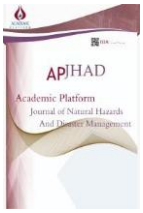

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Disaster Management in Türkiye: Current Situation, Challenges, and Solutions

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Abstract

Türkiye is a country with a high risk of both natural and human-made disasters. Natural disasters such as earthquakes, floods, and landslides occur frequently, and due to its geopolitical position, the country also frequently faces humanitarian crises. Although Turkish legal and institutional framework for disaster management is theoretically adequate, recent disasters have revealed shortcomings in its implementation. This article analyzes the current state of disaster management systems in Türkiye and also evaluates the new risks the country faces in the context of climate change. Indeed, climate change has increased the frequency and severity of natural disasters, necessitating a reassessment of Türkiye's disaster management strategies. In this context, the article presents the main challenges encountered in disaster management practices and proposes solutions to address these challenges. It emphasizes the need for strengthening institutional frameworks, raising public awareness, and integrating strategies to combat climate change for effective disaster management. The insights provided aim to contribute to the development of a more resilient disaster management system for Türkiye.

Key words: Disaster management, Climate change, Crisis management, Local governments, Legal framework

1. Introduction

Türkiye, due to its geographical and geopolitical location, is situated in a region highly susceptible to both natural and human-made disasters. Natural disasters such as earthquakes, floods, and landslides that occur in various regions of the country pose continuous and significant risks affecting large parts of Türkiye [1]. In particular, Türkiye's active tectonic structure significantly increases its risk of earthquakes, necessitating constant vigilance and preparedness in the field of disaster management [2]. The seismic activity in Türkiye, especially the major earthquakes along the North Anatolian Fault Line, consistently underscores the need to strengthen the country's disaster management strategies [3]. Considering this recurring challenge, the Law on the Disaster and Emergency Management Authority (AFAD), enacted in 2009, provides a centralized structure for disaster management, regulating coordination and response processes. Nevertheless, implementation issues and legislative deficiencies observed after large-scale disasters raise questions about the effectiveness of this legal framework [4]. These shortcomings highlight the necessity of reevaluating institutional structures and improving coordination processes in disaster management. Particularly, the rising temperatures and prolonged dry periods have caused a notable surge in the frequency and severity of forest

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fires, which have become one of the most critical natural threats facing Türkiye today. Specifically in Türkiye, the effects of climate change, particularly the increase in natural disasters such as floods, droughts, and especially forest fires, further complicate these issues [4]. Recent years have seen a marked increase in devastating forest fires across the country, exacerbated by longer dry seasons, higher temperatures, and changes in vegetation patterns, leading to significant ecological, economic, and social impacts. Consequently, this change necessitates the adaptation of disaster management practices to climate change and the development of new strategies to combat and manage emerging risks. Effective forest fire management requires integrated approaches, including early detection systems, rapid response teams, community education, and landscape-level fire prevention policies tailored to Türkiye's unique climatic and geographical conditions. In this context, climate change demands proactive approaches and a comprehensive reassessment of existing disaster management strategies.

Building upon these observations, this article comprehensively examines the current state of the disaster management system in Türkiye and evaluates the impacts of climate change on disaster management. Additionally, the study addresses the potential new challenges and difficulties that may arise within the scope of disaster management and offers solutions to tackle these issues.

Ultimately, the purpose of the article is to contribute to the formation of a more resilient structure in the context of Türkiye's disaster response and to provide concrete suggestions for the improvement of existing management processes and systems. To achieve this, the subsequent sections will first provide information about the methodology adopted in the study, followed by an examination of the concept of disaster management. Subsequently, the major earthquakes and natural events experienced will be analyzed through case studies, and various aspects will be discussed. Finally, a conceptual discussion on how disaster management should be conducted will be held, and key issues for future research will be highlighted.

2. Methodology

In this research, literature review and secondary case analysis methods were used to gather information. In this context, a qualitative research design was adopted. Qualitative research is an appropriate method as it allows for a more comprehensive, in-depth, and meaningful examination and understanding of the events and phenomena under study [5]. Therefore, the literature review and case analysis methods were selected as the primary data collection and analysis techniques for this research. Existing literature on disaster management and climate change was reviewed through academic databases and scientific journals. This review aimed to identify previous studies and theoretical approaches related to the topic. The keywords "disaster management," "climate change," "risk management," and "institutional structure" were used during the search process, with the goal of incorporating significant and up-to-date research findings at both international and national levels into the study.

In the context of case analysis, major disasters that have occurred in Türkiye, including the 1999 İzmit, 2011 Van, 2020 Elazığ, 2020 İzmir, and February 6, 2023 earthquakes, the 2021 Western Black Sea flood disasters, and the persistent challenges of forest fires in Türkiye, which have become increasingly frequent and severe due to climate change and cause significant ecological, economic, and social damage, particularly in the Mediterranean and Aegean regions, were examined. The management processes of these disasters were analyzed in terms of institutional and legal structures, and the data obtained were analyzed to evaluate the effectiveness of disaster management practices. Thus, through the case analysis method, the

strengths and weaknesses of the management processes and systems developed within the scope of disaster management were tried to be identified. The collected data were primarily evaluated using content analysis. The analysis was conducted manually by reviewing both academic articles and official reports. Key statements were coded line-by-line, and emerging patterns were categorized according to frequency and conceptual relevance. Content analysis is a method used to systematically examine qualitative data and identify meaningful themes [6]. In this process, data analysis was conducted in two stages. First, the data obtained from the literature review were subjected to thematic analysis. At this point, studies related to disaster management and climate change were categorized around main themes and sub-themes. This process identified key topics such as effective management strategies, legal regulations, and the impacts of climate change. For instance, the codes such as "coordination failure," "infrastructure weakness," and "legal ambiguity" were grouped under broader themes like "institutional challenges" and "policy gaps." Thematic analysis was used to gain a deeper understanding of various aspects of the subject. In case analyses, the management processes, legal and institutional structures, intervention strategies, and outcomes of the disasters were examined in detail. Throughout the entire process, the case analyses were evaluated within the historical context of the events, revealing both the deficiencies and successful practices in disaster management. For example, in analyzing the February 6, 2023, earthquakes, over 30 reports (including AFAD bulletins, NGO assessments, and international briefings) were reviewed. Recurrent issues such as "delay in aid delivery" and "urban collapse zones" were coded and analyzed under the broader category of "operational weaknesses." This helped highlight systemic shortcomings in emergency coordination and logistical preparedness. The results of the case analyses were also used to evaluate the effectiveness and applicability of disaster management strategies.

To ensure the reliability and validity of the research, triangulation and data verification methods were employed. In this context, the combination of different data collection and analysis methods was used to increase the accuracy of the findings. The concurrent use of literature review and case analysis methods allowed for a comprehensive evaluation of the findings. Triangulation plays a crucial role in enhancing the accuracy and reliability of data. Thus, the accuracy and consistency of the data were ensured by cross-checking the data obtained from various sources during the data collection and analysis phases [7].

Additionally, during the content analysis process, each case was reviewed line-by-line using manual coding techniques. Codes such as "coordination breakdown," "building code failures," and "emergency health access" were identified frequently across cases. These were subsequently categorized under broader themes such as "institutional limitations" and "systemic preparedness gaps." This approach allowed for a more nuanced interpretation of the data and helped identify cross-cutting challenges in Türkiye's disaster management landscape. An example of this can be seen in the 2023 Kahramanmaraş earthquakes, where reports from AFAD, IFRC, and WHO were systematically examined to extract thematic insights on inter-agency coordination and logistical bottlenecks.

3. The Concept of Disaster Management and its Brief History

The history of disaster management extends deep into human history, with various civilizations developing strategies and methods to cope with disasters, playing a significant role in the evolution of modern disaster management. The earliest traces of disaster management are notably evident in ancient civilizations. In Ancient Rome, disaster management was characterized by systematic solutions such as organized firefighting units and advanced water

systems. During this period, the Roman Empire implemented extensive infrastructure projects to prevent fires and control floods [8]. Additionally, in Ancient China, early engineering solutions were employed to address natural disasters like floods and droughts, which significantly contributed to the establishment of the scientific foundations of disaster management. In the Middle Ages, disaster management was primarily limited to religious and communal aid-based solutions. Societies developed mechanisms of solidarity and assistance in response to disasters. During this period, disaster management practices were largely shaped by social cooperation and religious institutions, with no formal and systematic disaster management structures in place. This era is not considered foundational for modern disaster management, as institutional and scientific approaches to disasters were limited [9].

Following the Industrial Revolution, disaster management became more systematic. By the late 19th century, the foundations of modern disaster management were laid following the great earthquake in San Francisco. The 1906 San Francisco Earthquake pioneered the development of professional approaches in disaster management, emphasizing the importance of scientific and systematic methods in managing disasters [10]. During this period, strategies aimed at mitigating the impacts of disasters were developed, forming the building blocks of modern disaster management. By the mid-20th century, significant transformations occurred in disaster management. The first international disaster risk management frameworks adopted by the United Nations in the 1970s accelerated efforts to standardize disaster management globally. In the 1980s and 1990s, scientific research and practical guides in disaster risk reduction and disaster crisis management were expanded, making disaster management strategies more systematic and integrated during this period [11].

In recent years, technological advancements and scientific developments have led to significant changes in disaster management. Technologies such as early warning systems, data analysis, and artificial intelligence have greatly contributed to predicting and managing disasters. Satellites and Geographic Information Systems (GIS) allow for real-time monitoring and analysis of disasters, while social media and mobile applications facilitate rapid response and public information dissemination during emergencies [12]. These technologies make disaster management more efficient and effective.

In this context, disaster management standards and protocols are determined by international organizations on a global level. For instance, the Sendai Framework [13] is recognized as a guiding document for global disaster risk management and has contributed to the standardization of disaster risk reduction strategies at the international level. Also, according to the Sendai Framework, at the local level, disaster management practices are carried out by local governments and non-governmental organizations, with strategies tailored to the specific needs and risks of each region. "Local level" refers to the actions and responsibilities undertaken by regional and municipal authorities, as well as community organizations, to address disaster risks in their specific contexts. This approach ensures that disaster management strategies consider the unique vulnerabilities, resources, and needs of each region. Consequently, local-level practices complement international frameworks, creating a cohesive disaster management system that operates from the global to the community level.

