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Climate Changes and Societal Stability in Iraq: Proposed Measures

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Abstract

Iraq is considered one of the countries most susceptible to the negative impacts of climate change. According to international reports, it is classified as among the top five most affected by climate change in the world, leading to economic resource shortages and an increase in water scarcity, which exposes societal stability in Iraq to a threat. This may result in social disintegration and civil conflicts, so climate changes are considered one of the most dangerous crises affecting societal stability in Iraq during this stage. In this context, the research attempts to trace the causes of climate change and their effects on societal stability in Iraq and suggest some necessary measures to confront them in the future. The research sums up the findings of the study, the most important of which is the need to take comprehensive institutional measures to mitigate the harmful effects of environmental degradation, such as the intensity of greenhouse gas emissions, and to develop treatments, such as legislating the necessary laws for water management to ward off immediate and future risks resulting from societal stability due to climate impacts in order to maintain a better level of societal stability.

Keywords: *Climate Change, Societal Stability, Environmental Degradation, Proposed Measures, Iraq.*

Introduction

Climate changes are considered one of the most serious crises affecting societal stability in Iraq, as there are a number of reasons that evoke these changes to occur, represented by the drying up of lakes, the high rate of desertification, the decline in the water levels of Tigris and Euphrates rivers, and then the shrinking of agricultural areas resulting from the lack of water releases of upstream countries. This is accompanied by the world's shift towards decreasing the use of fossil fuels and, thus, the decline in demand for oil exports, which encourages the occurrence of forced migration that creates the conditions for the outbreak of internal conflicts over services and scarce resources in the structure of Iraqi society, which mainly suffers from differences in customs, cultures, and patterns of daily life. In addition, since 2003, Iraq has been suffering from a political conflict over the mechanism of distributing wealth and economic resources, which may be transferred at a higher rate to the social level due to its association with climate change. This is confirmed by the World Bank report in 2022, which indicated that climate change threatens the social contract in Iraq, mainly since it is classified by the UN as one of the countries most affected by climate change.

Therefore, this research examines the relationship between climate change and societal stability in Iraq, analyzing both causes and effects in addition to seeking to propose the necessary measures to reduce the repercussions of climate changes on societal stability in Iraq. Despite the Iraqi government taking a set of measures that express its desire to mitigate the impact of climate changes on societal stability, the most important of which is the formation of the National Committee to implement the Mesopotamia Revitalization Initiative, and supporting the implementation of national plans to adapt to climate change, these measures are not considered sufficient, and require, among other things, more comprehensive institutional measures. In other words, if the Iraqi government is able, through its relevant institutions, to establish mechanisms to mitigate the severity of greenhouse gas emissions, and legislate the necessary laws for water management, as well as other measures proposed in the research, it will contribute to mitigating the effect of climate change on societal stability.

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Causes of climate change in Iraq

Before discussing the reasons for climate change in Iraq, it is important to point out these causes at the global level and then clarify whether these changes lead to civil conflicts that affect societal stability.

The causes of climate change globally and their repercussions on societal stability

There are both natural and human causes that contribute to climate changes. Natural causes are changes that occur in the Earth's external system (from extra-terrestrial systems) or in the internal system (from the ocean, atmosphere, and land). For instance, external changes may contain variations in the output of the sun; External factors may cause changes in the amount of solar radiation received by the Earth's atmosphere and surface. Similarly, variations in atmospheric gas concentrations and volcanic activities can lead to internal changes in the Earth's climate system. (Nwankwoala, 2015, 226)

Human activities are the primary source of greenhouse gas emissions. Governments in many countries have been focusing on reducing these emissions, and they have been recognized through national commitments in the United Nations Framework Convention on Climate Change. The greenhouse gas emission inventories have also helped to identify these sources. (Liu & GAO, 2018, 244)

They are represented by greenhouse gas emissions resulting from human activities in agriculture, industry, waste disposal, deforestation, and the use of fossil fuels. (Wuebbles & Jain 2001, 103).

