obstacles encountered by non-state organizations with regard to climate change could be listed as: limited institutional and financial capacity , lack of adequate legal regulations ,and difficulty of associating with

other related local scale projects, and the lack of cohesion and harmony between local actors (Aall et al., 2007; Hanak et al. 2008; Sippel & Jenssen, 2009: 31).

In addition to local level, cooperation among NGOs at the national and international similar ties-stakeholders in the transnational climate networks such as ICLEI, energy-cities, C40, CCP, and Climate Alliance increase achievement likelihood of climate change policies and strategies (Bulkeley et al., 2009:26). Through transnational climate networking, local stakeholders would have several advantages advantage to obtain political support, eliminate resources and capacity problems, and increase knowledge and experience sharing, which support them to deal with other local climate change related problems (Bulkeley et al., 2009:26). Similarly, Schroeder and Bulkeley (2009) argues that that kind of transnational climate network support the local government for motivations, tangible plans, and projects, financial and technical assistance, provision of best practices, informal recognition and reward (p319).

3.9 Main Barriers and Challenges for Local Climate Protection Initiatives

Effective and comprehensive local climate change policies and strategies considerably depend on the existence of barriers and challenge encountered, drivers and benefits and co-benefits to local stakeholders in the cities. Interestingly, a few studies in the literature have concentrated on barriers encountered in combating climate change at the local level. Although almost all actors at the local level have robust desire to implement climate change initiatives locally anyhow, they encountered a number of challenges and obstacles once transferring their desire into practice. Indeed, barriers and obstacles, in particular, encountered by local government, and their importance vary from country to country, as well as city to city (Collier, 1997:53). It is possible to summarize main barriers and obstacles based on results of several studies in literature as following[19]

[19] In order to form the list of the barriers and obstacles encountered by stakeholders in the cities concerning climate change policies and strategies, it is mainly benefited from a PhD thesis by Czako (2011:50). Similar points indicated in different sources are collected in one item in the list. To obtain more information, following comprehensive studies should be seen: Collier, 1997, Betsill, 2001, Betsill &Bulkeley 2007, Allman et al. 2004,

- inadequate of institutional, financial and personal capacity,
- lack of interest, desire, and support among stakeholders due to a low awareness level,
- the lack of legal obligation or any types of sanction for local public and non-public authorities concerning climate change initiatives,
- the difficulty of achieving necessary coordination among actors and in their institution,
- the existence of other priority issues on the agenda of local authorities (or central government),
- the difficulty of associated climate change plan and strategy with other local policies and dominance of traditional management understanding,
- the necessity of extra-legal, bureaucratic and financial burden
- regulation, policies, and strategies and action plans conducted at national the international level do not promote climate action plans on the local level,
- problems related to communication and authority sharing between local and central governments,
- the lack of adequate data on the subject of the environment, climate change and energy issue for city level,
- climate change requires a large participation, long-term and interdisciplinary work,
- political leadership, desire and condition of other local political priorities,

It should also be highlighted here that most of these studies have predominantly been made for industrialized countries, and not for transition economies, developing and southern countries (Czako, 2011). Therefore, more studies examining barriers encountered in the fight against climate change at the local level for these countries seems to be necessary.

Davies 2005, Rezessy et al. 2006, Granberg & Elander, 2007, Holgate 2007, Henrichs et al. 2009, Bulkeley et al. 2009.

3.10 Major Drivers and Motivators for Local Climate Change Initiatives

Comprehensive and influential mitigation and adaptation policies at the local level also depend on a variety of internal or external factors (Czako, 2011). These factors are crucial for local governments to monitor their development process of climate policies and to determine the degree of being successful. In the literature, these factors can differ from each other either or both for adaptation and mitigation activities. In addition, each of influential factor's influence and significance level might be able to become different based on the spatial and temporal condition of the cities. In this regard, these outstanding drivers can be classified as[20];

- The content of existing national policies and strategies,
- The ability to access the financial resources of local government units,
- The government's ability to allocate financial resources to this issue and legal sanction,
- Schemes and patterns of decentralization in the country,
- Harmonization of mitigation and adaptation policies, and with other related policies,
- The relationship between government, non-government organization and academic institutions such as the universities to provide technical and institutional knowledge,
- Unexpected situations such as energy and economics crises and media pressure,
- Adequate institutional, personnel, knowledge and resource capacity in local and central government,
- Political champions, the presence of personal leader who has will and ambitious on this issue,
- High awareness among employees and community on this issue,
- The level of vulnerability,

Effective and comprehensive mitigation and adaptation initiatives for dealing with climate change in the cities depend on the co-benefits that they provide to municipalities in practice (Czako, 2011). A variety of factors determines the motivation of municipalities for

[20] Similarly, In order to form the list of the drives that have significant influence on mitigation and adaptation polices in the cities, mainly following studies was used such as Corfee-Morlot, et al.2009, Holgate 2007, Rezessy et al. 2006, Henrichs et al. 2009, Bulkeley and Kern 2006, Puppim and Oliveira, 2009, Granberg,& Elander, 2007, Gustavson et al.2006, Collier, 1997

involvement and implement of local climate mitigation and adaptation measures in the cities. Similarly, based on the framework and theoretical background of the major drivers and motivators, one needs to differentiate these for mitigation and adaptation actions separately. Results of the comprehensive adaptation police and measure are linked to the city directly, outcomes of the mitigation efforts in the cities have global influence (Sippel & Jenssen, 2009: 6). In addition, influences of these factors vary considerably from cities to cities based on several conditions such as geographical and development background, economic structure, social setting, or preferences of the local governments (Sippel & Jenssen, 2009:6). In this regard, some motivators could also be listed as[21]:

- energy reduction and other cost reduction at the sectoral level, and economic development,
- new employment opportunities,
- positive impact on the industry and the transport sector,
- ensuring sustainability, smart growth and the increased quality of life,
- positive impact on the management of environmental pollution such as reduction of emission, air and noise pollution,
- Influence of technology, innovation, and competitiveness of the cities in a positive way.

3.11 Linkage between Local - National Climate Initiatives

For development and implementation of effective and comprehensive local mitigation and adaptation strategies, policies, plans, and programs in the cities mainly depend on existing national legislations and regulations (Gurria, 2014). The legislation carried out at the national level on associated with climate change can either empower or slow-down capacity of local governments on local climate actions (Gurria, 2014). Put differently, standards, objectives, measures and instruments in the national legislative framework concerning climate change

[21] For further information, see a number of the studies such as Betsill 2001, Kousky and Schneider 2003, Allman et al, 2004, Rezessy at al 2006, Czako, 2011.

have an influence on removing obstacles encountered by municipalities to greater urban climate governance such as financial resources, institutionalization, knowledge, and technology capacity, etc. (Gurria, 2014). Rational and effective way on that issue is that all policies and strategies for climate change protection should be harmonized in compliance with each other at all levels (IPCC, 2014c).

There are a variety of reason for national governments` support of local government engagement with climate change policies and strategies, what is more, three essential factors-central government's role and function at each administration level, the relationship between state actors and institutions, tools used in decision-making, have significant impacts on determination of the scale of climate change management approach at each administrative level (Corfee-Morlot et al., 2009). Firstly, the central government` function and its role in climate change level in each administration level depending on administration system might differ at each location. For example, while local government has strong legislative and executive power on city development plans and land use planning policies, maintenance and repair of local parks and green space, waste management, they have less responsibility and authority on critical and large-scale road construction. Second, the institutionalization and condition of actors in this field at the national level differ from the local level. That is to say, the central government can be particularly advantageous regarding obtaining adequate resources, finance, and budget, professional staff, compared to the local level. Finally, to address climate change impacts, the central governments can use more flexibility and variety of tools such as market mechanisms and incentives to the private sector and civil society compares to the local governments.[22] As a result, local mitigation and adaptation approaches and their scales for dealing with climate change impacts are identified based on the framework of the central axis of these three main factors and the relationship between national and local governments.

[22] For more information concerning each level of governance initiatives undertaken in framework of these three basic factors for climate change is explained in chapter 8, table 8.1 on p. 200 of the OECD report (2010).

On the other hand, there is no single fit framework for national climate policies that support and guide local climate action (OECD, 2010: 198). Vertical cooperation and coordination between Climate change legislations and actions plans and their harmonization with each other at local, national, and international level in each country could be evaluated with three basic institutional models (Corfee-Morlot et al., 2009);[23]

- Top-down or national-led approach: regarded as central climate change regulations promoting and supporting initiatives at the local level, capacity transfer from center to local, such as in Norway and China
- Bottom-up or local-led approach: indicates local actions approaches influencing national policies and strategies and capacity and knowledge transfer from local to center such as in the United States
- Mixed approach: defined as approach indicating cooperation initiatives between national and local governments and mutual exchange of knowledge and other resources such as in Sweden

In particular, policies and strategies concerning infrastructure and financial resources at the national level need to support the local government for reaching low carbon and resiliency cities. Local governments which have a vast share of public spending on the environment and climate change[24] are affected too much by the global and national crisis. Local authorities applied public, private, national and international organization to increase financial and infrastructure investment sources (Carmin et al., 2012). However, due to the fact that they have a variety of disadvantages compared to the central government such as low loans reliability rate, they encounter serious difficulties in obtaining infrastructure and financial resources.[25] In this respect, national policies should include several climate-related

[23] For more information concerning these basic three institutional models, see OECD (2010)`s report, table 8.3 (p.216). Due to lack of regional government in Turkey, all evaluations refer central and local governance in the study.

[24] Gurria (2014) claims that local government are account for 70% of public spending and 50% of environment spending of the total public expenditure among OECD countries.

[25] According to survey results conducted by Carmin with his colleagues (2012) regarding OECD and non-OECD countries, more than half of the existing cities face several difficulties in finding financial support for adaptation

characteristics and targets listed below relating to enhancing financially and infrastructure investments of municipalities on that issue (Gurria, 2014 & GIZ. 2013).

- ability to mobilize on the local markets on the issue of climate change and low-carbon, energy efficiency and urban infrastructure, and use of a mechanism such as credit lines, grand's, bonds, guarantees, equity, venture capital, carbon finance,
- providing credit for city-scale investors at appropriate rates,
- minimizing risk factors for investors,
- activating international trade on this issue,
- supporting the local government on the issue of information, staff training and technical concern,
- alignment of taxation between national and local governments,
- increase credit reliability of the city, support providing financial resources,
- promotion for the use of mixed, efficient and effective financial resources for the city,
- encouragement for local government in the necessary data and inventory studies in the cities.

Another significant point is associated with the assessment of central and local regulations concerning transport and land use planning. National regulations needs to be in the way that stimulates necessary minimum standards, provision of infrastructure for sustainable transportation policies, ensure taxation and pricing flexibility in fuel and vehicle maintenance issues, ensure capacity, financial resources and technology for smart and integrated, strategic, long-term planning, provide local initiatives plans more compatible with national to increase partnership and cooperation between public and private actors (Gurria, 2014).[26]

especially for those of which is account for 24% of central government, %9 of local authorities, %2-4 of international institution, %9 of private authorities and NGO`s

[26] For further information, see UN-Habitat (2011) that is comprehensive report for decision makers on national climate change policy to cope with climate change.

CHAPTER IV

CLIMATE CHANGE POLICIES AND STRATEGIES IN TURKEY

Comprehensive and effective policies and strategies that aim at mitigating GHGs emission or adapting of Turkey`s political, economic, social, and environmental dynamics to the possible impact of the possible climate change is relatively new and limitedly investigated issue. Some studies argue that low-level historical responsibility on climate change is the main reason of that while others point out that the situation would be getting worse much more if taken necessary actions in advance. For instance, the study published by Istanbul Policy Center in 2015 (p4) indicates that Turkey has 0.94 % share of global GHGs emission in 1990 has increased about by 110.4 %. Though a variety of national strategies and action plans have been implemented to combat climate change problem so far, many studies have still asserted that Turkey's national achievement regarding climate change is not holistic and in harmonizing with the country's other social, economic and development plans. Many scholars also argue that absence of any commitments and targets on GHGs emission reduction would lead to a serious challenge for Turkey at the international arena in the future. In addition, lack of comprehensive and reliable data concerning GHGs, in particular at the city and sectoral basis, still seems like the biggest obstacle to conduct more empirical and comparative projects to figure out `big picture` and the current trend in Turkey.

In this regard, this chapter mainly inquires climate protection policies, strategies, and commitments taken at international, national and local administrative level so far, the impact of climate change on the region as well. Firstly, it begins with an answer given to the question of what sort of climate change impacts is expected to be experienced in the region. Then, how the issue emerged at the international community's agenda and Turkey was engaged in that climate change negotiations were tried to investigated. At the same time, some evaluations were made to comprehend the Turkey's national duty and responsibility on emission reduction and to form a comprehensive policy package to deal with the issue to minimize the impact of

such responses on economics and political indicators of the country. Finally, subnational and local level climate policies and initiatives in Turkey which form a basis for this research, are being scrutinized briefly. All in all, in this chapter, Turkey's international, national and sub-national climate policies, strategies and measures are evaluated on the basis of the theoretical framework of climate governance with an objective perspective.

4.1 Climate Change and Main Impacts in Turkey

The number of official reports studies indicate that a significant increase in the average world's temperature, a change in hydrological cycle of the earth, the melting of glaciers, rises in sea levels, an increase in epidemic disease frequency and a negative pressure on the life of the ecosystems and the human-being are some of the devastating impacts of the climate change. Regional and temporal differences regarding these effects are also expected to be seen in the future (Türkeş, 2000: 13). In this regard, recent legal studies and reports also state that the climate change's impacts, in particular, from environmental and socio-economic perspectives will take place in the geographic region of Turkey located in the Mediterranean and sub-tropics climate zone (MEAU, 2013: 9). Indeed, the studies specifically put forward that the Mediterranean climate zone is one of the areas affected mostly (Şen, 2013). In this respect, Turkey (especially for metropolitan cities) are shown among the countries at risk of being potentially affected in the form of threats such as the experience of the water shortages and stress, droughts, desertification, forest fires and other environmental degradations. (Türkeş, 2000: 13).

Based on the projections, it is expected that average temperature in Turkey will increase by around 2-3 C^{o}. In addition, the amount of precipitation in the country is projected to decrease until 2099 though regional differences are possible in general (MEAU, 2016:22). In particular, projections indicate a decline in precipitation, especially in the southern regions, and an increase in the northern and northeastern parts of the country (Türkeş et al., 2013: 21). The increase in average summer temperatures is referred as the greatest impact on aspects of climate change on the geography of Turkey (Türkeş et al., 2013: 20). It has also been argued

that a significant increase in average temperature (13:20 C^o) of the country is observed in the period of 1971-2013, especially as 1990. It is also estimated that based on the data for 1960-1990, there has been an increase in the number of hot days and nights frequency and a decrease in the number of cold days and nights in Turkey (MEAU, 2016:22 & Sen 2013: 13). Similarly, Demir et al. (2008) state that considering the temporal and spatial distribution of the temperature change in winter is about plus 3-4 C^o in the western part of the country and plus 4-6 C^o increase in the eastern part of the country. For spring, a temperature increase of 4-5 C^o is estimated as average, and an increase of 3-4 C^o will be in the black sea coastal areas and 5-6 C^o in the Eastern Anatolia region. Change in average summer temperatures generally would be high in the western part of Turkey in comparison to eastern regions.

Though comparing predictions for temperature, there has been more uncertainty about precipitation regime; it is another important impact observed in the region because of climate change. The reports also indicate that the regional distribution of precipitation pattern change in Turkey is expected to be different. The rate of precipitation decline is increasing from the east to the west. To be clearer, it is expected that precipitation decline rate will be about 30% in Mediterranean, Aegean and Southeastern Anatolia and 5% in the Eastern Anatolia and the Black Sea coastal areas (Demir et al., 2008). In particular, rainfall intensity will increase in the Eastern Black Sea region and it will decrease in the Southeastern Anatolia (MEAU, 2016: 21& Sen, 2013: 14). It is also expected to see an increase in the landslide risk in the Eastern Black Sea region due to raising precipitation intensity (Türkeş et al. 2013: 21). In addition, the amount of the snow cover in a mountain in the Eastern Black Sea and Eastern Anatolia will decline up to 300 mm that is considered another one among the negative consequences of the climate changes in the region (Arikan and Ozsoy, 2008: 25).

In addition, Turkey consists of 24 coastal cities and approximately 54.7% of the total population lives in these areas by the 2014 data; this circumstance increases the vulnerability level of the country to the climate change. In particular, sea level rises and floods are referred as the most crucial impact of the climate change in the region. Sen (2013) states that sea level rises and natural disasters will take place with different amounts regarding temporal and spatial perspectives (p13). In particular, sea level rises will effect on river deltas (such as

Çarşamba, Bafra, Çukurova) and other coastal areas (Türkeş et al., 2013: 21). In particular, the importance of these areas for the country's tourism and, agricultural production and ecosystem intensify seriousness of the situation (MEAU, 2016:23). Similarly, an increase in the number of diseases carried by water and nutrients, cancer incidences depending on the air pollution, diseases carried by rodents and vector, and several health problems including injuries and deaths are being evaluated as others devastating impacts of the climate change in the region (MEAU, 2016: 23 &Kayhan, 2007: 14).

On the other hand, the wind and solar radiation potential in Turkey are pretty much that is important for Turkey`s renewable energy sources. In this context, it is expected that the wind potential will increase with the rate of about 15-20%, especially in the Marmara and Aegean regions, while a decrease in the Eastern region (Sen 2013: 16). In particular, the cities of Ankara, Konya, and Kırıkkale will provide significant wind potential in the future (Sen 2013: 16). With regard to solar radiation, according to the projections, the least (up to 3%) increase will be in Turkey, especially in the western part of the country in the long term, a decrease in the eastern black sea regions (Sen 2013: 17). As a result, it is possible to claim that both the intensity and severity change in the stream, change in the wind and solar radiation sources will affect the country's energy sector as well (Sen 2013: 26).

Possible changes that will take place in the climate variables, in particular temperature and precipitation regimes are expected to affect indirectly existing water resources in Turkey as well. Variations in the average climate variables (rise of temperature and decrease of precipitation) will increase the areas suffering from water stress in Turkey (Türkeş, 2013: 21). Similarly, Kadıoglu (2009: 23) asserts that frequency and severity of drought will increase significantly in the future and water resources will be affected by this situation adversely. Considering the need for water increase at least by three fold with climate variables changes till 2030, water stress is seemed to be the most significant adverse result of the climate change in Turkey. In particular, metropolitan cities are expected to be affected much more from such changes due to high population density. To this end, almost all sectors including housing and industrial sectors have already been taking several measures for water efficiency in advance. (MEAU, 2016:22 & Aksoy and Coskun, 2010: 376). Finally, it is also claimed that potential

changes in the water supply are also expected to influence national parks and other natural habitats negatively, and the diversity of animals in these areas (Kadıoglu, 2009: 24).

Similarly, the agriculture, one of the most important sectors of the Turkish economy, will also be influenced by the climate change. It is estimated that due to the average temperature rise and desertification, the amount of the total yields in farmland will fall (Türkeş, 2013: 21). The decrease in production efficiency and reduction of overall production will cause serious adverse impacts such as price rise and reduction of social welfare as well (Türkeş, 2013: 22 & MEAU, 2016:23). Similalry, Sen (2013) states that `food security` will be one of the significant and permanent threats in Turkey in the 21st century (p22).

Other sectors exposed to climate change in Turkey are Tourism and Forestry. In particular, while it is expected that summer tourism will be affected positively due to the increase in the length of summer, winter tourism will be adversely affected by contrast (Sen, 2013: 25). In addition, Turkey seems to have difficulty in maintaining its existing structure of forest vegetation. Mainly due to increasing temperature and decreasing rainfall in the Aegean and Marmara regions and more frequent hot days, forest fires and other tree diseases will be widespread (Sen, 2013: 25). Similarly, natural disasters, the adverse effects of animal and plant diversity and tree drying are some of the destructive influence of the climate change on Forestry (Aksoy & Coskun, 2010: 378 & Önol, 2007).

All in all, Turkey has followed global climate change studies and policy cycles so far, but regional and temporal analysis of the climate change in the region has been ignored, in particular not taken into account of the probable effects on the territory and results in sectors such as energy, agriculture and water resource management (Kadıoglu, 2009:22). Both results of The IPCC's projections and the modelling studies that investigate impact of the climate change in Turkey could be summarized as; an increase the country's average temperature, drought, a change in precipitation regime, intensified and highly frequent rainfalls, erosion in the river basins, and an increase of natural disasters such as flooding, sea level rise, adverse effects on water resources, energy, agriculture, tourism and forestry (Kadıoglu, 2009: 22).

4.2 International Climate Change Experience of Turkey

As parallel to international initiatives to determine global climate change regime such as establishment of the IPCC in 1988 and INC in 1990, The Second World Climate Conference in Geneva from 29 October to 7 November 1990 could be evaluated as an initial point for the involvement of Turkey in the process of international climate change negotiations (Sahin, 2014: 24).[27] After world climate conference, Turkey tried to take part in international climate negotiations such as IPCC meetings for preliminary preparation of Environment and Development Conference held in Rio, 1992. Then, it has enhanced it's institutional and essential regulations such as the establishment of the Ministry of Environment in 1991 and the formation of the National Climate Coordination Group and publishes of several official reports, even if having a low historical responsibility (Şahin, 2014: 24).

Thereafter, that Turkey as a developing country and a member of OECD was listed in Annex I and Annex II based on UNFCCC that was opened in June 1992, but signed by the representatives 191 countries and the European Union in March, 1994 could be evaluated remarkable progress in terms of development of its international climate policies (Berberoglu, 2009:21). At the time, due to the concerns over GHGs reduction to 1990 bases level by 2000, and financial and technological assistance requirement for other developing countries, Turkey did not become a party to the UNFCCC (as cited in Turkes, 2002, and MEF, 2007:77). Main objectives of Turkey were not to take responsibility and make a commitment to international climate regime and tried to continue its initiatives on a volunteer basis due to low historical responsibility. Thus, in November 1998 at the Fourth Conference of the Parties in Buenos Aires (COP-4) Turkey presented "National Report on Climate Change" voluntarily (Oguz, 2009: 155).

Berberoğlu (2009 also assert that although Turkey agreed with the philosophy of the global climate regime and desire to contribute to the process of international cooperation. It was

[27] Some reports such as “Low Carbon Development Pathways and Priorities for Turkey” by Istanbul Policy Center states Turkey’ international climate policy process began with Noordwijk Ministerial Conference, which was held in the Netherlands in 1989 as well.

reluctant a period of over ten years to be a party to the convention because of the listed in Annex I and II that required robust commitment and high historical responsibility (p21). Turkey's attitude in the period 1992-1997 for global climate change agreement could be explained as being a party member to the UNFCCC by removing these Annexes. Afterward, in the period of 1997- 2000, Turkey's aim could be assessed as a soft involvement in the agreement with a specific target and GHGs emission reduction according to the OECD average basis line (Oguz, 2009: 155).

Turkey finally achieved to be removed from Annex II categories, being kept only in Annex I which means a particular position based on the principle of "common but differentiated responsibilities" at 7th conference of parties (COP-7) held in Marrakech, Morocco in 2001 (Decision 26 / CP.7) (Oguz,2009:156, Berberoğlu, 2009: 21 &, Cabuk, 2011:248). So, these developments led Turkey to have a more moderate approach in global climate international agreements. To this end, Turkey was accepted UNFCCC on 11 November 2003 with climate Law (No. 4990), and the Council of Ministers`Decision (No. 2003/6458) and entered into force on 18 December 2004 and published in the Official Gazette (No. 25320). Afterward being a member of UNFCCC in 2004, Turkey continued its national efforts with some institutionalization efforts and regulations on the issue of climate change such as Ankara Climate Conference, obtaining financial support from Global Environmental Facility and the establishment of parliamentary research commission.

It is possible to claim that active and decisive climate policies and strategies in Turkey began with the membership to the UNFCCC agreement. After being a party to the agreement, a number of studies and projects, greenhouse gas inventories, national communications, strategies and action plans were decided to prepare, implement and monitor national achievement. Hereafter, Turkey also started to participate in the world climate summits with larger delegations. As being a member of the UNFCCC, the main obligation of Turkey could be summarized as; to prepare national policies and strategies to control greenhouse gas emissions, to protect greenhouse gas sinks and reservoirs, and to take appropriate measures and standards, and to report commitment and achievement regularly to the UNFCCC Secretariat (Oguz, 2009: 156).

Moreover, following the UNFCCC agreement, global and national climate change movement could be evaluated as another inspiration for Turkey to be involved in global climate change regime more actively. In particular, the climate change movement in Turkey has increased since 2005. Earlier, lack of international coordination in the global climate movement led to Turkey to be stagnant in the climate change regime (Baykan, 2013:2). Hence, it is claimed that a part of the climate change movement in Turkey was started in 11th conference of the parties meeting and the Climate Summit held in December 2005 in Montreal. Key results of the meeting were to prepare greenhouse gas the inventory, to reduce fossil-fuel based activities and investments such as oil and coal, and to prefer using clean energy to deal with climate change problem (Baykan, 2013:2).

Each member of the UNFCCC was required to submit National GHGs Inventory Report that consists of two document as the Common Reporting Format (CRF) and the National Inventory Report (NIR) to the Secretary including information GHGs sources and sink resources regarding the previous two years in April each year. In this regard, Turkey submitted the first greenhouse gas inventory to the UNFCCC secretariat under the coordination of Ministry of Environment and Urbanization and supported by UNDP and the Global Environmental Facility (GEF) in 2007 (Sahin, 2014, 28).

The expression of the possibility of the acceptance of the Nationally Appropriate Mitigation Actions-NAMAs in the Bali Action Plan at COP meeting in 2009, in Bonn, was evaluated as a significant marker that indicates Turkish government's support for having an active role in the global climate regime (Berberoglu, 2009:23). Turkey's requirement for emission reduction and giving clear support for the international climate policy cycle goes back to the agenda at the 15th conference of parties (COP-15) in the Copenhagen in December 2009 (Voyvoda et al. 2015:20). Turkey announced that it did not become parties supporting the Copenhagen Accord which make any legal obligation on the parties to reduce greenhouse gas emissions. This development was interpreted as Turkey declined to give an effective fight at the national and international plan against climate change with arguing that it's particular position under the Annex I comparison to other countries. Similarly, lack of decisive, comprehensive, fair, stable

decisions at the international climate negotiations, the global financial crisis, concerns regarding developed countries' financing and technology transfer, developing countries' reluctance on contribution to negotiation process, and the US' ambiguous strategy on global climate change with many other uncertainties could be interpreted as another reason for Turkey reluctance on global climate change regime (Baykan 2013:6 & Berberoglu, 2009:25-26).

Turkey finally accepted Kyoto Protocol which ensures concrete requirement and commitment for parties about the actions to be taken necessary to deal with climate change problem with the law (No: 5386) on 5 February 2009 in Turkish Parliament (MEAU, 2016). Because that Turkey accepted Kyoto Protocol lately and was not listed within Annex-B countries, it has not any commitment to reduce emission. However, it missed the opportunity to benefit from additional flexibility mechanism that will provide significant gains for developing countries in the period of 2008-2012 (Çabuk, 2011:248). Similarly, for a period of 2012 to 2020 (called as the second period of Kyoto Protocol), Turkey has no contractual commitments, but it could not benefit from the Protocol flexibility mechanisms as `emissions trading, joint implementation, and clean development mechanism` because of non-existence in the Annex-II categories (Çabuk, 2011:249). As Turkey tried to benefit from the Kyoto flexibility mechanism, it endeavored to increase institutional and legal capacity for voluntary emission reduction activities in that period as well (TÜSİAD, 2009:2).

Several arguments are put forward for Turkey being a part of the Kyoto Protocol. Firstly, being among Annex-I listed countries, the OECD membership, EU membership, economic size, emerging economic, and having high-level development objectives, expectations for taking an active role in shaping global climate change regime are just some of those main promises. (Berberoglu, 2009: 23). Secondly, Turkey agreed with the Bali Road Map at the COP-13 meeting in December 2007, which was evaluated as a desire to take an active role in shaping the global climate change regime especially after 2012 (MFWA,n.d). Thirdly, there has been an argument that Turkish government's decision to agree the Kyoto Protocol was due to purely economic gains and national interests. Finally, several studies also argue that Turkey's being members of the Kyoto Protocol could be evaluated as an example for the

theory of realism regarding international relations, rather than environmentalist efforts (Oguz, 2009, 182).

Turkey's position in international climate change regime is being evaluated as a country whose economy and industry are developing rapidly, have the potential of reducing greenhouse gasses, the ability to perform sectoral mitigation actions within national programs framework, and desire to take advantage of the relevant contractual financial mechanism and the transfer of technology. In this sense, it could be claimed that Turkey aims to play an active role in the shaping of the global climate regime, through "voluntarily" mitigation and adaptation activities and projects, rather than any legal commitment (MFWA, n.d). The voluntary carbon trade markets are the mechanism that has the potential to provide significant opportunities for Turkey as acting within the framework of environmental and social responsibility principles and working independently from flexibility mechanisms of the Kyoto emissions. To this end, it was announced that annual 20 million tCO2 equivalent GHGs emission reductions have achieved through corresponding 308 projects in Turkey since 2005. Those projects consist of 159 hydro-electric power plant and 106 wind power plant concerning the voluntary carbon market in Turkey (MEAU, 2015).

17th Conference of Parties (COP-17) in Durban, South Africa and 18th conference of parties (COP-18) in November 2012 in Doha, Qatar were important meetings that member countries draw attention on Turkey`s non-concrete commitments for the climate change actions. Those countries also argued that national climate change commitment should be completed at the end of 2015 and implement a new global climate change agreement after 2020 (IKV, 2013: 68, and Gencel, & Yasarkurt, 2013: 39). Similarly, 19th meeting of the conference of the parties (COP-19) held in Warsaw in Poland in 2013 was another significant phase for Turkey's climate change policies and strategies. At that meeting, parties agreed with efforts of the European Union to accept reductions of 20% commitment based on 1990 and decided provision of more concrete and significant contribution to global climate change regime and present a roadmap text for new global climate agreement with clear and transparent national plans by May 2015 (Gencel &Yaşarkurt,2013:40).

After the following the meeting, Turkey has been faced pressure from the international actors and parties for vital contribution, active role, and commitment in a new global climate regime agreement (Voyvoda et al., 2015: 21). In this regard, the president of the Turkish Republic, Recep Tayyip Erdogan declared Turkey's prominent targets and commitment to the international climate policy, even if existence of fair, effective and inclusive international climate change negotiation in the UN general assembly speech before 20th COP meeting held in New York and 21th COP meeting held in Paris in France, 2015 (Canikligil, 2014).

Another significant international effort that was taken in Turkey is associated with the National Communication Reports. Parties within Annex-I should present their national communications prepared on a timetable to the UNFCCC secretariat regularly.[28] 'National Communication reports mainly include information such as national status, policies, strategies and measures, vulnerability assessment, financial and technological constraints, education, training, public awareness (UNFCCC,2014). In this regard, the first national communications of Turkey was summited in 2007, and fifth (covering second, third, fourth and fifth communication reports) were able to present on April 14, 2013. The preparation of the sixth national communication report was completed recently with efforts of Ministry of Environment and Urbanization. All of this progress indicate that although Annex I parties is supposed to submit their national communication to UNFCCC secretariat regularly since 2004, Turkey seems to follow similar consistency, but it presents its official reports and documents in late.

After all, although there has not been any specific commitment to international climate change policy target for Turkey, it is being planned to perform actions within the framework of the national measures and strategic plans. Because of not being in a full consensus and existence of ambiguity in the global climate change agreements, Turkey has refused to provide the significant greenhouse gas reduction targets and to take concrete steps in this direction. It is possible to claim that consensus that had been held in the international arena would have an effect on progress of Turkey climate change policies and strategies in the future (Baykan,

[28] First for period of 1994-1995, second for 1997-1998, third for 2001, forth for 2006, fifth for 2010, sixth for 2014

2013: 2). Considering the 110.4% increase by 2015 compare to 1990, Turkey has already begun to take attention in the international arena as an Annex-I country which has grown GHGs emission constantly since 2006. Voyvoda et al. (2015) state that early political response to climate change and green growth would be rational and feasible for Turkey to deal with emission reduction and economic losses, and to continue its economic growth and development (p9).