The experiences and accumulated knowledge in disaster management and response have significantly shaped the current understanding and implementation of disaster management processes. Today, these processes are typically defined by four fundamental stages, each of which is crucial in ensuring a comprehensive and effective approach to disaster risk reduction and management [14]. These stages, preparedness, risk mitigation, disaster response, and post-

disaster normalization, form a cyclical framework that aims to minimize the impact of disasters, aid in efficient recovery, and build resilience against future risks.

The first and foundational stage of disaster management is preparedness. Disaster preparedness refers to the proactive measures taken to ensure readiness for the potential impacts of a disaster. This stage encompasses a variety of activities, including the development of emergency plans, the conduct of simulation drills, the establishment of early warning systems, and the raising of public awareness regarding disaster risks [15]. Preparedness is critical as it sets the groundwork for a more coordinated and effective response during an actual disaster. It involves not only governmental and organizational efforts but also community participation in risk awareness and response training. Through preparedness, societies can reduce vulnerabilities and increase their resilience, enabling them to better cope with the immediate challenges posed by a disaster [16]. Effective preparedness not only ensures that emergency teams and local authorities are ready to respond but also empowers individuals and communities to take proactive steps in protecting themselves.

Following preparedness, the second stage is risk mitigation. Risk mitigation focuses on reducing or eliminating the potential impacts of disasters before they occur. This stage incorporates both structural and non-structural measures designed to minimize damage and loss during a disaster. Structural measures may include reinforcing buildings, retrofitting infrastructure, and constructing protective barriers to prevent flooding or landslides. Non-structural measures, on the other hand, often involve policies, regulations, and public awareness campaigns aimed at promoting safe practices and behaviors [17]. Risk mitigation requires a long-term, sustained effort, as it involves changes in land use, infrastructure, and even cultural practices. For example, urban planning that considers earthquake-resistant building codes or floodplain zoning can greatly reduce future disaster risks. Moreover, risk mitigation is an ongoing process, requiring continual updates to strategies based on the evolving understanding of hazards and the changing socio-economic and environmental conditions [18].

The third stage is disaster response, which involves immediate actions taken to provide emergency aid and support during or shortly after a disaster. Disaster response is critical in saving lives, alleviating suffering, and addressing the urgent needs of affected populations. This stage includes activities such as search and rescue operations, the provision of emergency medical care, the distribution of food and water, and the establishment of shelters for displaced individuals [19]. Successful disaster response hinges on effective coordination among various agencies, including governmental bodies, non-governmental organizations (NGOs), international aid organizations, and local communities. Communication systems and information flow play a vital role in ensuring that resources are allocated efficiently and that response teams are deployed where they are most needed. Response efforts must be flexible and adaptable to the rapidly changing circumstances on the ground, as disasters can evolve unexpectedly. Strong leadership and inter-organizational cooperation are essential in making disaster response swift and effective [17].

The final stage of disaster management is post-disaster normalization, also known as recovery. This stage focuses on rebuilding and restoring societal and economic systems to pre-disaster conditions. However, recovery is not just about returning to normal; it is also an opportunity to improve resilience and reduce future vulnerabilities [19]. Recovery efforts may include infrastructure rebuilding, economic rehabilitation, psychological support for affected populations, and the re-establishment of essential services like education and healthcare. Moreover, post-disaster normalization also involves rethinking existing disaster management

strategies and implementing lessons learned from the disaster to better prepare for future events. Effective recovery is a long-term process, often taking years to fully complete, and requires the coordination of government agencies, private sector partners, and community organizations. The goal is to restore and enhance resilience, ensuring that communities are better equipped to face future disasters.

In conclusion, the disaster management process is a comprehensive and cyclical framework that helps communities prepare for, respond to, and recover from disasters. Each stage, preparedness, risk mitigation, disaster response, and post-disaster normalization, plays a crucial role in enhancing societal resilience and minimizing the negative impacts of disasters. By continuously refining and updating these stages based on new research, technological advancements, and the evolving nature of risks, disaster management can effectively protect lives and property, ensuring a more resilient future.

In summary, disaster management can be defined as the systematic and integrated activities carried out to minimize the potential impacts of disasters. This concept encompasses not only responding to emergencies but also the preparation and recovery efforts conducted before and after such events. In this regard, the subsequent sections of the study will first examine specific natural disasters, followed by an evaluation aimed at scrutinizing and improving disaster management processes.

4. Case Studies of Disasters and Lessons in Management

Natural disasters can have profound effects on a country’s socio-economic structure, with impacts felt across a broad spectrum, from human resources to economic development. Türkiye, due to its geographical and geological location, frequently encounters earthquakes, floods, and similar natural disasters. These events have led to significant lessons in disaster management and crisis response and have prompted a reassessment of strategic approaches. The large-scale natural disasters in recent years have tested the effectiveness of Türkiye's disaster management system. Notably, the August 17, 1999, İzmit Earthquake marked a turning point in Türkiye's disaster management capacity. This earthquake caused substantial loss of life and widespread destruction, revealing the inadequacy of the existing disaster management systems. Reforms made after the earthquake led to significant improvements in disaster management in Türkiye, with the establishment of new structures such as the AFAD [1].

The February 6, 2023, earthquakes centered in Kahramanmaraş stand among the most devastating disasters Türkiye has experienced in recent years, underscoring the need for further development and enhancement of the disaster management system. These earthquakes emphasized the necessity to accelerate decision-making processes during crises, improve infrastructure and building inspection standards, and further educate the public on disaster awareness. The post-earthquake coordination shortcomings and difficulties in delivering aid highlighted the need for a reassessment of Türkiye's disaster management system.

Similarly, the 2020 İzmir Earthquake revealed significant challenges in managing urban disaster risks. With a magnitude of 7.0, it caused considerable damage, particularly in densely populated coastal areas. The event highlighted the need for stricter building codes, modern inspection systems, and more effective evacuation planning to reduce urban vulnerabilities [20], [21].

The floods in the Western Black Sea region in 2021 once again highlighted the effects of climate change and the importance of water management strategies. Such floods tested the adequacy of infrastructure and the effectiveness of emergency response plans. Furthermore, the 2011 Van Earthquake underscored the vulnerability of the region to seismic activity, drawing attention to the necessity of improving infrastructure and disaster preparedness, particularly in rural and less developed areas [22]. The response to the Van earthquake also demonstrated the critical need for better coordination between local, national, and international actors during large-scale disaster events.

In addition to these events, Türkiye faces a persistent and escalating challenge with forest fires, especially in the Mediterranean and Aegean regions. These fires, driven by climate change and prolonged dry conditions, have become a recurring structural problem, causing widespread environmental damage, loss of biodiversity, and significant disruption to local communities. The frequent occurrence of forest fires reveals gaps in early warning systems, firefighting capacities, and public awareness programs, underscoring the urgent need to integrate forest fire management as a fundamental component of disaster case studies. This integration is essential to develop comprehensive, adaptive strategies tailored to the increasing frequency and severity of such events.

In the discussed section, major natural disasters that Türkiye has encountered in recent years will be specifically examined, analyzing each disaster's date, geographical and social impacts, response processes, and the challenges that emerged post-disaster. This examination will now explicitly include forest fires, evaluating the unique difficulties they present, and the lessons learned from managing these disasters alongside earthquakes, floods, and other events. Through these case studies, the aim is to deeply evaluate Türkiye's experiences in disaster management, drawing lessons and recommendations that can be applied to similar events in the future. In this regard, it can be said that these efforts are critically important for building a more successful and purpose-driven disaster management system by utilizing the feedback and lessons learned from past experiences. The 2011 Van earthquake, the 2020 İzmir earthquake, the 2023 Kahramanmaraş earthquake, and the ongoing challenges posed by forest fires each provide unique insights into how Türkiye can strengthen its disaster management framework and improve the resilience of its infrastructure and communities [17], [18].

4.1. The 1999 İzmit Earthquake

The İzmit Earthquake, which occurred on August 17, 1999, is recorded as one of Türkiye's most devastating natural disasters. With a magnitude of 7.4, this earthquake resulted in the death of approximately 17,000 people and left more than 250,000 individuals homeless [23]. The earthquake had a wide impact across the Marmara Region, causing significant damage in many cities and revealing deficiencies in Türkiye’s disaster management capacity.

Despite swift and effective rescue operations following the earthquake, coordination issues between local and central governments created significant problems. The inadequacy of healthcare services, particularly in emergency interventions, led to serious disruptions, and many injured individuals did not receive adequate treatment. Economically, the earthquake caused approximately 20 billion dollars in damage according to the Turkish Statistical Institute (TÜİK) data. The extensive damage to around 100,000 buildings and infrastructure posed severe challenges to the country's economic recovery process [24].

International search and rescue teams and financial aid played a crucial role in the recovery process. This collaboration underscored the need to enhance international cooperation in future disaster management strategies. Additionally, the collaboration between public institutions and non-governmental organizations (NGOs) strengthened social solidarity, although some coordination issues were encountered.

The İzmit Earthquake exposed serious deficiencies in Türkiye's disaster management system, particularly in institutional coordination, legal frameworks, and building safety enforcement. In response, reforms were introduced, including the establishment of the Disaster and Emergency Management Authority (AFAD) and enhancements to the building inspection regime. While these steps marked progress, challenges remain in ensuring consistent implementation and accountability across all levels of governance. The earthquake underscored the critical need to not only identify lessons in disaster management but to ensure their sustained and effective integration into policy and practice.

4.2. The 2011 Van Earthquake

On October 23, 2011, a devastating earthquake struck the eastern province of Van, with a magnitude of 7.1. This earthquake led to the deaths of over 600 people and left more than 50,000 people homeless. The earthquake's impact was particularly pronounced in the rural areas, where buildings were poorly constructed and lacked the resilience to withstand such a strong seismic event. The response to the Van earthquake, although quick in some respects, faced several challenges related to infrastructure damage and the provision of healthcare services. The region's remote location and lack of adequate resources complicated the delivery of aid and medical assistance.

The Van Earthquake highlighted the need for better infrastructure development, particularly in rural areas, and improved disaster preparedness systems for remote regions. The earthquake also exposed shortcomings in the response coordination between local, national, and international organizations. However, the cooperation between national agencies, the Turkish Armed Forces, and NGOs helped to provide relief to those affected. The Van earthquake demonstrated the importance of strengthening the country's disaster preparedness systems, especially in less developed regions, and integrating more robust risk management measures [25].

4.3. The 2020 Elazığ Earthquake

The Elazığ Earthquake, which occurred on January 24, 2020, exposed new challenges in disaster management related to climate change. The earthquake, which resulted in approximately 1,500 deaths and displaced 30,000 people, underscored the importance of integrating disaster management strategies with climate change scenarios [26].

