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Water Scarcity – Türkiye - Konya and Niğde

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Abstract

Water scarcity has become a critical issue globally, exacerbated by climate change, with significant implications for Türkiye, particularly in regions like Konya-Karapınar and Niğde in Central Anatolia. This study examines the causes of water scarcity and its growing consequences in these areas, where once-abundant water resources have dwindled significantly. Through a comprehensive literature review and field observations, the research identifies the primary factors contributing to water scarcity, such as groundwater depletion, improper irrigation practices, and the over-extraction of water through numerous individual wells. The findings highlight the negative effects of water scarcity, including flooding and inundation, and stress the importance of adopting sustainable water management practices. The study emphasizes the need for an integrated approach to water resource management, including the development of collective irrigation systems, proper regulation of water usage, and the implementation of soil conservation and land consolidation strategies. Additionally, it calls for a rethinking of water pricing to ensure equitable access, particularly in light of the anticipated water shortages Türkiye is likely to face in the 2030s. The research concludes that a forward-looking, holistic approach to water, energy, and soil management is essential to address the current and future challenges of water scarcity.

Keywords: Land Use Planning, Urban and Rural Landscapes, Urban and Environment Problems, Water Policies, City and Regional Planning.

1. Introduction

The water scarcity issue has become a crucial factor due to our current climate problems. The research's aim is the change in water availability in the world and Türkiye. The literature review discussed the sources of water scarcity issues, which were confirmed by field practice. The study pointed out that faulty managerial decisions related to water processes in the past 72 years have contributed to the issue. The ineffectiveness of the right decisions was also decisive. Additionally, the study explored the neglect of technical land use and practices on the ground, particularly in Türkiye. Unfortunately, the findings and field samples suggest that the results on water scarcity are increasingly spreading in a negative direction.

An interdisciplinary literature review was conducted in the fields of water, agriculture,

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energy, food economics, planning and politics. Land use maps received by satellites are also used in agricultural land use data. Some data are given in figures and tables. In addition, institutional projects were examined for future findings. Many relational issues should also be briefly discussed in the future. With the changes in the use of natural water resources and the increasing requirements for water, the theoretical background of the study can be formed through global warming and climate change agenda.

Water is one of the most critical global challenges of the 21st century. The EU aims to enhance its diplomatic efforts on water to promote peace and stability, support transboundary and integrated water management, safeguard the right to water and sanitation, and implement the UN Sustainable Development Goals and the Paris Agreement. Additionally, it seeks to strengthen the multilateral system, mobilize both public and private sector partners, and ensure these objectives are reflected in its policy dialogue and development cooperation (Ruiz, 2020).

An article examines the state of peace in the Middle East through both regional and international perspectives, highlighting the unfortunate reality that the region remains far from peace in many ways (Umar, 2020). Another article also focuses on the growing water conflicts among subnational actors, including municipalities, states, and provinces, and examines existing conflicts that require innovative hydropolitical solutions at the subnational level, along with preventive measures for potential future conflicts (Yıldız, 2020).

This paper outlines the situation in the Occupied Palestinian Territories (OPT), focusing on the main water-related issues faced by Israel, including disputes with the OPT and Jordan over shared water resources. These issues, such as water allocation, politicization, and privatization, are discussed in detail and following this, the paper reviews the government policies, initiatives, and partnerships designed to address these challenges. Finally, it examines how these measures contributed to the development of Israel's Water Tech industry, with particular emphasis on its key sectors: desalination, wastewater management, water network management, irrigation, and water security (Tepecik, 2021). After revealing the cultural importance of water for countries, the focus is on the strategic role of water use in Türkiye and all over the world.

We are in a period where climate problems are increasingly experienced, so water scarcity has become a particularly important problem. The study examines the water problem in general terms. The decrease in water availability in the world and in Türkiye is heading towards a disaster. In the research, the sources of water scarcity problems were investigated through literature review. Field applications also make errors in water-related processes visible. According to the findings and field examples, the consequences of water scarcity are increasingly negative and show flood and inundation effects.