These activities contribute to an increase in greenhouse gases, which considerably impact the environment, such as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Carbon dioxide gas is considered the most significant contributor to global climate change because it leads to an increase in the temperature of the atmosphere (Kabir et al., 2023), through burning fossil fuels such as coal, oil and gas, which generates electricity around the world. It is used for transportation vehicles and others, which leads to higher carbon dioxide emissions, especially with the increase in population (Suner, 2019). Annual emissions from burning fossil fuels have risen consistently every decade, increasing from around 11 billion tons of CO2 per year in the 1960s to an estimated 36.6 billion tons in 2022. (Lindsey, 2023).

Human activities contribute to climate changes, which mean that these changes increase the possibility of violence and conflicts occurring between individuals and communities that affect societal stability. For more clarification, two paths will be addressed:

Direct Path

This path holds that the climate has a direct impact on armed conflict through physiological and/or psychological factors; as temperature changes, whether it gets warmer or colder, raises levels of discomfort, aggression, and hostility, leading to violence. Therefore, climate change affects the possibility of violence occurring within groups of people during scarcity of renewable resources such as fresh water, arable land, forests, and fisheries, rising temperatures, or falling rainfall, coupled with population increase that reduces the resources needed to sustain human livelihoods. Therefore, declining resources lead to increased competition and the potential for conflict. At the national level, for instance, low rainfall or high Temp can lead to conflict among different groups of consumers, such as farmers and herders. This can also fuel urban unrest, rebellions, and other forms of civil violence, particularly in the developing world (Koubi, 2019, 346).

At the external level, decreased rainfall leads to reduced water supplies in transboundary river basins, which could raise the possibility of conflict between countries, especially in river-sharing dyads, and the danger is more evident in upstream/downstream configurations (Koubi, 2019, 350).

Climate changes lead to the inability of the state to monopolize power internally and externally. Public order may collapse locally and lead to de facto lawless areas. In some areas, the uncontrolled growth of cities makes it difficult for the state to exercise control, which represents a tangible challenge to its monopoly of

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power internally and, thus, its ability to impose law and order. Weak state political steering capacity due to the impacts of climate change could also lead to a situation in which actors willing to use violence see this development as an opportunity to advance their own interests. In this context, the state is forced to raise the costs of maintaining a monopoly on force and thus lose the ability to transform the conflict through non-military means (Carius et al., 2008, 33).

There are many applications in this path, some of which can be addressed, the most important of which is the Syrian war, as drought related to climate change during the years preceding 2011 was a major causative factor behind the Syrian civil war, as dysfunctional agricultural policies, excessive use of land and groundwater, the sudden elimination of fuel subsidies, and the simultaneous massive increases in global food prices led to disastrous consequences in a repressive regime (Schaar, 2018, 9).

Lake Chad in the African Sahel region is another example. The environmental changes that led to the reduction of the lake by 95% contributed to strengthening social divisions on multiple grounds, some of which were ethnic groups, such as the conflict between the Fulani group and a number of neighboring groups, such as the Kanuri, Jukun, and Tiv groups. Some of these were economic, represented by the conflict between agricultural professionals and pastoralists, as the lives and economic activity of both sides depend entirely on water and land suppliers. While farmers became in a critical situation due to the decrease in both land and water, pressure came from pastoral groups that moved into the Lake Chad Basin region in search of pastures for their herds, and in recent years, the multiple environmental changes led to a clash between farmers who had to expand to areas closer to the water resources of Lake Chad and herders who found themselves grazing in direct contact with agricultural lands (Amal, 2022, 109-110).

The Indirect Path

This path asserts that climate change is not a direct cause of conflict. Still, it does increase the likelihood of conflict by worsening existing conditions, particularly economic ones, since conflicts are often driven by low economic output resulting from climate change. For instance, climate fluctuations may reduce agricultural income, which can trigger conflicts, mainly in regions that rely heavily on agriculture. Moreover, the reduction in government revenue caused by a climate crisis affects the duration and severity of conflicts (Xie et al., 2022, 1).