Although some successful steps were taken during the response process, partial coordination deficiencies and communication issues limited the effectiveness of emergency services. Additionally, damage to infrastructure and challenges in providing healthcare services highlighted difficulties in the recovery process. Economically, the Elazığ Earthquake caused damages amounting to approximately 10 billion dollars according to Turkish Statistical Institute data. This damage, affecting numerous homes, businesses, and infrastructure, complicated economic recovery efforts.

International aid played a significant role in mitigating the effects of the disaster. The interventions of international search and rescue teams, including organizations like the International Search and Rescue Advisory Group (INSARAG) and Médecins Sans Frontières (Doctors Without Borders), facilitated a more effective management of the post-disaster processes. Humanitarian organizations such as the International Federation of Red Cross and Red Crescent Societies (IFRC) and the United Nations Children's Fund (UNICEF) provided critical support, including emergency medical care, shelter, food distribution, and psychological support for victims. Additionally, the World Food Program (WFP) and Cooperative for Assistance and Relief Everywhere (CARE International) ensured the provision of food aid and essential supplies to affected areas. The cooperation between public institutions and non-governmental organizations (NGOs), such as local Red Crescent societies and international partners, provided swift assistance and support to earthquake victims. However, coordination issues—arising from differences in operational protocols and communication barriers—limited the overall effectiveness of this collaboration. These challenges underline the importance of pre-disaster planning and establishing clear frameworks for international cooperation [27], [28], [29].

The Elazığ Earthquake provided important lessons for disaster management policies. Given that climate change increases disaster risks, it became evident that disaster management processes need to be expanded to cover these risks. Furthermore, improvements in the building inspection system and strengthening of healthcare infrastructure contributed to Türkiye's relative resilience compared to previous disasters.

4.4. The 2020 İzmir Earthquake

The İzmir Earthquake, which struck on October 30, 2020, with a magnitude of 7.0, caused extensive damage, especially in the city of İzmir and surrounding areas. The earthquake resulted in the deaths of 114 people and left thousands of others injured and displaced. The earthquake's impact was particularly severe in the coastal districts, where several buildings collapsed. The event demonstrated the vulnerability of densely populated urban areas to seismic risks and highlighted the inadequacies in urban planning and building inspection systems. Although the initial response efforts, including search and rescue operations, were relatively swift, the earthquake exposed significant challenges in managing urban disaster risks. Many residents criticized the slow pace of recovery and rebuilding efforts, particularly regarding the rebuilding of homes and restoring critical infrastructure [21].

The İzmir Earthquake underscored the necessity for stronger building codes, better monitoring of construction quality, and more proactive urban transformation projects. Additionally, it revealed gaps in communication and coordination between local authorities, national agencies, and non-governmental organizations, which hindered the effective delivery of aid and services. Despite these challenges, the earthquake also saw significant cooperation between public institutions and local NGOs, which played an important role in providing immediate relief to survivors. The İzmir event reinforced the need for better preparedness and quicker response times in urban centers [21].

4.5. The February 6, 2023, Earthquakes

The earthquakes occurring on February 6, 2023, across various regions of Türkiye, often referred to as the catastrophe of the century by the international community, provided a significant feedback opportunity regarding the effectiveness of the country's disaster

management strategies. These earthquakes, with their epicenter in Kahramanmaraş, affected several provinces, including Gaziantep, Hatay, Adıyaman, Malatya, and Şanlıurfa, causing widespread destruction and devastation. This catastrophe caused substantial material damage and severe human losses, highlighting critical issues in disaster management processes, such as delays in aid distribution, coordination problems between local, national, and international actors, inadequacies in infrastructure resilience, and challenges in reaching remote areas due to damaged roads and communication breakdowns [30]. These critical issues pointed to the urgent need for a reassessment of Türkiye's disaster preparedness, response capabilities, and long-term recovery strategies.

Although some successful applications were observed immediately after the earthquake, logistical and coordination problems due to the scale of the disaster and its wide impact caused delays in delivering aid to certain regions. However, this situation once again demonstrated the vital importance of utilizing national resources collectively and ensuring rapid and effective cooperation and coordination among institutions and NGOs in disaster management. Additionally, partial inadequacies in reaching healthcare services, particularly in rural areas, and shortcomings in crisis management limited the effectiveness of the response [31]. According to the World Bank's Rapid Damage Assessment Report, the material damage caused by the February 6, 2023, earthquakes in Türkiye was estimated at approximately US$34.2 billion, equivalent to about 4% of the country's GDP [32]. The earthquakes led to extensive damage to homes, businesses, and infrastructure, creating significant challenges for the country's economic recovery [33]. Particularly, the extensive damage to infrastructure exacerbated long-term economic impacts [34].

International aid and cooperation played a crucial role in alleviating the effects of the disaster. Many countries and international organizations sent search and rescue teams, medical services, and humanitarian aid materials to Türkiye. However, difficulties in coordinating aid highlighted the need for more effective international cooperation. The cooperation between public institutions and NGOs played a critical role in providing aid and support to disaster survivors. NGOs, especially in meeting basic needs, were effective, but coordination issues revealed the need for developing a more effective collaboration model for future disasters.

4.6. The 2021 Western Black Sea Flood Disasters

The 2021 Western Black Sea flood disasters in Türkiye's Black Sea region are among the significant events associated with the effects of climate change. These disasters, caused by excessive rainfall, led to substantial damage to settlements in the region and resulted in numerous fatalities. The increased frequency and severity of extreme weather events due to climate change during this period made it necessary to reassess disaster management strategies from a climate change perspective [35].

In terms of economic impact, the Western Black Sea flood disasters of 2021 had significant financial repercussions. The floods caused severe damage to hundreds of homes, businesses, and infrastructure, with economic losses amounting to approximately 1.5 billion dollars [36]. These damages deeply affected the regional economy and complicated long-term economic recovery processes.

Approximately 100 people lost their lives due to the floods, and many others were injured. Many settlements were submerged, and significant challenges were faced in search and rescue operations. The inadequacy of health and safety services presented a major obstacle to

preventing loss of life and injuries. Contamination of water sources, infrastructure damage, and deteriorated hygiene conditions increased public health risks [37].

International aid provided significant support in search and rescue and healthcare services during the floods. However, challenges in coordinating aid highlighted the need for better-organized international cooperation. The collaboration between public institutions and NGOs played an essential role in providing aid and support during the floods. However, coordination issues indicated the need for developing a more effective disaster management model.

The Western Black Sea floods provided important lessons on how climate change affects disaster management strategies. The need for increased investments in health and infrastructure, revising emergency response plans, and developing climate change adaptation strategies was emphasized. It can be stated that, to be better prepared for similar future disasters, institutional structures and disaster management strategies should be reassessed based on the insights gained from these experiences.

4.7. Persistent Challenges of Forest Fires in Türkiye

Forest fires in Türkiye represent an ongoing and recurring natural disaster that poses significant challenges to disaster management systems. Due to the country's climatic conditions, extended dry periods, and increasing temperatures attributed to climate change, forest fires have become a structural problem rather than isolated incidents. These fires regularly affect vast forested areas, agricultural lands, and nearby communities, causing environmental degradation, loss of biodiversity, and socioeconomic disruptions.

The persistence of forest fires highlights critical gaps in prevention, early warning, and response mechanisms. Despite advances in firefighting technology and organizational capacity, Türkiye continues to face difficulties such as insufficient coordination among local and national agencies, limited resources dedicated to rapid intervention, and inadequate community engagement in fire prevention efforts. Furthermore, the complexity of wildfire behavior, influenced by climatic variability and changing land use patterns, exacerbates these challenges. Economically, repeated forest fires impose substantial burdens through damage to natural resources, infrastructure, and local economies that rely heavily on forestry and agriculture. Additionally, the frequent occurrence of fires strains public budgets due to ongoing firefighting efforts and recovery costs. From a public health perspective, recurrent forest fires produce continuous air pollution episodes, adversely affecting respiratory health in affected populations. This underscores the need for integrated disaster management approaches that incorporate health risk mitigation alongside environmental and economic considerations. Addressing the structural nature of forest fires in Türkiye requires a comprehensive strategy emphasizing climate change adaptation, landscape-level forest management, investment in advanced detection and monitoring systems, and strengthened institutional cooperation. Public awareness and community-based fire prevention programs are also vital components in reducing fire risks and enhancing resilience [38], [39].

Overall, recognizing forest fires as an ongoing, systemic challenge demands a shift from reactive crisis management toward proactive, sustainable disaster risk reduction. This approach is essential for Türkiye to mitigate the long-term impacts of wildfires and safeguard both its natural ecosystems and human communities.

5. The Legal Aspects of Türkiye's Disaster Management System

Disaster management in Türkiye is conducted within a multi-dimensional and integrated system. The fundamental components of this system are various legal regulations and the institutions and organizations that implement these regulations. Effectively managing disasters and executing these processes supports the country's goals of reducing disaster risks and increasing resilience to crises. In this context, Türkiye's disaster management requires coordinated efforts from multiple stakeholders at both national and local levels. Each of these institutions has specific roles in disaster management and response processes and holds the necessary authority and responsibilities for the successful implementation of disaster management strategies.

The legal framework for disaster management provides a comprehensive framework for the actions required before, during, and after disasters. This framework includes regulations not only for the immediate response to disasters but also for preparedness and recovery processes. The primary legislation underpinning disaster management in Türkiye includes the Disaster and Emergency Management Authority (AFAD) Law, the Law on Measures and Aid for Disasters Affecting Public Life, and the Disaster and Emergency Response Services Regulation. These regulations outline methods for disaster intervention and clearly define the powers and responsibilities of the institutions involved in disaster management [40].

This legal framework determines the roles and responsibilities of various institutions and organizations involved in disaster management. AFAD forms the core of Türkiye’s disaster management system and is responsible for coordinating disaster and emergency management activities at the national level. The Ministry of Interior, the Ministry of Health, the Ministry of Environment, Urbanization and Climate Change, the Ministry of National Defense, and local governments play critical roles in the disaster management process, each with specific responsibilities and capabilities [41].

Effective disaster management hinges on the seamless collaboration and coordination of various institutions. In this context, Türkiye’s disaster management system is bolstered by the technical capacities and resources provided by each involved institution. The framework clearly defines the roles and responsibilities of these organizations, outlining how they will cooperate across preparedness, response, and recovery phases. This structured approach aims to reduce the impacts of disasters and strengthen societal resilience, ensuring a more efficient and coordinated effort in mitigating and managing disaster risks.