Consequently, it is possible to claim that Turkey's international climate change policy process has largely been shaped by the international climate change negotiation process. Ambiguity and political instability in this area appear to be important in determining Turkey`s climate change policies and strategies in the long term (Berberoglu, 2009: 26). Besides international climate change negotiations, community-based request and demand would be effective in the determination of the country's climate policies. However, it is still claimed that achieving the sufficient level of climate protection in Turkey has not been reached, and the community interest is low. For instance, a survey conducted by the Ministry of Environment and Urbanization found that though 66 % participants evaluate climate change as a risk and a worrying issue, society knowledge is not at a sufficient level. Though there has been a close relation between the environmental problems with daily living habits in Turkey, climate change issue has not yet associated directly with human life activities (Baykan, 2013:2).

4.3 National Climate Change Experience of Turkey

Even though it has not made any commitment to GHGs reduction or commitment at the international negotiations, Turkey has prepared several national mitigation and adaptation initiatives regarding institutionalization and capacity buildings projects besides international efforts. In general, national initiatives for climate change protection in Turkey could be regarded as a reflection of international attitudes. In other words, any progress at the international climate regime goes parallel to Turkey’s national climate change policy development. Certain institutionalization efforts regarding Turkey’s national climate change

policies also have a significant influence on the development of proper measures and strategies.

4.3.1 Organization Structure of Climate Change Policy in Turkey

Institutionalization efforts at the national level for emission reduction in Turkey have taken time because of several changes in the public authority and their responsibility (Oguz, 2009: 156). With regard to climate change, Turkey has continued its effort to investigate social, political, economic and ecological impacts, and to take necessary and proper measures and to adapt strategies to accomplish capacity building in this manner. To this end, several working groups and commissions related to climate change were formed, the council meeting was held, and action and strategy plans were performed since 2000. However, it is still possible to claim that Turkey has not completed its institutionalization for the climate change management. Consequently, one of the tops established coordination board was assigned to manage the national climate change regulations (Oguz, 2009: 185).

Due to the fact that climate change covers almost all sectors, it makes the involvement of public and non-public organizations in the decision-making process closely related to energy, industry, housing, transport, forestry, agriculture and livestock, science and technology and finance compulsory (Sahin, 2014.64). To ensure that, a coordination board structure including several corresponding public institutions, ministries and the multilateral process for the essential regulation cycle was considered as necessary. So, a coordination committee board for the climate change established in 2001 was restructured with the new arrangement including air coordination committee board formed in 2013, and renamed as “Climate Change and Air Management Coordination Committee (CBCCWM)" (No: 28788). The main purpose of the board is explained as;

> "National air emissions and greenhouse gas emissions inventory can be upgraded to include our country-specific information, collection information regarding all action in industry based emission development of national emission factors,

taking necessary measures to prevent the harmful effects of climate change, the identification of appropriate internal and external policies considering our countries specific condition, setting forth emission reduction strategy in this regard".

CBCCWM consists of fourteen ministries and three public agencies and three private organization with environmental and urbanization coordinators (as seen in Table 8)[29]. The board, its duties, and the responsibilities of the president and members, its gathering and decision-making process, its secretariat operations, works and counseling tasks are arranged by the guidelines, procedures, and principles of the board directive based on a memorandum of the Prime Minister published on 7, September 2013. According to the directive, coordination board meets at least once a year and its operating and functioning procedures are determined by the board itself, and the decisions taken are implemented by relevant institutions and organizations (Official Gazette, No: 28788). If necessary, the committee board may set up advisory and working groups, and invite relevant agencies and organizations, civil society organizations, universities, representatives of the private sector and professional associations at its meetings (Official Gazette, No:28788).

[29] The present structure of 64 the Turkish government consists of 26 cabinet member including the prime minister and 4 vice president and 21 ministers. The structuring of the ministries in Turkey is as undersecretary and vice undersecretary with general manager, heads of departments and department manager. In addition, working groups including bureaucrats and experts in various institutions and coordination committees are available in the public institutional structure (Sahin, 2014: p.68).

Table 8 Organizational structure of Coordination Board on Climate Change and Weather Management (CBCCWM)

Ministry of Environment And Urbanization (MEAU) (Coordinator and National Focal Point of the UNFCCC)		
Ministries	Public Institution	Private Institutions
Ministry of European Union Affairs	Undersecretary of Treasury	Union of Chambers And Commodity Exchanges Of Turkey (TOBB)
Ministry of Science, Industry, And Technology (MSIT)	Disaster And Emergency Supreme Management Authority (AFAD)	Turkish Industry &Business Association (TÜSİAD)
Ministry of Foreign Affairs	Turkish Statistical Institute (TUIK)	Independent Industrialists' And Businessmen's Association (MÜSİAD)
Ministry of Economy		
Ministry of Energy and Natural Resources (MENR)		
Ministry of Food, Agriculture, And Livestock		
Ministry of Interior		
Ministry of Development		
Ministry of Finance		
Ministry of National Education		
Ministry of Forestry And Water Works		
Ministry of Health		
Ministry of Transportation Maritime Affairs, And Communication		

Sources: MEAU

As seen in figure 3 below, the working groups with subheadings for each cluster are created to continue their climate change and air management through these sub-committees[30]. Duty and responsibility of each working group are distributed to different ministries. It is required that Ministry of the Environmental and Urbanization is permanent members of each working and sub-committee with the participation of at least one vice general manager or head of the departments on each meeting. Each working group meets at least twice per year with coordinating institution and other relevant public institutions, organizations, private sector, academic institutions and civil society representatives on a time and place determined beforehand and making decisions for the related workspace by encouraging the participation of relevant consultants to obtain technical support to maintain their work and studies.

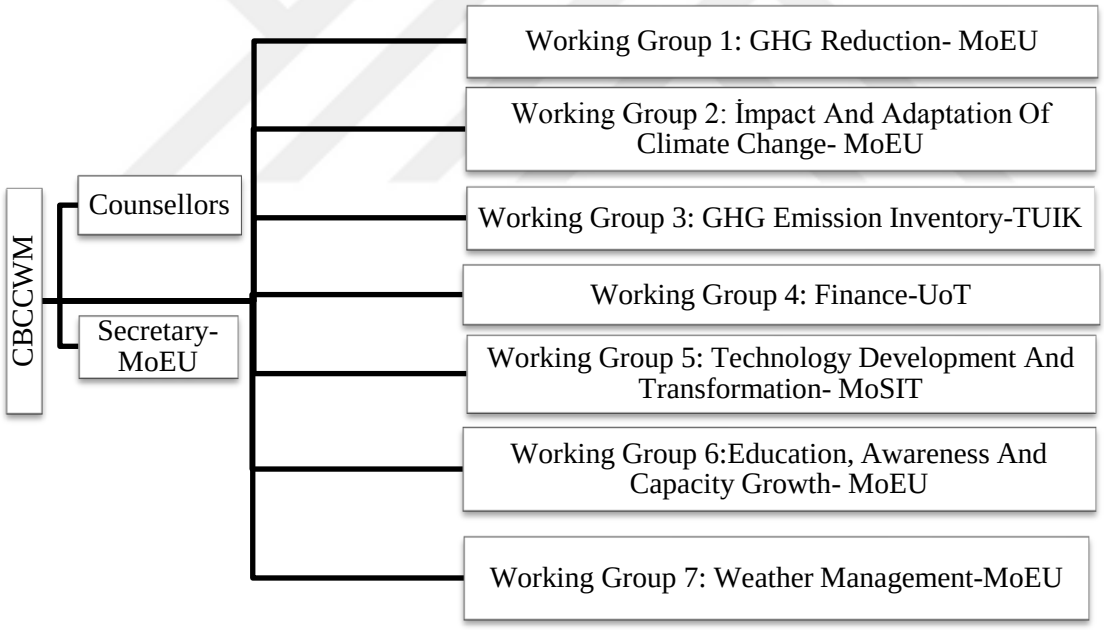

Figure 3 Climate change working group in Turkey (MEAU)

[30] Climate Change and Air Management Coordination Committee Working Group reports prepared by General Directorate of Environmental Management in Ministry of Environment and Urbanizations, explains each working group, the coordinating institution, and their duty and responsibility (Ministry of Environment and Urbanization)

With regard to public institutions and their role and impact in the fight against climate change, it is possible to stress that Ministry of Environment and Urbanization is the most important one. The Department of Climate Change in General Directorate for Environmental Management under Ministry of Environment and Urbanization which is also in charge of conducting the studies related to emission reduction and ensuring the coordination between different institutions is focus bodies regarding institutionalization in Turkey (Sahin, 2014).

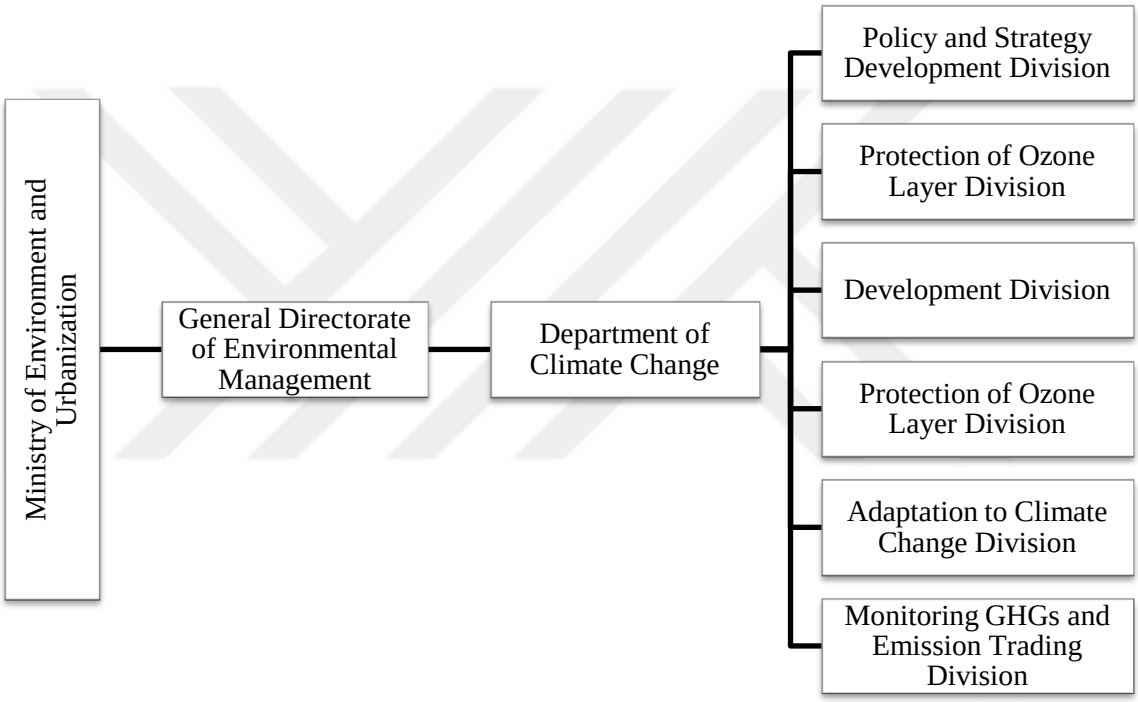

Figure 4 Organizational chart of climate change in Ministry of Environment and Urbanization

With regard to institutionalization efforts on climate change in Turkey, other prominent public institutions are the Ministry of Foreign Affairs which has an effective position with regard to international negotiations, Ministry of Forestry and Water Affairs which is particularly important for the adaptation policies and strategies, and Ministry of Development that has significant position in terms of economy, development, and financing policies are also crucial institutions for dealing with climate change in Turkey. No doubt as climate change requires interdisciplinary works, Ministry of Energy and Natural Resources (MENR), Ministry of Food, Agriculture and Livestock, Ministry of Transportation, Maritime Affairs, and

Communication, Ministry of European Union , Ministry of Science, Industry and Technology (MoSIT), Ministry of Economy, Ministry of Finance could be evaluated as another important public institutions in Turkey (Sahin, 2014: 70).

Moreover, General Directorate of Water is essential for obtaining data related to the impact of climate change, in particular on water sources, while General Directorate of State Hydraulic Works is necessary for the adaptation of policies. State Meteorologist Services has also played a significant role in the provision of meteorological data and modeling. General Directorate of Forestry provides data regarding the impact of the climate change on forest areas and the protection of carbon sinks under Ministry of The Forestry and Water Affairs by carrying out several projects related to climate change management (Sahin, 2014: 70).

In particular, it seems that climate change is negotiable and international agreements issue for Turkey. Therefore, the Ministry of Foreign Affairs is a central institution for the development of Turkey's international climate policy regime and influence on the formation of the country's national initiatives to a great extent in comparison with other public institutions. It mainly determines the general framework by both playing an active role in the international climate meetings and negotiations, and by contributing to the formation of Turkey's national climate policies (Sahin, 2014: 70).

Ministry of Development is another important public institution for the development of Turkey's climate policies and implementation process because it is responsible for the country's economy, and development strategies and plans. In fact, it is examining the environmental issues from a sustainability perspective (Sahin, 2014: 70). In addition, Turkish Statistical Institution (TSI) which has a particular position for creating GHGs inventory with essential data has increased the importance of the Ministry of Development about climate change policies and strategies in Turkey. In this respect, the High Planning Board and Economic Coordination are two important councils for determination of Turkey's climate protection initiatives, and its future trends (Sahin, 2014: 70).

Besides of public organizations, in terms of the development of Turkey's climate policies, international non-governmental organizations such as United Nations Development Program (UNDP) and the Regional Environmental Center (REC) also provide significant contributions to increase the capacity building, to raise awareness and to the maintenance of the international negotiations by considering national interest. In addition, GEF is one of the relevant agencies to provide financial support for national climate change initiatives and projects (Sahin, 2014: 82). Moreover, Regional Environment Center (REC) has been appointed as the "National Focal Point" on 9 May 2005 for education and public awareness raising on climate change issue (Oguz, 2009: 169).

4.3.2 Present Law and Regulations Concerning Climate Change Protection in Turkey

To see the overall `picture` of national climate change policies and strategies in Turkey, evaluation of main official documents and regulations would be rational. In this sense, two basic laws that form the basis of Turkey's national climate change policy are 1982 Constitution and the Environmental Law (No: 2872). Indeed, the present 1982 Constitution does not include any statements directly for emission reduction. The only one that could be regarded as associated with GHGs reduction in the Constitution is Article 56; "Everyone has the right to live in a healthy and equal environment. Improvement of the environment, protection of the environmental health and preventing the environmental pollution are the duty of the state and the citizens". Another expression is present in Article 90 as; "on behalf of the Republic of Turkey, ratification of the treaty with foreign states and international organizations depends on ratification by a law approved in Turkish Parliament... international agreements are statutory "(Sahin, 2014: 35). In addition, though those are not directly related to climate change protection and relating to the environment in the constitution, but they still serve as a basis for shaping the Turkey`s national climate policies and strategies.

The second important regulatory legislation related to climate change is the Environmental Law (No: 2872). In the Environmental Law, an explanation concerning climate change is present in Article 18 titled as `prevention environmental pollution fund` under the 4th chapter.

In the Article 18, it is referred as that a certain amount of the budget revenues is allocated in general ministry budget for climate change which is one of the activities aimed at the prevention of environmental pollution, supporting investment related environmental improvement (Environmental Law, No: 2872). Almost none of the environmental regulations in Turkey including waste and air quality management involve any targets for greenhouse gas reduction (Sahin, 2014: 35).

Sahin (2014) also indicates in his study that four legal regulations exist, two of those are associated with the ratification of the international conventions, and the other two are related to renewable energy and energy efficiency policies for GHGs reduction. On the other hand, there have been several legislations regarding climate change in Turkey such as two greenhouse gas emissions regulations, five national plans, two strategy documents, three reports and one statement (see Table 9 below). This list could be expanded with several other regulations, but the documents which can be evaluated directly in the context of climate change protection could be listed as;

Table 9 Main national climate protection policies, plans and strategies in Turkey, year, and corresponding institutions

- The Law (No: 4990) Participation in the United Nations Framework Convention on Climate Change. 25266, 16 October 2003, Grand National Assembly of Turkey
- The Law (No: 5836) Turkey's Accession to Kyoto Protocol concerning United Nations Framework Convention on Climate Change. 27144, 05.February 2009, Grand National Assembly of Turkey
- The Regulation on Monitoring Of Greenhouse Gas Emissions. No:29003, 17 May 2014, Ministry of Environment and Urbanizations (MoEU)
- 8th Development Plan (2001-2005). 27 June 2000, State Planning Organization
- 9th Development Plan (2007-2013). No: 26215, 1 July 2006, State Planning Organization
- 10th Development Plan (2014-2018). 13. Haziran.2013, Ministry of Development
- 8th Development Plan Climate Change Specialized Commission Report. 2000, SPO
- National Greenhouse Gasses Inventory Report. 14 Nisan 2012, TSI
- Regulation (28274) On Greenhouse Gas Emissions Monitoring (Monitoring, Verification, and Reporting). 25 April 2012, (MoEU)
- Turkey's Fifth National Communication under UNFCCC, May 2013-MoEU
- Turkey National Climate Change Action Plan (2011 – 2020 [Second publ. (2011 – 2023)], 2012, (MoEU)
- Turkey Climate Changes Adaptation Strategy and Action Plan. November 2012. MoEU
- Turkey Sustainable Development Report – Embracing Future. June 2012, Ministry of Development
- Turkey National Climate Change Strategies report (2010 – 2020). May 2010, MoEU
- The Law (No. 5346) Relating Generating Electrical Energy from Renewable Energy Resources. 25819, 10 May 2005, Grand National Assembly of Turkey
- The Law (No:5627) on Energy Efficiency. 26510, 18 April 2007, Grand National Assembly of Turkey
- Energy Efficiency Strategies Documents (2010-2023). No: 28215, 20. February 2012, Ministry of Energy and Natural Resource

Sources: (Sahin, 2014:33-34)

4.3.3 National Greenhouse Gases Inventory Reports

Based on UNFCCC, Parties (in different content and timetable for Annex I and non-Annex I parties) are required to turn in their National GHGs inventories to the secretary prepared in accordance with principle of "common but differentiated responsibilities" and IPCC guidance in order to follow and monitor implementation process of decisions taken at the international convention conference meeting (UNFCCC, 2014). Parties in Annex I, including Turkey, must submit their National Inventory Report by October 15 each year including GHGs emission and removal amount in energy, industry, solvents, agriculture, LULUCF, and waste on a base year

or period (UNFCCC, 2014). In this sense, the first National Inventory Report of Turkey was delivered in 2006 after Turkish parliament decision for being a member of UNFCCC in 2004. By 2014, nine national inventory reports have been submitted to the UNFCCC (Sahin, 2014 43)[31]. In addition, TSI is the relevant public institution using the data created and responsible for the preparation of national greenhouse gas inventory report in Turkey. Based on 2009-2012 data published in 2015, Turkey's 2013 general inventory report could be summarized as following;

The inventory prepared by the TSI indicates that as CO^2 equivalent, total release amount was 459.1 million tons in 2013, and 6.04 million tons per capita which increased by 110.4% compared to 1990 (see figure 5). In this regard, Turkey has not any obligations and commitments so far in the international arena. The achievement of a low level per capita emission amount seems not possible for the future. It is expected that Turkey will face serious pressure from other countries for the support of the global climate regime and will be forced to determine a specific target as soon as possible.

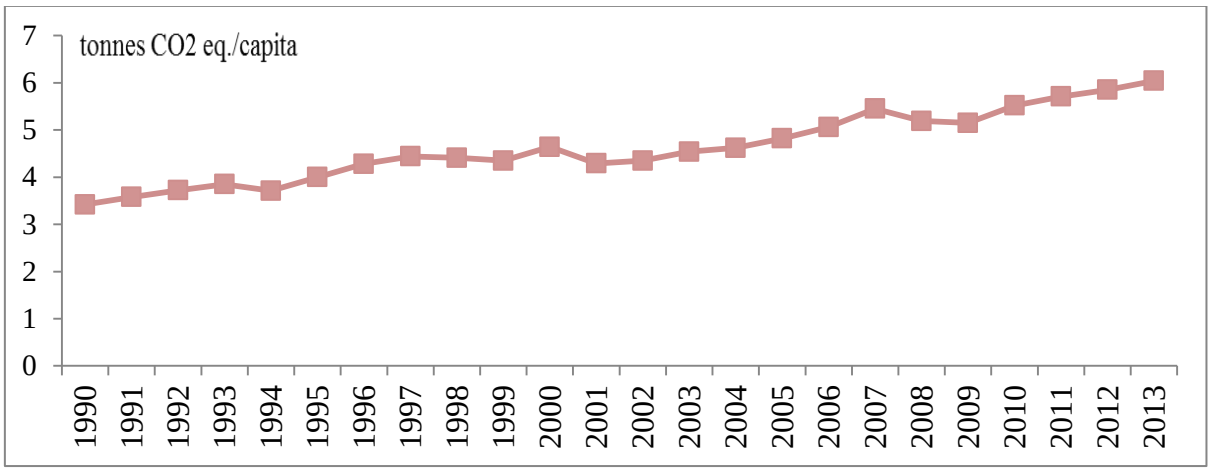

Figure 5 the amount of total GHG emission (CO_2 eq.) per capita, 1990-2013

[31] National inventory emission reports are presented in the form of two separate table series as included land use and cleaned data (LULUCF) or not included.

A major part of GHGs emissions concerning climate change, which constitutes a devastating problem, is CO^2 gasses. In parallel with world data, TSI announced in 2013 based on official data of inventory reports that 79.1% of total GHG is accounted for CO^2, and the percentages of Methane (CH4) and Nitrogen Oxide (NO2) are listed as 14.1% and 5 % respectively (see Table 10).

Table 10 Overview of GHG emissions and removals, 1990-2013 in Turkey (mt CO2 eq.)

Greenhouse Gas Emission	1990	1995	2000	2005	2010	2011	2012	2013
CO2 emissions including LULUCF	123.65	154.13	202.85	242	278.65	294.1	317.49	304.7
CO2 emissions excluding LULUCF	153.83	184.3	239.03	285.93	326.11	343.71	368.34	363.4
CH4	46.76	48.47	51.02	52.22	60.44	63.19	67.61	65.81
N2O	16.97	16.24	19	19.66	19.48	19.46	21.04	23.23
HFCs	NO	NO	0.9	2.62	4.88	5.23	6.31	5.71
PFCs	0.6	0.52	0.52	0.49	N.E.	N.E.	N.E.	N.E.
SF6	NE	NE	0.31	0.82	0.84	0.91	0.93	0.96
Total(including LULUCF)	187.99	219.35	274.6	317.8	364.28	382.89	413.37	400.4
Total (excluding LULUCF)	218.16	249.53	310.78	361.73	411.74	432.5	464.22	459.1

Sources: TSI, Greenhouse Gas Emissions Inventory, 2013

According to the data of 2013 provided on a sectoral basis, CO^2 equivalent (except LULUCF), the largest share is accounted for energy emissions with 82.2%, followed by industrial processes and product use with 17.6%, waste, and agricultural activities by 1% (TSI, 2015). It also explained that for Methane (CH_4) among GHGs, 46.4% of the emissions resulted from agricultural activities, 36.7% of the waste, and 16.8% from the industrial processes and product use including the energy (TSI, 2015). It has announced that 79.4% of N_2O emissions come from the agricultural activities, 8.3% from the energy, 8% from the waste, the 4.4% from the use of industrial processes and products (TSI, 2015)[32].

[32] In previous national inventory reports, IPCC guidelines in 1996 was used, but in 2015, 2006 IPCC guidelines was benefited for 1990-2013 emission calculation ,and for period 1990-2012, data has been revised. Emission inventory covers energy, industrial processes and product use, agricultural activities and waste including direct greenhouse gasses such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and F gases and indirect greenhouse gas with nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), carbon monoxide (CO) and sulfur dioxide (SO2) emissions.

Table 11 GHGs emissions by sectors in Turkey, 1990-2013 (kt.)

Greenhouse Gases Sources	1990	1995	2000	2005	2010	2011	2012	2013
CO2 Emissions Total (including LULUCF)	123650	154130	202850	242000	278650	294100	317490	304700
CO_2 Emissions Total (excluding LULUCF)	153827	184297	239028	285927	326105	343708	368339	363396
Energy	123665	151451	204584	243227	272187	285001	307497	298699
Industrial processes	29700	32417	33824	42083	53270	58147	60200	63889
Agriculture	460	426	617	613	645	558	640	807
Waste	3	3	2	4	3	3	2	1
CH_4 Emissions Total	1871	1939	2041	2089	2418	2528	2704	2632
Energy	263.5	233.5	304	280.2	438.7	441.5	459	424.3
Industrial processes	3.2	3.4	3.6	5.2	5	12.9	46.1	18.6
Agriculture	1101.2	1086.3	970	887.6	958.1	1038.2	1170.1	1222.5
Waste	502.7	615.7	763.3	915.7	1015.8	1034.9	1029.1	967.1
N_2O Emissions Total	56.9	54.5	63.8	66	65.4	65.3	70.6	77.9
Energy	4.4	5.1	5.3	5.4	5.5	5.3	6	6.5
Industrial processes	2.3	2.3	2	2.4	2.9	3.3	3.3	3.4
Agriculture	45.7	42.2	51.1	52.5	51	50.6	55.2	61.9
Waste	4.5	4.9	5.3	5.6	6	6.1	6.1	6.2

Sources: TSI, Greenhouse Gas Emissions Inventory, 2013

In the period of 1990-2013, in terms of the GHGs emissions increase rates in sectoral basis in five-year periods, it is observed that CO_2 by 35.1% in period of 1995-2000 from the agricultural activities, while Methane with 56.7% between 2005 -2010 from the waste, while N_20 with 18.1% in 2010 from the agricultural activities. Furthermore, it is shown that in the period of 1990-2013, the total increase in GHGs is as follows: the CO_2 increase is around by 136.2%, CH_4 increase is by 40.6%, and N_2O increase is by 36.9% (see figure 6).

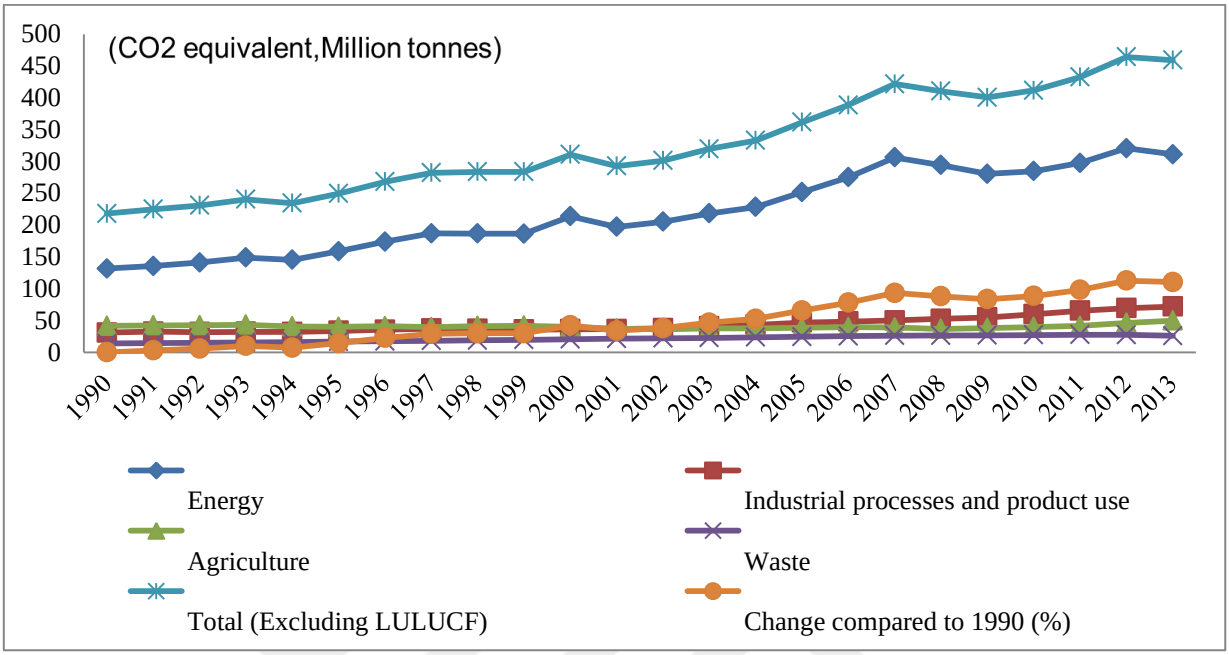

Figure 6 Total GHGs emissions by sectors in Turkey, 1990 – 2013, Sources: (TSI, 2015)

4.3.4 National Climate Change Plans and Strategies

In Turkey, there are three basic regulations and action plans ensuring compliance or reduce GHGs emissions and determining the necessary strategies and policies;

- ✓ National Climate Change Strategy Paper (NCCSP)(2010-2023)
- ✓ National Climate Change Action Plan (2011-2023)
- ✓ Climate Change Adaptation Strategy and Action Plan (2011)

The most important one is the National Climate Change Strategy Paper approved by the Supreme Planning Council (SPC) on 3 May 2010, covering a period of 2010-2023 and created with the broad participation of the corresponding representatives from public and non-public institutions, non-profit organizations, universities, and climate experts. In general, it includes important strategies concerning mitigation, adaptation, finance, technology policy, measures, capacity and the necessary international efforts in this sense (MEAU, 2010).

Turkey's national vision, main purpose, and objectives in NCCSP are expressed as (MEAU, 2010);

> "(...) national vision; to become a country that has integrated its climate change policies into its development policies, to promote energy efficiency, and the use of clean and renewable energy sources, active participation with keeping its particular condition in the fight against climate change and to offer the lowest carbon intensity with a high quality of life for all citizens."(NCCSP, p.7-8)

> "(...) The main purpose is to participate in international efforts to deal with climate change which is humanity's common concern, to benefit from an objective and scientific findings, common sense determined global effort, in accordance with sustainable development policies, common but differentiated responsibilities principle and keeping Turkey's particular circumstances."(NCCAP: p.9)

> "(...) The strategic objectives are to integrate climate change mitigation and adaptation policies and measures into the national development plans in accordance with principle of `common but differentiated responsibilities` and keeping its specific conditions; (...) to contribute to global measures with limiting greenhouse gas emissions growth rate within their possibilities, to harmonize the sustainable development principle and without interrupting its development program (...) in the main issue of mitigation, adaptation, technology transfer and financing , to adoption for global strategic objectives 'planning and execute process, and to play an active role in international activities; (...)to increase access to needed financial resources; (...) to improve capacity of R&D and innovation for clean production by taking into account the existing technologies and development level; (...) to enhance adaptation action with effective and continuous coordination, transparency, participatory and decision-making processes based on scientific research; (...)to increase public awareness; (...) to create an integrated information management system" (NCCAP s.9-10 & CCSP: p.9)

National Climate Change Action Plan (NCCAP) (2011-2023) is another outstanding legal document for climate protection published in July 2010 that was prepared in line with the 9th Development Plan and NCCSD. That action plan includes explanations concerning sectoral structures to greenhouse gas emission reduction and to lower sectoral structures for compliance (energy, transport, industry, building, a waste, agriculture, land use and forestry, water resources management , agriculture, food security, risk management of natural disasters, ecosystems, biodiversity, human health, and crosscutting issue for mitigations and adaptation) timetable and responsibilities, institutionalization, technology and financial support mechanisms, capacity building, information systems, and education and awareness raising actions, monitoring and evaluations (MEAU, 2013:95).

NCCAP consists of 49 objectives, 107 goals, and 541 actions. Similar to National Climate Change Strategy Paper. Unfortunately, this coercive action plan has not committed to a specific emissions target and emission reduction. Indeed, some claim that it is a sort of plan adopted in a participatory and transparent principles and an extension of the development plan which follows carbon-intensive growth model (Algedik, 2013: 37).

Even if evaluating the strategy and action plans together, both plans highlight comprehensive priorities regarding Turkey's climate change strategies and policies. In this regard, few focal points in both documents indicate the position of Turkey on GHGs reduction. At first, both documents were prepared in accordance with “the common but differentiated responsibility principle", the UNFCCC's basic principles, and infer a corresponding meaning `considering the Turkey's special condition and harmonization with the development principles` (IKV 2013: 69).

The third important official documents determining Turkey’s national climate protection initiatives is the Climate Change Adaptation Strategy and Action Plan (CCASAP)(2011) prepared by the MEAU in 2011. In general, climate adaption activities, objectives, and goals mentioned in the plan focus on five different topics: *management of water resources, agriculture and food security, ecosystem services, biodiversity, forests and natural resources, and hazard risk management and human health*. (Aygun, 2015: 26 & Sahin, 2014: 53). In

general, it is a kind of a detailed part of the CCAP which evaluates Turkey`s geography regarding climate change such as a change in the pattern of the temperature, precipitation, erosion, floods, etc. (Sahin, 2014: 54).