1.1 Water resources

Since the past century, it can be summarized as the world population and the amount of annual water in the underlying table. In 1900, the population of the world was one billion, it is eight billion now. The water did not have enough due to demand and supply. Türkiye's per capita annual amount of water per thousand seven hundred cubic meters. Now it has begun to fall below one thousand cubic meters. The world's population and the annual amount of water are compared to the years below (Table 1).

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Table 1. The world's population and the annual amount of water compared to the years.

Years	World population	The annual amount of water
1900	One billion	1700 m3
2020	Eight billion	<1000 m3

Underground and surface water resources are gradually decreasing, and the increasing population and urbanization rate create significant environmental pollution. Especially crowded settlements exhibit a fragile structure that is exposed to the negative effects of the climate crisis.

The amount of water per capita is gradually decreasing. One of Türkiye's foremost problems is the reduction of loss rates. The network needs to be renewed with infrastructure investments. While the loss-theft ratio (LTR) in the OECD average is 25%, LTR is 50% in Türkiye (OECD, 2016).

1.2 Global warming

Global warming is caused by greenhouse gases. Global warming also especially affects the climate. if we look at the issues from a broad perspective, climate change can form the main framework of environmental problems. Climate change and the consequent global warming continue to threaten the planet.

In recent years, the probability of experiencing climate change in the region where Türkiye is located has increased gradually. In Türkiye, it is not yet possible for people to have in-depth knowledge of climate change. 90% of the population does not have enough knowledge. One of the problem areas that we need to implement to combat climate change is population planning.

The world's first carbon-neutral continent will be Europe in 2050. meanwhile, Türkiye has declared 2053 carbon neutral.

1.3 The climate change

Climate change, which has been occurring for a long time, has also triggered a series of natural disasters that threaten human settlements and have many negative effects. The adaptation of cities to climate change is becoming an important case for all settlements. The effects of climate change have also been an important parameter in the study in terms of water management.

Therefore, agriculture, food and water crises are among the issues that cause concern both in this period and in the future. Despite all this, economic crises, on the other hand, have been at the forefront of the most recurring main destructive phenomena, although it has been difficult to get used to since the beginning of the last century. We have already entered a new century where the resilience of cities is also being questioned.

Management of adaptation for climate change is difficult day by day on this planet. The

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study focused on agricultural land use planning and rural studies with developments of eco-politics in Türkiye about water resources. The study scope also covers some topics related to hydropolitics (agricultural land use planning, agriculture-food-water policies, city and regional planning, politics, rural development, etc).

The author showed in the last years, the formation of sinkholes was primarily driven by the collapse of karstic cave ceilings, a process accelerated by the excessive use of water in agriculture, which depletes underground water reserves. Administrative records from the last study highlight the urgency of addressing the root causes and reassessing the visible consequences. Failure to do so will only exacerbate the environmental degradation, leading to increased natural and societal losses (Kocalar, 2023).

1.4 Environmental problems, nature-human relationship, and sustainability

The most important reason for the environmental problems increasing with the effect of urbanization is the planning and design approaches where the human-nature relationship and interaction are not analyzed and evaluated, and landscape ecology is not considered (Yıldız, 2017).

In establishing the nature-human relationship, natural landscape features should be evaluated as holistic rather than fragmented (Şahin, 2010). A study in which the sustainability indicators of cities (Atıl, Gülgün, & Yörük, 2005) are given in tabular form clearly shows the problems in artificial areas.

It is seen that Bafa Lake Nature Park, which was once a port and was later formed among the important lakes in Türkiye, and the neighboring Latmos Mountains, which have hosted sacred places with rock paintings in history, have many problems such as quarries that are currently being opened, etc (Kocalar, 2020).

1.5 Türkiye's Wetlands, natural protected areas, and agricultural areas

Türkiye's Wetlands are gradually drying up with global warming (Figure 1).