- **Disaster and Emergency Management Authority (AFAD) Law (2009):** Law No. 5902, adopted in 2009, constitutes the core of Türkiye's disaster management system and outlines the powers and duties of AFAD [42]. The law assigns AFAD the responsibility of coordinating disaster and emergency management activities at the national level. AFAD’s role is to provide effective management before, during, and after disasters and to respond swiftly to crises.
- **Law on Measures and Aid for Disasters Affecting Public Life (1959):** Law No. 7269 regulates the compensation of damage caused by natural disasters and measures to be taken in disaster areas. The law covers compensation for damages, assistance to citizens, and post-disaster reconstruction processes. This legal regulation aims to establish societal support mechanisms after disasters and to mitigate the effects of disasters [43].
- **Forest Fire Management Legal Framework (Forest Law No. 6831):** Law No. 6831, enacted in 1956, constitutes the fundamental legal basis for forest protection, fire

prevention, and firefighting activities in Türkiye. The law assigns the General Directorate of Forestry to take the primary responsibility for monitoring, early detection, and suppression of forest fires. Coordination with AFAD and local authorities is mandated to ensure effective disaster response. This legal framework establishes clear roles and responsibilities in preventing and managing forest fires, highlighting the importance of inter-agency collaboration and post-fire recovery efforts within the national disaster management system [44].

- **Disaster and Emergency Response Services Regulation (2013):** This regulation defines the response plans to be implemented during disasters, the duties of relevant institutions, and the response processes. The regulation is designed to ensure rapid and effective intervention during disasters. It details the procedures necessary to ensure collaboration and coordination among institutions during disasters [45].
- **Türkiye Disaster Response Plan (TAMP):** Prepared by AFAD, TAMP is a comprehensive plan aimed at enhancing Türkiye's national disaster response capacity [46]. The plan specifies intervention strategies for various types of disasters and outlines the roles and responsibilities of institutions during disaster situations. The Türkiye Disaster Response Plan aims to increase coordination and effectiveness in disaster management processes. Following the 2023 earthquakes, Türkiye has initiated legal reforms to enhance building inspection processes, especially in high-risk seismic zones. Additionally, the Türkiye Disaster Response Plan has been updated to include more comprehensive coordination strategies between local governments, AFAD, and NGOs, ensuring faster response times and better resource distribution in future disasters.

6. Institutions and Organizations Assigned with Disaster Management in Türkiye

Disaster management in Türkiye is an integrated process conducted through a comprehensive organizational structure and the collaboration of numerous stakeholders [47]. Due to its geographical and climatic features, the country is exposed to various natural disasters, making the development of an effective disaster management system critically important. To carry out disaster management effectively, a wide range of institutions and organizations assume responsibilities, from the central government to local authorities, from healthcare services to security forces. This structure is designed to reduce risks before disasters, ensure effective interventions during disasters, and accelerate recovery processes after disasters [48].

This multi-layered approach in disaster management aims to create a more resilient society against disasters by utilizing the expertise and resources of each institution effectively. At the central level, primary coordination bodies such as the Disaster and Emergency Management Authority (AFAD) lead in the formulation and implementation of national disaster strategies, while other critical ministries like the Ministry of Health and the Ministry of National Defense undertake specific tasks such as providing health services during disasters and logistical support. At the local level, municipalities and provincial special administrations manage operations in areas directly affected by disasters and coordinate community support [49].

This organizational structure requires the collaboration of various institutions to ensure that disaster management is conducted in a multi-faceted and effective manner. Each institution's role covers different stages of the disaster management process, and interventions and supports at these stages are determined to minimize the impacts of disasters and speed up societal recovery. Additionally, non-governmental organizations (NGOs) and other voluntary organizations enhance social solidarity by providing humanitarian aid and psychosocial support. This multi-stakeholder approach provides a comprehensive strategy to be prepared for

the impacts of disasters and to implement effective interventions. In this context, information about the technical capacities and duties of the institutions is presented below [49].

- **Disaster and Emergency Management Authority (AFAD):** AFAD is central to Türkiye's national disaster management system. Its duties include risk analysis, disaster awareness creation, coordination of search and rescue operations, logistical support, and preparation of disaster response plans. AFAD also provides technical support such as setting up mobile hospitals, organizing temporary shelters, and supplying and distributing emergency equipment. Additionally, AFAD has responsibilities for coordinating search and rescue activities and deploying specialized teams. At the local level, AFAD works in close collaboration with regional and local authorities to implement disaster management strategies tailored to specific areas. Local units are responsible for executing AFAD's directives and managing the immediate response within their jurisdictions. They handle the establishment of temporary shelters, the distribution of emergency aid, and the coordination of local search and rescue operations. This decentralized approach ensures that disaster management is responsive to the unique needs of each region while maintaining a cohesive, nationwide strategy [50]. Through this dual system, AFAD strengthens Türkiye's disaster management capacity, ensuring both central oversight and localized, rapid response capabilities.
- **Ministry of the Interior:** The Ministry of the Interior is responsible for ensuring safety in disaster management and increasing the disaster preparedness capacities of local governments. The ministry coordinates among local governments and other public institutions during disasters and provides necessary guidance for security forces to maintain order in disaster areas. It also coordinates safety and security services for disaster survivors [51].
- **Ministry of Health:** The Ministry of Health is responsible for providing emergency health services in disaster areas. Its duties include setting up field hospitals, evacuating the injured, organizing health services, and protecting public health after disasters. The Ministry also provides psychosocial support to individuals affected by disasters and performs technical tasks such as supplying and distributing medical equipment and personnel for emergency health services [52].
- **Ministry of Environment, Urbanization, and Climate Change:** This ministry undertakes tasks related to damage assessment, reconstruction, and urban transformation projects after disasters. Its primary responsibilities include ensuring the safety of buildings in affected areas, preparing damage assessment reports, and coordinating reconstruction projects [49].
- **Ministry of National Defense and the Turkish Armed Forces:** The Turkish Armed Forces provides logistical support, participates in search and rescue operations, and ensures security in disaster areas. Military logistics capabilities are effectively used for transporting materials and personnel to disaster areas. The Turkish Armed Forces sets up humanitarian aid brigades, providing emergency tent settlements, mobile hospitals, and temporary shelters. It also offers helicopter transportation services for quick access to disaster areas and undertakes the opening and operation of airports. In rescue operations from debris, the Turkish Armed Forces' search and rescue teams use specialized equipment and trained personnel [53].
- **Local Authorities:** Municipalities and provincial special administrations are responsible for organizing disaster management within their regions. Their duties include preparing disaster response plans, establishing temporary shelters, coordinating local response teams, and overseeing post-disaster cleanup and reconstruction efforts. Local authorities also play an active role in managing and supporting local search and rescue teams for debris removal and rescue operations [54].

- **Non-Governmental Organizations (NGOs):** Kızılay (Turkish Red Crescent), AKUT (Search and Rescue Association), and TUDAC (Turkish Disaster and Emergency Assistance Foundation) are indeed prominent organizations, but Kızılay and TUDAC are not NGOs in the strictest sense, as they are government-supported organizations, despite their non-profit nature. Kızılay is one of Türkiye's largest humanitarian organizations, with a government affiliation, while TUDAC also operates with close ties to state mechanisms. On the other hand, AKUT is a true non-governmental organization. It is a volunteer-based rescue team that has been operational in Türkiye for decades and is known for its expertise in search and rescue operations during both national and international disasters. AKUT is a fully independent organization and operates without direct governmental control, although it collaborates with public institutions in times of crisis. It is also the only Turkish team recognized by INSARAG (International Search and Rescue Advisory Group) as a "heavy" urban search and rescue team. Thus, for humanitarian assistance and disaster relief, while Kızılay and TUDAC are government-affiliated, AKUT, with its volunteer-based and independent structure, plays a vital role as a purely NGO entity in Türkiye's disaster response framework.

NGOs provide humanitarian aid and psychosocial support in disaster areas. They distribute aid through volunteer teams, assist in setting up emergency tent settlements, and offer post-disaster rehabilitation services. Additionally, NGOs collaborate with volunteer search and rescue teams in the rescue of survivors from debris and support these processes. They implement projects that enhance social solidarity and contribute to the rescue of individuals and animals in disaster areas [54], [55], [56]. In this context, it can be stated that disaster management in Türkiye relies on a broad legal framework and the coordinated efforts of various institutions. AFAD, the Ministry of the Interior, the Ministry of Health, the Ministry of Environment, Urbanization, and Climate Change, the Ministry of National Defense, local authorities, and NGOs all provide various means and capabilities to minimize the impacts of disasters and conduct intervention processes effectively. This comprehensive and multi-disciplinary approach plays a critical role in increasing societal resilience against disasters. Disaster management in Türkiye is carried out by various institutions at both central and local levels, with each institution fulfilling specific roles before, during, and after disasters, contributing to the disaster management process. Strengthening these domains through localized planning, cross-sector collaboration, and inclusive education will not only improve Türkiye’s disaster resilience but also ensure that institutional efforts remain grounded in community needs and adaptive to emerging risks.

7. Evaluation and Recommendations

This study aimed to comprehensively examine the current state of disaster management systems in Türkiye and the impact of climate change on these systems. The literature review and case analysis reveal that Türkiye has made significant strides in disaster management but still faces numerous challenges and deficiencies. In this section, data and analyses obtained from the information discussed so far will be interpreted, and a discussion on current practices and strategies will be conducted.

7.1. Disaster Management Strategies, Institutional Structures, and Legal Aspects

Disaster management strategies and institutional structures in Türkiye are generally organized with a central approach. This centralized structure plays a crucial role in the management and coordination of disasters in Türkiye. In Türkiye's disaster management framework, AFAD (Disaster and Emergency Management Authority) occupies a central position and directs the

coordination and intervention processes before, during, and after disasters. AFAD performs critical functions such as national-level policy development, strategy setting, resource management, and coordination during crisis situations.

However, challenges faced by the centralized structure at the local level can limit the effectiveness of disaster management. One of the main challenges of the centralized structure is the insufficient consideration of local dynamics and needs. Türkiye's vast geographical and cultural diversity necessitates a significant role for local governments and communities in disaster management processes. When central authorities do not adequately consider the local characteristics and social dynamics of disasters, various issues may arise in intervention and recovery processes.