Another official document that may be considered necessary for the climate change policy in Turkey is the Sustainable Development Report. That report prepared by the Ministry of Development in 2012 indicates Turkey`s possible contribution to global sustainable development, especially in the last 20 years, and progress in this sense. In the report, there has been a prevalent explanation regarding climate adaptation policies (Ministry of Development, 2012). Similarly, the report stresses the importance of political responses to emission rise in context of sustainable development, and possible opportunities such as (p.6), low-level greenhouse gas contribution rate with 0.4% of Turkey (p.23), per capita GHG emissions rate despite high economic growth, lowest population and energy demand in 2010 (p.23), only contribution for process with its own facilities (24) importance of the adaptation activities in this sense (24) initiatives performed by Turkey for dealing with financial constraints (31) (p.6). Moreover, the report illustrates that Turkey contributes to the process completely with its own facilities in a period of 1990-2007 without any commitment in the international arena and increase GDP by 171% and 1.4 billion tons emission release gain (Sahin, 2014: 39).

4.3.5 Climate Change in Development Plans

Other significant official reports that should be investigated regarding Turkey national climate change strategies and policies are Development Plans. For the first time, in 1999, a Special Commission on Climate Change in coordination with the State Planning Organization (DPT) was established in the framework of the Eighth Five-Year Development Plan covering the period of 2001-2005. With this commission, the climate change issue was discussed in detail. 'Climate Change Special Commission Report' includes national climate policies, strategies, measures, financial and technology capacity, and other legal and scientific and technical, institutional assessment in particular for investment in Turkey's next development period (DPT, 2000). In particular, 8th Development Plan argues that GHGs emissions reduction by

sectors such as building, industry, transport, energy through energy efficiency in accordance with general principles of the UNFCCC. (MEAU, 2013:93). Two targets on the reports were determined as being a member of the international agreement based on the principle of `common but differentiated responsibility` and fulfilling the responsibilities of the Turkey by increasing GDP rate, and low-level GHGs emission based on projection scenario (Sahin, 2014:36).

In 2005, following the Kyoto protocols, increasing the importance of the global climate change policies and strategies led Turkey's economy, development plans, and policies to highlight the issue much more. With respect to climate change and development plans, in particular, 9th development plan (2007-2013) provides significant gains. In particular, this plan underlined the importance of the preparation of "National Climate Change Action Plan and other essential plans and policies, strategies and measures for GHGs emission reductions in Turkey (MEAU, 2013:94). In addition, 10th development plan (2014-2018) put more emphasis on climate change and environmental issues. The expression that highlights important role of development plans on shaping Turkey`s national climate policy and international climate change initiatives are stated as;

> "Combating climate change mitigation and adaptation in the country will continue in accordance with the principles of `common and differentiated responsibility and Turkey` special condition"

In the plan, climate change is evaluated as a risk due to having the potential of causing disasters and offering significant opportunities for economic growth and development such as green growth and eco-efficiency. Another important statement in the report is associated with adaptation actions and measures besides to mitigation policies and strategies for GHGs emission reduction (Sahin, 2014: 37).

Finally, it is possible to claim that the climate change decision-making process in Turkey is in the hands of the high councils that decide country’s special economic and development aims. While there have not been any legal responsibilities imposed on development plans, NCCAP

prepared based on the 9th Development Plan (2007-2013) for period of 2011-2023, imposes certain responsibilities on local governments in several sectors such as transport, building, waste management, renewable energy, design and planning urban areas and raising awareness for GHGs emission reduction (Kalabalık, 2014: 65).

4.3.6 European Union Harmonization Process and Turkey's Climate Change Policies

The harmonization process of Turkey's EU membership is another focus point that should be examined regarding the determination of the country's climate policies and strategies. For Union acquis, environment and climate change have a significant place. The EU is calling for 40% reduction commitment for its members based on 1990 by 2030 (LPCEU, 2015:18).

In this regard, as Turkey had gained candidate status in 2005, it has attempted to harmonize the current policies and strategies with the EU acquis so far. Since 2009, it has continued to make regulations such as the environmental phase negotiations concerning air quality, water management, waste management, emissions from large-scale incineration plants, prevention and controlling of integrated pollution environmental impact assessment (MEAU, 2013:101). Turkey maintains its climate-related actions in the framework of Regional Environmental Network for Accession to EU and Ozone Depleting Substances (ODS)[33]. Turkey has been working on issues of monitoring of trading mechanism in harmonization with the EU law including raising awareness about the EU's Emission Trading System by-Law (No:28274) on monitoring of GHGs emissions which was published in the Official Gazette dated 25 April 2012. Within the scope of this legislation, only the "monitoring, reporting and verification" of the GHG emissions that result from the industry sector as a part of the Emission Trading Directive (No.2003/87/EC) was harmonized (MEAU, 2013:101).

The EU progress reports are other official documents that determine Turkey's climate change related activities at the national level. For the first time, a progress report in 2003 gave place to

[33] Turkey became a party to the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on substances that deplete the ozone layer in 1991. Turkey benefits from the Multilateral Fund (MLF) that was organized within the scope of the Montreal Protocol as well.

the Turkey's GHGs emissions estimates and included information of the Turkey`s ratification of the Convention in 2004. In each year in the period of 2005-2008, reports highlighted that Turkey was not a member of the Kyoto Protocol, and the emissions trading directive is not transposed into domestic law, and greenhouse gas emissions trading are not provided. In particular, 2009 progress report discussed institutionalization and progress in climate change policy afterward. The emphasis was often given that Turkey was reluctant for the adoption of international climate policy actions. It stated that as an Annex 1 Party, the absence of specific targets and commitments constitutes an obstacle to progress in this sense for Turkey.

After Turkey's ratification of the Kyoto Protocol was an important development in December 2009, environment chapter in the negotiation process with the EU was opened (Şahin, 2014: 39). While Turkey has achieved remarkable progress on submissions of essential reports in matters of the environment and climate change, the EU had different attitudes and opinions. EU`s stance is summarized as; Turkey is one of the countries which performs GHGs emissions, not having a emissions reduction target by 2020 and have a significantly weak regarding the administrative capacity of carbon market mechanisms. Moreover, it seems necessary for more efforts to strengthen cooperation and coordination among the various agencies. In addition, mitigation should not be counted based on projections. The absence of comprehensive scientific research on the effects of climate change in Turkey led to the underestimation of the issue and blocked active participation into the international climate policies, limited the sectoral adaptation measures. Turkey should be a member of the international agreement with more ambitious climate policies, set a national target for emission reduction, develop a policy parallel to the EU's attitude are some of that explanation. In this regard, the rapid development of the regulation capacity for the climate change and participation in the system of the GHGs emissions trading which is the most important tools for the EU acquis are also required for Turkey.

4.4 Local Climate Change Initiatives in Turkey

Potential of local governments that have major powers and responsibility in the city administration is quite high for climate protection initiatives. In this regard, in the global climate change literature, the necessity for more active participation by local governments in the process begins to be discussed due to weaknesses of the national government in achieving the desired targets, in particular, the inefficiency of their mitigation activities. The city and regional authorities in advanced economies like the US, UK, and Australia which are reluctant in support to international climate change efforts are given as the most striking examples (De Oliveira, 2009: 254).

In this regard, in 2007, Local Government Climate Roadmap adopted at the COP-13 in Bali played a crucial role in the development of local climate initiatives by the local governments. That document necessitates local governments to participate in the international climate negotiations as an actor which have potential responsibilities and resources in mitigation and adaptation efforts for fighting climate change (Demirci, 2015: 87). Subsequently, in the COP-15 meeting, local authorities have begun to realize their potential in the global climate change regime. In particular with COP-15 in Copenhagen in 2009, local governments called for a more powerful and comprehensive global climate agreement for the post-2020 (Demirci, 2015: 85).

In parallel with progress and developments on climate change regime in the world, local and multi-level climate change governance also has an important role in determining and investigating Turkey's climate protection policies and strategies. Although Turkey has not any commitment to carbon reduction at the international negotiations, the rate of total emission increase will necessitate appropriate interventions and participation of local administrations to the efforts for dealing with the climate change issue (Orhan, 2014: 131).

Local governments, in particular, the municipalities have become a pioneer regarding services and policies to be carried for climate change in Turkey. Although legal frameworks related to environmental policy and climate change in Turkey are usually determined at the national

level, local governments still have a great importance for the implementation of this policy and enforcement. To be more precise, municipalities have become the main actors in the implementation of cohesion policy in energy efficiency, renewable energy, waste management, urban transport and urban governance (including urban planning and development control) which provides high potential for reduction of carbon emission in Turkey (Demirci, 2015: 94). For instance, according to the study conducted for all European regions, some regions of Turkey are shown among the most contaminated areas regarding air pollution emissions which are the most important indicators of the greenhouse gas problem (Orhan, 2012). It indicates the importance of municipalities both for the emergence of the problem and its solution (Orhan, 2014: 130). Thus, a significant increase in the number of local government declarations, transnational network ties and inter-municipal agreements on climate change has taken place in Turkey (Demirci, 2015: 109). In this regard, it is still possible to claim that local governments` active role in GHGs emission reduction in Turkey has been started early in parallel to the developments in the world (Kuban, 2013).

Local governments in Turkey are defined as administrative units which have a public entity whose establishment, functions and powers are regulated by law in accordance with the principle of subsidiarity, established to meet local people's common needs. Their decision-making bodies are elected (Eryılmaz, 2012:179). Three types of local governments are defined in the 1982 Constitution as; *the special provincial administrations, municipalities, and villages* (Eryılmaz, 2012:180). Local governments, particularly municipalities, have an important place in meeting local needs and represent a significant position in Turkish local government system.

Around 93, 3% (72,505,107) of the population in Turkey's total population (77,695,904) based on 2014 data, lives in urban areas. There are 1396 municipalities including 30 metropolitan municipalities that provide services to the urban population in Turkey. The size of the area served by the municipalities, population density, economic and climatic conditions in the metropolitan region show large differences in Turkey (Özsoy, 2011). What is more, Municipalities are experiencing structural and functional transformation with new legal regulations, in particular, in the last years (İnanç, 2015: 7). Important laws related to

municipalities in Turkey including the recent legislative amendments contain the following: Law No. 5393, Law No. 5216, and Law No. 6360. There are 30 metropolitan municipalities in Turkey by 2015 whose duties and areas of jurisdiction include several services according to the Metropolitan Municipality Law (No:6360) such as; to prepare and implement of the urban transport plans; to create policies for waste collection and recycling, to provide infrastructure services; to supply water and wastewater discharge services; and to perform various environmental protection activities. In fact, these laws do not require municipalities to take some responsibility on climate change issue. Mazlum (2009: 53) argues that municipality` initiatives for climate protection are regarded as a requirement for being in harmony with the local social policy approach as well.

Municipalities have potentials to develop different modes of governance as local mitigation and adaptation measures with duties and responsibilities determined by the law (Demirci, 2015). Based on article 14 of Municipality Law (No: 5393), several tasks and responsibilities such as "water and sanitation services, urban infrastructure, transport, environment and health, solid waste management, fire-fighting, first aid, rescue and ambulance services, city traffic, plantations, parks and green space" are closely associated with urban GHGs emission reduction policies and strategies.

The history past of Turkish public administration has based on the dominance of state-centric management approaches. That is much more common in climate change policies and actions. Certain measures taken at the local and regional level are evaluated as a problem in its administration systems. However, local authorities in particular municipalities and development agencies at the regional level have a significant potential for emission reduction (Demirci, 2015: 89).

Similarly, the 5th national report argues that local governments in Turkey have a significant role for emission reduction because they have substantial powers and responsibilities in energy, city transportation and waste sectors (MEAU, 2013: 102). Local level climate initiatives are legitimized with several benefits such as increasing energy efficiency and stimulation of the local economy and enhance public health, prevention of air pollution,

reducing congestion, besides combating the climate change. Despite the lack of any commitment to carbon reduction with the special status of Turkey among Annex I group of countries, it tries to benefit from the financial and technological support and to take an active role in shaping the global climate change regime in the future.

Due to the fact that Turkey`s position as a candidate for the EU membership requires to decrease the weight of the central government and increase decentralized administrative systems and more participation in decision making on public policy at the local level is becoming increasingly important. In this regard, Turkey has taken important steps in local government's regulation for harmonizing legislation with the EU, which was adopted in 1999 and began accession negotiations in 2005. It carried out new legislations based on the European Charter of Local Self-Government. The European Charter is regarded as the main constitutional source for the local governments in the EU. Therefore, it is the largest source for creating laws that are applied by the government. In this regard, local governments in Turkey should be seen as partners in the central government, rather than an extension of the central government (Kalko, 2010: 146-148).

The number of local governments which give importance carbon reduction initiatives and carrying out the projects following principles and guidelines in Turkey is not sufficient. Local governments in Turkey have continued their climate protection initiatives with the central government and multi-level network ties (horizontal and vertical). They do not act independently (Demirci, 2015: 92). Similar to the developments in the world, it is possible to claim that mitigation initiatives are more common among two main strategies in climate change policies rather than an adaptation in Turkey (Demirci, 2015: 92).

The climate change action plans which put common standards across the country and prepared in accordance with the principles has not been yet available (Demirci, 2015: 92). Similarly, the "sustainable action plans" could be regarded as important plans, which are indirectly related to climate change and carried out by local governments in Turkey.

The local governments have experienced as members of the international networks such as ICLEI. For instance, Bursa Metropolitan Municipality, Gaziantep Metropolitan Municipality, Konya Metropolitan Municipality, Kartal Municipality, Seferihisar Municipality and Sisli Municipality have become already members of ICLEI. Gaziantep Metropolitan Municipality is also one of those that take initiatives for carbon reduction and prepare a climate action plan for that purpose. In particular, Gaziantep Metropolitan Municipality indicates 15% reduction in carbon footprint and energy consumption by 2023 based on its action plan. In this regard, other activities of that Municipalities can be summarized as the rail systems for public transportation, the natural gas-powered buses, the electric cars, the waste reduction and recycling, the solid waste management for energy production such as methane gas, the electricity from sewage water, the water and energy efficiency, particularly in public buildings and the ecological city project (Guzelbey, 2011, as cited in Orhan 2014: 133). So, Gaziantep Metropolitan Municipality could be regarded as the pioneer municipality in Turkey with `Climate Change Action Plan` and analysis of GHGs emissions and specific targets. In addition, Climate Change Action Plan proposes to facilitate and support the establishment of essential institutions for climate change, low carbon intensity technologies, and management in all types of the economic sectors.

Another local government in Turkey is Konya Metropolitan Municipality that takes necessary steps for carbon reduction. It became a member of WMCCC in 2007 and ICLEI in 2012 for climate protection and to share experience and knowledge at present. With Clean Air Action Plan (2013-2019), it has limited the use of fossil fuels in particular in public buildings, promoting alternative fuels usage, heat insulation activities, encourage public transportation and low-carbon transportation such as cycling usage. Actions that have already done by that municipality so far could be summarized as, obtaining methane gasses from solid waste, recovery of vegetable and mineral oil, air quality management, solar energy lighting and bike usage and smart environmental management information system (Orhan, 2014: 133)

Similarly, Kadikoy Municipality, Karsıyaka Municipality, Seferihisar Municipality and Bornova Municipality are members of The Covenant of Mayors. In particular, it is possible to realize that Bornova Municipality and Karsiyaka Municipality take a much more active role in

combating climate change with a municipal action plan (Orhan, 2014: 131). Kadikoy Municipality could be regarded as a pioneer with GHGs inventory report, other climate and alternative energy projects, and energy efficiency (Demirci, 2015).

Turkey has also taken an important step towards benefiting from the flexibility mechanisms with signed PMR (Partnership for Market Readiness Project) with the World Bank in 2011. Moreover, MEAU has initiated new projects titled as “Sustainable Cities or Turkuaz Cities” in collaboration with local governments for following major principles of the `climate-friendly cities`. Main objectives of these projects include enhancing of technical and institutional capacity, determining general guidelines for local climate action plans, determination of significant indicator for sustainable city development, the creation of technological and knowledge networks at all government levels, and the establishment of `Turkuaz certification scheme` (Tugan, n.d: 42).

The necessity of policy integration and cooperation among local authorities for climate protection actions limits local governance performance and capacity. In this regard, municipality, rather than metropolitan municipalities, can be restricted by central government on that issue (Orhan, 2014: 131). Therefore, for enhancing local climate governance, ensuring access to the additional financial resources, developing horizontal and vertical cooperation with other organizations in Turkey is of great importance (Demirci, 2015: 94).

Action and strategy documents determined at the national level in Turkey also refer to the importance of local governments to take the necessary measures for carbon reduction from time to time. Turkey`s 5th national climate change notification report, NCCAP for 2011-2023, CCASAP for 2011-2013, Integrated Urban Development Strategy and Action Plan for 2010-2023 (KENTGES) can be given as examples (Demirci, 2015, 90).

KENTGES is an important document that includes information regarding local climate change actions implemented by municipalities. KENTGES indicates "enhancing climate mitigation and adaptation measures in the human settlement, determination of the procedures and principles for building with planning” (MEAU, 2010: 39). The Plan primarily includes

strategies and actions on the issue of; spatial planning, transportation and infrastructure, housing, transformation, preparation for natural disasters, preservation of natural and cultural assets, climate change, energy efficiency and renewable energy resources, settlement and ecology, immigration and social policies, and strengthening economic structure and accession (MEAU, 2013: 102).

In addition, Bursa Metropolitan Municipality is another local government that performs climate change action in coordination with the Ministry of Environment and Urbanization (MEAU, 2013). Similarly, the NCCAP imposes municipalities indirectly related to climate change, particularly on transportation, waste, energy efficiency and climate sensitive settlement/housing policy (MEAU, 2013: 103).

Vertical relationships between local government and the central administration are also important for carbon reduction in Turkey. WMCCC, CCC and the European Convention of Mayors are just examples for such relationship (Demirci, 2015: 91). To this end, in 2009, fourteen municipalities have joined to the climate-friendly cities campaign formed by ICLEI and REC. Several of them also signed the Mexico City Local Government Climate Agreement. The municipalities that are eager to implement more concrete projects by means of the climate friend city campaign in 2009 could be listed as; Alanya Municipality, Beyoglu Municipality, Bodrum Municipality, Cankaya Municipality, Halkapınar Municipality, Kadıköy Municipality, Karadeniz Eregli Municipality, Kecioren Municipality, Mugla Metropolitan Municipality, Nevsehir Municipality, Nilufer Municipality, Sivas Municipality, Sisli Municipality, and Yalova Municipality (Demirci, 2015: 91). The outstanding initiatives and actions in this campaign are waste management, energy efficiency and awareness-raising activities (MEAU, 2013: 265).

Although it is at an early stage, Turkish municipalities are members of the Covenant of Mayors which aims to exchange information and experience by establishing a horizontal network in climate change mitigation and adaptation activities as well. So far, members of the Covenant of Mayors are Karsıyaka Municipality, Seferihisar Municipality, Kadıkoy Municipality, Eskisehir Tepebası Municipality, Maltepe Municipality, Antalya Metropolitan

Municipality, and Nilufer Municipality in Turkey (Demirci, 2015: 92). In addition, MEAU selected Bursa Metropolitan Municipality as a pilot for the "Adaptation to Climate Change Support Package for the City` in 2014. Turkey also encouraged local sustainable energy plans closely related to the local climate change governance including several projects and actions about participation, training, education, collaboration, waste management, low-carbon urban transport, and energy efficiency. (Demirci, 2015: 93).

It is a clear that crucial regulatory and supervisory powers have given to the municipalities in Turkey. That offers significant opportunities in dealing with climate change at local levels. However, the regulatory and supervisory authority of the municipalities on several urban plans such as local government strategic plans, master plans, implementation plan, disaster and emergency and the development plans, have still shortcomings regarding climate protection principles (Karabag, 2011: 131).

In addition, a more rational planning, construction and new technological opportunities in urban renewal activities are expected to be significantly causing emissions mitigation through the provision of energy efficiency. In this regard, MEAU has been planning to make at least 43 million tons of GHGs emissions reduction with urban renewal projects in 2014 (Demirci, 2015: 93).

Similarly, Kadikoy Municipality has become a member of climate-friendly city campaign which was created by ICLEI and REC coordination in 2009. The major projects undertaken by this municipalities could be summarized as " no for plastic bag" and creation of institutional GHGs emissions inventory, increasing social consciousness, promotion of renewable energy, and water efficiency and workshops" (Orhan, 2014: 134; Özsoy, 2011)

Bornova Municipality, İzmir is also among the municipalities that are members of the European Convention of Mayors in 2011 and committed to reducing 20% carbon emission by 2020. The most important projects in this regard are Bornova `sustainable municipal energy action plan` (Orhan, 2014: 135). Similarly, Seferihisar municipality signed convention of mayors and committed emission reduction with 20% by 2020 in 2011. Also, Karsiyaka

Municipality committed 35% emission reductions by 2020 and prepared sustainable energy action plan (Orhan, 2014: 137). In general, promoting renewable energy, energy efficiency, trams, and bicycles and supporting public transport are preliminary activities in such action plans. Similarly, Kartal Municipalities could be evaluated among municipalities which are reaching significant gains in this regard by being a member of ICLEI. For instance, waste recycling, a collection of waste batteries, energy saving, raising environmental awareness, clean energy campaigns are some of the actions performed by this municipality (Orhan, 2014: 137). The significant point here is that several municipalities perform climate actions without being a member of international climate organization as well (Orhan, 2014: 139).

Istanbul Metropolitan Municipality`s activities such as obtaining methane gases from solid waste , electricity generation, dissemination of public transport, carbon inventory efforts, and Kayseri Metropolitan Municipality`s activities namely preferring rail transport, promotion for the usage of bicycles, Diyarbakir Metropolitan Municipality`s attempts like solar home project`, and Bursa Nilüfer Municipality`s planning of residential areas that provide energy and water savings , rainwater storage systems and promotion of solar energy systems are the examples of local climate change actions performed by the various municipalities in Turkey (Özsoy, 2011).

Due to having a strong leadership experience and potential of emphasized subject in the common platform, the mayors in Turkey have an important role in climate change policies (Özsoy, 2011). To this end, the question of why some municipalities are active in local climate change actions while some are not should be investigated with a detailed empirical research. Also, such a study makes possible the evaluation of these pioneer municipalities and their actions regarding global climate change literature.

There have been several obstacles faced by metropolitan municipalities in Turkey for carbon reduction. For instance, municipalities have limited power and responsibility on transportation and housing policy. In addition, there have been several arguments that present metropolitan municipalities carry out a number of activities increasing carbon emission vice versa reduction. The primary reason for this is associated with the municipalities' desire for capital

and economic growth which resulted in less attention for the environment and climate change actions in their administrative areas (Orhan 2014: 143). Another point is that climate policies should be integrated with other environmental policies and strategies in particular for the metropolitan cities, metropolitan municipalities have been necessitated regarding their resources and responsibilities and power potential. There have been several studies indicating that metropolitan municipalities are more active than some in Turkey. However, it is still possible to claim that the number of local initiatives directly related to climate protection has not reached to a sufficient level in Turkey compare to ones in the west.

CHAPTER V

CLIMATE CHANGE GOVERNANCE IN TURKISH METROPOLITIAN MUNICIPALITIES

In this section, climate change protection activities (implicitly) carried out by the metropolitan municipalities in Turkey are evaluated through taking into consideration the theoretical framework discussed in the previous sections. For this purpose, research design, main findings, and discussions are presented below.

5.1 Research Design and Methodology

In this part, the methodological approach utilized in the thesis is presented. The primary theoretical framework employed in the research is associated with "local climate change governance" and major "socio-economic, local climate stress and risk factors" which have a significant impact on the adoption of local climate protection initiatives. This part mainly consists of an explanation of the data sources, collection, and analysis process of the research that has two tiers. It also argues validity, the reliability of data used and main limitations of the study. In the first part of method section, sequentially, a methodological framework allowing investigation of the climate change actions carried out by metropolitan municipalities in their administrative borders in Turkey using document analysis was explained to answer the first tier of the research question. In the second part, essential statements for empirical research design employed in the study to determine the extent of which major socio-economics, climate stress and risk factors that influence on local climate change initiatives which are the second tier of the research question, is mainly investigated.

5.1.1 Methodological Framework

This part describes methods including what sort of data sources were used, how essential and comprehensive data was collected, and which analytical techniques were employed in the study. Primarily, it was considered that both qualitative and quantitative method was

used to answer research question which requires two-tiers analysis. In the beginning, qualitative research was conducted to collect necessary data and analysis, and to respond research questions of how local metropolitan municipalities performs climate protection initiatives with respect to modes of climate change governance. Then, the result of the qualitative analysis was used as dependent variables (as called as MCCAS score) in the second tier of analysis with several other explanatory variables (secondary data) to figure out why some metropolitan municipalities engage in carbon reduction much more, some do not. In the end, all findings were evaluated and discussed in a holistic and interrelated manner.

Several reasons could be provided for using such methods and techniques in the study. Firstly, lack of comprehensive data concerning local level GHGs emission reduction and local government actions are main motivators to follow such method in the research. Similarly, in spite of a significant increase in the rate of GHGs reduction per capita in particular since the 2000s in Turkey, and the underlining importance of local government' engagement with climate protection at international climate meetings, there has not been any comprehensive study at present. Another reason for applying two different methods in a single study is associated with the notion that initial results need further explanation in detail. Hence, end, such methodological approaches, using different data collection and analysis process including qualitative and quantitative increased the validity of the study by completing deficiency of each. In addition, it is possible to evaluate the research questions, in particular for sophisticated problems including technical and social dimension such as climate change from different perspectives. Moreover, it is possible to claim that several challenges encountered such as spending extra time and efforts could be regarded as major disadvantages while there have been several advantages such as providing a clear and reliable scientific result with that method.

To be more precise, complex phenomena of local climate protection governance including technical and social dimension required us to use both qualitative and quantitative research method that is called as mix method in social science. In general, the ability of a social scientist to study complex phenomena such as climate change is restricted once only one methodological approach is followed in the studies. To this end, it was considered that encouragement for use both qualitative and quantitative research design was essential in

particular in the field of climate change governance in an appropriate manner based on research questions types. After all, it was well known that application of mixed method research design in the literature has been expanding increasingly including several areas from nursing to political science (Terrel, 2011: 259).

In this regard, concerning mixed-method approaches, scholars claim that qualitative and quantitative research approaches are compatible with each other, and no research question could be investigated with only one methodological research design in fact (Terrel, 2011: 258). However, it is possible to claim that though there has been increasing argument for combining qualitative and quantitative research design in social science, studies using mixed-method approaches in the field of climate change governance is still limited. In addition, regarding the terminology of mixed-method in climate change literature, the majority of studies has preferred to use terms such as `dual or multi` qualitative and quantitative research design instead of `mixed-method approach`.

In general, mixed method refers to using a combination of both qualitative and quantitative research design (Clark et al., 2008: 1546). In fact, the mixed-method research design originates from two different methodological research paradigms including positivism (quantitative research) and constructivist or interpretive paradigm (qualitative research) (Terrel, 2011: 257). Creswell et al. (2007) explain that the basic premise for mixed method research design is to a better understanding of research question with both methods rather than either approach by itself. Even though there has been some argument that mixed method research design is not appropriate due to including different worldwide approaches including positivism interpretive and constructivist, several studies still present a philosophical foundation (Clark et al. 2008: 1546). Main characteristics of the mixed method are a combination of collecting and analysis technique with qualitative and quantitative data and given priorities to one of both data in single or in multiple phases of the one study (Creswell & Clark, 2007).

Research design proposed by Creswell and Clark's (including Triangulation, Explanatory Design, Exploratory Design and Embedded Design) was used to apply mixed methods in local climate change initiatives, in particular, metropolitan municipalities in Turkey. For choosing types of mixed methods in the research, several criteria were used such as level

of interaction, relative priority, and timing (concurrent, sequential, etc.). Sequential exploratory research including qualitative and quantitative approaches in mixed method was used for investigation of the main research question in the study. The exploratory research design is more appropriate when there has not empirical and comprehensive literature study in terms of theoretical foundation, variables, etc. in the research questions such as local climate change governance (Creswell & Plano Clark, 2007). Indeed, exploratory research design among mixed methods begins with qualitative research first, and quantitative investigation that is connected to qualitative research results secondly (Clark et al. 2008: 1554). The main purpose of such methods is a generalization of results obtained from qualitative study to larger sample representing the population.

Firstly, to be more precise, it is possible to define qualitative research as; usage different techniques as "observation, interviews and document analysis" that necessitate qualitative data collection procedures, setting out the process of perceptions and phenomenon in a realistic and holistic manner (Yıldırım & Şimşek, 2008:39). Similarly, Neumann (2011: 510) states qualitative research is a type of methods designed to be made generalizations with several concepts, idea, and themes and helps researchers to obtain simple nominal level variables and non-variables conceptual data. Qualitative research also could be defined as a method that is prone to extremely difficulty, uncertainty, and doubt, during conducting data collection and analyzing process simultaneously until reaching gradual sufficient knowledge in the research problem (Walliman, 2006: 129). Similarly, Creswell (2007: 51) regards qualitative research as a research method that is appropriate for complex social problem needed to be understood, not having strict guidelines, requiring data analysis and long time-consuming.

In this sense, conducting qualitative research in the first part of that study has made possible for evaluations of local climate change policies and strategies adopted by metropolitan municipalities in interdisciplinary, holistic view and interpretive manner. At the stage of the qualitative research process, it was tried to avoid following deterministic approach so far as possible. Types of the relation between events and phenomenon groups in local climate protection actions are evaluated, rather than searching for a casual relationship. In other words, in the first stages of the study, more emphasis was given for qualitative analysis, rather than the quantitative part.

The major benefit of conducting qualitative research preference in the study is associated with the notion that local climate change issue has new and evolving research subject in Turkey. Thusly, there have not been sufficient studies and methodological approaches to evaluate it in a scientific manner. To this end, qualitative research method provided flexibility for us to conduct this study even in spite of the lack of academic study and quantitative data at local climate protection initiatives in Turkey. In fact, this challenge might be the main reason for a limited number of a study investigating local carbon reduction initiatives in Turkey. To this end, official documents of metropolitan municipalities were used to overcome this challenge. To this end, in the first part of the research, several categories of themes and phenomena concerning local climate change measures for each sector such as urban development and design, built environment, urban infrastructure, transportation and carbon sequestration, and adaptation were formed to investigate the issue with the exploratory qualitative approach. The main process prevalently used in the first stage of the study could be summarized as establishing theoretical framework to create baseline for the research, forming of rational and flexible coding and thematic measures (transportation, tree-planting, energy and water efficiency, CO_2, renewable energy, public transportation etc.) based on the literature, combining codes under specific thematic categories in a consistent, coherent and holistic manner path (see figure 7 indicating a model for the research).