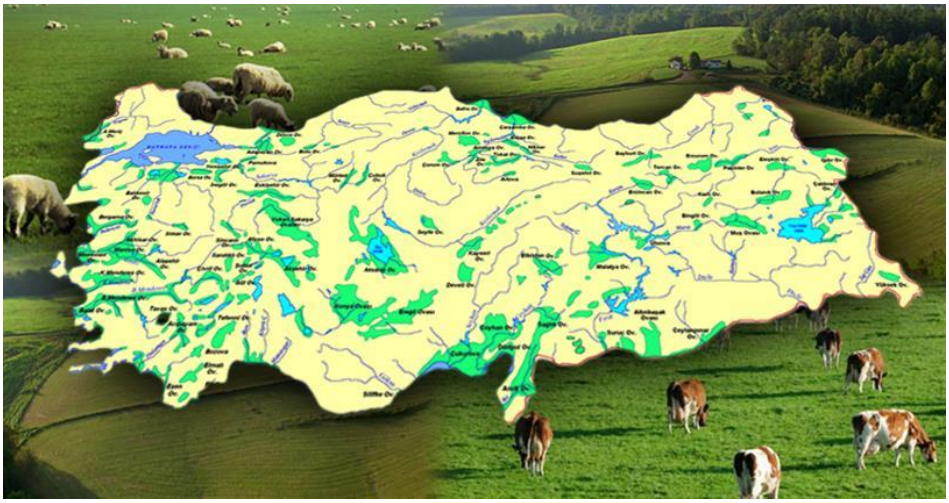

Figure 1. Wetlands of Türkiye.

(Source. https://www.tarimorman.gov.tr/Haber/1102/141-Buyuk-Ova-Koruma-Alani-Olarak-Belirlendi)

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Natural protected areas opened for construction by decreasing the protection degree (Figure 2). The natural areas lost in the post-2000 period have increased rapidly.

Figure 2. Building-zoning decisions and applications in valleys and plateaus (Uzungöl, Trabzon).

Serious losses were also experienced in agricultural areas. As agricultural land is converted into urban land, the images below emerge (Figure 3). Today, urban development is not only losing agricultural lands but also progressing irreversibly by creating continuous destruction in nature. As the peasantry ends, the villages turn into ghost settlements. Those who used to be peasants sold their freedom and became slaves while emigrating to the city.

Figure 3. Examples of urbanization intertwined with agricultural areas (Adana).

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Construction was prohibited in these 141 plains, which are under protection against non-agricultural activities in Türkiye (Table 1). Landowners are not allowed to build vineyard houses on these plains, which are under the status of the Great Plain. All kinds of construction activities require the approval of the Soil Conservation Board and the Minister of Agriculture. Buildings can be built for agricultural investment purposes. Within the scope of the Great Plain status, agricultural investments are encouraged in the plains. Within the scope of this investment planning, administrative buildings or houses can be allowed to be built up to a maximum of 75 square meters on agricultural lands in the protected area. Now, there is no application regarding the illegal constructions made on these plains. Among the 141 plains in the list of these plains for which the Soil Conservation Board Decision was taken (Table 2) (Figure 4), 4 of them within the borders of Niğde are presented below.

Table 2. Plains (141 units) for which the Soil Conservation Board Decision was taken.

No	City	Plains
…	…	…
115	NİĞDE	ALTUNHİSAR-ÇUKURKUYU
116	NİĞDE	ÇİFTLİK
117	NİĞDE	AMEN
118	NİĞDE	MİSLİ
…	…	…
141	YOZGAT	BOĞAZLIYAN

(Source. http://www.emlakinfo.com/haberler/m/news.php?id=4396)

The studied area where Akkaya Dam Pond is located was not seen as a plain, and the historically productive vineyards and gardens on the skirts of Melendiz were almost ignored along with this decision. The decisions on Türkiye's agricultural sites are visualized below (Figure 4).

Figure 4. Agricultural protected areas of Türkiye
(Source. T.R. Republic of Türkiye Ministry of Agricultural, Forestry, Rural Affairs-TKİB).

