**Journal of Iran Futures Studies**
**Print ISSN:** 6365-2423
**Online ISSN:** 2676-6183

# Analyzing the Challenges of Urban Governance in the Face of Climate Change and Presenting its Scenarios in Mashhad Metropolis

**Rouhollah Asadi***
Assistant Professor of Geography and Urban Planning, Ferdowsi University of Mashhad, Mashhad, Iran. asadir@ferdowsi.um.ac.ir
**Mohammad Reza Arab**
PhD student in Geography and Urban Planning, Ferdowsi University of Mashhad, Mashhad, Iran. m.rezaarab@mail.um.ac.ir

## Abstract

**Purpose:** Climate change, as one of the biggest challenges in this century, has brought many problems to cities. Urban governance is one of the approaches that can be effective in better management, reducing the effects and adapting to climate change; But the realization of this approach is accompanied by obstacles, especially in big cities like Mashhad; Therefore, the purpose of this research is to analyze the challenges of good urban governance in the direction of adapting and reducing the effects of climate change, as well as identifying its future scenarios.
**Method:** The current research is applied in terms of purpose and analytical and descriptive in nature and with a future research approach. The necessary data were collected through an elite questionnaire of 21 people in two sections: identification of challenges and scenario writing. Data analysis was done with the importance-urgency model for the challenges section, and Scenario Wizard software for scenario writing.
**Findings:** Among the 38 challenges investigated in this research, 6 of them have higher priority. These challenges are the diversity of actors involved in the process of urban policies, the limited income base of Mashhad municipality, the strong political division ruling the city-region of Mashhad with the involvement of various public organizations and institutions, the lack of public access to information and data related to climate change, the weakness of the municipality's authority over Government agencies are in the absence of integrated urban management and financial dependence of the city of Mashhad on the central government.
**Conclusion:** Finally, 6 priority variables were selected and based on that, 7 scenarios were presented to face the key challenges, and among the 42 situations in these scenarios, 19% are in favorable conditions, 50% are on the verge of crisis, and 31% are critical. The first scenario, with 6 additional assumptions, draws an ideal vision of Mashhad city, which by stepping on its path, the challenges of urban governance in the era of climate change can be reduced.

**Keywords:** urban governance, climate change, importance-urgency, scenario, Mashhad

**Cite this article:** Asadi, Rouhollah. Arab, Mohammad Reza.(2024) Analyzing the challenges of urban governance in the face of climate change and presenting its scenarios in Mashhad metropolis
, Volume9, NO.1 Spring & Summer 2024,186-211
**DOI**: 10.30479/jfs.2024.20868.1575
**Received on:** 8 September 2024 **Accepted on**: 29 October 2024

**Publisher**: Imam Khomeini International University
**Corresponding Author/ E-mail**: Rouhollah Asadi/asadir@ferdowsi.um.ac.ir