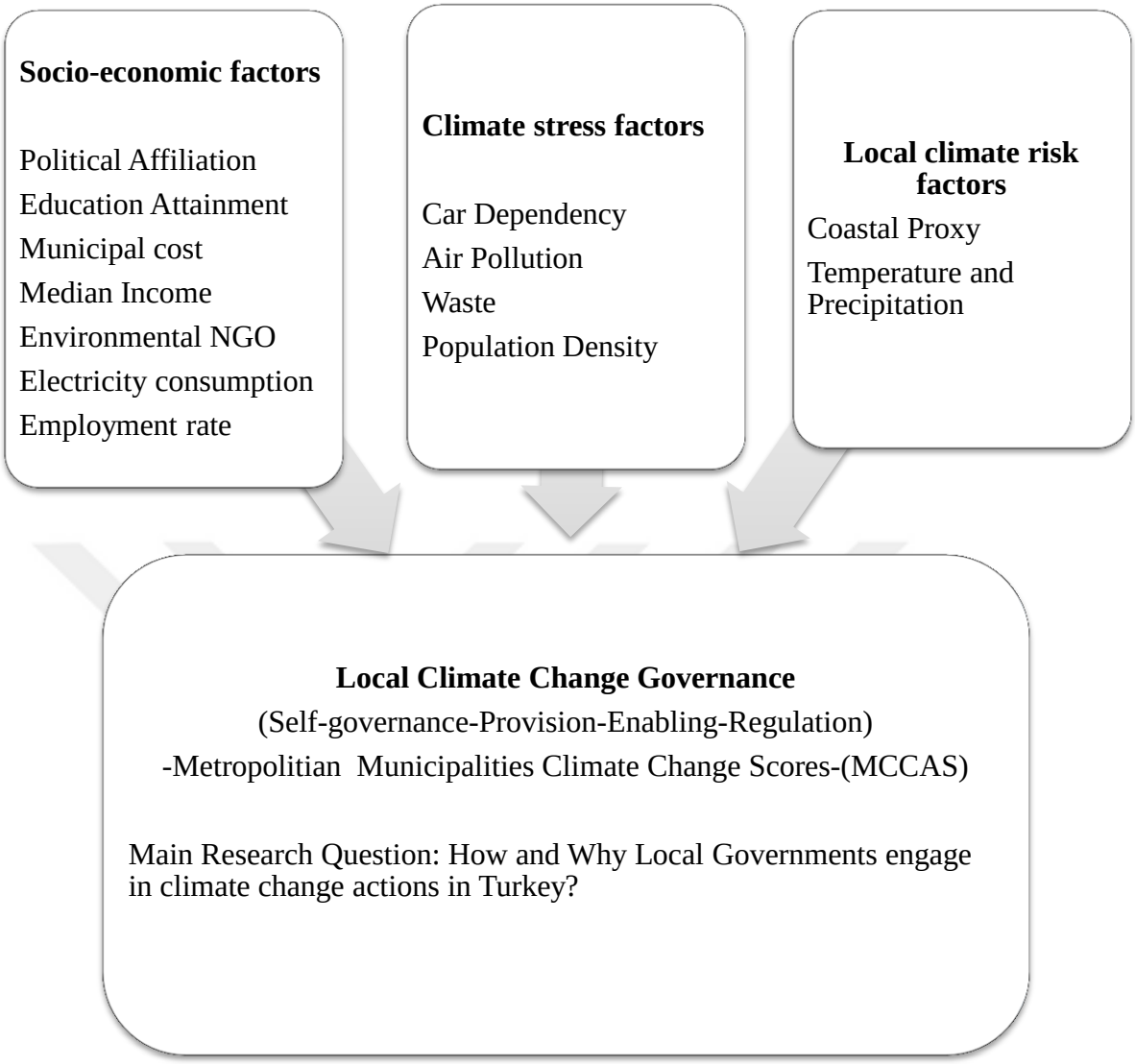

Figure 7 A model for research design in the study

In the second part of the study, quantitative research approaches were carried out to answer the second tier of the research question which is why some local governments engage in climate change actions in Turkey, others not. In this regard, quantitative part of the study was conducted to investigate key features of data through numerical value and statistical analysis, and to explore causality between phenomena as seen figure 7. In the data collection process, the level of measurement (i.e. nominal, ordinal, interval, and ratio), played a significant role in determining which types of quantitative methods should employ to answer the research question. In this regard, quantitative research study could be used not just as a result of numerical data obtains from the survey, but also from the contents analysis of the reports and official documents (Walliman, 2006: 112). Similarly,

Neumann (2011: 165) states quantitative research as a method that dominates the much more positivistic principle refers exploring causal relationships among variables and hypothesis following systematic and linear research.

5.1.1.1 Data Sources

Our research question requires different types of data in the study. To achieve this, mainly two unique data source were used. In the first part, document analysis was conducted to reply question of how Turkish metropolitan municipality's climate change policies and strategies have performed in their administrative areas. As aforementioned, the primary reason for document analysis in the study could be explained by the lack of data concerning local climate change actions or limited level which does not make possible to reach a scientific result and generalizations. To address that gap, using original data collection method was aimed to reach accessible, integrated and inclusive information concerning local climate protection initiatives adopted by metropolitan municipalities.

In general, all metropolitan municipalities (Except for Mardin because of unavailable data) were selected as a sample in the research (N=29). The main reason for selection of the metropolitan municipalities as research units are associated with the notion that climate change issue requires actions, the solidarity of sufficient social and economic capacity, large geographic and administrative areas. Metropolitan municipalities have more potential regarding populations, social networks and economic competence, environmental integration, and cooperation in provincial borders. Furthermore, the main focus was given to metropolitan municipalities in Turkey due to providing major local service for around 93.3 percent of total Turkey` population based on TSI official data in 2014. Furthermore, a vast majority of local economic, social production and consumption activities of the Turkey population emitted a significant amount of GHGs into atmosphere occurs within metropolitan cities. Similarly, the municipal boundaries in metropolitan cities still cover provincial and administrative borders with new Metropolitan Municipality law by No 6360 (2012). This law aims at economies of scale issue ensuring the optimization of efficient and effective resources usage, and acceptation of new 14 Metropolitan Municipalities into

16 already ones. So, metropolitan municipalities have become the most prominent local public authorities in the province with that new legislation in Turkey.

In general, which types of data sources to use in the study is closely associated with a research question (Yıldırım & Şimşek, 2000: 140). Hence, Annual Reports and Strategic Plans of corresponding metropolitan municipalities concerning reference years in the second period of Kyoto Protocol were investigated with document analysis. Climate change actions or initiatives performed by those metropolitan municipalities are evaluated with modes of the governance framework (including four major modes such as self-governance, provision, enabling and regulation). At the initial stage, official web pages of the metropolitan municipality were searched to obtain essential documents. Once absent of relevant documents on the internet, it was tried to make direct contact with officers in municipalities by phone or email to reach vital information. Consequently, 29 metropolitan municipalities' corresponding reports and plans were obtained concerning reference years except for Mardin Metropolitan Municipalities despite all efforts (see Appendix-B for information and sources of documents analyzed for metropolitan municipalities).[34]

There have a variety of premises behind the use of the strategic plans and annual reports as a data source in the thesis. Firstly, the strategic planning is a process which helps for improvement of organizational learning, determining suitable long-term strategies, goals, and target, determining their priority in an appropriate manner, establishing a link between the organization and its environment, goals and existing resource capacity, which make possible effective resource usage (Gürer, 2006:103). Moreover, strategic plans provide harmonization between organizations` environmental conditions, objectives, and resources, which ensure to have a strong vision and contributing positive competitiveness for sustainable development (Demir & Yılmaz, 2010:84).

Similarly, strategic planning- designing future with present materials- become widespread among public authorities, in particular, local governments and metropolitan municipalities which provide public services to local communities in Turkey. Strategic plans are of great importance for metropolitan municipalities due to make possible service and investments

[34] The strategic plan and action reports of the Mardin Metropolitan Municipalities could not be reached for document analysis despite all efforts. Experts and officers on the municipalities claim that it does not have unified strategy or annual action reports that can be assessed by content analysis.

in a planned manner (Atalı, 2015: 49). For this purpose, evaluation of goals and objectives in the strategic plans for metropolitan municipalities which serve a significant portion of the country population will be beneficial regarding GHGs emission reduction.

On the other side, Annual Action Reports also give significant information concerning metropolitan municipality's annual actions in references year. Each metropolitan municipality is required to submit their annual accurate and reliable action information within the framework of the principle of fiscal transparency and accountability in the reference year. Furthermore, the reports should be a clear and understandable form to ensure public information. For this purpose, evaluation of Annual Action Reports adopted by metropolitan municipalities for GHGs reduction efforts offers significant gains in the study.

Finally, the second stage of the research investigates the question of why some metropolitan municipalities are pioneers in local climate change actions without any legal obligation at the national and international level in Turkey. For this purpose, several statistical techniques with IBM SPSS statistical software (23 versions) was applied to essential variables mainly obtained from TSI that is a public institution having a statistical database, and several official documents such as province environmental status report. A data source for dependent variable is results of annual reports of the metropolitan municipalities which was analyzed with content analysis and called as MCCAS[35](see Table 12 for further information on variables)

5.1.1.2 Data Collection

A significant explanation for the data collection process in the study is associated with `inference` from local climate change actions. Local climate change actions could be evaluated in two different ways in explicitly and implicitly. First one is associated with actions or implementations which aim for directly and explicitly carbon emission reduction and adaptation, in particular, assessed with small-n sample case studies. Another one is linked with local climate actions which do not aim at dealing with carbon reduction directly but could be evaluated implicitly as local climates related policy such as energy

[35] MCCAS means "Municipal Climate Change Action Score"

and water savings, and air pollution, mainly with quantitative large-n sampled studies in the literature (Krause, 2011:200). In this regard, `implicit local climate change initiatives` were taken into account once conducting content analysis to figure out cumulative impact of local climate either actual and potential initiatives in Turkey for the majority of municipalities which have not joint any climate change networks. In that way, it was possible to overcome undercounting of total GHGs emissions at the local level in the study.

The first phase of the study begins with documents analyses as data collection techniques. Document analysis is a method frequently used to support other methods or as a single method by itself to improve the validity of the research where qualitative the research techniques such as observation and survey are difficult or impossible (Yıldırım & Şimşek, 2000:140). Documents analysis consist of several stages that include obtaining documents, control of the originality of the document, permit for usage, the understanding and analyses of the documents (as cited as cited in Baş & Akturan, 2013: 120). Regarding the research topic, in the process of the document analysis, it was taken into account of that official documents are reliable, comprehensive, and prepared to some extent by experts on the subject in an objective manner (Kümbetoğlu, 2012: 149).

While document analysis provided some convenience and advantages during research, it was also faced several obstacles in the study to examine the documents that consist of at least 200 pages as pdf format. In this regard, the easy to reach, the lack of responsiveness, long and being analysis formed as a result of overtime large time, being large sample size, providing originality, being cost effective and high and quality could be given as some advantages of the document analysis in the study (Yıldırım & Şimşek, 2000:143). On the other hand, being possible unbiased, accessibility, sampling bias, lack of a standard format and encoding challenges are some of the disadvantages of the document analysis in the research (Yıldırım & Şimşek, 2000: 145). To eliminate to that challenge, the documents were analyzed with at least two persons in the same table, which took three and half months to complete all documents.

In this sense, document analysis technique as a data collection method was used to analysis local climate actions adopted by the metropolitan municipality in the first phase of the

study. There have been several promises for choosing such data collection techniques in the first stage of the research. The first argument is associated with the notion that obtaining sufficient information regarding local climate protection initiatives in metropolitan cities in Turkey is possible by this technique. Otherwise, contact to experts in these organizations would have been difficult regarding financial and time to collect such reliable information. Alternatively, survey and in-depth interviews techniques with some skilled people in the metropolitan municipalities could not have provided such reliable and comprehensive data for the research. On the other hand, with the document analysis of the official reports, responsiveness problem was eliminated. Due to the fact that working as a staff in local governments units are exposed to high political debates and concerns, document analysis provides unbiased data for the research. Another important reason for selecting this method is that high-quality data formed as a result of the long-term investigation, sufficient specialist knowledge from different sources could be possible. Finally, this research technique compared to other qualitative research methods provided us to evaluate the results in an individual and unique environment.

On the other side, the second stage of the data collection process in the study is associated with quantitative data collection process to answer the second tier of the research question. In this regard, MCCAS as dependent variables were obtained by adding the weighted values of 41 different activities in 6 different categories of excel sheet. Independent variables were also gathered mainly through TSI, relevant public organization database such as General Director of Association, The Supreme Electoral Council, Turkish State Meteorological Service (TSMS), Ministry of Development etc., and official reports such as Province Environmental Status Report and Cities with Selected indicators published by TSI etc., and Google Earth. Comprehensive information concerning dependent and independent variables is presented in the following the table 12.

Table 12 Dependent and independent variables for determination major factors that have an impact on metropolitan municipality`s climate change protection actions in Turkey.

Dependent variables		Measures Description	Sources
MCCAS		Local climate protection actions with document analysis	Annual Reports of Metropolitan Municipalities
Independent variables		**Measures Description**	**Sources**
Socio-Economic Factors	Political Affiliation	Nominal variables (Dummy), whether Metropolitan presidency is from ruling party or opposition party based on General Local Election result in reference years	The Supreme Electoral Council
	Education Attainment	Rate of the population who have a bachelor's degree or higher to not having in age 25 +	TSI
	Municipal cost and revenue	Metropolitan Municipal Total expand and income from environmental protection service (TL)	TSI
	Median Income	The median household income (TL)	TSI
	Environmental NGO	Percentage rate of population who attend to a `Green` NGOs to total population in city	Department of Association, MI
	Electricity consumption	Electricity consumption per capita in kWh	TSI
	Employment rate	Ration of employed person to working for age population	TSI
Local Climate Stress Factors	Car Dependency	motorized car number excluding privately owned car and van in the city	TSI
	Air Pollution	Average annual air pollution amount including SO_2 and PM10 ($\mu g/m^3$)	City Environmental Status Reports
	Waste	Total waste amount disposed of per capita	TSI
	Population Density	Total population per square kilometer	TSI
Local Climate Risk Factors	Coastal Proxy	Categorical variables. Weather city center has coastal area, or not	Google Earth
	Temperature and Precipitation	Percentage of difference in annual observed average temperature and precipitation in reference year from long-term data (1950 to 2015)	TSMS

5.1.1.3 Data Analysis

The local climate initiatives carried out by metropolitan municipalities in Turkey to for GHGs emission reduction was analyzed with modes of the climate change governance framework. In fact, there have been a variety of local-scale climate actions by non-public

actors such as private company, NGO, media, citizens as well, but mainly metropolitan municipalities` mitigation and adaptation policies and strategies were evaluated with *content analyses*. Each municipal mitigation and adaptations initiatives were categorized into different urban areas based on literature studies (41 different actions in 6 different categories). Four main climate change governance modes claimed by Bulkeley (2006) and Alber et al. (2008) *(self-governance, provision, enabling and regulation)* were used to evaluate the extent to municipalities` climate responds to decrease GHGs emission implicitly at the local level in Turkey.

With content analysis, essential concepts and themes relations between local climate protection actions were quantified based on local climate measures. Then, each mode of climate governance approach was linked with each local level actions determined to gather information of how metropolitan municipalities engage with climate change in Turkey. With such data analysis efforts, the constraint of lack of data was overcome, and sufficient level of information was obtained, not require us to do an interview with mayors or experts in municipalities or any observations in the field that includes such reliability level. In this way, extra time and resources were obtained, and then rest of efforts was given for the second tier research empirical analysis.

Forty-one different local climate change actions associated with five different sectoral and two main climate protection approaches model was created based on UN-Habitat (2011), OECD report (2010), and Krause (2011) studies (see Table 13). Each distinctive climate protection actions in the model were represented with several themes categories. Then, each thematic cluster was distinguished by several codes in different categories. For Coding systems, selective coding method was used which indicates themes classifications, then conceptual categorization process to see the holistic view in the study. Afterward, the coding system was applied for annual action reports (regarding reference years) of metropolitan municipalities and their strategic plans (mainly for 2015-2019). In sum, observed each local climate actions and policy instrument types in both plans were categorized under each concept previously formed, then linked with thematic categories in the model. Each action in the distinctive thematic categories was also evaluated regarding modes of climate change governance framework including self-governing, provision, enabling and regulation to determine how actions are being performed.

Table 13 Municipalities` GHG emission reduction actions and initiatives used for document analysis

No	Approaches	Sectors	Actions or strategies adopted by Municipal Authorities in Turkey
Z1	Mitigation	Urban development and Design	Municipality has GHG reduction plans, inventory, target or strategies
Z2			Land-use and zoning planning for urban sprawl,
Z3			Urban expansion and new residential areas for Energy efficiency activities
Z4			Informal settlement and suburban development,
Z5			Mixed-use zoning to shorten trip distance
Z6			Zoning to promote multi-family and connected housing
Z7			Reuse of brownfield land
Z8		Built Environment	Energy-efficient material and energy star purchase usage for equipment, appliance, and building design,
Z9			Efficient lighting installed in city buildings
Z10			Efficient lighting installed in city streetlights
Z11			Alternative clean energy and water technologies and supply in its operations, building and for commercial and industrial building and operations,
Z12			Energy demand reduction program and obligatory requirements for public and private building
Z13		Urban Infrastructure	Alternative and renewable energy sources,
Z14			Landfill sites for energy recovery,
Z15			Provision of alternative water resources,
Z16			İncentives less water and energy usage
Z17			Waste management and recycling for communities
Z18			More energy efficient systems usage in urban infrastructure
Z19			Energy and water demand reduction campaign
Z20		Transportation	Adequate public transportation and intensives (expand mass transit)
Z21			Low carbon transport infrastructure such as community-wide hike and bike trails, bicycle lanes
Z22			Fleet replacement and fuel switching(efficient, alternative and hybrid fuel vehicles)
Z23			Non-motorized transportation (bike lines)
Z24			Public awareness campaign
Z25			Clean technology implementation
Z26			Limitation of mobilization (employee transport plan, Traffic calming, driving and parking restriction)
Z27		Carbon Capture and Storage	Carbon capture and storage technologies
Z28			Tree-planting program
Z29			Restoration for preservation of carbon sink,
Z30			Carbon-offset scheme
Z31			Education awareness campaign
Z32	Adaptation		Heating and cooling services and designs in building
Z33			Energy and water saving and efficiency
Z34			Storm and flood protection management
Z35			Freshwater and groundwater treatment and design
Z36			Reducing urban Heat island effect and vulnerability to extreme heat (mass transit systems, building codes, tree planting, etc.)
Z37			Land using planning(open space as buffer zone for flooding)
Z38			Blue and green infrastructure
Z39			Early warning systems
Z40			Healthcare systems
Z41			Education awareness campaign and behavior-based changing

After content analysis for the first phase of the study, corresponding the local climate change actions of each metropolitan municipality has been classified in the excel sheet in sectoral basis. After weighting score of the frequency of the municipality climate activities, MCCAS score was calculated from total 41 climate activities. The weighted score of local climate change activities also provides a comparison among municipalities.

In the next stage of the research, it was decided to run the ordinary least square (OLS) regression analysis to determine the extent to which 15 different explanatory variables including socioeconomic, stress and risk factors that have an impact on MCCAS. Due to having many explanatory variables and small n-sample size (n = 29), classification of the independent variables under appropriate heading was needed to reach the reliable result of the regression model. It was decided to apply *reliability analysis* because of not forming rational groups with factor analysis or other statistical grouped application. Then, three different statistical reliable indexes (socio-economic, stress and risk) have been established with average standardized values of the each index. In particular, results of the reliability analysis and *Alpha values* were taken into account for creating different index categories. Due to having low alpha values, some variables were not included in the research model. Afterward, 29 metropolitan municipalities in Turkey according to the reliability index value were ranked based on these three index categories. In the results of the research, seven different models from the ordinary least square regression analysis are formed.

Main assumptions of the ordinary least square regression analysis was tested with appropriate statistical analysis such as: *beta values, the correlation coefficient and VIF values* for multicollinearity problems among variables, *Jarque Bera test for testing normality distribution* of the variables and standard errors, White test for evaluation of constant variance of the error terms and *heteroscedasticity assumptions*, *Durban -Watson* test for autocorrelation assumption, and other statistical tests. Moreover, correlation analysis by SPPS was conducted for determination extent of which relation between variables and MCCAS values within 95 % confidence interval.

5.1.2 Validity and Reliability

The reliability and validity are two primary criteria for a research study. It is not possible to evaluate validity (trustworthiness) with statistical tests in a qualitative research study as in quantitative research. The case and phenomenon should be evaluated in a holistic manner and used some auxiliary methods conducted if necessary to test validity in a content analysis (Yıldırım and Şimşek, 2008: 256). To this end, several proper criteria and instrument were followed to build validity during data collection, analyses, and interpretation at the each phase of the research. For instance, not only annual reports of metropolitan municipalities but also strategic plans were evaluated with content analysis to determine local climate change initiatives in the study. In other words, after the coding process, classifying under certain themes categories, it was tried to see the extent of which obtained data represents a real condition in Turkey by the correlation between both Annual action reports and strategic plans results (Internal validity). In addition, data obtained was reviewed by experts and scholars in the field and the unclear matter was revised several times (for triangulation). Moreover, content analysis was conducted with at least two people on the same table to eliminate researcher`s bias in the study. On the other hand, it was tried to pay action for generalization issue, and transformation of findings for similar sample group (external validity) with more sample size covers all metropolitan municipalities except for Mardin. In this regard, it is possible to claim that generalizations can be made with 29 metropolitan municipalities in this study.

Reliability can be used as criteria for qualitative research. Due to being social phenomena and conceptions, many factors could be effective and each one has scientific and originality. In this regard, studies in the literature have low reliability because of small n-sample size and case study method. However, in our study, usage of standardized measurement with the high sample with qualitative and quantitative approaches increases consistency and replicability (reliability) of the findings concerning local climate change activities in Turkey. It is also possible to use this methodological framework to evaluate other municipalities` local climate change actions. Even though research aims might be different; there would not have been a significant shift in the findings. As previously conducted studies, the different method could

be formed to reach the same result, but in this case, concerns about validity problems would increase. Finally, in the quantitative analysis that consists of the second stage of the research, reliability, and validity of results in the regression analysis were tested with the several statistical techniques such as Cronbach Alpha, Adjusted R^2.

5.1.3 Limitation and Assumption of the Study

It is possible to claim that lack of data concerning climate change at the local level in Turkey explains why the literature is dominated by case studies even if limited. That research using different methodological approaches apart from case study as seen almost all academic works still has several limitations that need to be highlighted.

First and significant limitations of the study are associated with units of analysis and selection of 29 metropolitan municipalities as research sample. Only, local climate change actions are being evaluated for metropolitan municipalities in Turkey. Other actors such as the provincial organization of the central government, development agencies, the private sectors, universities, NGOs, local media and city dwellers, etc. who influence on city administration were excluded from the study. The local level climate protection initiatives performed by all actors including public and private sectors could have been evaluated to see the `bigger picture` and for the perfect measure on that issue, which might be an inspiration for future studies. In addition, province and district municipalities were focused on the researchers which are considerably active on climate change protection with city networks.

Ensuring the integrity of research and achieving scientific results, several important documents such as the OECD (2010), UN- Habitat report (2011) and scientific studies as Krause (2011) has been benefited to form MCCAS index score. However, the second limitation of the study might be associated with the possibility that many actions and initiatives outside existing practice index could be possible at the local level.

Another major limitation of the study is related to document analyzes conducted in the first stage of the research. During document analysis, several local climate actions that could be

evaluated with mix or difference climate governance modes, apart from main four modes were encountered. Another limitation encountered in the second stage of the study is associated with main and unavailable data for possible factors which have an impact on metropolitan municipality's climate change initiatives. In the study, only factors mostly cited in the literature and appropriate ones for Turkey` social, economic and political condition were included, and several ones were excluded from the research analysis such as median household income, hazard causality, carbon employment, public political attitude, degree of interest group in the society, and leadership etc. Moreover, some variables creating multicollinearity problem and not explaining MCCAS values sufficiently were excluded from the analyses. Finally, each one of local climate change initiatives observed was averaged to reach to MCCAS, which might be another limitation of the study.

5.2 Findings and Discussions

The local governments, in particular, metropolitan municipalities, have persuaded a variety of local mitigation and adaptation actions based on the extent of their political power, functions, and capacity mainly determined by the central government in Turkey. Indeed, not only local governments performs these local climate protection actions in their administrative border by themselves, but also they cooperate with other related public and private stakeholders as a compulsory or and voluntary basis. In particular, metropolitan municipalities In Turkey have high level legislative and executive responsibility on a variety of local policies and strategies including land use planning, waste and recycling management, transportation, housing and social services, etc. especially with new regulations (as the law of 5216 in 2004 and 6360 in 2012).

Metropolitan municipalities in Turkey are referred as critical stakeholders for determination and implementation of local policies strategies and master plans that are closely associated with climate change in the cities. Indeed, there has not been a compulsory duty for municipalities to address climate change in the cities, and it is not priory for them at present. Nevertheless, energy and water efficiency or other local services that are linked with the

climate change are seen preliminary working areas for municipalities, that is the main reason of why implicitly not explicitly climate change actions were taken into account in the study. To this end, this chapter provides comprehensive results of document analysis of annual action plans and strategy plans of the metropolitan municipalities in Turkey based on modes of climate governance framework to reply the first tier of the main research question. Afterward, it presents empirical analysis results of the study to answer the question of why some metropolitan municipalities have great initiatives and ambitions on local climate protection actions, which is a link to the second tier of the research question in the study.

5.2.1 Analysis of Climate Change Initiatives Adopted by Metropolitan Municipalities in Turkey through Modes of Local Climate Governance Framework

Based on findings of the study, in Turkey, it is possible to claim that all metropolitan municipalities (except for Mardin Metropolitan Municipalities, *N=29*) perform local climate change actions through different governance mechanisms and instruments such as particular subvention; codes, tax etc. supporting coordination, cooperation with other public and private actors including community itself. Based on framework of modes of climate governance proposed by Bulkeley and Kern (2006) as self-governing, provision, enabling and regulation, it was found that each metropolitan municipalities in Turkey have persuaded local climate actions through certain one of modes of climate governance, or as a combination of those at a certain time and place.

In this regard, each mode of climate governance has a variety of pros or cons for metropolitan municipalities in Turkey. For instance, while literature indicates that self-governance (mainly focusing on municipalities own local climate activities and operation within the framework of climate protection principles) provides a short-term and visible commitment for municipalities, it is not the most common approach in Turkey. In addition, considering developed and developing countries, our literature review point out that those self-governing and enabling forms are widespread in developed countries, while provision is more commonly used the approach in developing countries. Similarly, the result of the study indicates that

provision mode (mainly focusing on goods and services delivered by municipalities), is the most prevalent approaches by about 58% of municipalities climate protection actions, while enabling mode (focusing on encouragement and subsidy of other stakeholders) is second most widespread forms with 28% in Turkey.

In that study, 2977 local climate change actions were evaluated with content analysis of annual actions reports (in reference years in the second period of Kyoto Protocol) of the metropolitan municipalities in Turkey. As seen figure 8, with respect to scope of mitigation and adaptation actions, it is found that municipalities carried out mitigation actions with rate of 78% (2307) of total actions aiming at the direct GHGs emission reductions in their administrative border, while adaptations actions with rate of 22% (670) of the total actions for elimination of risk and vulnerability to climate change, which is quite similar result that literature put forward.

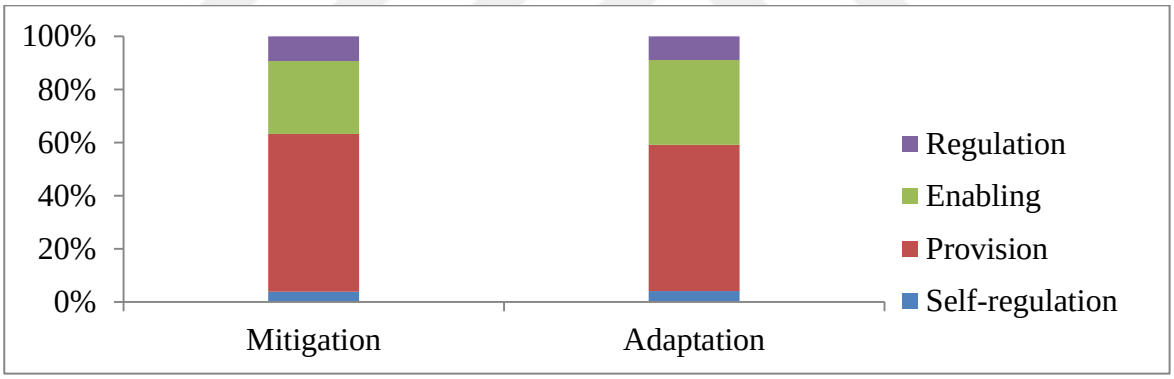

Figure 8 Local climate change actions with major modes of climate governance based on Annual Action Reports (A.R, *f = 2977*) in Metropolitan Municipalities in Turkey

As aforementioned, based on content analysis for annual action reports and strategic plans of the corresponding metropolitan municipalities in the study were conducted to determine the level of municipality` political respond to climate change. According to results of the study, 2977 from annual action reports and 1059 from strategic plans of the responsible municipalities are closely associated with implicit GHGs emission reduction or adaptation actions. Moreover, It is found that *provision modes* with the approximate rate of 60% are the most common governance form in both approaches as seen in figure 9. Furthermore,

Corresponding metropolitan municipalities in Turkey have worked to ensure reduction of GHGs emission with provision mode in low carbon Infrastructure. In particular, metropolitan municipalities in Turkey provides explicit goods and service delivered in the sectors of the waste and transportation through provision modes. To this end, it is possible to claim that despite the fact that local good and service to citizens are being delivered to private authorities besides public authority because of neoliberal market regulation in developed countries such as the UK and the USA, metropolitan municipalities have still crucial role for providing local needs of the society in Turkey, which also indicates its importance on GHGs emission reduction activities.

Likewise, given local climate protection actions, it is found that the second most prevalent governance mode applied by corresponding municipalities in metropolitan areas is enabling. On the other side, self-governance with the rate of 3.83 % is the least applied governance form based on analysis of the annual action reports, while regulation with 6.05 % is the least one based on strategic plans as seen in figure 9.

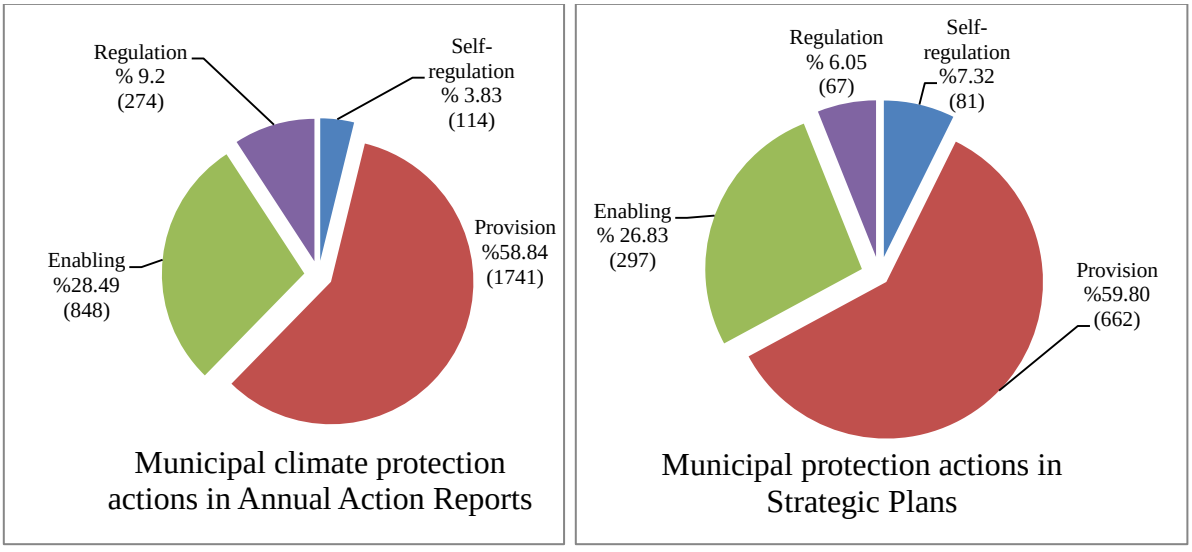

Figure 9 Local climate change actions with major modes of governance based on Annual Action Reports (A.R, *f=2977*) and Strategic Plans (S.P, *f*=1107) in 29 Metropolitan Municipalities in Turkey

Most studies point out that about sectoral basis, regulation is the most common forms in the sector of the transportation, a provision in the sector of urban infrastructure and urban development and design, enabling in built environment and carbon sequestration for mitigating GHGs emissions. If we take into account all of the activities carried out by the metropolitan municipality based on annual action reports and strategic plans in Turkey (includes mitigation and adaptation), it is found that waste management and recycling for communities (Z17), adequate public transportation and intensives for mass-transportation (Z20), restoration or preservation of carbon sink areas (Z29), storm and flood protection management (Z34), tree-planting program (Z28), and low carbon transport infrastructure such as a community-wide hike, bike trails and bicycle lanes (Z21) are some initiatives linked with local climate protection that could have higher rank compare to other local GHGs emission reduction initiatives as seen in figure 10 below.

In particular, a number of metropolitan municipalities mainly do activities because of environmental protection concerns such as waste management and recycling, rather than climate protections. Similarly, support for a low-carbon motorized vehicle, technological progress in the transport sector, encouragement of public transport usage, further service delivery with new vehicle fleets could be evaluated in a similar manner for energy saving and environmental concerns. Moreover, the preservation of green area provides significant pros not only because of mitigating GHGs emissions but also public health and aesthetic concerns.