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As a result of the lawsuit filed by the Metropolitan Municipality for agricultural lands, which were not on the list in 2016 and which was declared a metropolitan city with the new law, the court decided in favour of the farmers after a long period of research and exploration (RHA Ajans, 2018). High-rise blocks are now rising on the plains that have been opened for construction over time. On the other hand, there are limited lands where agricultural activities continue (Figure 5). The effect created by TOKİ on the texture of Doğanbey residences by distorting the silhouette of Bursa can be seen below (Figure 6).

Figure 5. Agricultural lands where agricultural activities are conducted.

Figure 6. Bursa Doğanbey TOKİ.
(Source. https://www.bursa.net.tr/doganbey-toki-aciklamasi-geldi-11419.html)

An example of the destruction of agricultural lands is also seen in the following statement of the TMMOB Chamber of City Planners (ŞPO/CPO) titled "Cancellation of Southwest Plan is the Decision of Ankara's Need for Balanced Development":
“The economic policies pursued in Türkiye since 1980 have put our cities in a deep impasse. By moving away from industrial and agricultural production, Türkiye is trying to meet the deficit in the production-consumption processes that the capitalist economy

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needs with ground rent and a construction-based economy that feeds this rent. In line with this model, in the last two decades, our cities have been subjected to continuous demolition and reconstruction processes under the guise of urban transformation, on the other hand, natural and rural areas in the city periphery have witnessed intense structuring."

While Ankara has lost its historical and cultural values in line with the economic model it has implemented in the recent past, it is seen that the urban sprawl and dense construction in the city periphery have also increased. In this way, Ankara has become a capital city that has lost its rural landscape and production areas as well as its natural areas.

Beyond the construction, irrigation techniques are still not changed. The release irrigation methods in the photo are outdated and leaks, evaporation, etc. It can be used even though it is open to other factors (Figure 7).

Figure 7. Flood irrigation methods and fertile plains should remain in the past.

1.6 Agriculture-Food-Water Ecosystems and Economic-Politics

The fact that agriculture is as vital as energy has become known with the recent increase in food inflation. There is a Living Planet report published every two years. In this report, the loss occurred in fresh waters, where most living things also live. When we look at the living population, it is the life in the water that keeps the water alive. As we play with a living ecosystem, we also play with the quality of the water, we change the time of access to water.

Therefore, we need to look at the sustainability of agricultural activities rather than generating electricity with water. Especially when we think about the increase in the prices of the last agricultural products we live in Türkiye, drought and so on, we need to look at where we should use the water first. Should I first use this water to generate electricity, or should we use it to grow agricultural products?

Apart from energy, which has a large share in the increasing inflation that has occurred

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since 2021, increases in food inflation also cause serious financial difficulties.

1.7 Cost of Water-Water Rights and Water Policies

Water costs and rights subjects are discussed all over the world. Water cannot be cost-free anymore. Before we can use the water, we lose half of it on the way before we can deliver it. The amount of energy from the water management system you draw from the system to bring the water to the users is also an important cost factor. All of these constitute an economic value.

According to an economist, what can happen when you give water to everyone for free also seems a bit controversial. Then the landscape would be much worse than it is today. Of course, low-income people also must access water, pricing should be done accordingly. There should be equitable access to water, and that is what we must ensure. It is estimated that Türkiye will be water poor in the 2030s.

1.8 Land use in Türkiye

Land use in Türkiye shows the distribution as given in the table (Table 3) below.

Table 3. Land Use in Türkiye

Land Use in Türkiye	%
Flat and Slightly Sloped Areas	8
Medium Slopes and Slightly Wavy Areas	13
Sloping Areas	16
Steep Lands	63

Türkiye-Sentinel-2 10 m. Land Use/Land Cover Timeseries is below (Figure 8).

Sentinel-2 10 m. Land Use/Land Cover Timeseries Downloader: This application provides access to individual 10-meter resolution GeoTIFF scenes for all land masses on the planet, for each year from 2017-2021. All scenes for each year are also available to download as a zip file.