The need to strengthen the roles of local governments and non-governmental organizations (NGOs) in disaster management is highlighted. Local governments can better understand disaster-related risks and needs, allowing for a faster and more effective response process. Therefore, enhancing disaster management capabilities at the local level, assessing local risks, and developing strategies for these risks are important. Additionally, NGOs play a critical role in community mobilization, aid organizations, and awareness-raising activities during disasters. These organizations can make significant contributions to increasing community preparedness for disasters and supporting post-disaster recovery processes.

The legal and administrative framework for disaster management in Türkiye should also be considered in this context. The Disaster and Emergency Management Law, enacted in 2012, defines AFAD’s authority and responsibilities in disaster management and regulates disaster management strategies. This law provides a broad framework covering all necessary measures, coordination mechanisms, and resource management before, during, and after disasters [1]. However, for legal regulations to be effectively implemented, local governments and other stakeholders must adhere to these regulations and cooperate as needed.

In addition to the legal framework, the institutional structures and strategies of disaster management should be effectively implemented at the local level. Preparing local disaster management plans, keeping these plans updated, and ensuring their applicability at the local level require active involvement of both central and local governments. Furthermore, post-disaster evaluation reports and feedback mechanisms are important for measuring the effectiveness of implemented strategies and making improvements as necessary. Inter-agency data-sharing protocols and a unified national disaster information system should be developed to enhance coordination, real-time decision-making, and transparency during emergencies. This includes integrated platforms for logistics, shelter availability, medical response, and early warning dissemination.

It can be said that the effectiveness of disaster management strategies and institutional structures in Türkiye depends on the coordinated efforts of central and local governments. While central management maintains high-level functions such as strategic planning and coordination, the operational and supportive roles of local governments and NGOs should be strengthened. This is critical for minimizing the effects of disasters and enhancing societal resilience [23]. While Türkiye’s legal framework is comprehensive on paper, enforcement remains inconsistent. Research and policy efforts should focus on identifying bottlenecks in the legal implementation process, including administrative capacity, inspection mechanisms, and judicial follow-up in non-compliance cases (e.g., building code violations). Additionally, effective implementation of legal regulations and institutional structures at the local level will

enhance the overall success of disaster management and ensure that communities are better prepared for disasters. Disaster resilience requires robust public-private partnerships. Future strategies should clarify the roles of private sector actors in logistics, infrastructure, telecommunications, and financial recovery. Incentive mechanisms could be designed to support corporate disaster preparedness and business continuity planning.

In addition, developing locally tailored disaster response plans and establishing disaster coordination offices within municipalities could improve response effectiveness. These offices can work in alignment with AFAD and central authorities, ensuring rapid decision-making and more context-sensitive interventions.

7.2. Post-Disaster Recovery Processes

Post-disaster recovery processes play a crucial role in enabling communities to recover from the devastation caused by disasters and to resume normal life. These processes vary significantly depending on the type and magnitude of the disaster, as well as the socio-economic structure of the affected area. Regardless of context, recovery is inherently complex, long-term, and multidimensional. Effective recovery management requires consideration of both physical and psychological factors.

Common challenges include deficiencies in coordination, inadequate resource management, infrastructure damage, and the neglect of social dynamics. In particular, a lack of cooperation among institutions and coordination issues between local and central governments can significantly hinder recovery efforts. For example, during the aftermath of the 1999 İzmit Earthquake, coordination problems resulted in major delays in aid delivery and damage assessments [4].

For recovery efforts to be sustainable and effective, efficient resource management is vital. However, many post-disaster periods in Türkiye, such as those following the 1999 İzmit, 2011 Van, 2020 Elazığ, 2020 İzmir, and the 2023 Kahramanmaraş earthquakes, as well as the 2021 Western Black Sea floods, have been marked by mismanagement of funds and inequities in distribution. These issues delayed infrastructure repairs and led to unmet basic needs among survivors [4]. The repeated emergence of such issues highlights the critical role of financial and logistical planning in post-disaster scenarios.

For instance, reports indicate that after the 1999 İzmit earthquake, delays in infrastructure repair and limited allocation of resources were significant obstacles to recovery [23]. Similarly, the 2020 Elazığ earthquake revealed financial mismanagement, with delayed and insufficient distribution of aid [26]. The 2023 Kahramanmaraş earthquakes exposed additional systemic issues, where logistical challenges and ineffective resource allocation—exacerbated by political and administrative complications—severely hampered recovery operations [30], [32].

These recurring problems suggest that financial constraints and inefficient resource governance continue to slow recovery efforts and worsen survivors' hardships. Inadequate coordination between central and local authorities, slow fund distribution, and inequities in allocation all hinder the timely restoration of services and infrastructure [4]. A centralized disaster recovery fund tracking system should be developed under the supervision of AFAD or the Court of Accounts, ensuring transparency and public accountability in the allocation and use of recovery funds. This would reduce public distrust and improve institutional efficiency in long-term reconstruction efforts.

In addition to physical reconstruction, psychosocial support plays a critical role in post-disaster recovery. Disasters often result in long-term psychological trauma, and insufficient support systems can increase rates of stress, depression, and anxiety. For example, following the 2023 earthquakes, cases of trauma-related stress disorder were widespread, negatively impacting recovery. Therefore, reinforcing community solidarity and developing psychosocial support mechanisms are essential components of long-term recovery. To enhance psychosocial support in disaster-affected areas, regional mental health response units could be established within provincial health directorates. These units would include trained professionals equipped to provide immediate counseling and long-term psychological care in coordination with NGOs and public institutions.

International cooperation also plays a crucial role in improving recovery processes. In the context of Türkiye, international support has historically contributed significantly to post-disaster interventions, both financially and operationally. After the February 6, 2023, earthquakes, the Organization of Turkic States collaborated with Türkiye to quickly mobilize emergency resources and humanitarian aid [30]. Similarly, international bodies such as the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the International Federation of Red Cross and Red Crescent Societies (IFRC), and European Union civil protection mechanisms provided technical assistance, coordinated logistics, and direct aid.

Türkiye's alignment with international frameworks, particularly the Sendai Framework for Disaster Risk Reduction, demonstrates a commitment to global standards. As noted by Salik Ata, diplomatic ties and pre-existing agreements accelerated cross-border aid delivery in 2023, showcasing Türkiye's increasing institutional capacity in managing international partnerships [31]. However, persistent issues, such as overlapping mandates, protocol differences, and communication barriers, continue to limit the full effectiveness of these collaborations. Overcoming these obstacles requires robust pre-disaster planning, legal harmonization, and regular joint simulation exercises with international actors.

Long-term international partnerships should not only serve emergency needs but also function as platforms for knowledge exchange, contributing to better disaster governance, infrastructure resilience, and social preparedness. As emphasized by Gözükızıl and Tezcan, such collaboration can have enduring benefits beyond immediate response [33].

Research has shown that community-based support systems significantly enhance mental health recovery, social cohesion, and overall resilience, key factors in rebuilding life after disasters. Effective psychosocial programs address both immediate and long-term mental health needs, fostering sustainable coping mechanisms [54], [56]. Additionally, community solidarity facilitates collective action and mutual aid, improving the speed and effectiveness of recovery efforts [57]. Integrating these psychosocial and community-based components into disaster strategies is therefore vital.

Among the most critical aspects of recovery is long-term reconstruction and urban planning. Reconstruction entails more than rebuilding structures; it involves creating more resilient and safer communities. For example, the recovery efforts following the 1999 İzmit Earthquake were criticized for insufficient planning and oversight. Improvements in construction standards and infrastructure resilience are essential. Furthermore, urban planning policies that consider future disaster risks can significantly reduce vulnerability. Sustainable and participatory approaches are key to successful recovery. While short-term solutions may offer immediate relief, they

often fail to support long-term resilience. In contrast, participatory approaches, where survivors actively contribute to recovery planning, ensure that efforts align with local needs and priorities [58].

In summary, post-disaster recovery is a multifaceted process that requires a coordinated and inclusive approach. Addressing psychosocial needs, improving financial and logistical systems, fostering international cooperation, and incorporating sustainability and participation into recovery planning are all essential to building resilient communities. Creating a centralized post-disaster monitoring framework under AFAD's supervision could support transparency and ensure that recovery funds and services are equitably distributed. Periodic public reports would also help strengthen institutional accountability and trust.

7.3. Effects of Climate Change

Climate change significantly increases the intensity and frequency of disasters, necessitating a reassessment and update of disaster management strategies. Extreme weather events and natural disasters caused by global warming can render existing disaster management systems inadequate [27]. For instance, rising temperatures, sea level rise, and sudden changes in weather conditions are leading to more frequent and severe natural disasters. This situation increases the frequency and impact of events such as floods, droughts, wildfires, and severe storms, making it essential for disaster management systems to adapt to these new conditions. It is important to emphasize that many of these wildfires are human-induced, resulting from both accidental and intentional activities, which compounds the challenges posed by climate change and demands targeted prevention and management strategies."

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Existing disaster management systems are often designed based on past data and experiences and may struggle to address the new and complex risks posed by climate change. For example, urban planning and infrastructure design may have been based on outdated weather conditions, raising concerns about their suitability for new climate conditions. Additionally, disaster response and recovery processes may find it challenging to cope with unprecedentedly intense events. Therefore, it is necessary to enhance the flexibility and resilience of existing systems considering the impacts of climate change [60].

Developing proactive and adaptive strategies for climate change can lead to more effective results in disaster management [61]. Proactive strategies involve identifying potential risks caused by climate change in advance and taking measures to mitigate these risks, while adaptive strategies aim to increase the flexibility and resilience of existing systems in response to changing climate conditions. For instance, updating water management systems, increasing green infrastructure, and regularly updating disaster risk maps are parts of these strategies. Such measures can reduce the impact of disasters and help communities become better prepared for such events. Furthermore, offering technical and financial support to local authorities for green infrastructure projects, such as permeable pavements, flood canals, or urban forests, can strengthen community-level climate resilience without requiring regulatory overhaul.

Türkiye’s efforts and strategies in combating climate change should be strengthened in line with international standards. Türkiye has developed various strategies to address climate change; however, aligning these strategies with international standards and integrating them with global best practices could enhance the country's performance in climate change mitigation. Ensuring that Türkiye's climate change policies and practices are in harmony with those of other countries is also important for international cooperation and information sharing. Furthermore, strategies supported by international standards and scientific data can improve the country's disaster management capacity and provide a broader impact area [62].