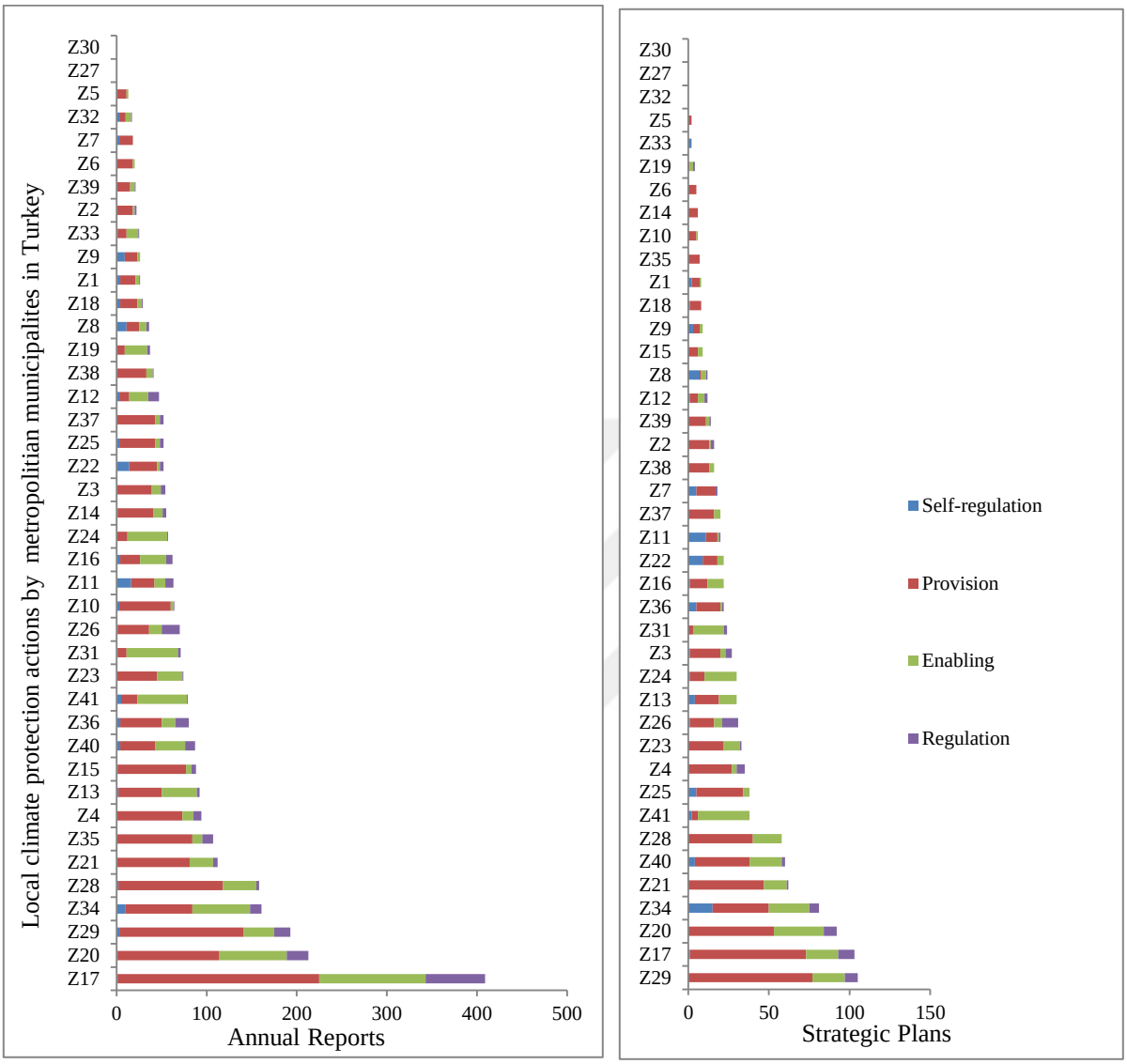

Figure 10 Local climate change actions with major modes of governance based on Annual Action Reports (A.R, *f*=2977) and Strategic Plan Reports (S.R, *f*=1107), in 29 Metropolitan Municipalities in Turkey

In urban areas, energy consumptions and GHGs emissions are closely associated with a sector of the urban development and design. In particular, to be more urban sprawl, unplanned urbanization, and less population density leads to raising energy consumption per capita and GHGs emissions. Similarly, households have trouble to access reliable and sustainable sources of energy and water in urban areas in which have unplanned urbanization and informal

settlement. In this regard, the corresponding municipalities in the metropolitan areas in Turkey have implemented a variety of measures, standards, and instruments in land-use zoning, master planning, and a mixed-use urban development that could be associated with GHGs emission reduction.

According to analysis results in that study, if we take into account all local climate change activities conducted by the metropolitan municipalities in Turkey in terms of sectoral basis, in particular, it is found that initiatives for energy and water efficiency in informal settlement and suburban development (Z4 and Z3) respectively with rate of 38% and 22% are leading actions in the sector of urban development and design. In other words, any initiatives conducted by the corresponding municipalities for dealing with unplanned urbanization, informal settlement and urban transformation with energy and water efficiency could be considered within the scope of local climate protection in Turkey as seen in figure 11. The study also indicates that proportion of the other activities performed by the respective municipalities in that sector was found to be below 10% in Turkey. If taken into account of the mode of governance, provision, then enabling form seems too weighted management modes in the urban development and design sectors, which are identical results indicated by many types of research in the literature. Indeed it is expected that metropolitan municipalities have performed their local actions associated with urban development and design through regulation modes concerning climate change because of having high-level legal power and responsibility on urban policies. However, even though metropolitan municipalities have legal power on other actors to implement their climate protection principle in their operations, it still seems that such initiatives could be applied in a voluntary manner, not compulsory.

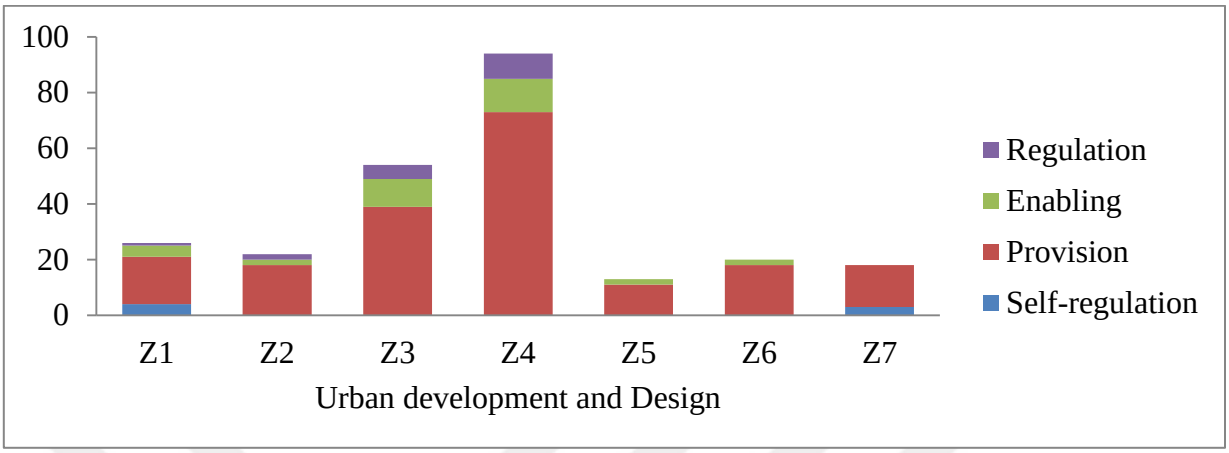

Figure 11 Local climate change actions in the sector of Urban Development and Design with major modes of governance based on Annual Action Reports (A.R, *f = 247*) in 29 Metropolitan Municipalities in Turkey

Another important sector for dealing with climate change and reduction GHGs emission is the *built environment*. In particular, energy and water efficiency building material, design and the system in the industrial, public and private sector provide significant gains for climate protection. Due to the fact that major rate of end-usage of energy has taken place from that sector, economic sanctions such as tax, certain regulatory campaign for energy efficiencies, specific codes or standards have a crucial role to decrease energy consumption that is closely linked with GHGs emission reduction. In other words, in the sector of built environment, any policies and strategies conducted by the corresponding municipalities to ensure energy efficient systems and technology, to support energy usage from alternative energy sources, energy demand reduction program are necessary for local GHGs reduction.

In this sense, findings in that study indicate that the metropolitan municipalities in Turkey has persuaded a variety of actions such as energy efficient lighting installed in city streetlights and alternative clean energy and water technologies, and supply in their commercial and industrial building and operations (Z10 and Z11) with rate of respectively 27% and 26 based on content analysis of annual action reports in reference years. Furthermore, the Energy reduction campaign in public and commercial building (Z12), and energy-efficient material and energy-

star purchase for equipment, appliance in building design (Z8) with ratio of 19% and 15% are other crucial initiatives that can be considered within the scope of the climate protection among other activities concerning built environment as seen in figure 12.

What is more, it is found that the most applied governance modes in municipalities' activities in the sector of built environment are a provision with the rate of 52%, and the regulation is the least one with the rate of 11 %, as literature indicates that enabling is comprehensive approaches in that sector. There have been several reasons for finding different results that literature claim here. Firstly, metropolitan municipalities in Turkey have significant legislative and executive responsibility and duties on energy, water, transport and waste management. To this end, they have a crucial position to steer several local policies and strategies that are closely associated with climate protection. Moreover, in particular, metropolitan municipalities have provided certain provision of local services that enables other local stakeholders to follow energy and water efficient infrastructure for GHGs reduction. Finally, enabling modes requires cooperative actions with other local stakeholders for climate protection at the local level. That could be possible in the industrialized countries that have a further neo-liberal market in energy, transport or another related sector. Each actor including public and private organizations have mutual responsibilities and control power on these sectors for developed countries, as the local provision of services is met through mainly local public authorities in developing countries.

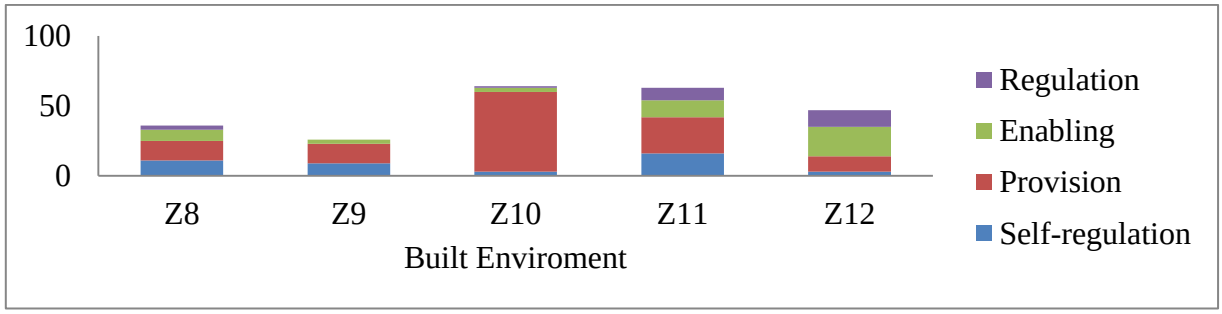

Figure 12 Local climate change actions in the sector of the Built Environment with major Modes of Governance based on Annual Action Reports (A.R, *f = 236*) in 29 Metropolitan Municipalities in Turkey

Another significant sector which has played a crucial role in reducing and shaping future trajectories of GHGs emissions including energy and water efficiency, infrastructure and sewerage systems is *urban infrastructure*. In Turkey, metropolitan municipalities together with other civil and private actors have tried to persuade a variety of mechanisms for reducing GHGs emission through the development of urban infrastructure systems. The present of alternative and renewable energy sources, landfill sites for energy recovery, provision of alternative water resources, incentives less water and energy usage, waste management and recycling, demand reduction campaign for energy and water usage are some of the local climate initiatives adopted by metropolitan municipalities concerning urban infrastructure. In this regard, it is found that the sector that local climate protection actions carried out by metropolitan municipalities is urban infrastructure with the rate of 26 % in the study. In particular, given that the urban infrastructure sectors, waste management, and recycling are main actions that municipalities perform further at the rate of 53 % (Z17 as seen in figure 13). Provision of waste services, recycling, and reuse schemes enables metropolitan municipalities to address climate change in the cities. Other actions that evaluated in that sector have a rate between 4% and 12 % in the study.

The main finding concerning urban infrastructure is associated with energy security in Turkey that is crucial for reduction of GHGs in the cities. Though metropolitan municipalities in Turkey consider climate change issue secondary objectives after energy security, certain initiatives to ensure energy security including new low carbon and renewable energy systems remains a low priority with the rate of about 6 %. Municipalities have limited support for energy efficiency measures through incentives and grants for other related energy services companies. Furthermore, development of clean energy sources such as the sun, geothermal and wind, etc. are not given priority by metropolitan municipalities in Turkey. What is more, mechanisms to generate energy from waste are another significant driver supported by clean development mechanisms for energy security. Though there have been certain supporting schemes for generation energy from waste for municipalities or other private companies in Turkey, it remains still low rank. Finally, education and awareness initiatives for energy and

water demand reduction has a crucial role in addressing climate change, but it is found that these sorts of initiatives are still limited in Turkey.

Given modes of climate governance and urban infrastructure, it is also concluded that provision modes are wide speared governance form for corresponding municipalities with the rate of 57 %, while self-governance is the least one with the rate of 2%. Main reason is that metropolitan municipalities are a significant stakeholder for the provision of local services such as energy and waste collection in the cities. So, direct provision of such local services enables metropolitan municipalities in Turkey to create low carbon infrastructure in particular demand-side management.

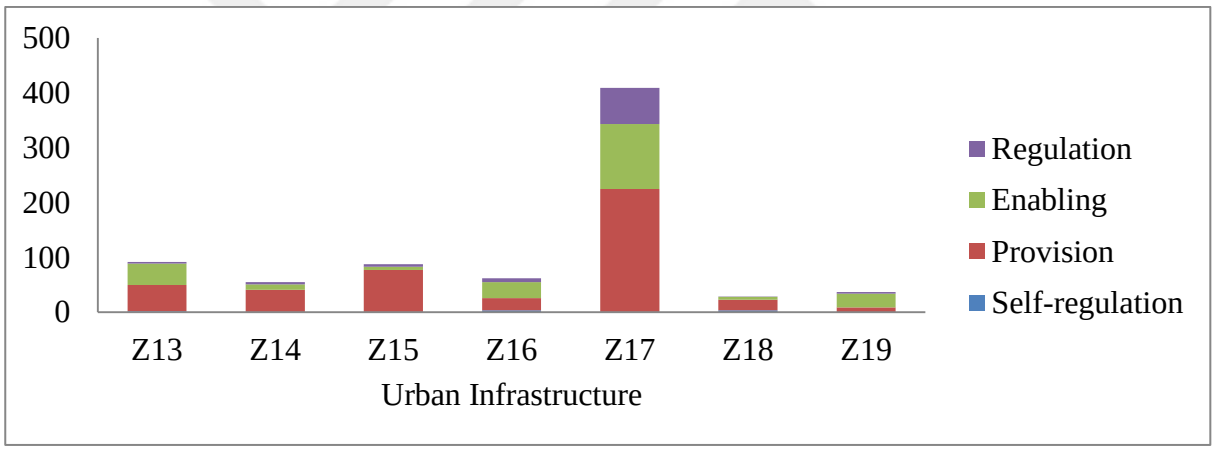

Figure 13 Local climate change actions in sector of Urban Infrastructure with major modes of governance based on Annual Action Reports (A.R, *f = 772*) in 29 Metropolitan Municipalities in Turkey

Another important sector that has a significant contribution to reducing GHGs and amount of CO_2 emissions from fossil fuel combustions is *transportation*. Although the release rate of GHGs emissions from transportation is low in developing countries compared to other sectors, it is still important due to rapid increase trajectory because of a significant increase in household income and affordability personal transportation in parallel to economic development and growth. In particular, a variety of actions performed by a municipality such as the provision of adequate public transportation and intensives low carbon transport

infrastructure, fleet replacement and fuel switching, clean technology implementation, limitation of mobilization, public awareness campaign are expressed as crucial for future trajectory GHGs emission in cities. In this regard, it is found that the most critical sectors focused by metropolitan municipalities in Turkey are transportation with the rate of 21 % compare to other sectors. In the transport sector, demand enhancement measures such as incentives for public transportation with the rate of 34%, alternative transportation and bicycle line with the rate of 18 % are most common actions conducted by metropolitan municipalities for reduction of GHGs emission in Turkey. (Z20 and Z21 as seen in figure 14). Other activities in the transport sector such as the promotion of non-motorized transportation, public awareness campaign, and limitation of mobilization have a value between 8% and 12%.

In particular, development of new public transportation systems implemented by metropolitan municipalities in Turkey is the most common initiatives compare to other actions such as trams, rail, and trains. For instance, Bus Rapid System (BRT) was implemented in a few cities such as Istanbul has played a crucial role to decrease GHGs emission because of being low cost, speed, high capacity, and easy to implement. Furthermore, another set of initiatives in transport sectors adopted by municipalities in Turkey is associated with demand reduction program. For instance, bicycle networks led by a wide range of actors and work-related mobility reduction projects in the cities are some of the initiatives implemented by municipalities in Turkey. Moreover, GHGs reductions program adopted by metropolitan municipalities through fuel and vehicles replacement in transportation is limited, but attention for new technology investment and green fleet in transportation is increasing significantly in Turkey.

Local climate mitigation actions implemented by metropolitan municipalities through the main governance modes in the transport sector are a provision with the rate of 57 %, while the least one is self-governance with the rate of 3%. Even if mass transportation is partly privatized in Turkey, municipalities in metropolitan cities have still influence transportation systems due to the determination of local green public transportations plans and education campaign, which could be evaluated as enabling modes of governance. Because of that, the enabling mode is a second most common form of governance in transportation for addressing climate change in

metropolitan cities. Even though metropolitan municipalities in Turkey have a variety of regulation tools, financial incentives for low-carbon transportation, a regulatory mechanism such as physical and parking restraint, low emission zone, congestion charge, speed control, and construction of cycle path for reduction GHGs emission from transportation in Turkey are still limited.

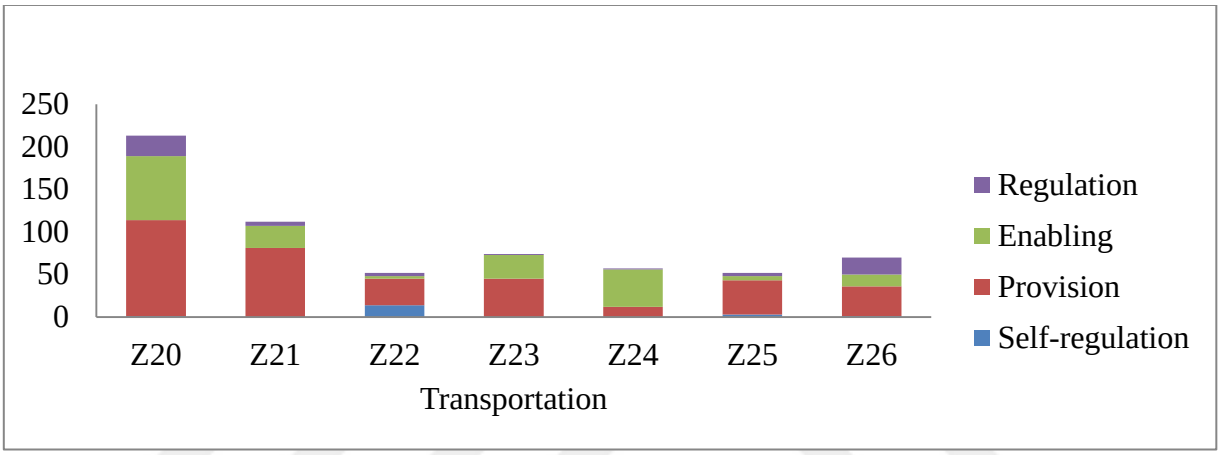

Figure 14 Local climate change actions in sector of Transportation with major Modes of Governance based on Annual Action Reports (A.R, *f= 630*) in 29 Metropolitan Municipalities in Turkey

Another sector in urban areas that is essential for reducing GHGs emissions is *carbon sequestration*. In general, Carbon sequestration includes a variety of local initiatives such as preservation and restoration of green fields and human-made carbon sink areas such as afforestation and reforestation. Similarly, the energy to be obtained from methane gasses could be evaluated in carbon sequestration activities. In this regard, carbon sequestration has the third rank compared to another sector with the rate of 14 that local government performs their climate protection actions. For instance, restoration and preservation of carbon sink and tree-planting program respectively have a rate of 46% and 37 % (Z29 and Z28 as seen in figure 15). It is also found that the promotion of the environmental awareness activities and campaigns are about by 17 % in this sector. On the other side, it is not observed any actions regarding carbon capture and storage technology and carbon-offset scheme. Though new development and growing interest in carbon capture and storage technologies, and carbon

finance through international policy instruments are common in developed countries, a limited project has been carried out in metropolitan cities in Turkey. It is also found that corresponding municipalities performers their action mainly through provision modes with the rate of 63 %, while at least self-governance with the rate of about 1 %. Indeed, the main reason of that is associated with concerns and objectives of environmental protection, not climate change protection.

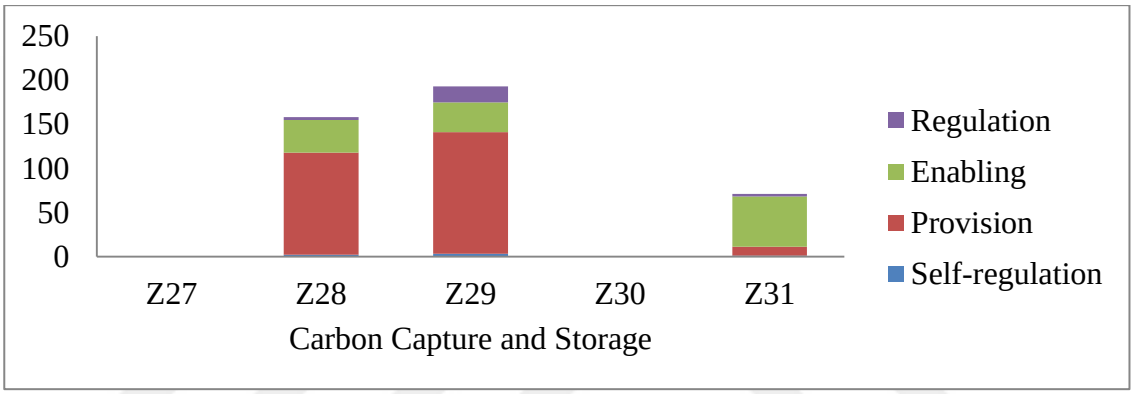

Figure 15 Local climate change actions in sector of the Carbon Capture and Storage with major Modes of Governance based on Annual Action Reports (A.R, *f= 422*) in 29 Metropolitan Municipalities in Turkey

Another major approach for GHGs reduction in the cities is the *adaptation*. In general, adaptation can be expressed as a wide range of initiatives to be taken against the risk of climate change, and new one compared to mitigation. In particular, adaptation actions implemented by municipalities in urban areas in the last decades includes heating and cooling services and designs in building, storm and flood protection management, freshwater and groundwater treatment and design, reducing urban heat island effect and vulnerability to extreme heat, blue and green infrastructure, early warning systems, healthcare systems, education awareness campaign and behavior-based changing. Literature indicates that in particular in developing countries mitigation is the most common approach compares to adaptation. So, in this study, it is found a similar result that adaptation actions have a rate of 22

% compare to mitigation with the rate of 78 %. The main reason of that could be associated lack of visible commitment in the short terms and political concerns for adaptation.

Overall, in the study, it is found that storm and flood protection management, freshwater and groundwater treatment are common actions conducted by relevant municipalities among adaptation approaches with the rate of 24 % and 16 % respectively (Z34 and Z35 as seen in figure 16). In particular, municipalities have worked to increase their capacity for storm water collection systems, ensure landscape requirement for water runoff reduction and create buffer zones in this manner. In addition, they have implemented early warning systems to reduce property damage from storm and flooding in the cities. At the same time, municipalities have performed a variety of service through fresh and groundwater management in the city. For instance, they have worked hard to develop, enhance and construct new freshwater, groundwater supplies. Similarly, they have persuaded local adaptation actions through wastewater treatment for water reuse, increasing billing rate for water use, promotion water efficiency measures, and education awareness programs (expressed as Z41 in figure 16). Consequently, municipalities have significant ambition for addressing public health problem as a priority through public education programs and health care systems (expressed as Z40 in figure 16).

Similarly, metropolitan municipalities in Turkey have provided local service, not for directly adaptation objectives, but it could be still evaluated as local climate protection initiatives. For instance, some of those adaptation initiatives have been carried out by municipalities for disaster risk reduction measures, not for climate change adaptation objectives. Moreover, it is found that metropolitan municipalities in Turkey have limited capacity, knowledge and willingness to act in addressing the risk of climate change and disaster. Each of other related adaptation actions has a value between 3% and 13%. For the adaptation actions, responsible municipalities perform their local policies mainly through provision modes with 55 %, while least with self-governance with the rate of around 4 %.

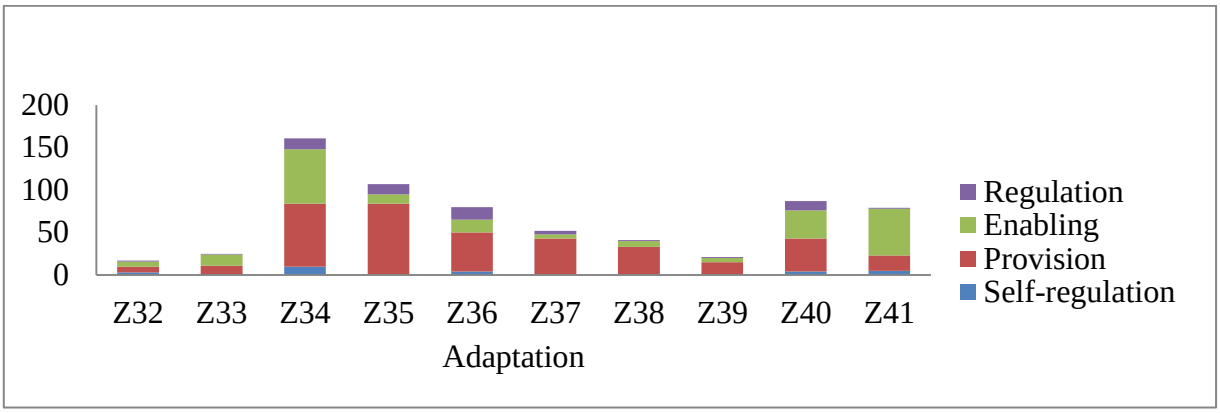

Figure 16 Local climate change actions in Adaptation with major Modes of Governance based on Annual Action Reports (A.R, *f = 670*) in 29 Metropolitan Municipalities in Turkey

Similarly, if we take into account of all municipal GHGs reduction actions in comparative and sectoral basis, it is found that urban infrastructure with the rate of 25 %, adaptation with the rate of 22 % and transportation with the rate of 21 % are widespread sectors in that municipalities have performed local climate protection action in Turkey. However, regarding modes of climate governance, corresponding municipalities have performed their local policies and strategies through mainly by provision with the rate of 58 %, enabling with the rate of 28%, regulation wit rate 9% and self-governance with the rate of 4% as seen in figure 17.

On the other hand, a similar result was found based on content analysis of strategic plans of municipalities. In this regard, the results of the study indicate that transportation with the rate of 28 % and adaptation with the rate of 23 %, urban infrastructure, and carbon sequestration with the rate of 16% are sectors in which responsible municipalities performs their climate protection aims and strategies. When considered those strategies and aims regarding governance modes, it is found that provision with the rate of 60%, enabling with 27%, self-governance with 7% and regulation with 6 % is common governance modes in responsible municipalities GHGs reduction actions. Based on those finding, the crucial point here is that regulation modes including taxes, codes, and standards, etc. that provide lots of contribution

for GHGs reductions in the cities is not common climate governance form for metropolitan municipalities inTurkey, while literature points out that regulation is more appropriate modes in the transport sector in developing countries. However, because of limited capacity for knowledge, institutionalization, finance, and technology in the metropolitan municipalities, it seems that it is difficult for municipalities to implement climate protection actions through regulations in Turkey.

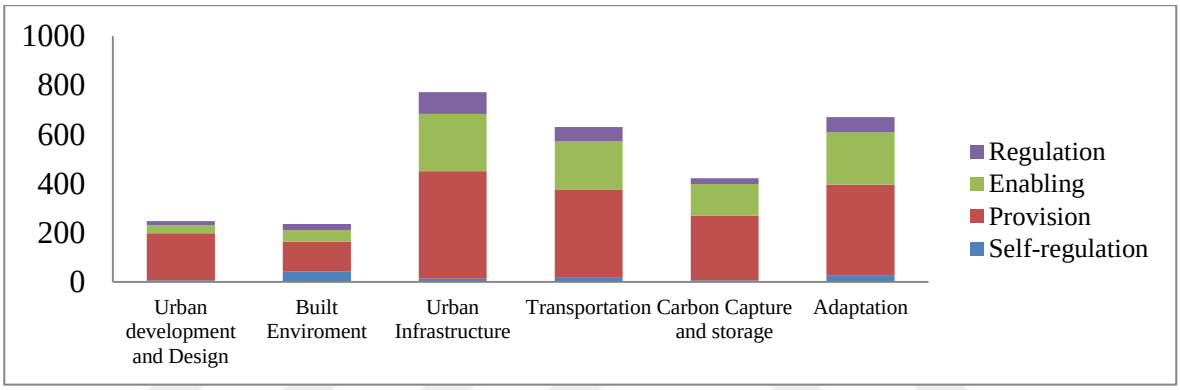

Figure 17 Frequencies of local climate change actions by sectors and major modes of governance approaches based on Annual Action Reports (A.R, *f = 2977*) in 29 Metropolitan Municipalities in Turkey

All in all, among local climate protection activities adopted by the municipalities in Turkey, waste management and recycling is widespread with the rate of 18% in the urban infrastructure sector. Similarly, in the transport sector, adequate promotion for public transportation, intensives to mass transportation with 9% and low carbon transport infrastructure such as community-wide hike and bike trails, bicycle lanes, etc. by 5% has high ranked among all local level climate actions in Turkey. In addition, the restoration and preservation of carbon sink with 8%, the tree-planting programs by 7% were found to be the most common operations in carbon capture and storage sector. Finally, storm and flood protection management by 24%, freshwater and groundwater treatment and design with 16% and healthcare systems with 13% are most prevalent actions implemented by responsible municipalities in Turkey.

In general, if taken into account result of content analysis with annual action reports of the metropolitan municipalities, it is found that İstanbul, İzmir, Bursa, Konya, and Kocaeli are some pioneering metropolitan municipalities on local climate protection actions in Turkey. Given sectoral analysis, İstanbul, Kocaeli, and Bursa for adaptation, Izmir, Istanbul, and Eskisehir for carbon sequestration, İzmir, Istanbul, and Kocaeli for transportation, are leading municipalities. In addition, Istanbul, Kocaeli, and Antalya for urban infrastructure, Konya, Bursa, Antalya for built environment and, İstanbul, Konya, and Antalya for urban development and design are pioneering municipalities in Turkey as seen in the following figures.