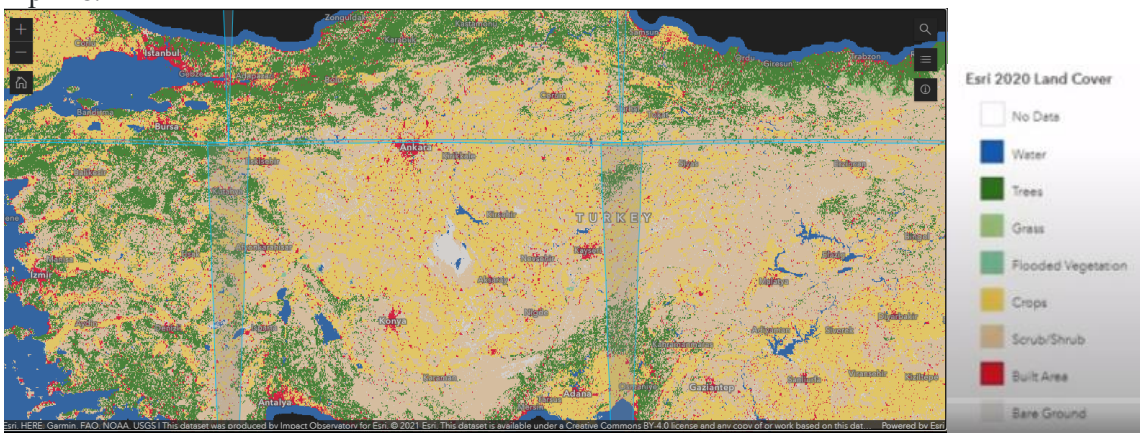

Figure 8. Türkiye- Sentinel-2 (2021). 10 m. Land Use/Land Cover Timeseries (Sentinel-2). Zip-file: 2017, 2018, 2019, 2020, 2021. Each annual zip download is approximately 60 GB. 10 m. resolution land cover maps - 10 classes (settlement, forest, water surface, agriculture, grassland, open area, etc.) digitized data for 2021.

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1.9 Agricultural basins

In 2009, the 30 basins set with the supporting model of agricultural basins in Türkiye are given at the bottom (Figure 9).

Figure 9. Agricultural Basins Support Model Map (30 basins).
(Source. Republic of Türkiye Ministry of Agricultural, Forestry, Rural Affairs-TKİB).

Among the literature review of the research in agricultural areas, land use problems, as well as water management, are at the forefront. Land use problems have sufficiently revealed the importance of planning. Despite that soil protection and land consolidation are other issues that can bring solutions to the fore in field studies. It can be said that smart water/energy/soil management comes next.

1.10 Soil conservation and land consolidation

Since small family businesses are in most of our country, agricultural lands are increasingly fragmented. Most of the fields have a share ownership structure. Although it changes from time to time according to the Soil Conservation Law, it is not possible to sell agricultural lands under 20 years (5403 numbered and 2005 dated Law). Since there is no individual title deed in shareholding areas, the sale of these areas becomes difficult, and their use remains limited. If the owners of the shared lands can agree, these lands are rented at a certain rate. This rental income is shared by the shareholders for those who save by the rental method. If the land is cultivated by the property owners or by renting, these natural resources are in use. However, other than the cultivated lands, the soil remains uncultivated. This leads to the waste of natural resources, which increases foreign dependency on the country.

1.11 Agricultural water use

Water problems continue to increase in rural areas. Field observations in these areas, which can sometimes be the scene of wild agricultural water use, do not change their destructive character at all because no precautions are taken. However, rural life should set an example for the city and its processes should be protective. Ecological restoration processes should be built to help ecosystem recovery in sensitive areas. Often, an ecosystem in need of restoration has been degraded, damaged, transformed or destroyed as a direct or indirect result of human activities (Society for Ecological Restoration, Science

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& Policy Working Group, 2004).

1.12 Intelligent resource (soil/water/energy) management

However, the dry agricultural lands of the past, which were brought to water in places, can now be turned into fertile agricultural areas. But these plentiful irrigated areas have also led to wild irrigation. Today's smart water management can be provided with a delay. Therefore, controlling wild irrigation still takes time. In this respect, the importance of intelligent process management is obvious. In addition to water and agriculture, all processes related to energy should be evaluated and managed in parallel from a holistic point of view.