In this aspect, addressing the effects of climate change requires the development of a comprehensive, updated, and integrated disaster management approach at both national and international levels. This approach will form a critical foundation for reducing disasters, managing risks, and increasing community resilience. Revisiting and updating existing strategies are crucial for reducing the impacts of disasters and ensuring that communities are better prepared for future events. In this regard Türkiye has developed several strategies and practices to combat climate change, with the goal of aligning with international standards and mitigating environmental risks. Some of the key strategies and practices include:

- **National Climate Change Action Plan (NCCAP):** Initiated in 2011, this plan outlines Türkiye’s strategic approach to reduce greenhouse gas emissions, promote renewable energy sources, and enhance energy efficiency. It is intended to guide Türkiye's climate policy and actions through various sectors, including energy, transportation, industry, agriculture, and waste management [63]. It emphasizes sustainable development while addressing climate adaptation and disaster risk reduction.
- **Paris Agreement:** Türkiye ratified the Paris Agreement in 2021, committing to limiting global warming to well below 2°C above pre-industrial levels, with efforts to limit it to 1.5°C. This is a key international commitment that influences Türkiye’s national climate policies. The country has pledged to reduce its carbon emissions significantly by 2053 and is focused on transitioning to a low-carbon economy. To achieve this, Türkiye has also set renewable energy targets, aiming for 30% of its energy to come from renewables by 2030 [64].
- **Energy Efficiency Strategy (2012-2023):** This strategy focuses on enhancing energy efficiency in various sectors, including residential, industrial, and transportation. The aim is to reduce energy consumption per unit of GDP while ensuring economic growth. Incentives for energy-efficient technologies and improvements in building standards have been critical components of this strategy.
- **Renewable Energy Development:** Türkiye has made significant investments in renewable energy, including wind, solar, and geothermal power. The country is among the leading nations in terms of wind energy production and aims to increase its reliance on renewables to diversify its energy mix. This is part of Türkiye's broader commitment to reducing its carbon footprint and enhancing climate resilience [65].
- **Climate Adaptation Strategies:** Türkiye’s National Climate Change Adaptation Strategy and Action Plan (2011) includes measures for protecting vulnerable ecosystems and communities. This plan focuses on adapting to climate change impacts, such as increased droughts, floods, and extreme weather events, by improving water resource management, disaster preparedness, and agricultural sustainability [62].

By aligning these strategies with international standards, Türkiye can improve its capacity to respond to climate-related disasters and ensure that its policies are consistent with global climate goals. Integrating scientific data, international cooperation, and best practices is

essential to enhancing Türkiye's disaster management and climate change resilience [62], [63].

In conclusion, Türkiye's climate change strategies, while effective in many areas, would benefit from greater alignment with global frameworks and continuous updates based on international research and experiences. This would not only improve disaster management capabilities but also ensure the country's long-term sustainability in a changing climate. Furthermore, given the increasing frequency and severity of forest fires largely driven by rising temperatures and prolonged droughts, Türkiye's climate change strategies must explicitly incorporate targeted forest fire prevention, preparedness, and response measures. Integrating fire risk management into broader climate adaptation and disaster risk reduction frameworks is essential to effectively mitigate the socio-economic and environmental impacts of these increasingly recurrent disasters

7.4. Education and Awareness in Disaster Management

Disaster management is crucial for enhancing a community's ability to withstand the devastating effects of disasters. In this context, the level of knowledge and preparedness within the community is a determining factor in the success of disaster management. Education and awareness play an important role in disaster preparedness and effective response processes. To create an effective disaster management system, comprehensive educational programs and awareness campaigns that target both the public and authorities need to be implemented [66]. Education and awareness in disaster management enable individuals and communities to understand disasters better and learn how to respond effectively when they occur [67]. Educational programs cover not only post-disaster response processes but also the precautions that need to be taken before a disaster. Expanding disaster education and awareness efforts in Türkiye can help the community become better prepared for disasters and prevent loss of life and property. Continuous education and awareness activities aimed at building a disaster-resilient community are of great importance.

Disaster education includes various training programs and activities aimed at minimizing the impacts of disasters on individuals and communities. These training courses may cover topics such as first aid, fire suppression, identifying safe areas during an earthquake, and evacuation plans. Given the increasing frequency and severity of forest fires in Türkiye, disaster education programs should also place special emphasis on fire prevention and response. This includes educating communities on fire risks, safe evacuation procedures during wildfires, and basic preventive actions such as avoiding open flames in high-risk areas. Integrating forest fire-specific drills and awareness activities within broader disaster preparedness efforts will significantly improve community resilience against such recurring natural hazards. Regular disaster training in schools, workplaces, and public institutions help individuals gain awareness of how to act without panic during a disaster. Additionally, regularly conducted disaster drills increase the applicability of theoretical knowledge and enhance response capabilities [68].

Increasing societal awareness in disaster management is essential for enhancing community resilience. It promotes preparedness at the individual level while fostering social solidarity in times of crisis. Community awareness initiatives, particularly through media channels such as social media platforms and television, can significantly amplify public understanding of disaster preparedness and response [69], [70]. These campaigns not only educate citizens on how to prepare for disasters but also encourage collective actions that enhance social cohesion, which is vital for effective recovery efforts after a disaster. Additionally, as individuals are more informed, they are better equipped to respond to emergencies, ultimately strengthening the

overall disaster response process [67]. Partnering with universities and civil society organizations to deliver community-based disaster education programs could enhance outreach. Workshops, local seminars, and digital campaigns may be tailored to different regions and age groups. Public trust in disaster management institutions is critical for compliance and cooperation. Strategies to improve institutional legitimacy, such as transparency in aid delivery, community involvement in planning, and consistent communication, should be prioritized as core components of resilience.

Türkiye's disaster management system already includes various arrangements for disaster education and awareness. However, enhancing and refining these initiatives through a national strategy can further improve the effectiveness of disaster management efforts. Developing a comprehensive national curriculum for disaster education, integrating disaster training into educational institutions and public organizations, and strengthening preparedness and response capacities are crucial steps to elevating disaster resilience. Ensuring that these policies are adaptable to local contexts and consider regional dynamics is essential for increasing community resilience and improving the overall effectiveness of Türkiye's disaster management framework.

The continuous evaluation of the effectiveness of disaster education and awareness programs is an important step in improving their success. Measuring the impact of training and awareness activities on targeted audiences provides the data needed to develop the programs. For instance, evaluations conducted after disaster drills can reveal how effective the programs are and identify areas for improvement. These evaluations support a continuous learning and development process in disaster management and ensure better preparedness for future disasters. In disaster management, education and awareness are indispensable elements for building a resilient community. The continuous development and expansion of educational programs and awareness activities can significantly contribute to reducing disaster risks by enhancing community resilience. Investments in disaster management can potentially minimize both loss of life and economic damage in the long run. This is supported by recent studies emphasizing that community-based education improves both individual and institutional disaster readiness [71], [72]. Introducing a voluntary "Disaster Awareness Certificate Program" through online platforms coordinated by AFAD can also motivate individuals to acquire essential knowledge, particularly in vulnerable regions.

8. Conclusion

This study has evaluated recent developments in Türkiye's disaster management field. The regulations implemented following the 1999 İzmit Earthquake and the establishment of AFAD highlight Türkiye's commitment to creating a centralized disaster management structure, significantly enhancing its disaster response capabilities. AFAD's role as the central body of disaster management has been a cornerstone of the country's disaster response system. Nonetheless, despite these advancements, there is a clear need to further empower local governments, as the central structure alone may face challenges in ensuring effectiveness at the local level.

Considering this, strengthening the capacities of local governments is essential for improving coordination and resource management during disaster response and recovery efforts. Greater integration of local governments into disaster management processes, along with a robust cooperation mechanism between central and local authorities, will improve overall disaster resilience.

Additionally, the increasing risks posed by climate change necessitate the development of more proactive and adaptive disaster management strategies. To effectively address these emerging threats, a flexible approach that accounts for the unpredictable and evolving nature of climate-induced disasters is essential for Türkiye's future success. Strategies that integrate climate change considerations into disaster planning will be pivotal in ensuring preparedness and responsiveness in the face of increasingly frequent and severe disasters.

Finally, the implementation of continuous education and awareness programs aimed at disaster preparedness is crucial. These programs are vital for increasing community resilience, reducing risks, and empowering citizens to act in the event of a disaster. Moreover, it is important to recognize that disaster management should be regarded as a shared responsibility across generations, acknowledging that the environment and societal resilience inherited from our ancestors must be preserved and strengthened in order to safeguard future generations. Embracing this intergenerational responsibility is considered fundamental to the sustainable development of Türkiye's disaster management framework and is seen as fostering a culture of preparedness and solidarity.

Therefore, to enhance Türkiye's disaster management framework, it is recommended that policies focus on expanding local government roles, integrating climate change strategies, and implementing widespread community education initiatives. Strengthening these areas will ensure a more prepared, resilient society, better equipped to face the challenges of future disasters.

9. Recommendations for Future Research

This study has provided valuable insights into disaster management in Türkiye, especially in the context of climate change. However, the increasing complexity of disaster risks highlights the need for more comprehensive and targeted research. The following key areas are recommended for future investigation to enhance the resilience and effectiveness of Türkiye's disaster management system:

- **Long-Term Socioeconomic Impacts of Disasters:** Research should focus on the prolonged social and economic consequences of disasters, particularly how recovery efforts influence the stability and development of affected communities. Such studies will enable more holistic evaluations of the effectiveness of disaster management over time.
- **Strengthening the Role and Capacity of Local Governments:** Detailed assessments of local authorities' responsibilities and operational capacities are needed to identify existing implementation gaps. Evaluating the effectiveness of capacity-building programs will contribute to more responsive and coordinated disaster governance at the local level.
- **Climate Change and Adaptive Disaster Risk Management:** Future research should explore how climate change alters disaster patterns and identifies suitable adaptation and mitigation strategies. Integrating climate resilience into existing disaster management frameworks will be crucial to addressing emerging risks.
- **Social Resilience and Effectiveness of Public Awareness Programs:** Investigating how disaster education campaigns influence public behavior and preparedness will help optimize outreach strategies. Special attention should be given to the relationship between knowledge acquisition and actual preparedness behaviors across different demographic groups.
- **Technological Innovation and Integration in Disaster Management:** The use of technologies such as Artificial Intelligence, Geographic Information Systems (GIS), and

satellite monitoring systems should be studied in terms of their impact on early warning systems, emergency response efficiency, and resource allocation. Research should also assess the scalability and cost-effectiveness of such innovations.