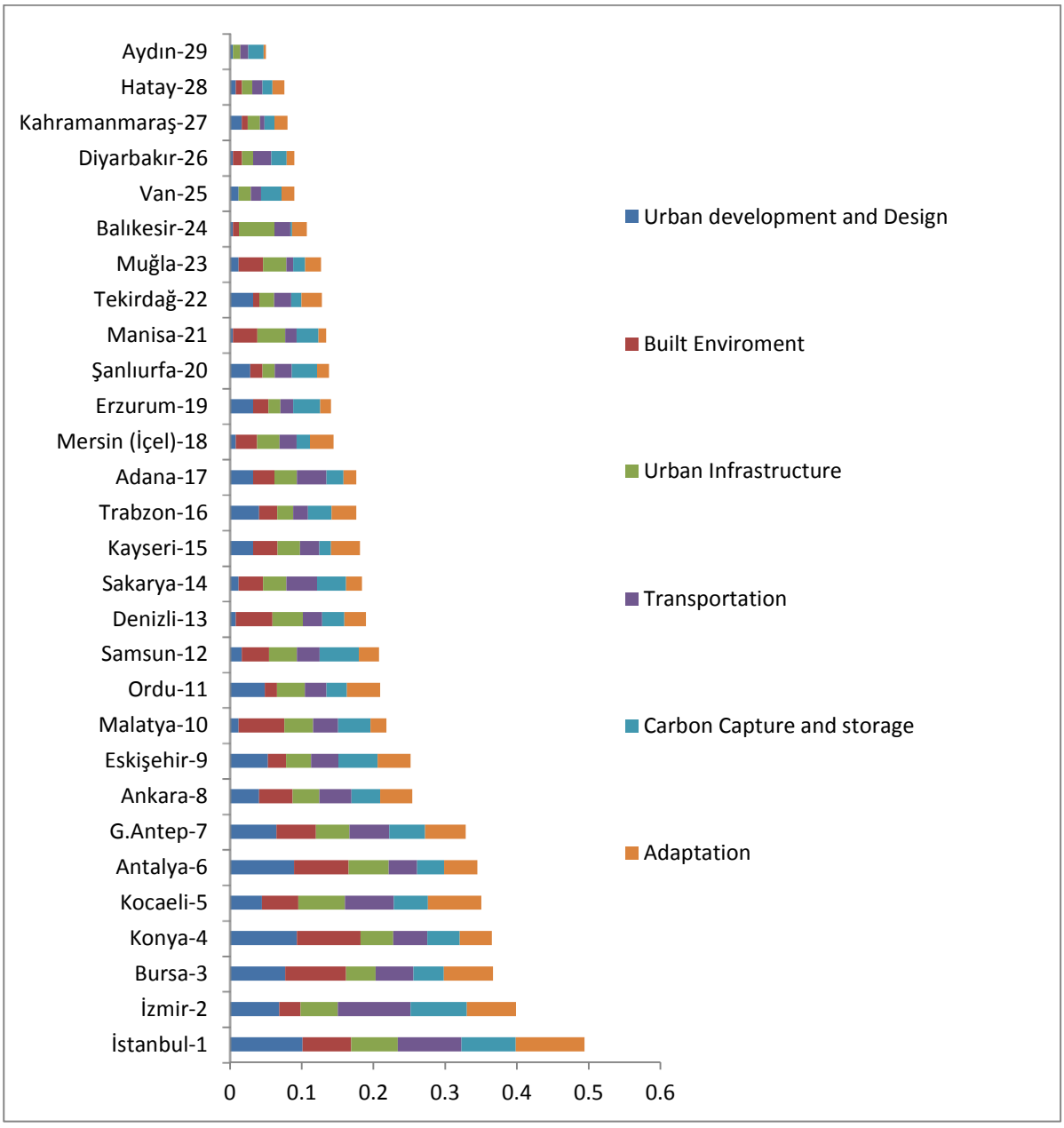

Figure 18 Local climate change initiatives by sectors and 29 metropolitan municipalities in Turkey based on Annual Action Reports (*f = 2977*)

To sum, a number of scientific studies examining what kind of policies and strategies are being adopted by municipalities for dealing with climate change, and what sort of difficulties they have encountered in this process have been available in the literature. Based on findings in the first part of the study, it could be claimed that metropolitan municipalities in Turkey

have worked to implement local climate protection actions indirectly based on their political power, knowledge, financial, technological and personnel capacity in each sector. However, these findings are still inadequate in explaining why some municipalities in Turkey are more prone to climate change protection initiatives compare to others. In other words, further explanations to address the question of why some municipalities have performed more initiatives, developed and implemented policies and strategies for carbon reduction in Turkey, while some of those remains reluctant are needed to be investigated. To this end, in the first part of the study, a variety of initiatives related to climate change and political response adopted by metropolitan municipalities in Turkey were evaluated through modes of climate governance framework. The major finding *is that some metropolitan municipalities in Turkey such as Istanbul, Izmir, Bursa, Konya, and Kocaeli have performed further actions (implicitly) mainly through provision modes of governance for GHGs reduction compare to others, in particular in areas of urban infrastructure and transportation.*

5.2.2 Major Factors on Local Climate Change Initiatives in Turkey

The second part of the study mainly focuses on certain intrinsic factors such as socio-economic, stress and risk that have a significant impact on the explanation of the variance of the climate change protection policies and strategies adopted by metropolitan municipalities in Turkey. Thusly, results of the study point out that local GHGs reduction actions and strategies adopted by municipalities in Turkey vary from city to city based on social-economic, stress and risk factors. Descriptive statistics for dependent and independent variables used in the study have been presented in table 14.

In the study, the extent of which 29 metropolitan municipalities climate change protection actions are evaluated as a result of the determination of municipalities` MCCAS. Main three different groups were formed based on reliability index analyses from explanatory variables which have a significant effect on MCCAS. Firstly, because of significant correlation between socio-economic capacity and willingness to local climate protection initiatives in the cities, those socio capital capacities are included in the study. Socio-economic factors consist of

political affiliation, education rate, the cost for environmental service per capita, median income, person participation on NGO in the city, electricity consumption per capita, and employment rate. In this regard, the literature indicates that the cities that have high level social, civic capacity and economic growth perform further GHGs reduction actions. For instance, Mayor of the municipalities has significant control and executive power and responsibility for urban policies including the local climate change protection initiatives. In particular, whether the mayor from the ruling party in Turkey or not might be a major factor affecting the local climate protection initiatives. Similarly, the rate of the NGO members to the total population (%) in the city is another significant indicator of the environmental consciousness. In addition, education level (%), median income (TL), employment rate (%), and electricity consumption per capita (kWh) illustrate the social and economic viability of the city in a similar way. Thus, it is possible to claim that the higher social capacity in the city led to being more consciousness about the environmental issues, which cause high pressure on the relevant municipalities to perform more activities regarding climate change protections.

Moreover, stress factors include six different variables such as car dependency, air pollution, SO2 (g / m^3), and PM10 (mg / m^3), Waste (kg / person / day), Population density (person/m^2) to determine the degree that the metropolitan cities creates stress for climate systems. Stress factors used in the study is those of that significantly influence dynamics of the climate system, especially regarding CO_2. For instance, the high frequency of vehicle and high population density leads to release CO_2 into the atmosphere that results in significant change in the main dynamics of climate change. Population density is measured as the sum of the total population divided by surface area (km_2). The high population density is closely related to the provision of energy and resource efficiency. Thus, population density increase, energy usage, and resources consumption rate would be decreased. Similarly, waste and air pollution are also explained as in among stress factors that affect the fundamental dynamics of climate change in a negative way. Cities with high air pollution and the amount of waste per person impose greater stress on climate systems. Similarly, car dependency is explained as significant stress factor that is probably less likely to implement policies and strategies for GHGs reduction because of resident's reaction.

Finally, three georeferenced risk factors were measured and analyzed including coastal proxy (dummy variables), temperature and precipitation deviation (C^0) to determine the degree of which municipalities initiatives for climate protection in the cities. It is expected that the most sensitive to impacts of the climate change, the more prone to local climate change protection actions. For instance, the municipalities that exposed the possible risk of sea rise, extreme temperatures and precipitation regime change would have further enthusiasm for GHG reduction actions in cities.

Table 14 Descriptive statistics for dependent and independent variables analyzed in the study

		Mean	*Standard Error*	*Standard Deviation*	*Kurtosis*	*Skewness*	*Max.*	*Min.*	*N*
Dependent variable	MCCAS	1.345	0.172	0.925	-0.126	0.966	0.177	3.633	29
Socio-Economic Factors	Political Affiliation (0-1)						0	1	29
	Education rate (%)	7.99	0.48	2.58	-0.51	0.15	3.21	13.13	29
	Cost(TL) for environmental service per capita	765216315	276186294.5	1487308713	23.1789	4.63683	92045036	8121878385	29
	Median Income (TL)	9897.89	514.75	2772.04	-0.77	-0.48	4528.06	14608.50	29
	Environmental NGO (%)	0.101	0.016	0.085	16.259	3.635	0.024	0.492	29
	Electricity consumption(kWh)	2730.55	276.20	1487.37	4.03	1.78	744.00	7268.00	29
	Employment rate (%)	45.73	0.95	5.13	-0.13	-0.87	35.00	52.70	29
Local Climate Stress Factors	Car dependency (%)	95137.48	16359.62	88099.23	2.145	1.433	6806	366777	29
	Air Pollution;SO2(μg/m³)	14.81	2.13	11.48	4.58	2.13	3.75	50.50	29
	Air Pollution; PM10 (μg/m³)	60.93	3.58	19.28	1.53	1.14	33.00	113.24	29
	Waste (kg/person/day)	1.04	0.04	0.21	2.89	1.12	0.67	1.73	29
	Population density(person/km^2)	229	88	473	26	5	31	2633	29
Local Climate Risk Factors	Coastal Proxy (0-1)						0	1	29
	Temperature Deviation(C^0)	7.10	1.70	9.18	4.34	-0.80	-23.84	28.96	29
	Precipitation Deviation(C^0)	-5.30	6.80	36.62	1.41	-1.24	-93.57	56.47	29

In the next phase of the study, bivariate correlations analysis was conducted to examine the degree of three different factors on local climate mitigation and adaptation initiatives adopted by municipalities (MCCAS or Y1). In this regard, Table 15 presents essential correlation results concerning dependent and independent variables in the analysis. It is found that there has been a significant relation between MCCAS (Y1) and other three exploratory variables, where p = <.05. For instance, results of correlation indicate that there has been a significant correlation between socio-economic factors such as environmental cost and the median household income and local climate initiatives adopted by corresponding municipalities, where p = <.01 (r = .620 and. 552). Similarly, there has been a significant correlation between climate protection actions and political affiliation of responding municipalities mayors whether mayor elected from ruling party or not (Dummy variables) (r = .375). Finally, it is also found a positive correlation between socioeconomic factors such as education rate, NGO capacity, electricity consumption, employment rate and MCCAS (Y1).

Similarly, it is found that local climate protection actions in Turkey are determined by local stress factors such as air pollution, waste, population density, car dependency, etc. In this regard, it is found a significant positive relation between vehicle numbers on the road and population density with MCCAS (Y1), where p = <.01. On the other hand, it is not determined any significant relation between air pollution (SO_2 and PM10), and waste amount per capita with local GHGs emission reduction actions adopted by corresponding municipalities (respectively r = .023, r = .087, r = .027).

Finally, it is also well-known that local climate protection policies and strategies are also determined by risk and vulnerability level of the cities to climate change. Thusly, the city that has high vulnerability level for climate change are expected to be further local climate policies and strategies implemented. To this end, in the study, coastal proxy, temperature, and precipitation deviation were measured and analyzed to determine vulnerability level of the cities. As a result, it found that there has been a modest correlation between three risk variables and MCCAS (Y1) in the study (respectively, r = .129, r = -.291; r = .186) as seen in the following table.

Table 15 Result of correlations analysis between local climate protection initiatives and three explanatory variables

		Y1	*X1*	*X2*	*X3*	*X4*	*X5*	*X6*	*X7*	*X8*	*X9*	*X10*	*X11*	*X12*	*X13*	*X14*	*X15*
MCCAS	***Y1***	_															
Political Affiliation	***X1***	.375*	_														
Education rate	***X2***	.309	-.114	–													
Cost for environmental(TL)	***X3***	.620**	.154	.412*	_												
Median Income	***X4***	.552**	.154	.508**	.473**	_											
Environmental NGO	***X5***	.332	.189	.650**	.357	.319	_										
Electricity consumption (kWh)	***X6***	.277	-.133	.236	.455*	.400*	.098	_									
Employment rate	***X7***	.142	.073	.463*	.316	.701**	.122	.250	_								
Car Dependency	***X8***	.518**	-.148	.433*	.371*	.445*	.144	.115	.061	_							
Air Pollution;SO2(μg/m³)	***X9***	.023	-.086	.041	-.239	.151	.004	.182	.131	-.111	_						
Air Pollution; PM10 (μg/m³)	***X10***	.087	.261	-.161	-.072	-.060	.016	.036	.095	-.055	.165	_					
Waste (kg/person/day)	***X11***	.027	-.211	.389*	.215	.400*	.091	.124	.356	.391*	.269	.137	_				
Population Density	***X12***	.552**	.148	.274	.428*	.339	.268	.095	.004	.619**	-.128	-.028	.077	_			
Coastal Proxy	***X13***	.129	-.133	.414*	.443*	.567**	.054	.364	.296	.371*	.126	-.265	.193	.258	_		
Temperature	***X14***	-.291	-.126	-.087	-.136	-.066	-.164	-.130	.021	-.125	-.351	.117	-.158	.141	-.072	–	
Precipitation	***X15***	.186	.178	.048	.046	.069	.036	.122	.063	-.097	.254	.354	.207	-.186	.131	-.010	_

*. Correlation is significant at the 0.05 level (2-tailed);**. Correlation is significant at the 0.01 level (2-tailed).

After correlation analysis, three different statistically reliability indexes were created for each three major factors including 15 exploratory variables that have a significant impact on MCCAS. These reliability index values are presented in table 16. Because of small sample size, reliability index analysis was used to create at least three indexes. For the creation of each group, factor analysis was not used because of the sample size (at least, ten times of independent variables must be equal to sample units in the study) and not found rational classification among variables in each group. In this regard, the climate change socio-economics index (*alpha* =, 566) averages standardized values (*z*-scores) for environmental service cost (TL), environmental NGOs participation, and electricity consumption per capita (kWh). The climate change stress index (*alpha* =. 764) averages *z* scores for population density, car dependency measures. Finally, the climate change risk index (*alpha* = .232) averages standardized scores on coastal proxy and precipitation deviation (C^0) as seen in table 16.

Table 16 Reliability statistics for socio-economic, stress and risk indices in metropolitan cities in Turkey

	Index Items Correlation	***Cronbach's Alpha***	***Variance***	***SD***
Socio-Economic Index		**,566**	**4.818**	**2.195**
Cost for environmental service(TL)	,548			
Environmental NGO	,266			
Electricity consumption (kWh)	,335			
Local Climate Stress Index		**,764**	**3.237**	**1.799**
Car Dependency	, 619			
Population Density	,619			
Local Climate Risk Index		**,232**	**2.263**	**1.504**
Coastal Proxy	,131			
Precipitation	,131			

Based on classification of metropolitan municipalities in terms of these three statistically reliability indexes, it is found that Kocaeli, Ankara, İstanbul, İzmir and Tekirdağ metropolitan municipalities were ranked in first in terms of socio-economics and civic capacity indexes, On

the other side, Erzurum, Malatya, Van, Sanliurfa, and Diyarbakır that are mainly located in south-eastern part of the Turkey were ranked last. In addition, İstanbul, İzmir, Antalya, Hatay and Manisa have the first rank, while Ordu, Diyarbakır, Malatya, Van, and Erzurum were the last rank in the way of stress factors. Finally, based on risk and vulnerability level of the metropolitan cities including coastal proxy and precipitation deviation, results indicate that Tekirdağ, Mersin, Balıkesir, Muğla, and Antalya were in the first, fifth rank, while Malatya, Hatay, Eskişehir, Manisa, and Erzurum has the last one as seen in Table 17.

Table 17 Metropolitan cities in Turkey based on socio-economics, Climate Stress, and Risk indices

Rank	***City***	***Socio-economic index***	***Rank***	***Climate stresses index***	***Rank***	***Climate risk index***
1	Kocaeli	2.12	İstanbul	4.08	Tekirdağ	1.04
2	Ankara	1.49	İzmir	1.00	Mersin (İçel)	0.87
3	İstanbul	0.90	Antalya	0.89	Balıkesir	0.83
4	İzmir	0.84	Hatay	0.40	Muğla	0.77
5	Tekirdağ	0.71	Manisa	0.29	Antalya	0.74
6	Eskişehir	0.54	Mersin (İçel)	0.20	Bursa	0.73
7	Antalya	0.49	G.Antep	0.20	Aydın	0.69
8	Bursa	0.38	Adana	0.18	Kocaeli	0.57
9	Samsun	0.26	Muğla	0.13	Sakarya	0.54
10	Sakarya	0.22	Aydın	0.03	Trabzon	0.53
11	Mersin (İçel)	0.10	Bursa	0.01	Ordu	0.44
12	Denizli	0.02	Konya	-0.06	İzmir	0.39
13	Muğla	-0.11	Kocaeli	-0.07	Adana	0.39
14	Kayseri	-0.14	Balıkesir	-0.09	Samsun	0.32
15	Adana	-0.17	Ankara	-0.13	G.Antep	0.30
16	Hatay	-0.23	Şanlıurfa	-0.24	İstanbul	-0.10
17	Aydın	-0.25	Denizli	-0.29	Kayseri	-0.10
18	Balıkesir	-0.26	Samsun	-0.38	Konya	-0.23
19	K. Maraş	-0.28	Sakarya	-0.40	Van	-0.33
20	Konya	-0.32	Tekirdağ	-0.44	Ankara	-0.36
21	Manisa	-0.41	Trabzon	-0.52	Şanlıurfa	-0.38
22	Trabzon	-0.46	K.Maraş	-0.53	Denizli	-0.39
23	Ordu	-0.48	Eskişehir	-0.54	Diyarbakır	-0.63
24	G.Antep	-0.51	Kayseri	-0.56	K.Maraş	-0.67
25	Erzurum	-0.64	Ordu	-0.56	Malatya	-0.71
26	Malatya	-0.70	Diyarbakır	-0.57	Hatay	-0.74
27	Diyarbakır	-0.86	Malatya	-0.63	Eskişehir	-1.07
28	Şanlıurfa	-1.10	Van	-0.66	Manisa	-1.69
29	Van	-1.13	Erzurum	-0.71	Erzurum	-1.75

In the final stage of analysis, we tested the extent to which indices of socio-economic, stress, risk capacity influence on MCCAS to determine the degree of municipality's commitment to dealing with climate change with regression analysis. Ordinary least squares regression results with unstandardized coefficients and standard errors are presented in Table 18. We run seven different models with numerous combinations of variable tested. As seen table below, coefficients are relatively stable across models.

Socio-economic factors are significantly and positively associated with metropolitan municipalities 'involvement in climate change protection initiatives (β = .722, p = .003). As socio-economic capacity increases in the cities, the willingness of the metropolitan municipalities for climate change protection initiatives increases. Approximately 25% of the variation in the percentage of metropolitan municipality's climate change protection actions is explained by the social-economics predictors such as electricity conception per capita, the number of people involved in any environmental NGO and cost for environmental services delivered. In addition, the climate change stress index is the strongest predictor of indices in the analysis, alone covering almost 33% of the variation in our dependent variable (as seen in model 2). Climate change stress factors are significantly and positively associated with metropolitan municipalities 'involvement in climate change protection initiatives (β = .661, p = .001) in Turkey. Results also point out that climate change risk factors are insignificantly correlated with MCCAS (β = 0.279, p = .275). On average, the threat of sea level rise, and patterns of excessive precipitation and temperature does not provide sufficient motivation for metropolitan municipalities to engage in climate protection policies implicitly.

Among binary model in the table, Model 4 involving socio-economics and stress index factors provide the greater exploratory results in the analysis. (For socio-economic index β = 0.494, p =< .005, for stress index β = 0.516, p = p =< .001). Approximately 42 % of the variation in the percentage of metropolitan municipality's climate change initiatives is explained by stress and socio-economic factors. Similarly, it is found in the model 5 stress factors such as population density and car dependency and risk factors as a coastal proxy and extreme precipitation pattern change explain only 32 of local climate protection action adopted by corresponding

municipalities in Turkey. Model 6 including social economic and risk factors are found the least exploratory power on MCCAS values (Adj. R^2=.226). Based on model 7, approximately 40% of the variation in the percentage of metropolitan municipalities` climate change initiatives is explained by predictors. In the Model 7, socio-economic and stress variables found as significant, while risk is not (in turn, β = .478; β = .516; β = .05) as seen in the following table. Consequently, based on OLS regression analysis, it is found that the highs exploratory factors for determining the degree of local climate protection actions adopted by metropolitan municipalities in Turkey are stress, then socioeconomics factors.

Table 18 Ordinary Least Square (OLS) Regression Models predicting local climate change initiatives adopted by metropolitan municipalities in Turkey

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Socio-economic	.722**			.494**		.703**	.478*
Std. Error	.223			.210		.24	.224
Climate stress		.661**		.516*	.641**		.516**
Std. Error		.172		.171	.174		.174
Climate risk			.279		.181	.058	.05
Std. Error			.205		.208	.234	.205
Constant	0	0	0	0	0	0	0
Std. Error	.161	.152	.185	.141	.153	.163	.143
Adjusted R-squared	.253	.329	.009	.426	.323	.226	.405
Std. error estimate	.864	.819	.996	.758	.823	.88	.772
F-test	10.467	14.748	1.242	11.392	7.683	5.083	7.34
N	29	29	29	29	29	29	29

Note: Cell entries are unstandardized OLS regression coefficients with standard errors. Null hypothesis test of coefficient equals zero. * p= <.05 **p = <.01.

All in all, it is determined that there have been many factors which have a significant impact on acquisition of local climate protection policies and strategies adopted by municipalities in Turkey. Among these factors, in particular, stress factors have strong exploratory power on change on local climate change action initiatives compare to socio-economic well-being and vulnerability level. In particular, results of the study indicate that certain type of truck on the

road and high population level has a significant impact on acquisition of local GHGs reduction initiatives by corresponding municipalities in Turkey. Similarly, socio-economics factors indicate high level environmental, economic and social capacity in the city, so it is expected to observe that municipalities perform further local climate actions in those cities. Put it differently, socio-economic factors including environmental cost, participation in NGO in the city and electricity consumption per capacity have a significant impact on the acquisition of local GHGs reduction actions by metropolitan municipalities in Turkey. Moreover, the study found that risk factors such as sea-level rise, temperature, and precipitation deviations are not associated with local climate initiatives in Turkey. This result could be evaluated that for developing country such as Turkey that have low vulnerability and risk for climate change because of certain geopolitical position, only stress and socio-economic measures would explain municipalities` commitments to climate protection. On the other side, some developed countries such as the UK and the USA in which all nations or just some part of the countries are exposed to climate change impact lead to local authorities to take further political respond.

To sum, the cities that contribute GHGs emission further, have high desire on local GHGs reduction actions. So, the city that has high socio-economic capacity has much more desire in enthusiasm on local climate action. Finally, possible risk impact of the climate change in cities that has not any historical events is not taken into account by local decision makers and politician during local plans and strategies.

CHAPTER VI

CONCLUSION

In conclusion, this part points out overall findings from literature review concerning local governing for mitigation and adaptation in the world and Turkey as a case study and specific recommendations that may be drawn from that study for scholars, decision makers, planners and practitioners in the cities and future studies.

Modern industrial societies led human to increase production and consumption activities, and over-using natural resources. The humankind experienced the impact of these changes more strongly especially in the second quarter of 20th century and started to face environmental problems on a global scale. In particular, climate change is one of the primary global environmental challenges which involve mutual dependency, relationships and many areas of politics. Concerning its cause and solution, the issue of global climate change as an environmental problem requires the involvement of several actors in various administrative level and involves a high degree of complexity and uncertainty as well.

Scholars argue that criticisms and debates related to how global climate change governance should be carried out, have reached a peak. Although discussions on climate change and its possible effects on social life and ecosystems at present or in future still continue, it is already accepted by the majority of the society as one of the global environmental problems based on comprehensive scientific reports such as IPPC`s fifth and previous ones. At this point, several actors from all administrative levels (local, regional, national and international) of the government and the society must be involved in the fight against the climate change -which is regarded as a global and complex environmental problem- and efforts to create a sustainable society producing low-carbon should be immediately started on a global scale.

Although a central and traditional administrative approach were adopted in the fight against climate change such as the idea that it could be solved only with government`s institutions and agencies at initial stage, it is frequently emphasized that actors of all administrative levels should collaborate each other to address the problem, and local approaches with more participants should be adopted. Indeed, neither meetings nor agreements signed as a result of efforts of supranational structures and international institutions, nor governmental institutions at the national level of government had success in the solution of the climate change problem. As a result, even though it is accepted that significant progress has been taken to solve the climate change problem so far, it has been considered that the necessary holistic and appropriate approach has still not been adopted.

It is asserted that local efforts and initiatives related to climate change will enhance national and international actions regarding both being causes of and impacted from of the climate change. Indeed, the motto of 'think globally, act locally' has been accepted in the climate change literature as the best approach. Considering studies conducted in the last 20 years, it is recognized that climate change protection activities and strategies adopted at the local scale have a legitimate basis and contribute significantly to the development of a global low-carbon society.

Local governments are important actors for local climate protection initiatives since they have a crucial influence on urban policies such as land-use and settlement planning, the creation of living spaces and use of energy and water, etc. In particular, planning of urban forms and settlements is closely related to urban characteristics such as residential buildings, population density, spatial structure, urban forest, landscape. All of these urban characteristics are directly or indirectly related to energy use and GHGs emission. The said urban characteristics are evaluated within local governments' legal and administrative responsibility. In addition, local governments have importance and priority on the issue of climate change since comprehensive studies have demonstrated that variations in the climate will have greater socio-economic, environmental and social impacts on urban areas, where more than half of the world populations live today. Finally, local governments have an important place regarding ensuring

participation, collaboration and coordination of relevant shareholders for emission reduction, which increases their significance.

Local governments are associated with climate change policies and strategies about two basic approaches which support and complement each other. Firstly, the increasing population in urban areas as a result of urbanization causes a rapid rise in existing production and consumption activities. In this sense, local governments determine necessary policies and strategies for carbon reduction by regulating those activities, which is primary reason of GHGs emission into the atmosphere (mitigation). Secondly, they could develop adaptation policies and strategies which prepare cities for the negative influence of climate change (adaptation).

The Policies and strategies adopted by local governments for climate protection, which is regarded as a global problem with full of uncertainty and complexity, can usually be explained with the theoretical framework of "governance". Climate protection activities performed on a local scale require a multi-layer, multi-actor and multi-sector management approach, which can be explained by the concept of "governance". Indeed, the concept of "climate change governance", which forms the basis of this study, involves a management process in which shareholders directly or indirectly related to causes and consequences of the issue of climate change collaborate and work in tandem with each other to fight against the problem.

The concept of climate change governance, which is highlighted as the keystone of an effective and comprehensive local climate policy, is evaluated in three theoretical frameworks: modes of climate change governance, multi-level governance, and transnational climate governance. Each of these theoretical frameworks tries to highlight a different dimension of the issue of climate change governance, which covers uncertainty and requires a multi-actor and multi-level long-term management approach.

First of all, "modes of the climate change governance" focuses on management types used by local governments for mitigation and adaptation activities. Studies on this subject suggest four common governance modes: self-governance, provision, enabling and regulation. The self-governance mode indicates the capacity of local governments to implement mitigation and

adaptation principles in their services and organizations. On the other hand, the provisioning mode focuses on the delivery of local services such as energy, water, and transportation provided by local governments in a manner that is compatible with climate change principle. The enabling mode is regarded as the capacity of local governments to ensure active participation of public and private shareholders in the management process through education, incentives and awareness efforts. Lastly, the regulation mode is described as local governments' managing the process with regulatory mechanisms and tools in connection with their legal and administrative responsibility in areas of urban policies. Hence, the first part of this study includes an analysis of climate change activities carried out, even if indirectly, by metropolitan municipalities in Turkey taking these theoretical frameworks into account of.

Another important theoretical framework related to climate change governance is "the multi-level governance" approach. That approach emphasizes the necessity of horizontal and vertical collaboration and coordination between shareholders of all administrative levels (local, national, and international) in the fight against climate change. In particular, Horizontal collaboration highlights the collaboration and coordination between local shareholders in determination and implementation of policies covering larger geographical areas such as energy, water, and waste management services in metropolitan cities. Vertical collaboration, on the other hand, is related to vertical and transversal collaboration between shareholders of all administrative levels regarding causes and consequences of climate change.

Another important theoretical framework related to climate change governance is "the transnational climate governance" approach. Although some studies consider this approach as a subheading of the multi-level governance framework, it would be more appropriate to address this framework as a separate heading to better understand motivators level of local governments` mitigation and adaptation activities, technical obstacles and capacity building efforts. Unlike concepts of `global governance` and `global civil society`, transnational climate governance is described as a theoretical approach which inquiry operational mechanisms of local governments networks related to climate change formed in the supranational area.

In addition to three climate change governance theoretical approaches, it is suggested in the literature that there are internal and external factors which affect determination and implementation of mitigation and adaptation strategies of local governments. These factors defined under headings such as civic capacity, socio-economic stress, and risk indicates, the motivation or willingness of local governments in relation to carbon reduction in a way. In other words, certain characteristics of cities which are motivated and active in this sense differ from other cities. For example, many socio-economic factors such as education, income, employment, civic participation and political attitude, etc. are closely related to the interest in and pressure on climate change policies and strategies adopted by local governments. Similarly, factors causing climate change such as a number of vehicles, population density, air pollution and wastes and indicators related to exposure level from climate change such as geographical position, temperature, and change in precipitation are effective in determination and implementation of local climate change activities. Hence, the second part of the study evaluates effects of metropolitan municipalities on local climate change activities about factors mentioned above.

Most of the studies on city and climate change governance within the last 20 years were conducted for developed countries. The studies only focus on a single mitigation or adaptation activity with a prominent sector. Additionally, most of these studies are comparative and employ the qualitative research method and involve cities which have a strong economy and focus solely on mitigation activities.

Metropolitan municipalities in developing countries such as Turkey have a high activity and responsibility with regard to the provision of local services. Although some studies suggest that reasons such as lack of capacity and gaps in existing legal and institutional regulations stand as severe obstacles in front of local governments' fight against climate change in Turkey, we should not succumb to such prejudices without performing a comprehensive and holistic study. Indeed, the number of studies investigating the fight against climate change in Turkey on a local scale is quite limited. In other words, even though there are serious studies on climate change in Turkey, it is necessary to address the issue on a local scale and in a

holistic manner due to recent leaps in the international area and legal and international regulations in Turkey.

In this context, the most important inspiration for this study was the question, "What local governments in Turkey, a developing country, do to fight against climate change and how?" Similarly, the study investigates the reason why some local governments stand out more as pioneers in the fight against climate change depending on certain internal and external factors in Turkey. As a result, the main research question of the thesis was determined to be *how and why local governments engage in climate change actions in metropolitan cities in Turkey*.

This study investigates urban policies and actions of twenty-nine metropolitans municipalities in Turkey (except for the city of Mardin) in relation to climate change after recently being given important administrative and legal authorities, duties and responsibilities with new regulatory changes. To this end, the study employs qualitative and quantitative research methods. The qualitative analysis was used to investigate the question of how municipalities perform activities related to climate change, whereas the quantitative analysis was used to assess why some municipalities are more inclined to this subject than others according to several internal and external factors.

In sum, the most important finding of this mixed-method study on climate change activities of metropolitan municipalities in Turkey is that mitigation activities are more common than adaptation efforts, as expected. Considering all strategies and activities, it was found that metropolitan municipalities in Turkey mostly perform climate change protection activities through provision mode. Evaluating the situation from a sectoral perspective, urban infrastructure and transportation were considered to be the primary sectors where climate change protection activities and strategies were applied by metropolitan municipalities in Turkey.

Although the literature suggests that local governments mostly use their legal and administrative authorities to carry out climate change protection activities especially in developing countries, it can be suggested that they mostly resort to the provision mode due to

lack of institutionalization and knowledge. Another significant finding of the study is that although the use of climate change adaptation activities is a relatively new and up-to-date approach compared to mitigation activities, it was found that metropolitan municipalities in Turkey perform, albeit indirectly, several actions and activities which can be considered within the scope of adaptation activities. That can be interpreted as that Turkey, which has entered a rapid development period, has started to take, albeit on a limited level, necessary measures against adverse effects of climate change, which have recently begun to make their weight felt to a higher degree. At this point, it is important to highlight that these steps taken by municipalities should not be misunderstood as that adaptation effort is on a sufficient level.

Similarly, the activities of metropolitan municipalities which can be considered within the scope of climate change protection activities include waste management and recycling in the field of urban infrastructure and popularization of public transport and provision of necessary incentives and support in the field of transportation. An issue that needs to be emphasized here is that low-carbon transportation activities such as bicycle paths and ropeways remain to be limited. Although more comprehensive studies are required on this subject, it is possible to suggest that lack of finance, knowledge and technical know-how, existing geographical conditions and rapid and unplanned urbanization stand as obstacles to dissemination of leaps in this direction. Similarly, tree planting and green spaces created by municipalities and protection and maintenance activities for existing green spaces can also be considered among climate change protection activities adopted by municipalities in Turkey. Another important issue worth consideration is that mitigation activity performed by municipalities are aimed at energy efficiency and saving, which is an expected result. On the other hand, the fact that the same sensitivity shown for energy is not shown in relation to water efficiency can be regarded as a surprising finding.