Small family businesses with agricultural activities should be supported and kept alive together with local cooperatives. It should be ensured that they use all natural resources such as water and soil in the most efficient way.

1.13 Konya and Niğde

In Konya and especially in recent years, long-term formations of sinkholes have been important findings for our subject. Similar studies can be done in Niğde, but for now, it is about field trips, geography, and field observations. In the previous field studies conducted in the neighbouring area, these findings are investigated in detail.

An old study revisits the issue of water scarcity by examining the historical evolution of water availability in Niğde, with a particular focus on the findings and field observations concerning water management. A key aspect of the research is its inclusion of a critical field study on the Niğde Akkaya Dam Pond, which has been observed over the past decade. This study highlights the significant changes in water availability in the region, especially in the context of the dam's development. The current state of the Akkaya Dam Pond is a direct consequence of the rapid changes that have occurred over the last 32 years, reflecting the ongoing shifts in water resource management in the area (Kocalar, 2022).

1.14 Causes of sinkhole formation and solutions

In the field study, the reasons for the formation of sinkholes are discussed under 3 main headings as follows (MTA,2013):

1. Wild watering,
2. Lithological structure,
3. Climate change,
4. Artificial Intelligence (AI) approaches.

The first topic sought for a priority solution should be the prevention of wild irrigation.

1. Wild watering

Although illegal wells can be noticed under control, no deterrent measures have been taken.

The wild irrigation that causes illegal wells is the irrigated farming practices on agricultural land. The cultivated products are corn, sugar beet, etc. and require irrigated agriculture. However, if the region is examined throughout history, it is much more suitable for dry agriculture.

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2. Lithological structure

The second topic, which requires an awareness of structural subjects and is the subject of physical field studies, is the increasing changes in the lithological structure. By examining these changes, up-to-date plans should be made, and the right land use decisions should be made accordingly. Risky areas should be moved to new reserve settlements.

With the acidity sensitivity of the soil in the region, the rocks can be dissolved quickly. For this reason, structural dynamics are constantly measured in the field with engineering methods if necessary.

Institutional duties are at the forefront of the measurement requirements. MTA is at the forefront of the relevant institutions due to its duties. Faulting and sinkhole formations in the region are recorded by MTA, and all these field records are the most important plan bases in terms of planning.

In addition, within the scope of various national and international projects, some other institutions and organizations (Development Agencies, Municipalities, Universities, etc.) conduct various measurement studies in the field.

3. Climate change

As far as can be determined from scientific studies and recent field studies, it can be said that climate change continues to increase, creating drought and desertification, especially in the region. In addition, it is known that the dynamics of the earth's crust in the region are constantly changing, and the formation of sinkholes is increasing accordingly.

4. Artificial Intelligence (AI) approaches

The purpose of an article is to highlight how the integration of various methods and techniques can help alleviate agricultural production problems for billions of people in rural areas who base their lives on agriculture and are dependent on agricultural production (Duygu, 2021).

4. Material and Methods

The study re-examines the problem of water scarcity, especially by focusing on this historical change in Konya and Niğde's water presence and the findings and field observations related to water management. Also, Konya and Niğde field studies and findings are particularly important and related references, especially formations of sinkholes.

Previously, studies were conducted on dams and ponds and irrigation canals with a focus on planning the water resources that come to life in Niğde and the visible effects of climate change.

Konya and Niğde Provinces and the visible effects of climate change and water use applications. Throughout history, the place and importance of water in terms of production and sustainability of life have been known for all human settlements. With the climate change in recent years, water is becoming an increasingly valuable mineral.

5. Field Studies

Field studies in Konya and Niğde Province in the Central Anatolia Region are

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summarized below. While Karapınar and Niğde were rich in terms of water resources in the past, they have become increasingly poor today. It is understood that the groundwater level has fallen to much lower levels than in the past.

5.1 Konya Province

In a report for a project study, research was conducted to determine danger areas by determining the formation mechanisms, development processes and areas of the sinkholes to prevent loss of life and economic losses due to collapses and settlements due to sinkholes, and to guide implementers in agricultural planning. The last chapter is named 'Generalized Conclusions and Recommendations on the development of Sink Development in Konya-Karapınar and its close surroundings' in this report (MTA, 2013).