- **Land Use Planning and Critical Infrastructure Resilience:** Research should evaluate the integration of hazard-based zoning policies into urban and regional planning. In parallel, the design, accessibility, and durability of critical infrastructure, such as evacuation routes, assembly areas, and emergency service corridors, should be assessed to support rapid and effective responses during crises.
- **Inclusion of Vulnerable Populations and Mental Health Support:** Studies should investigate how disasters disproportionately affect marginalized groups, such as the elderly, women, people with disabilities, and low-income communities, and how to promote inclusive access to aid and decision-making. Furthermore, culturally appropriate and scalable models of psychosocial support should be developed to improve community psychological resilience.
- **Institutional Trust, Coordination, and Governance of Slow-Onset Disasters:** Future studies should examine mechanisms for enhancing coordination between public agencies and civil society, including the effectiveness of joint training, information sharing, and integrated operational planning. In addition, research should address the governance of slow-onset and recurring disasters, such as droughts and wildfires, by proposing sustainable, long-term response frameworks. Public trust and institutional legitimacy during disaster events should also be analyzed, especially regarding transparency and accountability.

Pursuing these research directions will provide a stronger evidence base to improve Türkiye's disaster preparedness, policy frameworks, and community resilience in the face of increasingly complex and climate-related disaster risks.

Conflict of Interest

The author declares no conflict of interest.

Author Contribution

This is a single-author study; all research, analysis, and writing were carried out by the author.

References

[1] Afet ve Acil Durum Yönetimi Başkanlığı, *Türkiye Afet Müdahale Planı (TAMP)*. Ankara, Türkiye: AFAD, 2014.

[2] T. Erkal and M. Değerliyurt, "Türkiye'de afet yönetimi," *Doğu Coğrafya Dergisi*, vol. 14, no. 22, pp. 147–164, 2011.

[3] M. Özler, "Kamu yönetimi paradigmasında afet riski yönetiminden yönetişimine," *Kahramanmaraş Sütçü İmam Üniversitesi Sosyal Bilimler Dergisi*, vol. 16, no. 1, pp. 139–150, 2019. [Online]. Available: https://doi.org/10.33437/ksusbd.474491

[4] O. Şahin, "Doğal afet uygulamaları ve yönetimi," *International Anatolia Academic Online Journal of Social Sciences*, vol. 10, no. 2, pp. 218–225, 2024.

[5] J. W. Creswell and C. N. Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 4th ed. Thousand Oaks, CA, USA: SAGE Publications, 2018.

[6] A. Koçak and Ö. Arun, "İçerik analizi çalışmalarında örneklem sorunu," *Selçuk İletişim*, vol. 4, no. 3, pp. 21–28, 2013. [Online]. Available: https://doi.org/10.18094/si.51496

[7] D. Fotheringham, "Triangulation for the assessment of clinical nursing skills: A review of theory, use, and methodology," *International Journal of Nursing Studies*, vol. 47, no. 3, pp. 386–391, 2010.

[8] S. A. Oliver, "Anthropological research on hazards and disasters," *Annual Review of Anthropology*, vol. 25, pp. 303–328, 1996.

[9] F. V. Aguilar, M. D. Pante, and A. F. Tugado, "Disasters in history and the history of disasters: Some key issues," *Philippine Studies: Historical & Ethnographic Viewpoints*, vol. 64, no. 3/4, pp. 641–656, 2016.

[10] A. Oliver-Smith, "Theorizing disasters: Nature, power and culture," in *Catastrophe & Culture: The Anthropology of Disaster*, S. M. Hoffman and A. Oliver-Smith, Eds. Berkeley, CA, USA: University of California Press, 2002, pp. 23–47.

[11] N. Varol and T. Gültekin, "Afet antropolojisi," *Elektronik Sosyal Bilimler Dergisi*, vol. 15, no. 59, pp. 1–6, 2016. [Online]. Available: https://doi.org/10.17755/esosder.263244

[12] C. Aydın and V. Tecim, "Afet yönetiminde bilişim teknolojilerinin rolü," *Bilişim Teknolojileri Dergisi*, vol. 8, no. 1, pp. 1–8, 2015. [Online]. Available: https://doi.org/10.17671/btd.82314

[13] United Nations Office for Disaster Risk Reduction, *Sendai Framework for Disaster Risk Reduction 2015–2030*, United Nations Office for Disaster Risk Reduction, 2015. [Online]. Available: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030 [Accessed: Jun. 25, 2025].

[14] Afet ve Acil Durum Yönetimi Başkanlığı , "*Açıklamalı Afet Yönetimi Terimleri Sözlüğü*," AFAD, [Online]. Available: https://www.afad.gov.tr/aciklamali-afet-yonetimi-terimleri-sozlugu [Accessed: Nov. 2, 2023].

[15] B. Wisner, J. C. Gaillard, and I. Kelman, *The Routledge Handbook of Hazards and Disaster Risk Reduction*. London, U.K.: Routledge, 2012.

[16] Afet ve Acil Durum Yönetimi Başkanlığı, *Açıklamalı Afet Yönetimi Terimleri Sözlüğü*. Ankara, Türkiye: AFAD, 2014.

[17] D. Alexander, *Principles of Emergency Planning and Management*. London, UK: Terra Publishing, 2002.

[18] M. Kadıoğlu and E. Özdamar, "Modern, bütünleşik afet yönetiminin temel ilkeleri," in *Afet Zararlarını Azaltmanın Temel İlkeleri*, JICA Türkiye Ofisi No. 2, Ankara, Türkiye, 2008, pp. 1–34.

[19] D. P. Coppola, *Introduction to International Disaster Management*, 3rd ed. Oxford, UK: Butterworth-Heinemann, 2015.

[20] H. E. Demirci, M. Karaman, and S. Bhattacharya, "A survey of damage observed in İzmir due to 2020 Samos–İzmir earthquake," *Natural Hazards*, vol. 111, pp. 1047–1064, 2022.

[21] A. Çalışkan and G. Kaya, "Deprem Sonrasındaki Toplumsal Dayanışma Pratiklerinin Sosyolojik Görünümü: İzmir Depremi Örneği," *Vizyoner Dergisi*, vol. 12, no. 32, pp. 1052–1077, 2021. [Online]. Available: https://dergipark.org.tr/tr/pub/vizyoner/issue/65710/878817

[22] Afet ve Acil Durum Yönetimi Başkanlığı, *Türkiye'de Afet Hazırlığı ve Müdahale: Kapsamlı Bir Genel Bakış, Afet Yönetimi Raporu 2021*. Ankara, Türkiye: AFAD, 2021.

[23] N. Yavuz, "Türkiye'de afet yönetimi politikaları," in *Türkiye'de Kentsel Alan ve Çevre Politikası Analizleri*, E. Akman and C. Babaoğlu, Eds. Bursa, Türkiye: Ekin Basın Yayın Dağıtım, 2018, pp. 45–67.

[24] K. C. Mızrak and M. Tolon, "Development of disaster management in Türkiye: From 1999 Kocaeli earthquake to 2011 Van earthquake," *International Journal of Environmental Science and Applications (IJESA)*, vol. 1, no. 4, pp. 145–151, 2017.

[25] M. C. Yılmaz, "2011 Van Depremi Sonrası Afet Müdahalesi ve Toplumsal İyileşme," *Afet Yönetimi Dergisi*, vol. 5, no. 1, pp. 45–60, 2013.

[26] A. C. Zülfikar, "24 Ocak 2020 Elazığ depreminin kuvvetli yer hareketi verilerinin değerlendirilmesi," *Çukurova Üniversitesi Mühendislik-Mimarlık Fakültesi Dergisi*, vol. 35, no. 3, pp. 821–834, 2020. [Online]. Available: https://doi.org/10.21605/cukurovaummfd.846809

[27] Intergovernmental Panel on Climate Change, "Climate Change 2022: Impacts, Adaptation and Vulnerability," Cambridge, UK: Cambridge Univ. Press, 2022. [Online]. Available: https://www.ipcc.ch/report/ar6/wg2/ [Accessed: Jun. 25, 2025].

[28] International Federation of Red Cross and Red Crescent Societies, "IFRC Office of Internal Audit and Investigations 2023 Annual Report," Sep. 19, 2024. [Online]. Available: https://www.ifrc.org/document/ifrc-office-internal-audit-and-investigations-2023-annual-report [Accessed: Jun. 25, 2025].

[29] International Federation of Red Cross and Red Crescent Societies, "IFRC launches international emergency appeals for CHF 200 million to respond to deadly earthquake in Türkiye and Syria," Feb. 6, 2023. [Online]. Available: https://www.ifrc.org/press-release/ifrc-launches-international-emergency-appeals-chf-200-million-respond-deadly [Accessed: Jun. 25, 2025].

[30] K. Korkmaz, "Türkiye'de yaşanan 6 Şubat depremleri ve Türk Devletleri Teşkilatı," *TÜRKAV Kamu Yönetimi Enstitüsü Sosyal Bilimler Dergisi*, vol. 3, no. 4, pp. 161–176, 2023.

[31] N. Salik Ata, "Kahramanmaraş merkezli 6 Şubat depremlerinin kriz yönetimi bağlamında değerlendirilmesi," *Meriç Uluslararası Sosyal ve Stratejik Araştırmalar Dergisi*, vol. 7, Special Issue, pp. 59–77, 2023. [Online]. Available: https://doi.org/10.54707/meric.1327520

[32] World Bank, "Global Rapid Post-Disaster Damage Estimation (GRADE) report: February 6, 2023 Kahramanmaraş earthquakes – Türkiye," 2023. [Online]. Available: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099022723021250141. [Accessed: Jun. 25, 2025].

[33] C. Ağın Gözükızıl and S. Tezcan, "Cumhuriyet'in yüzüncü yılında Türkiye'de afetler: 06 Şubat 2023 Kahramanmaraş depremi," *Kent Akademisi*, vol. 16, Special Issue, pp. 97–114, 2023. [Online]. Available: https://doi.org/10.35674/kent.1353445

[34] G. Aydınbaş, "Sosyoekonomik boyutuyla Türkiye'de depremler üzerine bir inceleme: Kahramanmaraş depremi örneği," in *Sosyal Bilimlere Çok Yönlü Yaklaşımlar: Tarih, Turizm, Eğitim, Ekonomi, Siyaset ve İletişim*, pp. 177–212, 2023.