In addition to mitigation activities, it was found that adaptation activities, in spite of being the relatively new approach in the fight against climate change, are performed especially in the form of stream bed rehabilitation initiatives and measures taken against flood and other natural disasters, albeit on a limited level. Also, it is a remarkable result that wastewater management and treatment activities are among adaptation activities performed by municipalities. Finally,

education and awareness-raising campaign aimed at community health and protection of natural environment carried out on a local level can be considered within the scope of climate change adaptation activities adopted by metropolitan municipalities.

İstanbul, İzmir, Bursa, Konya, and Kocaeli metropolitan municipalities were found to be pioneers within the scope of climate change protection activities performed by metropolitan municipalities in the reference year. The second phase of the study was started with the hypothesis that there are many internal and external factors effective on the fact that these cities became pioneers among 29 metropolitan municipalities. Indeed, it was found that there were differences between 29 metropolitan municipalities according to socio-economic, stress and risk factors. It can be concluded that stress factors, which lead to changes especially in the climate change system, are more explanatory in local climate change activities in the cities. Indeed, metropolitan municipalities with a higher number of stress factors such as high population density and a number of vehicles led to more pressure regarding climate change protection and had to take necessary steps to address the issue. Similarly, factors indicating the socio-economic status such as electricity consumption, environmental expenses and contribution to non-governmental organizations can be considered to be effective on corresponding municipalities' willingness towards local climate change protection activities. Finally, it can be said that risk factors, which are described as indicators of the sensitivity of the city against possible adverse effects of climate change, are not effective on the eagerness of metropolitan municipalities in Turkey for local climate change protection initiatives.

Although policies and strategies adopted by the central government in Turkey in relation to climate change protection activities have been limited, it can be considered as a positive situation that local governments have certain activities. What needs to be highlighted here is that restriction of resources and authorities of local governments by the central government in sectors such as transportation and infrastructure services, the tendency towards centralization and responsibility confusion hamper the successful implementation of local climate change policies and strategies. In addition, it could be suggested that local governments need to align their activities aimed at fighting against climate change with their policies and strategies in other service fields such as infrastructure, transportation, housing, land use, social aid, disaster

management, emergency aid, health, energy, and water. It is a fact that attaining this alignment among other environmental policies would present important advantages as well.

One of the most significant problems encountered in the study is the lack of adequate knowledge and data related to climate change and GHGs inventory at the city level. To achieve more realistic and comprehensive results and perform comparative analyses, it is necessary to use city-level greenhouse gas inventories obtained with regular measurements and accurate methods, which will provide serious gains for future studies on this subject. Another important point for future study is that focusing on district municipalities in metropolitan cities may provide significant benefits in spite of having limited authority and responsibility. In this regard, it is a fact that giving more authority to district municipalities in metropolitan cities and ensuring localization especially in relation to climate change and environment will provide significant benefits to democratization and participation culture. It would be more rational to adopt sustainable development models and good governance principles instead of excessively developmental approaches.

Previous studies have only focused on climate change protection activities of metropolitan municipalities and ignored district municipalities and other provincial municipalities. Considering these municipalities as well and conducting studies with more variables and interviews with relevant experts will be beneficial regarding illuminating shortcomings and inadequacies in relation to local climate change governance. Dissemination of climate change protection activities among local governments in Turkey will positively affect determination and implementation of national and international climate change strategies and policies for both the new climate change regime planned to be implemented on a global scale after 2020 and legal proposals in the European Union harmonization process. Indeed, according to the results obtained in this study, in spite of insufficient policies and strategies adopted by the central government, necessity of developmental approaches and practices, it can be concluded that co-benefits such as reduction of air pollution and traffic congestion, energy and water efficiency, and public health could be important sources of motivation for each shareholder ın order to adopt local climate protection initiatives.

In this respect; institutionalization, provision of necessary financial, informational and technical support, improved cooperation and rapport with different administrative actors will positively affect local climate change governance. The use of financial mechanisms provided by international agreements for Turkey will provide significant benefits regarding determination and implementation of development and other environmental protection policies. In the start-up phase, it will be beneficial in terms of dissemination of local climate change activities if metropolitan municipalities in Turkey make more use of regulation tools to ensure other shareholders participate in the process.

Through analyzing of climate protection experience of Turkish metropolitan municipalities, the number of lessons were determined to designing climate mitigation and adaptation policies and strategies. The important policy recommendations for decision makers, politicians, practitioners and researchers in this study is closely related to the fact that the metropolitan municipalities in Turkey are a particularly active key actor in terms of local climate change governance. For instance, financial and technical capacities of corresponding municipalities need to be developed for effective and comprehensive urban climate change governance.

In this regard, other suggestions of the research could be briefly summarized as following; necessary of municipal climate change mitigation and adaptation strategies and action plans, development of consistent GHGs inventory on city scale, analyses of climate change impacts, organizing a range of activities such as conferences, workshops and panels to raise awareness on climate change at local level, establishment of a separate department in municipalities of with regard to climate change, raise awareness of energy efficiency and sustainable energy alternatives through local media, establishing an organization that constitute information to stakeholders and citizens on climate change and energy efficiency in the city, enabling non-governmental organizations and business to participate in policy process of sustainability and climate change, increase technical and knowledge capacity throughout in participation of the academic inertia such as colleges and universities, participation in international climate and energy networks, sharing experiences with other city governments.

Likewise, it is considered that consistency initiatives at the national level are important for municipal climate protection activities for being more effective and comprehensive. Particularly, the actions, strategies and action reports carried out at the national level should be accompanied by clear statements and suggestions for local authorities with regard to the climate mitigation and adaptation. Moreover, they may involve distinct guidelines and measures for municipalities or other stakeholders to cope with obstacles such as financial, technical and knowledge. In addition, alternative financial instrument and carbon market initiatives could be effective for companies to be involved with local climate policies and strategies. It is also considered that establishment of a distinct organization at a national level that is only responsible for local climate change protection activities is another important lesson of the study. Furthermore, taking advantage of international financial opportunities and mechanism through the provision of technical and information support for municipalities with the national level initiatives could be shown as another suggestion. Consequently, alternative sub-national tax incentives and support for municipalities to obtain revenue such as traffic congestion, development, a carbon tax could be rewarding to tackle with financial problems encountered by local authorities on climate change governance.

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APPENDICES

A. Data Sources For Document Analysis In The Study: Annual Action Reports And Strategic Plans Metropolitan of Metropolitan Municipalities In Turkey

No	Codes	City	Sources of Data
1	27	Gaziantep	2012 Annual Action Report, Strategic Plan (2015-2019)
2	16	Bursa	2012 Annual Action Report, Strategic Plan (2015-2019)
3	42	Konya	2012 Annual Action Report, Strategic Plan (2015-2019)
4	01	Adana	2014 Annual Action Report, Strategic Plan (2015-2019)
5	06	Ankara	2011 Annual Action Report, Strategic Plan (2015-2019)
6	07	Antalya	2014 Annual Action Report, Strategic Plan (2015-2019)
7	09	Adın	2014 Annual Action Report, Strategic Plan (2015-2019)
8	10	Balıkesir	2014Annual Action Report, Strategic Plan (2015-2019)
9	20	Denizli	2012Annual Action Report, Strategic Plan (2015-2019)
10	21	Diyarbakır	2014Annual Action Report, Strategic Plan (2015-2019)
11	25	Erzurum	2013Annual Action Report, Strategic Plan (2015-2019)
12	26	Eskişehir	2013 Annual Action Report, Strategic Plan (2015-2019)
13	31	Hatay	2014 Annual Action Report, Strategic Plan (2015-2019)
14	33	Mersin (İçel)	2014 Annual Action Report, Strategic Plan (2015-2019)
15	34	İstanbul	2014 Annual Action Report, Strategic Plan (2015-2019)
16	35	İzmir	2014Annual Action Report, Strategic Plan (2010-2017)
17	46	Kahramanmaraş	2014Annual Action Report, Strategic Plan (2015-2019)
18	38	Kayseri	2014Annual Action Report, Strategic Plan (2015-2019)
19	41	Kocaeli	2012 Annual Action Report, Strategic Plan (2015-2019)
20	44	Malatya	2013Annual Action Report, Strategic Plan (2015-2019)
21	45	Manisa	2013Annual Action Report, Strategic Plan (2015-2019)
22	48	Muğla	2014Annual Action Report, Strategic Plan (2015-2019)
23	52	Ordu	2014Annual Action Report, Strategic Plan (2015-2019)
24	54	Sakarya	2012Annual Action Report, Strategic Plan (2015-2019)
25	55	Samsun	2014Annual Action Report, Strategic Plan (2015-2019)
26	63	Şanlıurfa	2014Annual Action Report, Strategic Plan (2015-2019)
27	59	Tekirdağ	2014Annual Action Report, Strategic Plan (2015-2019)
28	61	Trabzon	2014Annual Action Report, Strategic Plan (2015-2019)
29	65	Van	Strategic Plan (2015-2019)

B. Frequency of Local GHGs Reduction Action in Annual Actions Plans of Metropolitan Municipalities In Turkey

	A.R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
Urban development and Design	Z1	5	5	5	0	0	5	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	26
	Z2	2	1	2	2	0	1	0	0	0	0	0	0	0	0	2	1	0	2	2	0	0	0	2	0	1	0	2	2	0	22
	Z3	1	2	3	2	5	5	0	0	0	0	2	5	1	1	5	6	0	3	4	1	0	0	3	0	0	2	0	3	0	54
	Z4	5	6	5	3	5	5	1	1	2	1	4	5	1	1	9	7	2	3	4	2	1	1	5	2	2	4	4	3	0	94
	Z5	1	2	3	1	0	2	0	0	0	0	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	13
	Z6	1	3	3	0	0	2	0	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	1	0	0	0	0	2	2	20
	Z7	1	0	2	0	0	2	0	0	0	0	1	1	0	0	2	1	0	0	1	0	0	0	1	1	1	1	2	0	1	18
Built Environment	Z8	3	5	4	3	4	4	0	0	1	0	0	1	0	0	3	0	0	0	0	0	0	3	0	1	1	0	1	2	0	36
	Z9	2	3	4	0	0	0	0	0	1	0	0	1	0	2	2	2	0	2	3	1	0	0	0	3	0	0	0	0	0	26
	Z10	2	2	4	1	2	2	0	0	2	1	3	4	1	4	5	3	2	0	4	6	5	0	1	3	3	1	1	2	0	64
	Z11	3	5	4	2	5	7	0	2	4	1	2	0	0	1	2	1	0	3	3	4	3	3	2	0	2	2	0	2	0	63
	Z12	3	5	5	1	0	5	0	0	4	1	0	0	1	0	4	1	0	3	2	4	0	2	1	1	3	1	0	0	0	47
Urban Infrastructure	Z13	5	5	5	3	8	6	0	5	4	2	0	2	2	3	7	14	1	2	5	1	0	6	0	0	3	0	2	0	1	92
	Z14	2	3	2	2	0	5	0	7	2	0	0	2	0	2	10	2	0	2	4	4	1	0	0	1	3	1	0	0	0	55
	Z15	5	0	6	1	8	5	0	1	8	1	0	2	0	1	6	3	0	0	17	2	7	0	7	1	3	0	1	2	1	88
	Z16	3	5	5	1	4	5	0	0	3	0	0	3	1	1	3	2	1	4	0	6	6	5	1	0	0	0	1	1	1	62
	Z17	10	11	13	16	3	17	8	25	12	9	13	14	8	16	21	13	11	14	21	16	16	14	21	23	17	12	11	14	10	409
	Z18	6	3	1	0	3	2	0	0	1	0	0	2	0	1	2	3	0	0	1	0	0	0	1	0	3	0	0	0	0	29
	Z19	5	5	3	1	3	3	0	0	3	0	0	2	0	0	1	3	0	2	2	2	0	0	0	0	1	0	1	0	0	37
Transportation	Z20	11	6	6	8	13	6	4	8	9	8	5	7	7	7	16	19	3	4	13	7	3	2	6	11	7	4	6	5	2	213
	Z21	6	9	5	3	3	5	0	2	2	2	4	5	1	2	8	14	0	2	9	5	2	1	2	5	5	1	3	3	3	112
	Z22	3	5	2	0	3	3	0	0	0	0	0	3	0	1	2	5	1	2	2	5	0	2	2	1	2	2	3	2	1	52
	Z23	5	0	5	4	2	5	0	0	1	1	0	3	0	1	10	9	0	5	6	2	3	1	3	4	3	0	0	0	1	74
	Z24	5	6	6	7	4	3	1	2	0	0	0	1	0	2	4	5	0	0	4	0	0	0	1	1	1	0	2	2	0	57
	Z25	2	2	1	3	1	3	0	2	3	2	2	2	1	2	6	5	0	2	3	1	1	0	2	2	1	2	0	0	1	52
	Z26	3	5	5	1	2	0	2	0	2	3	0	3	0	0	10	7	0	2	6	2	1	0	3	3	1	6	1	1	1	70
Carbon Capture and storage	Z27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Z28	7	6	6	6	8	3	3	0	5	4	7	8	1	3	11	12	3	2	7	9	6	2	3	3	15	3	2	7	6	158
	Z29	12	7	8	4	6	8	6	1	7	4	4	10	4	2	19	16	3	2	7	7	5	3	8	5	7	11	4	7	6	193
	Z30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Z31	2	5	5	0	3	5	0	0	1	1	5	5	1	3	2	5	0	3	6	3	2	2	1	9	1	1	0	0	0	71
Adaptation	Z32	2	0	1	0	2	0	0	1	0	0	0	0	0	0	0	4	1	1	0	2	0	1	0	1	0	0	1	0	0	17
	Z33	3	3	5	1	2	0	0	0	0	0	0	5	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	25
	Z34	6	9	5	2	5	6	0	7	5	2	4	5	4	5	11	15	7	4	8	5	2	6	7	4	6	5	6	6	4	161
	Z35	1	6	2	0	11	6	0	0	9	0	1	4	0	7	9	6	1	3	14	6	2	2	4	4	4	1	2	2	0	107
	Z36	6	5	1	2	0	3	1	0	0	1	0	5	3	0	10	7	1	5	4	1	2	6	6	3	0	1	3	3	1	80
	Z37	3	2	2	2	2	2	1	0	3	2	2	2	2	3	5	1	0	0	6	0	1	0	1	1	4	2	0	0	3	52
	Z38	3	8	2	1	1	5	0	0	0	1	0	0	0	0	5	1	0	3	6	0	0	0	2	0	1	0	0	2	0	41
	Z39	2	2	0	0	0	2	0	0	0	0	0	0	0	0	6	1	0	0	3	0	0	0	3	0	1	0	0	0	1	21
	Z40	6	5	6	2	2	3	0	4	0	1	0	5	0	6	5	7	2	6	5	1	0	0	6	0	0	2	4	6	3	87
	Z41	6	6	6	2	5	4	0	2	3	0	3	5	2	1	8	3	0	5	4	0	0	0	2	2	3	0	3	4	0	79
	Total	159	168	158	87	125	155	27	70	97	48	63	124	41	78	243	207	41	91	186	105	69	64	108	95	105	65	66	83	49	2977

C. Frequency of Local GHGs Reduction Actions in Strategic Plans of Metropolitan Municipalities in Turkey

	S.P	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
Urban development and Design	Z1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	1	0	7
	Z2	1	1	0	1	1	1	0	1	1	2	1	0	1	0	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	16
	Z3	1	0	0	0	3	1	1	1	0	1	1	1	2	1	1	1	4	1	1	3	1	0	0	2	0	1	0	0	0	28
	Z4	1	1	0	0	2	0	3	0	0	1	1	1	2	2	1	0	0	2	2	1	2	0	1	1	1	3	1	1	0	30
	Z5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Z6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	2	6
	Z7	0	0	0	0	0	0	2	1	0	0	1	2	0	1	0	0	2	0	0	1	1	1	2	1	0	2	0	0	1	18
Built Environment	Z8	1	0	0	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	0	11
	Z9	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	5
	Z10	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	6
	Z11	0	0	1	2	1	2	0	3	0	1	1	0	0	0	0	0	1	2	0	2	2	0	1	0	0	1	0	0	0	20
	Z12	1	0	0	0	1	1	0	1	0	0	0	0	1	0	1	0	1	1	0	0	1	1	0	1	0	0	0	1	0	12
Urban Infrastructure	Z13	0	0	1	2	0	2	4	0	0	1	3	0	2	0	2	1	0	0	0	2	2	1	0	1	1	0	0	2	1	28
	Z14	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	6
	Z15	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	7
	Z16	0	0	0	0	0	0	0	1	0	0	3	0	2	0	1	0	2	1	0	0	1	2	0	3	0	0	1	0	1	18
	Z17	1	1	2	3	3	2	4	4	3	2	8	4	4	3	3	2	8	1	2	2	2	6	6	7	2	5	2	1	10	103
	Z18	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	8
	Z19	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	4
Transportation	Z20	2	1	1	3	6	4	3	3	4	4	4	7	5	6	5	1	2	6	3	3	3	3	0	2	1	2	2	1	2	89
	Z21	1	1	1	1	1	0	3	2	4	2	3	4	3	5	6	2	4	2	3	1	2	1	0	3	0	1	1	2	3	62
	Z22	0	0	1	0	0	0	0	0	0	2	4	1	0	0	1	0	1	0	2	2	0	1	0	2	0	1	0	1	1	20
	Z23	3	1	1	0	1	2	2	1	1	1	1	2	0	0	0	0	1	0	1	0	2	1	2	4	0	1	1	1	1	31
	Z24	1	0	0	1	0	1	0	1	0	2	1	2	0	2	0	1	2	0	1	1	2	1	0	1	0	2	1	1	0	24
	Z25	1	0	1	1	2	1	0	1	1	3	5	4	0	2	0	1	2	0	1	1	1	0	0	3	1	2	0	1	1	36
	Z26	4	1	1	1	0	1	0	0	1	1	2	1	0	0	1	0	3	1	2	0	1	2	1	2	1	2	0	2	1	32
Carbon Capture and storage	Z27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Z28	2	0	2	2	2	2	2	0	1	2	3	4	2	2	2	1	3	1	1	2	2	1	1	2	2	5	0	2	6	57
	Z29	1	1	1	4	7	2	5	2	3	6	4	5	6	3	3	2	6	2	1	1	3	2	3	8	4	6	1	5	6	103
	Z30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Z31	1	1	1	1	1	0	0	0	0	1	0	2	1	0	1	2	0	1	2	3	2	0	1	0	0	0	0	3	0	24
Adaptation	Z32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Z33	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Z34	3	1	1	2	2	3	2	1	3	4	3	2	3	3	0	2	4	3	2	5	1	8	4	3	3	3	3	3	4	81
	Z35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
	Z36	2	0	0	0	0	0	1	2	0	0	3	2	1	0	1	1	1	0	1	1	1	1	2	1	0	0	0	0	1	22
	Z37	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1	3	15
	Z38	1	2	1	0	3	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	13
	Z39	0	0	0	3	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	11
	Z40	1	0	0	2	3	3	3	2	3	6	1	1	1	3	3	3	1	1	2	3	1	2	1	4	0	1	1	2	3	57
	Z41	1	1	1	0	5	2	2	1	2	0	2	0	3	1	2	1	6	1	1	4	0	2	0	3	1	0	0	1	0	43
	Total	37	16	19	33	47	31	37	31	29	47	57	47	47	35	39	21	62	27	30	41	34	41	27	62	19	41	17	36	49	1059

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TURKISH SUMMARY

Küresel iklim değişikliği sorunsalı ve bunun gelecekteki insan hayatı ve ekosistemler üzerindeki olası etkileri hususunda tartışmalar devam etse de, günümüz ülkelerinin çoğu tarafından salt bir küresel çevre sorunu olması yanı sıra, kalkınma, enerji, su, sanayi, imalat gibi birçok politik alanı da içeren yerel bir sorun olarak kabul edilmektedir. İnsan-doğa arasındaki ilişkiye tarihsel süreç açısından bakıldığında, İnsanoğlunun ilk yıllarından itibaren doğada kısmi bozulmalara neden olduğu tahmin edilse de, ekolojik denge o dönemlerde bir şekilde korunmuş, uyum içerisinde devamlılığını sağlamıştır. Ancak, özelikle 18. yüzyıldan itibaren, ağırlıklı olarak batı toplumlarında yaşanan düşünsel, siyasi, ekonomik, toplumsal ve teknoloji alandaki değişimler, modern sanayi toplumları oluşmasına, akabinde üretim ve tüketim faaliyetlerinin hızlı bir artış göstermesine ve doğal kaynakların aşırı tüketimine neden olmuştur. Sonuç olarak, insanoğlunun tabiata hâkim olma arzu ve istekliliği, özellikle kültürel ve zihinsel alanda yaşanan değişim doğal dengenin insan lehine olacak şekilde değişmesine neden olmuştur.

Tarihsel süreç içerisinde yaşanan bu toplumsal değişimler, günümüz insanoğlunun küresel çevre sorunları ile özellikle 20. yüzyılın ikinci çeyreğinde etkisini daha fazla hissettirerek karşılaşmasına neden olmuştur. Nitekim söz konusu küresel çevre sorunları arasında ilk sıralarda gösterilen, bir biri ile ilişkili pek çok politik alanı kapsayan sorunlardan biri de iklim değişikliğidir. İklim değişikliği problemi, yeryüzü atmosferinin fiziksel ve kimyasal özelliklerinin özelikle fosil yakıtlarının kullanımı başta olmak üzere insan faaliyetleri sonucu değişime uğraması sonucu küresel iklim sisteminin de farklılaşması şeklinde açıklanabilir. Küresel iklim sisteminin değişmesi, yeryüzü yaşamsal faaliyetleri bakımından olmazsa olmazı olan enerji dengesinin de bozulmasına, insanoğlu başta olmak üzere bütün canlıların yaşamsal faaliyetlerini devam ettirme potansiyellerinin riske girmesine neden olmaktadır. Özellikle atmosferdeki sera gazları olarak nitelendirilen kimyasal gaz oranlarının artması söz konusu değişimin temel nedeni olarak gösterilmektedir.

Küresel iklim değişikliği yönetiminin iç dinamikleri ve sürecin nasıl yürütülmesi gerektiği hususunda eleştirilerin ve tartışmaların doruk noktaya ulaştığını söylemek mümkündür. Küresel iklim değişikliği ile mücadelede kapsamında belirlenen yasal ve yönetsel atılımlar, gerek sorunun kaynağı gerekse çözümü noktasında önemli rolleri olan farklı yönetim birimlerindeki birçok aktörün çözüm sürecinde yer almasını gerekli kılması, kompleks ve belirsizliğin hâkim olması, katılımcı, demokratik ve şeffaf müzakere olanakların oluşturulamaması ve çıkar çatışmaları gibi birçok nedenden dolayı zorlaşmaktadır. Gelinen noktada, küresel ve karmaşık bir çevre sorunu olarak algılanan iklim değişikliği problemi ile mücadelede devletin ve toplumun her kademesinde birçok aktörün (yerel, bölgesel, ulusal ve uluslararası) sürece dâhil olması, küresel ölçekte düşük karbonlu ve sürdürülebilir bir topluma geçiş çalışmalarının ivedilikle sağlanması gerekliliği anlaşılmıştır.

Başlangıçta iklim değişikliği ile mücadelede daha merkeziyetçi ve geleneksel yönetim anlayışı benimsenmiş, sadece devletin kurum ve kuruluşları aracılığı ile sorunun çözülebileceği düşünülmüş olsa da günümüzde, her bir yönetim kademesindeki aktörün sorunun çözümü noktasında işbirliği içerisinde çaba sarf etmesi, daha fazla katılımcı mekanizmaların oluşturulması ve yerelleşme eğilimli yaklaşımların gerekliliği vurgulanmaktadır. Özellikle, son yıllarda, iklim değişikli ile mücadele kapsamında yerel düzeyde atılacak olan iklim değişikliği koruma faaliyetlerinin diğer düzeyde gerçekleştirilen politik ve yönetsel karar ve uygulamaları daha da güçlendireceği kabul edilmektedir.

Bu konuda yapılan birçok bilimsel çalışma ve analiz, günümüz küresel çevre sorunlarından önemli birisi olan iklim değişikliği ile mücadelede gerekli azaltım (*mitigation*) ve uyum (*adaptation*) faaliyetlerinde, yerel yönetimler son dönemlerde odak nokta konumunda değerlendirilmektedir. Nitekim dünyada ve ülkemizde, yerel yönetimler özellikle büyükşehir belediyeleri, sahip oldukları yetki, görev ve sorumlulukları bakımından ekonomik, toplumsal, çevresel koruyucu ve geliştirici faaliyetleri ile sürdürülebilir kent yaşam alanlarının oluşturulması bakımından önem arz etmektedir ki bütün bu açıklamalar bu çalışmanın esas esin kaynağını oluşturmaktadır.

Şehir ve yerel yönetim birimlerinin sürece dâhil edilmesini öngören anlayış, birçok gerekçeye dayandırılmaktadır. Birincisi, dünya nüfusunun yaklaşık yarıdan fazlasının şehirlerde yaşıyor olması ve salım miktarının en temel kaynağı olan üretim ve tüketim faaliyetlerinin bu mekânlarda gerçekleşiyor olması, enerji tasarrufu ve verimliliği başta olmak üzere birçok politika ve stratejinin de bu alanlardan gerçekleşeceği tezine dayanmaktadır. İkinci gerekçe ise, belediyeler başta olmak üzere diğer şehir yönetim birimlerinin enerji, ulaşım, konut, atık, imar, altyapı plan ve denetim başta olmak üzere birçok sektör alanında doğrudan ve idari bakımdan bağımsız yetkilere sahip olmaları nedeniyle iklim değişikli ile mücadele sürecine dâhil edilmesi gerekliliği öngörüsüne dayanmaktadır. Bir diğer önemli husus ise, şehirlerin ve yerel yönetim birimlerinin vatandaş katılımı, sivil toplum ve özel sektör işbirliğinin mümkün kılınacağı en uygun yönetim düzeyi olması tezine dayanmaktadır. Son ve bir diğer önemli tez ise iklim değişikliğinin etkilerinden en fazla ve doğrudan şehirlerin demografik, konut ve altyapısının etkileneceğinden bu birimlerin hassaslık durumlarının tespit edilmesi, bunlara yönelik politika ve strateji belirlemeleri, gelişmiş teknoloji, inovasyon ve sosyal değişimin gerçekleşmesi gerekliliği öngörüsüne dayanmaktadır.

Bir diğer anlatımla, İklim değişikliği mücadele amacıyla yerel yönetimler tarafından gerçekleştirilen faaliyetlerin doğrudan karbon azaltımı yanı sıra gerekli olan ekonomik, toplumsal ve teknolojik dönüşümü de mümkün kılacağından yerel iklim değişikliği koruma faaliyetleri önemlidir. Nitekim Amerika Birleşik Devletleri'nde federal ve eyalet yönetimlerinin ikim değişikliği ile mücadelede kapsamında gerekli politik atılımları gerçekleştirmede çekimser kalsalar da, birçok yerel yönetim iklim değişikliği sorununu gündemlerine taşımış ve uygulama noktasında da oldukça iyi bir ivme kazanmıştır. Benzer şekilde, ulus devlet anlayışının yerini giderek ulus üstü oluşumlara ya da yerindelik ilkesi gibi farklı parametreler nedeniyle olsa da, iklim değişikli ile mücadele hususunda, İngiltere, Almanya başta olmak üzere çoğu gelişmiş batılı ülkeler içinde benzer açıklamaları yapmak mümkündür.

Buna ilaveten, literatürde küresel iklim değişikliği problemine karşı mücadelede yerel yönetimlerin göstermiş oldukları politik tepki ve stratejiler daha çok "yönetişim" teorik çerçevesi ile açıklanabilmektedir. Yerel düzeyde gerçekleştirilecek olan iklim koruma

faaliyetleri çok katmanlı, çok aktörlü ve çok sektörlü bir yönetim anlayışını gerektirmektedir ki buda ancak "yönetişim" kavramı ile açıklanabilmektedir. Nitekim yapılan tez çalışmasının temelini oluşturan "iklim değişikliği yönetişimi" kavramı ile kastedilen, iklim değişikliği sorununun sebep ve sonuçları ile doğrudan ya da dolaylı olarak ilişkisi olan paydaş yâda aktörlerin, bu sorun ile mücadelede işbirliği, koordinasyon ve uyum içerisinde gerçekleşen bütüncül bir yönetim sürecidir. Alan yazında, yerel ölçekte etkili ve kapsayıcı bir iklim politikasının temel taşı olarak gösterilen "iklim değişikliği yönetişimi" kavramı genel olarak, üç farklı teorik çerçevede açıklanmaktadır: İklim Değişikliği Yönetişim Biçimleri (*Modes Of Climate Change Governance*), Çok Düzeyli İklim Değişikliği Yönetişimi (*Multi-Level Climate Governance*), ve Ulusüstü İklim Değişikliği Yönetişimi (*Transnational Climate change Governance*). Belirsizliğin hâkim olması sebebiyle, çok aktörlü, çok düzeyli ve uzun süreçli bir yönetim anlayışını gerekli kılan iklim değişikliği sorunun, söz konusu üç farklı yönetişim teorik çerçevesinin herbirinde, farklı boyutlar vurgulanmaktadır.

İlk olarak, 'iklim değişikliği yönetişim biçimleri' teorik yaklaşımı, yerel yönetimlerin gerçekleştirmiş oldukları azaltım ve uyum faaliyetlerini yönetme tarzlarına yoğunlaşmaktadır. Bu konuda yapılan çalışmalarda dört farklı yönetişim biçiminin olduğu ileri sürülmektedir, kendi kendini yönetme (*self-governance*), tedarik (*provision*), etkinleştirme (*enabling*) ve düzenleme (*regulation*). Kendi kendini yönetme biçimi, yerel yönetim birimlerinin daha çok kendi hizmet ve organizasyonlarında sera gazi emisyonu azaltım ve uyum prensiplerini dikkate alma kapasitelerini yansıtmaktadır. Diğer taraftan, tedarik biçimi ise, yerel yönetimleri sunmuş oldukları enerji, su, atık ve ulaşım gibi yerel mal ve hizmetlerde iklim değişikliği koruma prensiplerine uygunluk kapasitesine yoğunlaşmaktadır. Etkinleştirme biçiminde ise, yerel yönetimlerin diğer kamu ve kamu dışı paydaşları süreçte eğitim, teşvik ve farkındalık artırma çalışmaları ile daha aktif katılım sağlama kapasitesini ifade edilmektedir. Son olarak, düzenleme biçiminde ise yerel yönetimlerin kentsel politika alanlarındaki sahip oldukları yasal ve yönetsel sorumluluğa bağlı olarak düzenleyici mekanizma ve araçlar ile sürecin yönetilmesi kastedilmektedir. Nitekim bu çalışmanın ilk aşamasında, bu yönetişim teorik çerçeve dikkate alınarak Türkiye'deki büyükşehir belediyelerinin gerçekleştirmiş oldukları dolaylıda olsa iklim değişikliği koruma faaliyetlerı nitel analiz teknikleri ile sorgulanmıştır.

Bir diğer önemli iklim değişikliği ile ilgili yönetişim teorik çerçeve ise "çok düzeyli iklim değişikliği yönetişimi" yaklaşımıdır. Bu yaklaşımda, iklim değişikli ile mücadelede her yönetim düzeyindeki paydaşlar arasında yatay ve dikey işbirliği ve koordinasyonun gerekliliğine vurgu yapılmaktadır. Yatay işbirlikleri özellikle metropoliten şehirlerde enerji, su ve atık hizmetler gibi mekânsal bakımdan daha fazla coğrafik alanları kapsayan politikaların belirlenmesinde ve uygulanmasında yerel düzeydeki paydaşlar arasındaki işbirliği ve koordinasyon kastedilmektedir. Dikey işbirliğinde ise, her bir yönetim düzeyindeki iklim değişikliği sebep ve sonuçları ile ilgili paydaşların dikey ve çapraz olarak karşılıklı işbirliği içinde olmasını ifade edilmektedir.

Bir diğer önemli iklim değişikli ile ilgili yönetişim teorik çerçeve "ulus üstü iklim değişikliği yönetişimi" yaklaşımıdır. Esasen, bazı çalışmalar söz konusu yaklaşımı, çok düzeyli yönetişim teorik çerçevenin altında değerlendirmesine rağmen, yerel yönetimlerin iklim değişikliği ile mücadelede gerekli azaltım ve uyum faaliyetlerindeki isteklilik düzeyleri, karşılaştıkları finansal, teknik engellerin ve kapasite artırma çabalarının daha iyi anlaşılması bakımından ayrı bir başlık olarak değerlendirilmesi uygun olacaktır. "ulus üstü iklim değişikliği yönetişimi" "küresel yönetişim" ve "küresel sivil toplum" kavramlarından farklı olarak, iklim değişikliği hususunda ulus üstü alanda oluşmuş yerel yönetim ağlarının işleyiş mekanizmalarını sorgulayan bir teorik yaklaşım olarak ifade edilmektedir.