Groundwater Level

The analysis of the studies conducted during the project and previously in the region showed that the primary factor in the formation of sinkholes is the use of groundwater in the region, which has been increasing since the 1970s. The groundwater level, which is 2-5 m below the surface on average, has decreased to an average of 40 m from the surface in the current (February 2011) location.

Hazardous areas

The nature of the cover over the void areas will also determine the structure of the void that may occur (shallow/deep, dry/wet, narrow/wide diameter etc.). As with other natural disasters, a time-based analysis of when these potentially hazardous areas will collapse is not possible with currently available data. However, by making regional classifications, general definitions can be made about their relative sizes.

Sinkhole developments

As a result, there is a discontinuity (normal strike fault) detected in the Holocene period activity (about 10 thousand years ago), extending in the NE-SW direction in the north of Karapınar and west of the Sultaniye Plain, which was revealed during the studies conducted by the General Directorate of MTA. Current sinkholes triggered by groundwater level drop depressions (15-20 m in diameter, 8 m in average depth) are also concentrated along this line.

Starting from the north of the Karapınar settlement area, along the NE-SW direction, shallow-depth sinkhole formations occur, while deeper and watery sinkholes develop in the west (city exit-Küpbasan-Akkuyu line) and southwest (İnoba-Hotamış line). It is predicted that in parallel with the increase in the use of groundwater in the periods, the development of potholes will increase.

Water use

It is also beneficial to review the agricultural methods and product types applied throughout the region, which cause excessive water consumption, in a way that will reduce groundwater use. It is of great benefit to switch to the drip irrigation method to prevent the groundwater level from falling due to excessive groundwater withdrawal in the basin.

The recommendations portion of the reports has been extremely valuable to planners and decision-makers.

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5.2 Niğde Province

The city taken as an example in the fieldwork is Niğde in the Central Anatolia Region. The environmental relations of Niğde's irrigation dam ponds and especially Akkaya Dam Pond have also been chosen as the research subject.

Niğde is a settlement centre that is seen to have rich water assets in history in terms of water assets. However, today, the underground water level gradually decreases to much lower elevations, giving an alarm for years. In the future, the ponds that have been built recently may also face the danger of drying out because of the climate crisis. According to the project work and the information received from the team identifying the findings in the field, underground water levels decrease in the whole region.

Agricultural activities are quite common in Kaynarca village of Niğde and nearby settlements. However, since irrigated agriculture is prioritized here, there have been occasional collapses in the fields recently. It has moved to its new location near the old ***Kaynarca.***

It is known that similar situations have occurred in the past in Sazlıca, which is adjacent to Kaynarca. However, since these collapsed areas were covered, their exact location is not known. On the other hand, in Sazlıca, zoning is being opened for 2-storey villas in the village.

As stated in previous studies, an open pothole was detected in the mountainous region close to Sazlıca and Kaynarca, as seen in satellite photographs. How this pothole was formed is not known exactly, and since it was not located in a settlement, it remained open.

6. Results

It has been observed that farmers in agricultural basins focus on products that consume more water. Increasingly planting of water-consuming crops in uncontrolled fields has become objectionable.

For this purpose, the results and recommendations of the study are summarized below:

Climate change has turned into a vital crisis.

Cities show serious vulnerability in terms of energy and food supply. We have already entered a new century where the resilience of cities is also being questioned.

Renewable energy projects should be supported excluding water (HES in Turkish or HEPP in English). I think that a hydroelectric power plant should not be built, it is particularly important in agriculture.

Türkiye still needs to make a major reform and improve irrigation systems.

Natural resource management should be brought to the fore with more emphasis. Natural areas and agricultural lands should be carefully protected.

Building decisions should also be discussed in advance with the community.

The welfare of fragile groups needs to be minimally affected by climate change. Their bad affection should be tried to prevent it.

6.1. Discussion

The administrative traces of the research show us that it would be appropriate to critically re-evaluate the apparent results and correct the causes without delay.