[35] A. Ü. Kömüşcü, M. Aksoy, E. Turgu, and E. Ünal, "Ani taşkınlara karşı dirençliliği artırmada erken uyarı sistemlerinin rolü: FFG Sistemi ile 13–15 Temmuz 2021 Doğu

Karadeniz seline yönelik bir uygulama," *Resilience*, vol. 6, no. 1, pp. 93–109, 2022. [Online]. Available: https://doi.org/10.32569/resilience.1038633

[36] C. K. Özkök, "Sel felaketinin yaşandığı bazı bölgelerde 48 saatteki yağış miktarı, 1 yıllık toplam yağışın 3'te 2'sini buldu," Anadolu Ajansı, Aug. 15, 2021. [Online]. Available: https://www.aa.com.tr/tr/gundem/sel-felaketinin-yasandigi-bazi-bolgelerde-48-saatteki-yagis-miktari-1-yillik-toplam-yagisin-3te-2sini-buldu/2335014 [Accessed: Jun. 30, 2025].

[37] B. O. Aydın and Ö. Duğan, "Kriz sonrası bilgi yayılımı ve sosyal medya kullanım özellikleri: Batı karadeniz sel felaketi ağına dair bir analiz," *Connectist: Istanbul University Journal of Communication Sciences,* vol. 64, pp. 37–69, 2023. https://doi.org/10.26650/CONNECTIST2023-1063182

[38] C. Güngöroğlu, Z. U. Özkara, and V. Tutmaz, "Türkiye'de orman yangin yönetimi: sorunlar ve çözüm önerileri", *Memleket Siyaset Yönetim*, vol. 19, no. 43, pp. 517–570, 2024. https://doi.org/10.56524/msydergi.1565981.

[39] E. Bilgili, Ö. Küçük, B. Sağlam, and K. A. Coşkuner, "Büyük orman yangınları: Sebepleri, organizasyonu ve idaresi," *Türkiye Bilimler Akademisi Yayınları*, 2021. https://10.53478/TUBA.2021.039

[40] E. M. Türk, "6 Şubat 2023 depremlerine müdahale mevzuatının ve silahlı kuvvetlerin müdahalesinin değerlendirilmesi," *Ankara Barosu Dergisi*, vol. 81, Special Issue, pp. 301–323, 2023.

[41] Ç. G. Azimli, "Türkiye'de uygulanan afet yönetimi politikalarının incelenmesi: Yasal düzenlemeler ve DASK," *Dirençlilik Dergisi*, vol. 2, no. 1, pp. 13–21, 2018.

[42] F. Yaman, "Stratejik insan kaynakları yönetimi penceresinden afet ve acil durum yönetiminde iletişim," *Academic Perspective Procedia*, vol. 3, no. 2, pp. 920–927, 2020. [Online]. Available: https://doi.org/10.33793/acperpro.03.02.29

[43] G. Kozanoğlu, "Umumi hayata müessir heyelan riski nedeniyle afete maruz bölge uygulaması bakımından idari kolluk faaliyetleri ve idarenin hizmet kusuru," *İnönü Üniversitesi Hukuk Fakültesi Dergisi*, vol. 15, no. 1, pp. 116–130, 2024. [Online]. Available: https://doi.org/10.21492/inuhfd.1418543

[44] O. D. Elvan, Ü. Birben, U. Y. Özkan, H. T. Yıldırım, and Y. Ö. Türker, "Forest fire and law: an analysis of Turkish forest fire legislation based on Food and Agriculture Organization criteria," *Fire Ecology,* vol. 17, no. 12, pp. 1–15, 2021. [Online]. Available: https://fireecology.springeropen.com/articles/10.1186/s42408-021-00109-6

[45] C. Yılmaz, "Yerel yönetimlerin afet ve acil durum yönetimindeki yeri: Gaziantep Büyükşehir Belediyesi örneği," *Gaziantep University Journal of Social Sciences*, vol. 23, no. 3, pp. 1187–1213, 2024. [Online]. Available: https://doi.org/10.21547/jss.1418595

[46] A. Ceren, "Türkiye'de afet yönetimi ve afetlerde teknoloji kullanımının önemi," *R&S – Research Studies Anatolia Journal*, vol. 6, no. 1, pp. 78–106, 2023. [Online]. Available: https://doi.org/10.33723/rs.1217203

[47] E. Küpelioğlu, "The importance and achievements of the integrated disaster management system," M.S. thesis, Osmaniye Korkut Ata Univ., Osmaniye, Türkiye, 2022.

[48] Republic of Türkiye, "Law No. 5902 on the Organization and Duties of the Disaster and Emergency Management Authority," Official Gazette, no. 26569, May 24, 2009. [Online]. Available: https://www.mevzuat.gov.tr/ [Accessed: Jun. 25, 2025].

[49] N. Büyükkaracığan, "Türkiye'de kriz ve afet yönetimi mevzuatının değerlendirilmesi," *Selçuk Üniversitesi Sosyal ve Teknik Araştırmalar Dergisi*, vol. 13, pp. 144–193, 2017.

[50] Ö. Sezer and Ş. Tozbey, "Türkiye'de Afet Yönetiminin Merkezi ve Yerel Düzeyde Örgütlenmesi Üzerine Bir Değerlendirme," *Siyasal Bilgiler Fakültesi Dergisi*, vol. 8, no. 1, pp. 79–102, 2023. [Online]. Available: https://dergipark.org.tr/tr/pub/ismus/issue/79942/1364259 [Accessed: Jul. 2, 2025].

[51] Republic of Türkiye Ministry of Interior, "Disaster and emergency responsibilities of the Ministry," 2023. [Online]. Available: https://www.icisleri.gov.tr [Accessed: Jul. 2, 2025].

[52] N. Büyükkaracığan, "Türkiye'de yerel yönetimlerde kriz ve afet yönetim çalışmalarının mevzuat açısından değerlendirilmesi," *Selçuk Üniversitesi Sosyal ve Teknik Araştırmalar Dergisi*, vol. 12, pp. 195–219, 2016.

[53] A. M. İlhan, "Afetler ve insani yardım operasyonlarında silahlı kuvvetlerin rolü," *Güvenlik Bilimleri Dergisi*, vol. 2, no. 1, pp. 107–129, 2016.

[54] A. Güven and S. B. Kızılkaya, "Afetlerde yerel yönetimlerin etkinliği üzerine bir değerlendirme," *Tokat Gaziosmanpaşa Üniversitesi Hukuk Fakültesi Dergisi*, vol. 1, no. 2, pp. 1–20, 2023.

[55] H. Kök, "Afetlerde kriz yönetimi ve sosyal hizmet örgütleri," *Sosyal Çalışma Dergisi*, vol. 7, no. 1, pp. 1–17, 2023.

[56] B. Gray, F. Hanna and L. Reifels, "The integration of mental health and psychosocial support and disaster risk reduction: a mapping and review," *International Journal of Environmental Research and Public Health*, vol. 17, no. 6, art. 1900, 2020. [Online]. Available: https://doi.org/10.3390/ijerph17061900

[57] S. Aydın, "Community resilience and mental health after natural disasters," *Turkish Journal of Social Research*, vol. 45, no. 3, pp. 133–149, 2022.

[58] F. Ertürk and M. Özdemir, "The role of community solidarity in disaster recovery processes," *Disaster Management Review*, vol. 30, no. 2, pp. 67–82, 2020.

[59] G. Yıldırım and E. Saygın, "Türkiye'de afet yönetimi paradigması: AFAD'ın ürettiği politika belgelerinin içerik analizi," *Siyasal Bilgiler Fakültesi Dergisi*, vol. 9, no. 1, pp. 15–35, 2024.

[60] T. R. Linkha, "Landslide and flood disaster: Causes and its responses," *Journal of Population and Development*, vol. 5, no. 1, pp. 188–202, 2024. [Online]. Available: https://doi.org/10.3126/jpd.v5i1.67577

[61] W. N. Adger, J. Barnett, K. Brown, N. Marshall, and K. O'Brien, "Cultural dimensions of climate change impacts and adaptation," *Nature Climate Change*, vol. 3, no. 2, pp. 112–117, 2013. [Online]. Available: https://doi.org/10.1038/nclimate1666

[62] Z. Şen, "İklim değişikliği ve Türkiye," *Çevre Şehir ve İklim Dergisi*, vol. 1, no. 1, pp. 1–19, 2022.

[63] F. Çalışkan, "Climate change adaptation strategies in Türkiye: National policies and their alignment with international frameworks," *International Journal of Environmental Studies*, vol. 34, no. 4, pp. 122–140, 2021.

[64] Republic of Türkiye Ministry of Environment and Urbanization, *Türkiye's National Climate Change Action Plan (2021 Update)*. Ankara, Türkiye, 2021.

[65] S. Köse, "Renewable energy development in Türkiye: Progress and future prospects," *Journal of Sustainable Energy*, vol. 13, no. 2, pp. 77–94, 2020.

[66] B. Pazarbaşı, "Afet odaklı iletişim," *TRT Akademi*, vol. 8, no. 18, pp. 726–733, 2023. [Online]. Available: https://doi.org/10.37679/trta.1306897

[67] D. Paton and D. Johnston, *Disaster Resilience: An Integrated Approach*, 2nd ed. Springfield, IL, USA: Charles C. Thomas Publisher, 2017.

[68] D. Akman and Ş. Şahin, "Isparta'da deprem afet bilinci toplumsal düzeyinin belirlenmesi," *Teknik Bilimler Dergisi*, vol. 13, no. 2, pp. 1–6, 2023. [Online]. Available: https://doi.org/10.35354/tbed.1300148

[69] D. S. Mileti, *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Washington, DC, USA: Joseph Henry Press, 1999.

[70] M. K. Lindell and R. W. Perry, *Communicating Environmental Risk in Multiethnic Communities*. Thousand Oaks, CA, USA: Sage Publications, 2004.

[71] B. Tanaka, "The impact of disaster education on public preparedness: A case study from Japan," *International Journal of Disaster Risk Reduction*, vol. 50, art. 101734, 2020. [Online]. Available: https://doi.org/10.1016/j.ijdrr.2020.101734

[72] R. Kimura, and M. Ikeda, "Features and issues of disaster management education practices in schools and communities in Japan: Based on an analysis of activities of organizations participating in the 'Disaster Management Education Challenge Plan' of the Cabinet Office," *Journal of Disaster Research*, vol. 19, no. 1, pp. 19–29, 2024, doi: 10.20965/jdr.2024.p0019