Söz konusu üç farklı iklim değişikliği yönetişim yaklaşımları yanı sıra, alan yazında değişik "içsel ve dışsal" faktörlerin yerel yönetimlerin azaltım ve uyum stratejileri belirleme ve uygulamasında etkili olduğu ileri sürülmektedir. Sosyal kapasite, sosyoekonomik durum, stres ve risk gibi değişik başlıklar altında tanımlanan bu faktörler yerel iklim değişikliği koruma faaliyetlerinde yerel yönetimlerin bir bakıma isteklilik düzeyini de belirlemektedir. Diğer bir ifadeyle, bu konuda istekli ve uygulayıcı olan şehirlerin birtakım özellikleri bakımından diğer şehirlerden farklılık arz ettiği ileri sürülmektedir. Örneğin eğitim, gelir, istihdam, sivil katılım, siyasi tutum gibi birçok sosyoekonomik etken yerel iklim değişikliği koruma politika ve stratejilere olan ilgi ve baskı ile yakından ilişkilidir. Benzer şekilde araç sayısı, nüfus yoğunluğu, hava kirliliği ve atıklar gibi iklim sisteminde değişikliğe neden olan faktörler ve coğrafik konum, sıcaklık ve yağış rejiminde uzun dönemli ortalama değerlerinde yaşanan

değişimler gibi iklim değişikliğinden etkilenme düzeyine ilişkin göstergeler de yerel iklim değişikliği faaliyetlerin kararlaştırılmasında ve uygulanmasında etkili olmaktadır. Nitekim bu çalışmanın ikinci aşamasında, bu faktörler açısından büyükşehir belediyelerinin yerel iklim değişikliği faaliyetleri nicel araştırma yöntemi ile karşılaştırmalı olarak analiz edilmiştir.

Gerek iklim değişikliği sorunsalının gerekse çalışmada uygulanan yöntemin daha iyi anlaşılması bakımından, iklim değişikliği ile mücadelede başvurulan temel iki politik ve yönetsel yaklaşımdan burada bahsedilmesi yararlı olacaktır. Bu kapsamda, iklim değişikliği ile mücadelede başvurulan ilk yaklaşım azaltımdır (mitigation). Azaltım faaliyetlerindeki temel amaç, atmosferdeki sera gazları artış oranlarını belirli politika, strateji ve teknolojik gelişmeler ile doğrudan azaltmak yâda en kötü ihtimalle sabit tutmaktır. Şehir ölçeğinde söz konusu azaltım faaliyetlerinin yoğunlaştığı sektörleri ise, şehirsel gelişme ve tasarım, mekânsal çevre (*built enviroment*), kentsel altyapı, ulaşım, karbon tutma ve saklama (*carbon sequestration)* seklinde sınıflandırmak mümkündür.[36]

Buna ilaveten, iklim değişikli ile mücadelede aktörlerin başvurdukları ikinci ve diğerine nazaran daha yeni temel yaklaşım ise uyum (adaptation) faaliyetleridir. Uyum politika ve stratejilerinde temel amaç ise, iklim değişikliğine olası etkilerine karşı mevcut toplumsal ve ekonomik yapıyı uyumlaştırmaktır. Bir başka ifadeyle, iklim değişikliğinin kaçınılmaz etkilerine karşı mevcut toplumsal düzenin hassasiyet derecesini azaltmak ve eski konumuna geri getirebilmeyi mümkün kılmak amacıyla belirlenen politika ve stratejilerdir. Örnek olarak, şehirler ölçeğinde gerçekleştirilen dere yataklarının ıslahı, sel ve baskınlara karşı önlemlerin alınması, şehirsel altyapı ve drenaj sistemlerinin güçlendirilmesi, çevre sağlığı hizmetlerinin sağlanması, erken uyarı mekanizmalarının kurulması, mevcut yapıların enerji ve su verimliliği bakımından daha tasarruflu ve korunaklı hale getirilmesi, kıyı kesimlerinin taşkınlara ve tayfun gibi olumsuz iklim koşullarına hazırlıklı hale getirilmesi, bu kapsamda eğitim ve bilinçlendirme faaliyetlerinin gerçekleştirilmesi vb. gibi eylemler, yerel düzeyde uyum politika ve stratejileri kapsamında değerlendirilebilir. Burada altı çizilmesi gereken önemli

[36] Söz konusu sınıflandırmada Birleşmiş Milletler tarafından hazırlanan İnsan Yerleşimleri Küresel Raporu: şehirler ve iklim değişikliği (2011) başlıklı çalışmadan faydalanılmıştır.

husus ise söz konusu her iki yaklaşım ayrı değil bir birini destekler nitelikte olduğundan aynı anda uygulamaya geçirilmesinin iklim değişikli ile mücadelede başarı şansını artırmasıdır.

Yukarıda ifade edildiği gibi, küresel iklim değişikliği ile mücadelede yerel yönetim birimlerinin gerçekleştirmiş oldukları politika ve eylemler yapılan çoğu çalışma tarafından değerlendirilmiştir. Ancak, söz konusu çalışmalar daha çok gelişmiş ülkelerin öncü şehirleri için yapılan nitel araştırmaları kapsamakta, gelişmekte ve az gelişmiş ülkeler göz ardı edilmektedir. Nitekim yapılan kapsayıcı bilimsel raporlar gelecekte iklim değişikliğinin en önemli tetikleyicisi konumundaki enerji tüketimi başta olmak üzere hızlı nüfus artışı ve yoksulluk, çarpık kentleşme gibi birçok kıstas dikkate alındığında, küresel iklim rejiminin en temel belirleyici konumda bu ülkelerin olacağa açıktır. Buna ilaveten, yapılan çalışmaların kullandıkları yöntem bakımında da yeterli doygunluğa ulaşmadığını söylemek mümkündür. Nitekim alan yazında şehir ve iklim değişikliği sorunu ampirik yöntemler aracılığı ile sebep sonuç bağlamında değerlendiren çok az çalışma mevcuttur. İklim değişikliği yönetişimi ile ilgili olarak alan yazında bir diğer önemli eksiklik de, her ne kadar birbirlerini tamamlayıcı ve destekleyici olduğu sık sık vurgulansa da, söz konusu yapılan çalışmalar ya azaltım yada uyum çalışmalara yoğunlaşmaktadır, her ikisini de içeren çalışma sayısı oldukça sınırlıdır.

Bu kapsamda, gelişmekte olan ülke konumundaki Türkiye'nin tarihsel süreç içerisinde küresel iklim değişikliği rejiminin şekillenmesindeki rolü ve mevcut durumda gerçekleştirmiş olduğu atılımlardan bahsedilmesi araştırmanın temel tezinin daha iyi anlaşılması bakımından faydalı olacaktır. Türkiye'nin toplam sera gazi emisyon salım miktarı içerisindeki katkısının küresel ölçekte değerlendirdiğinde % 1`lik oranın altında olduğu ileri sürülmektedir. Toplam salım miktarı gerek AB gerekse OECD üye ülkeler ortalamasın oldukça altındadır. Ancak Türkiye'nin mevcut kalkınmacı politikaları dikkate alındığında gelecekte daha fazla enerji tüketimi ve emisyon salımı gerçekleştireceği beklentisi son dönemlerde yapılan rapor ve bilimsel tartışmalarda gerekli tedbirlerin şimdiden alması gerekliliği vurgulanmaktadır. Nitekim günümüz iklim değişikliği müzakere sürecinde Türkiye'nin ayrıcalıklı konumu sürekli gündeme gelmekte, Türkiye'nin belirgin salım hedefi ve taahhüdü bulunmadığı diğer taraf ülkeler tarafından sürekli dile getirilmektedir. Sonuç olarak, son dönemlerde yetkililer tarafından yapılan açıklamalar dikkate alındığında kısa süre içerisinde iklim değişikliği ile

mücadele kapsamında Türkiye'nin belirgin ve somut amaç ve hedefler belirleme zorunluluğunun kaçınılmaz olacağı gözükmektedir.

Türkiye iklim değişikliği ile mücadele kapsamında uluslararası alanda bağlayıcılığı olan iki temel anlaşmaya taraf olarak bu konuda önemli aktör olduğunu yâda olma çabası içinde olduğunu göstermiştir. Bu anlaşmalardan ilki 1992 de Brezilyanın Rio şehrinde imzaya açılan ve 2004 yılında Türkiye parlamentosunda kabul edilen İklim Değişikliği Çerçeve Sözleşmesi (BMIDÇS) dir. Söz konusu sözleşme taraf ülkelere emisyon salımını belirli oranda azaltmayı ve bu doğrultuda uygun bilimsel, teknolojik ve toplumsal değişimi "ortak fakat farklılaştırılmış sorumluluklar" ilkesi çerçevesinde gerçekleştirme gereğini öngörmektedir. Türkiye'nin başlangıçta söz konusu anlaşmada çekimser davranmasının en temel nedeni olarak ise kalkınma önceliği başta olmak üzere siyasi, ekonomik, demografik ve jeopolitik olarak özel konumunu koruma çabası olduğu söylenebilir. Nitekim 2001 tarihinde 7. taraflar toplantısında özel konumunu korumuş ve sözleşmenin öngördüğü sadece Ek- I listesinde yer almayı başarmıştır.

Türkiye'nin imzaladığı iklim değişikliği ile mücadele bağlamında uluslararası alanda taraf ülkelere önemli sorumluluklar yükleyen bir diğer antlaşma ise, 1997 yılında Japonya'nın Kyoto şehrinde gerçekleştirilen 3. taraflar konferansında imzaya açılan, 2005 yılında uygulamaya giren ancak ülkemizin 2009 yılında kabul ettiği Kyoto Protokolüdür. Kyoto protokolü ise 2008-2012 yılları arasında Türkiye'nin dâhil olmadığı Ek-B listesi, taraf ülkeler salımlarını ne oranda azaltması gerekliliği hususunda daha somut öneri ve koşullar sunmaktadır. Söz konusu anlaşmanın ikinci taahhüt dönemi suresince ise, kapsamlı kurum raporları ve devlet yöneticilerinin yapmış olduğu açıklamalara göre, Türkiye'nin küresel iklim değişikliği ile mücadelede aktif bir konum elde etme çabası içerisinde olduğunu söylemek mümkündür.

Küresel iklim değişikliği müzakereleri sürecinde Türkiye ulusal düzeyde de kurumsal, yasal ve yönetsel bir takım faaliyet ve eylem planını hayata geçirmeye çalışmıştır. Genel olarak, Türkiye de ulusal düzeyde gerçekleştirilen politika ve stratejilerin esas esin kaynağı olarak uluslararası alanda atılan atılımların etkili olduğu söylenebilir. Kurumsallaşma bakımından, ilk

ve önemli adım olarak ise, kamu ve özel kurum ve kuruluşlar arasında görev ve koordinasyonu sağlamak amacıyla "İklim Değişikliği Koordinasyon Kurulu" olarak bir üst yapının oluşturulması söylenebilir. En son, 2013 yılında yapılan düzenleme ile son halini alan üst kurul, Çevre ve Şehircilik bakanlığının koordinatörlüğünde on dört bakanlık, üç kamu ve üç özel sektör temsilcisinden oluşmaktadır. Üst kurul oluşturmuş olduğu sera gaz azaltımı ve envanter çalışmaları, uyum, finansal boyut, teknolojik gelişim, bilinçlendirme ve hava yönetimi gibi yedi farklı çalışma ve danışma grubu ile Türkiye iklim değişikliği azaltım ve uyum politika ve stratejilerini kararlaştırılmaktadır. Kamu kurumları açısından, doğrudan iklim değişikliği ile ilgili Çevre ve Şehircilik Bakanlığı, Çevre Yönetimi Genel Müdürlüğüne bağlı, İklim Değişikliği Daire Başkanlığı'nın kurumsallaşma bakımından önemli bir konumdadır. Son on yıl dikkate alındığında ise, Türkiye'de ulusal iklim değişikliği politika ve stratejilerinin belirlenmesi ve uygulanmasında etkili olan kamu ve kamu dışı paydaş sayısı ve mevcut kapasitelerinde önemli oranda bir iyileşme ve çeşitlenme olduğu söylenebilir. Burada altı çizilmesi gereken husus ise, öncülüğü ağırlıklı olarak kamu kesimin üstlendiği, sivil toplum ve özel sektördeki paydaşların ise kamu kurumlarının belirlediği kısıtlı alanlarda karşılıklı müzakere çerçevesinde faaliyetlerini sürdürdüğüdür.

Diğer taraftan, Türkiye'nin ulusal düzeyde ikim değişikliği ile mücadele kapsamında değerlendirilebilecek birçok kamu kurum ve kuruluşları içeren politika ve strateji sayısında ve çeşitliliğinde son dönemlerde ciddi bir artış söz konusudur. Doğrudan iklim değişikliği ile ilgili olarak amaçların, hedef ve eylemlerin belirlendiği, Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Planı (2011), İklim Değişikliği Ulusal Eylem Planı (2011-2023), Ulusal İklim Değişikliği Strateji Belgesi (2010-2023) gösterilebilir. Söz konusu belgelerin yanı sıra Sürdürülebilirlik raporu, Kalkınma raporları ve Avrupa Birliği ilerleme raporları başta olmak üzere ulusal düzeyde hayata geçirilen bilimsel ve kapsayıcı belgeler Türkiye'nin iklim değişliği politika ve yönetimi bakımından önem arz etmektedir. Sonuç olarak, doğrudan yada dolaylı olarak iklim değişikliği ile mücadele kapsamında azaltım ve uyum faaliyetleri ile ilişkili yasal metinlerin hiçbirinde Türkiye'nin sera gazı emisyonu konusunda belirgin bir hedef yada taahhüt yer almamaktadır. Bu konuda 2015 yılında BM'ye gönderilen bildirim raporunda 2030 yılına kadar %21'lik bir ser gazı azaltım açıklamasına yer verilmesi ise

Türkiye'nin ulusal iklim politika ve stratejilerinin bundan sonraki süreçte nasıl bir yol haritası belirleyeceği konusunda önemli bir ipucu olarak değerlendirilebilir.

Türkiye'de çevre politikaları ve iklim değişikliği ile ilgili yasal çerçeveler genellikle ulusal düzeyde belirlenmesine rağmen, yerel yönetim birimleri bu politika ve yasaların uygulayıcı birimleri olması bakımından oldukça önem arz etmektedir. Enerji verimliliği, yenilenebilir enerji, atık yönetimi, kent içi ulaşım ve imar yönetimi (kent planlama ve imar denetimi) yetkileri ile belediyeler Türkiye'de iklim değişikliği azalttım ve uyum politikalarının uygulanmasında kilit aktör haline gelmiştir. Yerel yönetimlerin, ikim değişikliği ile mücadelede aktif rol almaları, dünyada ki gelişmelere paralel olarak Türkiye'de de erken başladığını söylemek mümkündür.

Özellikle 2007 yılında, Endonezya'nın Bali şehrinde gerçekleştirilen 13. taraflar konferansından sora Türkiye'de yerel ölçekte iklim değişikliği koruma faaliyetlerinde bir artış ve hareketliliğin olduğu ileri sürülebilir. Özellikle, yerel yönetimlerle ilgili yeni yasal ve yönetsel düzenlemelerden sonra, 2014 TÜİK verilerine göre, Türkiye nüfussunun yaklaşık %93,3 lük kesim büyükşehirlerde yaşamaktadır ki, bur oran son dönemlerde yerel ölçekte gerçekleştirilecek politika ve stratejilerin ne denli etkili olacağının bir göstergesi olarak değerlendirilebilir. Bu kapsamda, Türkiye'de yerel düzeyde gerçekleştirilen sürdürülebilir eylem planları, Turkuaz şehirler projesi, uluslararası şehir networkleri ile işbirliği kapsamındaki proje ve uygulamalar gibi birçok atılımlar herhangi bir taahhüdü bulunmayan ülke konumundaki Türkiye için oldukça iç açıcı bir gelişme olarak değerlendirilebilir.

Sonuç olarak, Türkiye'de iklim değişikliği azaltım ve uyum faaliyetlerine önem veren ve gerçekleştirdiği proje ve eylemlerde prensip ve ilkelerini takip eden yerel yönetim birimlerinin sınırlıda olsa mevcut olduğu söylenebilir. Yerel yönetimler tek başlarına değil daha çok merkezi idarenin ve çok kademeli yerel yönetim ağ bağları (yatay ve dikey) ile iklim değişikliği faaliyetlerini sürdürmektedirler. Dünyadaki gelişmelerle benzer şekilde, Türkiye'de iklim değişikliği iki temel stratejik yaklaşımdan azaltım faaliyetleri daha sık olmasına nazaran uyum faaliyetleri daha başlangıç aşamasında olduğu söylenebilir. Ülke genelinde

yaygınlaştırılmış ortak standart ve prensiplere göre hazırlanmış yerel iklim değişikliği eylem planının henüz mevcut olmaması önemli bir eksiklik olarak değerlendirilebilir.

Bu kapsamda, söz konusu tez çalışmasının temel amacı ise, gelişmekte olan ülke konumundaki Türkiye'de yerel düzeyde, özellikle büyükşehir belediyelerin gerçekleştirmiş oldukları iklim değişikliği ile doğrudan ya da dolaylı olarak ilişkili politika ve stratejileri nitel araştırma yöntemleri ile değerlendirmektir. Bir başka ifade ile belediyelerin iklim değişikliği koruma faaliyetlerini hangi yönetsel çerçevede gerçekleştirdiklerini açıklamak bu çalışmanın ilk aşamasının temel amacıdır. Buna ilaveten, Türkiye'de gerçekleştirilen yerel iklim değişikliği koruma faaliyetleri üzerinde etkili olan içsel ve dışsal faktörleri nicel araştırma ile analiz etmek ise araştırmanın ikinci aşamasının temel amacını oluşturmaktadır.

Yukarıda da ifade edildiği üzere, özelikle gelişmekte olan ülkelerin yerel yönetim birimleri iklim değişikliği ile mücadele için neleri ve nasıl yaptıkları ya da yapabilecekleri sorusu son dönemlerde önem arz etmektedir. Benzer şekilde, bu konuda yapılan çalışmalar, bazı yerel yönetim birimlerinin mevcut birtakım içsel ve dışsal faktörlere bağlı olarak iklim değişikliği ile mücadelede daha fazla öncü olmasının temel nedenlerini sorgulamaktadırlar. Sonuç olarak, bu çalışmanın temel araştırma sorusu: *Türkiye'deki yerel yönetimler, özelikle metropoliten şehirlerde iklim değişikliği ile mücadele kapsamında uyguladıkları faaliyetleri nasıl ve neden gerçekleştirmektedirler?* olarak belirlenmiştir.

Yapılan bu çalışmada, son dönemlerde yapılan yasal değişiklikler ile önemli yönetsel ve yasal yetki, görev ve sorumlulukları olan Türkiye'deki büyükşehir belediyelerinin (Mardin büyükşehir belediyesi veri eksikliğinden hariç tutulmuştur) dolaylı olarak iklim değişikliği ile ilgili kent politika ve eylemleri nitel ve nicel araştırma ile değerlendirilmiştir. Nitel analiz kısmında ilgili belediyelerin iklim değişikliği ile ilgili faaliyetleri nasıl gerçekleştirdikleri sorgulanırken, nicel analizde bazı belediyelerin bu hususta neden daha fazla eğilimli oldukları birçok içsel ve dışsal faktörlere göre analiz edilmiştir.

Sonuç olarak karma araştırma yöntemi ile belediyelerin gerçekleştirmiş oldukları iklim değişikliği faaliyetlerine ilişkin olarak önemli bulgu, azaltım faaliyetlerinin uyum

çalışmalarına nazaran daha yaygın olduğu tespitine ilişkindir. Bütün strateji ve faaliyetler dikkate alındığında ise, Türkiye'deki büyükşehir belediyelerinin ağırlıklı olarak tedarik biçimi ile iklim değişikliği koruma faaliyetlerini gerçekleştirdiği gözlenmiştir. Sektörel bakımdan durum değerlendirildiğinde ise, kentsel altyapı ve ulaşımın iklim koruma faaliyet ve stratejilerinin en fazla belirlendiği ve uygulandığı sektörler olduğu tespit edilmiştir. Alan yazında, özellikle gelişmekte olan ülkelerde yerel yönetimlerin daha çok yasal ve yönetsel düzenleme yetkilerini kullanarak iklim koruma faaliyetlerini gerçekleştireceği ileri sürülse de, kurumsallaşma, bilgi kısıtları vb. nedenlerden dolayı daha çok tedarik biçimi ile gerçekleştirdiği ileri sürülebilir.

Yapılan çalışmanın bulgularından çıkarılacak bir diğer önemli sonuç ise, her ne kadar iklim değişikliği uyum faaliyetlerinin azaltım faaliyetlerine nazaran yeni ve güncel bir yaklaşım olmasına karşın, Türkiye'deki mevcut büyükşehir belediyelerinin dolaylı da olsa uyum faaliyetleri kapsamında değerlendirilebilecek birçok eylem ve politika gerçekleştirdikleri tespit edilmiştir. Bu husus, özelikle hızlı bir kalkınma surecine girmiş olan Türkiye'nin, son dönemlerde etkisini giderek daha fazla hissettirmeye başlayan iklim değişikliği olumsuz etkilerine karşı kısıtlıda olsa gerekli tedbirler alındığının bir göstergesi olarak yorumlanabilir. Burada altı çizilmesi gereken bir diğer önemli husus ise, uyum çalışmalarının yeterli düzeyde olduğu anlaşılmaması gerekliliğidir.

Benzer şekilde, dolaylıda olsa iklim değişikliği koruma faaliyetleri kapsamında değerlendirilebilecek olan eylemlerden, kentsel altyapı sektörü kapsamında değerlendirilen atık yönetimi ve geri dönüşüm faaliyetleri ile ulaşım sektöründe toplu taşımanın yaygınlaştırılması ve bu konuda gerekli teşvik ve yardımların verilmesi belediyelerin en fazla gerçekleştirdikleri iklim koruma eylemleridir. Burada vurgulanması gereken bir diğer husus ise, özellikle bisiklet yolları ve teleferik gibi düşük karbonlu taşımacılığa yönelik faaliyetlerin sınırlı bir düzeyde olması ile ilgilidir. Bu konuda daha kapsamlı çalışmalara ihtiyaç olsa da, bu konudaki finansal, bilgi ve teknik kısıtlar ile mevcut coğrafik koşulların, hızlı ve plansız kentleşmenin gerçekleşmesi sonucu bu yöndeki atılımların yaygınlaştırılması önünde büyük bir engel oluşturulduğu ileri sürülebilir. Benzer şekilde, belediyelerin gerçekleştirmekte olduğu ağaçlandırma faaliyetleri ve yeşil alanların oluşturulması ve korunması ile bakım

faaliyetleri, karbon tutma ve saklama sektörüne ilişkin en fazla başvurulan iklim değişikliği koruma eylemleri olarak değerlendirilebilir. Burada dikkate değer önemli bir husus ise, belediyelerin gerçekleştirmiş oldukları iklim değişikliği azlatım faaliyetlerinin birincil olarak enerji verimliliği ve tasarrufu ile yakından ilişkili olduğu en önemli ve beklenen bir sonuç olarak karşımıza çıkmaktadır. Buna ilaveten enerji kullanımına yönelik hassasiyetin su verimliliği ve tasarrufu noktasında gösterilmemesi ise dikkat çekici bir sonuç olarak değerlendirilebilir.

Diğer taraftan azaltım faaliyetleri yani sıra, uyum faaliyetleri her ne kadar yeni bir yaklaşım olsa da, özelikle dere ve nehir yataklarının ıslah çalışmaları, sel ve diğer doğal felaketlere yönelik gerçekleştirilen tedbirler ise sınırlı da olsa alınmaktadır. Buna ilaveten, atık suların yönetimi ve arıtma faaliyetleri de uyum faaliyetleri kapsamında belediyeler tarafından gerçekleştirilen eylemler olduğu dikkate değer bir sonuçtur. Son olarak yerel düzeyde gerçekleştirilen halk sağlığı ve çevre korumaya yönelik eğitim ve bilinçlendirme faaliyetleri de belediyelerin büyük şehirlerde iklim değişikliği uyum faaliyetleri kapsamında değerlendirilebilecek diğer eylemlerdendir.

Araştırmanın ikinci aşamasına ilişkin ise, büyükşehir belediyelerin referans yılı sonrası gerçekleştirdikleri iklim değişikliği koruma faaliyetleri kapsamında İstanbul, İzmir, Bursa, Konya, ve Kocaeli illerinin öncü oldukları tespit edilmiştir. Söz konusu 29 büyükşehir belediye arasında bu beş şehrin öncü olması üzerinde birtakım içsel ve dışsal faktörlerin etkili olduğu temel tezinden hareketle, araştırmanın ikinci aşamasına geçilmiştir. Nitekim sosyoekonomik, stres ve risk faktörlerine göre 29 büyükşehir belediyesi arasında istatistiksel olarak farklılıklar olduğu tespit edilmiştir. Söz konusu farklılıklar içerisinde ise özellikle iklim değişikliği siteminde değişikliğe neden olan stres faktörler ilgili şehirlerde yerel iklim değişikliği faaliyetlerin daha yoğun olduğu sonucu çıkarılabilir. Nitekim nüfus yoğunluğu ve araç sayısı gibi stres faktörlerin fazla olduğu büyükşehir belediyelerin iklim değişikliği koruma hususunda daha fazla baskı hissetmiş ve bu konuda gerekli atılımları gerçekleştirmek zorunda kalmıştır. Benzer şekilde elektrik tüketimi, çevresel alanda yapılan harcamalar ve sivil toplum kuruluşlarına katılım gibi sosyoekonomik durumu gösteren faktörler de ilgili belediyelerin yerel iklim değişikliği koruma faaliyetlerine daha fazla yönelmesinde kısıtlıda

olsa etkili olmaktadır. Son olarak, ilgili şehrin iklim değişikliğinin olası olumsuz etkilerine karşı olan hassasiyetin bir göstergesi olarak ifade edilen risk faktörlerinin belediyelerin yerel iklim koruma faaliyetlerinde istekli olmalarında etkili olmadığı tespit edilmiştir.

Bu çalışmanın sonuçları özellikle Türkiye gibi gelişmekte olan ülkelerde, belediyeler başta olmak üzere şehir yönetiminde karar vericilere, planlayıcı ve uygulayıcılara, iklim değişikliği ile mücadelede gerekli olan politik ve stratejik atılımların belirlenmesi ve uygulanması husussularında önemli kazanımlar sunmaktadır. Benzer şekilde, enerji, çevre ve iklim değişikliği ile ilgili ulusal ve uluslararası alanda faaliyet gösteren sivil toplum kuruluşları için de yerel iklim değişikliği faaliyetlerinde yol haritasının belirlenmesi ve yaygınlaştırılması bakımından önemli katkı sunacağı tahmin edilmektedir. Yerel yönetimlerin yanı sıra, diğer ilgili kamu ve özel kurumları ve akademik camia içinde iklim değişikliği ile mücadelede atılması gereken atılımların tespiti ve şimdiye kadar göz ardı edilmiş hususları tespit etmesi bakımından önemli katkılar sunmaktadır.

Türkiye'de merkezi yönetim tarafından iklim koruma faaliyetlerine yönelik gerçekleştirilen politika ve stratejiler kısıtlı olmasına nazaran, yerel yönetim birimlerince dolaylıda olsa bir takım eylemler yürütülmesi oldukça olumlu bir durum olarak değerlendirilebilir. Burada altı çizilmesi gereken husus, ulaşım ve altyapı hizmetleri gibi değişik sektörlerde merkezi yönetim tarafından bazı kaynak ve yetkilerin sınırlandırılması ve kısmide olsa merkezîleşme eğilimi olması yâda yetki kargaşası yaşanması yerel iklim değişikliği politika ve stratejilerinin başarılı olarak uygulanmasını engellemektedir. Yerel yönetim birimleri, belirlemiş oldukları iklim değişikliği mücadele atılımlarını, altyapı, ulaşım, konut, arazi, sosyal yardım, afet, acil yardım, sağlık, enerji ve su gibi diğer hizmet alanlarına ilişkin belirlemiş oldukları politika ve stratejiler ile birbirleri ile daha fazla uyumlaştırması gerekmektedir. Bu uyumun diğer çevre politikaları arasında da sağlanmasının önemli kazanımlar sağlayacağı bir gerçektir. Diğer taraftan, yapılan çalışmada karşılaşılan en büyük problemlerden biride ilgili şehirlerde iklim değişikliği ve sera gazı envanterle ilişkin yeterli bilgi ve veri olmamasıdır. Daha gerçekçi sonuçlara ulaşabilmek ve karşılaştırılmalı analizler yapılabilmesi için düzenli ve doğru bir şekilde elde edilmiş şehir düzeyi sera gazi envanter bilgilerinin tutulması bu konuda ciddi kazanımlar sağlayacaktır.

Bir diğer önemli husus, büyükşehir belediyeleri bu konuda daha fazla yönetsel ve yasal yetkilere sahip olmaları bu çalışmanın odak noktasını oluşturmuştur. Ancak diğer çalışmalarda Türkiye'deki yerel düzeyde iklim değişikliği koruma faaliyetleri gerçekleştirenlerin daha çok yetki ve sorumlulukları kısıtlıda olsa büyükşehir ilçe belediyelerine yoğunlaşması önemli katkılar sunabilir. Bu hususla ilgili olarak, iklim değişikliği ve çevre konuları başta olmak üzere büyükşehir ilçe belediyelerine daha fazla yetki verilmesi ve yerelleşmenin sağlanmasının demokratikleşme süreci ve katılım hususunda da ciddi kazançlar sağlayacağı bir gerçektir. Bu konuda kalkınmacı yaklaşımlardan ziyade sürdürülebilir ve iyi yönetim ilkelerinin benimsendiği bir kalkınma modeli prensipleri takip edilmesi önemlidir.

Yapılan çalışmalarda sadece büyükşehir belediyelerinin iklim değişikliği koruma faaliyetlerine yoğunlaşılrmış, ilçe belediyeleri ve diğer il belediyeleri dikkate alınmamıştır. Gelecekte yapılacak çalışmalarda bu belediyeler dikkate alınarak ve daha fazla değişkenli ve ilgili uzman kişilerle detaylı görüşmelerin yapılması bu hususta eksik yâda yetersiz kalan hususların daha fazla aydınlatılması bakımından faydalı olacaktır. Gerek küresel ölçekte 2020 sonrası gerçekleştirilmesi planlanan yeni iklim değişikliği rejimi için, gerekse Avrupa birliği adaylık sürecindeki yasal öneriler gereği, Türkiye'deki yerel yönetimlerin iklim değişikliği koruma faaliyetlerini yaygınlaştırması, ulusal ve uluslararası iklim değişikliği strateji ve politikalarının şekillenmesini de olumlu etkileyecektir. Nitekim, bu çalışmadan elde edilen sonuçlara göre, bu konuda merkezi yönetimlerin yetersiz kalmasına, kalkınmacı yaklaşım ve uygulamaların gerekliliğine nazaran yerel düzeyde dolaylıda olsa birtakım hava kirliliği, trafik sıkışıklığı, enerji ve su verimliği ve halk sağlığı gibi yan faydalar paydaşlar için önemli motivasyon kaynağı teşkil ettiği ileri sürülebilir.

Bu konuda kurumsallaşma, finansal destek, gerekli bilgi ve teknik desteğin sağlanması, diğer yönetim düzeylerindeki aktörler ile daha fazla işbirliği ve uyumun artırılmasına yönelik atılımlar yerel iklim değişikliği yönetişimi bakımından olumlu olacaktır. Türkiye'nin uluslararası anlaşmalar gereği sunulan esneklik mekanizmalarından faydalanması ülke kalkınma ve diğer çevre koruma politikalarının kararlaştırılması ve uygulanması bakımından önemli kazançlar sağlayacaktır. Türkiye'de, büyükşehir belediyelerinin daha fazla yasal ve

yönetsel düzenleme araçlarını kullanarak diğer paydaşların sürece dâhil olmasını sağlaması başlangıç aşamada yerel iklim değişikliği faaliyetlerinin yaygınlaştırılması bakımından faydalı olacaktır.