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7. Conclusion and Suggestion

The subject discussed in this study that the water resource management in agricultural land use planning and rural development. Food, agricultural and energy policies have a strategic importance to ensure that every country, especially Türkiye. For such reasons, the planning area has come to the fore in many current issues that gradually increase its importance. The cities taken as examples in the field study are Konya-Karapınar and Niğde in the Central Anatolia Region. National dynamics adapted to global market conditions, as can be seen from the field examples above, have been turned into products and profit-oriented services, in short, they have been commodified.

As a result of every small farmer drilling a well in his garden, countless holes are formed in the volcanic ground, which has a porous character. These holes can also cause water to escape to quite different areas underground. Numerous wells cause both the reduction of water resources and the indirect pollution of these resources.

In addition, excessive energy is consumed for the water drawn by the motor of each well. In today's consumer society, such comfort conditions cause unnecessary consumption. The preferences that create the possibilities of using water by keeping it under special control in this way are the predominant consumption preferences of today, rather than agricultural production. However, instead of opening separate wells, a common irrigation system should be established. The water system should operate at appropriate times and irrigate without the need for human supervision. However, only the relevant agricultural lands that are permitted and cultivated need to be irrigated regularly. Thus, wild, and uncontrolled irrigation will be prevented.

Although the Central Water Administration (DSI) knows about the illegal wells in the region, it leaves them unsupervised. In places with an irrigation system, paying a water fee per acre is deemed sufficient, so those who over-irrigate cannot be detected. Unless the type of planting is determined and kept under control, crops that require excessive water will be planted and increased water requirements will come to the fore. Additionally, since it is not on the meter, water usage time and amount cannot be measured.

On the other hand, the importance of soil conservation and land consolidation in rural areas and especially in agriculture is better understood in this study. If the land is cultivated in most agricultural lands, these natural resources are in use. However, waste of natural resources is caused in areas other than cultivated lands.

Dry agricultural lands, which have been brought to water in places, can now be turned into productive agricultural areas. But all these processes should be evaluated and managed in parallel from a holistic point of view. This is only possible with today's smart water/energy/soil management. Otherwise, starting from faulty land uses, the number of faults increases along with the precedents.

Water costs and rights subjects are discussed all over the world. Water cannot be cost-free anymore. Before we can use the water, we lose half of it on the way before we can deliver it. The amount of energy of water you draw from the water management system to deliver the water to the users is also an important cost factor. All of these constitute an economic value.

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Of course, low-income people also must access water, so pricing should be done accordingly. There should be equitable access to water, and that is what we must ensure. Since it is predicted that Türkiye will be water-poor in the 2030s, today's water management should be done by considering the difficult conditions of the future.

As climate-related challenges continue to intensify, water scarcity has emerged as a critical issue, particularly in regions such as Konya-Karapınar and Niğde in Central Anatolia, which once boasted abundant water resources but are now facing significant shortages. This study emphasizes the urgent need for improved water resource management, particularly in agricultural land use planning and rural development. The over-extraction of groundwater through numerous individual wells, along with inefficient irrigation practices, exacerbates the depletion and pollution of water resources. The study highlights the necessity of transitioning from fragmented, individual water use to a collective irrigation system, which could significantly reduce waste and ensure more sustainable water consumption.

Additionally, it underscores the importance of proper monitoring and regulation of water usage, especially in areas where irrigation systems are in place, yet excessive water usage remains untracked. The lack of efficient water metering further contributes to the over-irrigation of crops, which is exacerbated by the absence of proper crop-water matching. The study also stresses the need for land consolidation and soil conservation, which are essential to mitigate the adverse effects of uncontrolled land use and to make the most of available water resources.

Considering the potential water scarcity Türkiye may face by the 2030s, it is crucial to implement strategic, sustainable water management policies today. These should consider future challenges, ensuring equitable access to water while addressing the economic and environmental costs associated with water management. Equitable water distribution, alongside innovative solutions such as smart water, energy, and soil management, will be key to preventing further resource depletion and to safeguarding water availability for future generations.

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