## Introduction

In recent decades, the challenges caused by the occurrence of natural events in the world have grown increasingly and have severely affected human settlements, including urban areas (Rus et al, 2018). A large part of these events are affected by a phenomenon known as climate change (Faizi and Barakpour, 1400, 82). Climate change is not only an environmental problem; It also includes other economic, political and social dimensions (Mogano and Mokoele, 2019). Therefore, considering the huge challenges and problems that it puts on the way of urban development, it is necessary to adopt new ideas and methods to reduce the effects and adapt to the consequences of climate change (Thaler and et al, 2020). In order to implement climate change adaptation policies and measures, certain conditions must be considered. This often requires the participation of various stakeholders and citizens at the city level (Pasquini, 2020); Because without increasing the participation of key actors active at the city level, adapting to the issue of climate change will be impossible (Susskind, 2022). In other words, to adapt to climate change, it is necessary to increase the participation of civil society groups, the government, the private sector, and citizens in city-related decisions (Betsill and Bulkeley, 2021); Therefore, reducing the effects of climate change requires coordinated efforts between all active groups at the city level, including urban management, the private sector, and citizens (Mies et al., 2019). In general, adapting cities to the consequences of climate change requires accepting new ideas and concepts. This often requires substantial action by various stakeholder groups at the city level. In other words, it can be claimed that adapting to climate change in cities requires urban governance (Broto, 2017). This approach is a complex term that indirectly tends to lead us from the main and centralized view of governance to network-based participatory policy-making (Lyall and Tait, 2019). In relation to climate change, although this concept does not deal with climate change alone, it promotes a cooperative and coordinated approach to adapting to climate change. As a result, the reason that urban governance requires strong and responsive institutions at the national and local levels on the one hand, and on the other hand, because it invites all institutions, stakeholders and all actors active at the city level together, is a necessary element to deal with The complex challenges of urban development include climate change (Mogano, 2019). But in the implementation of this, it faces many obstacles and challenges. Meanwhile, in less developed countries, pressures such as rapid urbanization and climate change have led to an increase in the vulnerability of citizens (Mitchell et al, 2015). Mashhad metropolis is an example of these cities. The conducted investigations indicate that in this city, the temperature has taken an upward trend since the mid-1980s and the long-term average temperature is increasing in statistical periods, and following the increase in the average temperature, other temperature-related components such as hot summer days, heat waves, etc. .. have had an increasing trend. Some other indicators, such as cold days, or days with frost, cold waves have had a decreasing trend. Also, rainfall has shown fluctuating behavior and the continuity of rainfall in this city has been less continuous than in the previous period; But the intensity of rainfall has increased. In such a way that it can be considered that the rainfall in a shorter period flows more, which exposes the city of Mashhad to the risk of flooding

(Hamidianpour and Nabizadeh, 2015: 13). Therefore, due to the negative effects of climate change on the city of Mashhad, this city should take steps to adapt and reduce the effects of climate change. In this regard, it seems that urban governance, as one of the comprehensive approaches to guide and manage urban development, can play a key role in adapting Mashhad to climate change and reducing its effects; But the realization of this approach comes with some challenges and obstacles. Therefore, the purpose of this research is to analyze the challenges of good urban governance in order to adapt and reduce the effects of climate change, as well as to identify its future scenarios.

## Methodology

The current research is applied in terms of purpose and analytical and descriptive in nature and with a future research approach. In order to analyze the data and the challenges in realizing urban governance in the face of climate change in Mashhad, the importance-urgency model has been used. The output of this model identifies challenges of high importance and urgency for policy making and action. In the end, after identifying the key challenges, for scenario writing, different future states of the challenges were identified by the method of cross-effects analysis. Scenario Wizard software was used to analyze the data and achieve the desired scenario in this section**.**

## Results

In order to identify high-priority challenges, the total score of the respondents in two dimensions of urgency and importance was averaged and the final score was calculated for each of the challenges. In this part, the following challenges got the most points.

1. The diversity of actors involved in the process of urban policies (score = 2.76)
2. Limited income bases of Mashhad municipality (score = 2.60
3. The severe political division ruling the city-region of Mashhad with the involvement of various organizations and public institutions (score = 2.55
4. Lack of public access to information and data related to climate change (score = 2.54)
5. Weakness of the authority of the municipality compared to government institutions in the absence of integrated urban management (score = 2.54)
6. The financial dependence of the city of Mashhad's income on the central government (score = 2.51)

In the following, three possible situations (desirable, intermediate and critical) were formulated for each of the key challenges by asking the opinions of the relevant experts. Therefore, during a semi-structured interview with 5 experts in the field of urban planning and climate change, they were asked to express their opinion about the possible situations of six key indicators in the future. In the end, 18 possible situations for 6 key challenges were identified by examining the respondents' opinions and summarizing the common points. After identifying the possible situations of key indicators, a 18x18 matrix was designed and provided to urban

planning and climate change experts. Questionnaire by raising the question that if each of the possible situations occurs, what effect will it have on the occurrence or non-occurrence of other possible situations, was handed over to the experts, and they entered numbers between +3 and -3 to rate the effect of each of the possible situations. specified over other situations. The judging scale is as follows: 1- severely limiting, 2- moderate limiting effect, 3- weak limiting effect, 0 no effect, 1 weak strengthening effect, 2 medium strengthening effect and 3 strong strengthening effect. After completing the questionnaire, using simple averaging, the data was entered into the Scenario Wizard software and analyzed. According to the opinions of experts and dimensions of the matrix, the following scenarios have been obtained:

- Strong or probable scenario (scenarios with zero compatibility): 3 scenarios
- Believable or high compatibility scenarios (scenarios with compatibility one): 7 scenarios
- Weak scenarios (scenarios with compatibility 2): 80 scenarios

As mentioned above, the software showed 80 weak scenarios, which seems that on the one hand, it is not reasonable to trust weak scenarios, and on the other hand, managing and planning for this amount of scenarios is considered a challenging task. In the meantime, what is logical and reasonable are scenarios with compatibility 1, which is between strong range scenarios and weak wide scenarios. In fact, this distance represents an increase of one unit from the range of strong scenarios to weak scenarios. Based on these scenarios, it is possible to increase the range of strong scenarios, and with one unit of increase, which is the standard unit of increasing this range based on the Scenario Wizard software, 7 logical scenarios were presented for policy making and planning for the future of city governance in the face of climate change. . Among the 42 situations in the existing scenarios, 8 situations (19%) have the ability to improve key challenges in such a way that they can pave the way in the future for the realization of urban governance in the face of climate change. 21 situations (50 percent) of the situations are static or on the verge of crisis, and 13 situations (31 percent) of the situations are in critical situations, so that the key challenges of good governance in the face of climate change are more critical in the metropolis of Mashhad. Among the scenarios, the scenario First, with 6 additional assumptions, it draws an ideal vision of the city of Mashhad, which can overcome the challenges of urban governance in the era of climate change by adopting appropriate policies and measures. This scenario, in the light of factors such as increasing constructive interaction between different actors involved in urban policy making, increasing and diversifying municipal revenue sources, convergence and effective cooperation between various organizations and institutions in the city-region of Mashhad, etc., will become a city with Efficient management, public participation, and the use of available resources and facilities have the ability to reduce the effects of climate change and adapt to them**.**

## Conclusions

Climate change refers to significant and long-term changes in the weather patterns of an area. Meanwhile, cities, as the center of human activities, both play a role in the

emergence of this crisis and are greatly affected by its consequences. This two-way relationship has led to the emergence of a wide range of natural hazards such as floods, droughts, rising air temperatures and heat islands in urban areas. Considering the destructive effects of climate change on cities, it is inevitable to take serious measures to reduce the effects and adapt to these changes. This requires comprehensive planning and comprehensive cooperation of all stakeholders in the city. In other words, it can be said that realizing adaptation and reducing the effects of climate change requires adopting an approach based on effective governance at the local level, which cities must move towards. But the realization of this is associated with obstacles and problems. So that these problems have challenged the implementation of governance indicators. Meanwhile, Mashhad, as the second metropolis of Iran, is severely suffering from the effects of climate change. To deal with these effects such as temperature increase, change of precipitation patterns and natural hazards, this metropolis needs attention to new approaches, including urban governance; But in the current situation, which has been affected by climate change, achieving it has faced many challenges, which were investigated and analyzed in this research. In the current research, in order to identify and describe the state of the challenges, key indicators were identified by taking advantage of the urgency and fundamental nature of the challenges, and in order to present the optimal scenario and solve these challenges, the method of cross-effects analysis was used in the Scenario Wizard software. The results showed that among the 38 challenges in the non-realization of urban governance, 6 factors play a prominent role. These components, respectively, include the diversity of actors involved in the process of urban policy-making, the limited income base of Mashhad Municipality, the strong political division ruling the city-region of Mashhad with the involvement of various public organizations and institutions, the lack of public access to information and data related to climate change, and weak authority. Compared to the government agencies, the municipality is in the absence of integrated urban management and financial dependence of the city of Mashhad on the central government**.**

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