This pathway refers to the impact of climate-induced changes on the economy, food security, or group interactions, which can increase the chances of violent conflicts among groups. This impact is associated with theories such as the "sharedness" hypothesis, which suggests that the climate crisis can reduce economic productivity, leading to an increase in conflicts that are more likely than economic activities. On the other hand, the "inequality" hypothesis argues that the climate crisis can cause an upsurge in conflicts due to increased economic inequality. The "state weakness" hypothesis suggests that reduced economic productivity due to the climate crisis fosters weak government institutions and their ability to suppress violence (Helman et al., 2020, 1-2).

The causes of climate change in Iraq

The causes of climate change in Iraq are framed as follows:

High Temperatures

The main challenges facing Iraq due to climate change are heat waves and extremely high temperatures. By 2025, the average temperature may rise by 2°C, and there may be more instances of extremely high temperatures (above 50°C), especially in the south, where such extremes may last for up to 21 days in a row by the year 2100 (Luzu, 2023). Due to the limited availability of green spaces, uncontrolled urban development, and poorly designed housing, the temperature in Iraq has been soaring to extreme levels. Shockingly, 6% of children in Iraq are being exposed to extremely high temperatures, making it one of the countries most vulnerable to the severity of heat waves. According to UNICEF, if preventative measures

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are not taken, every child in Iraq will be at risk of exposure to the severity of heat waves by 2050 (Shuker, 2023a).

Greenhouse Gas Emissions

Iraq's heavy reliance on oil has made it more susceptible to the impacts of climate change. this is mainly due to the practice of gas flaring and off-gases that occur during the extraction of oil. This process results in the emission of a polluted mixture containing CO2, CH_4, and black soot, which adversely affects the environment. Iraq is the world's second-largest gas-burning country, releasing approximately 30 million tons of CO2 yearly, which represents 10% of the world's greenhouse gas emissions from burning gas. Despite producing a daily average of 6 million cubic feet of gas, only half of the gas produced during oil extraction, roughly 3 million cubic feet, is processed (Shuker, 2023b).

Water Shortage

The water shortage in Iraq stems from two problems: the internal problem of water used in agriculture, which constitutes the largest form of water waste, as well as water waste due to human use and drinking. In fact, agriculture accounts for approximately 85% of Iraq's water use, significantly exceeding the global average of 70%. Furthermore, while the global average water consumption is 200 liters per capita per day, Iraqis consume almost double this amount, and this overconsumption stems from government subsidies on the price of water. As for the external problem, Iraq's main water supply comes from the Tigris and Euphrates rivers, which don't stem from Iraq; the Tigris flows from the Turkish border, while the Euphrates flows from the border of Syria. In the past few decades, Iraq has experienced the effects of global warming, which has resulted in volatile climatic circumstances, such as drought, desertification, intense sandstorms, and a reduction in the water flow of the two rivers (Adamo et al., 2018a, 76).

The construction of dams by Turkey and Iran has decreased the water flows of the Tigris and Euphrates rivers. Turkey has implemented the South Eastern Anatolia Project, which involves the construction of 22 dams and 19 hydroelectric power stations in the country's eastern region. The completion of certain projects is causing worry in Iraq and Syria. Once finished, these projects will impede up to 70% of the natural flow of the Euphrates and 50% of the flow of the Tigris, as well as 40-50% of the observed flow. A significant amount of water supply from Turkey to Iraq and Syria is expected to be polluted. Specifically, 25% of the water supply of the Tigris River and 40% of the water supply of the Euphrates River will be affected. Additionally, the flow of the Euphrates River from Syria to Iraq is expected to pollute around 50% of the river water in that region (Hamid, 2020).

Water supplies in Iraq have also declined due to the water policy pursued by Iran, as 40% of Shatt al-Arab Water of Iraq comes from tributaries from Iran. The construction of dams has greatly disrupted water supplies to the eastern provinces of Iraq. Iran has built 600 dams and plans to build more; it also has a plan to divert river water, such as the Karun and Karkheh rivers, so that it remains in Iran and does not flow into Iraq, which leads to a discount in water flow and a rise in water salinity in Iraq. The year 2018 witnessed the admission of 118,000 cases to hospitals in Basra province alone due to water quality-related diseases (Al-Aloosy, 2021).

The Social Impacts of Climate Change in Iraq

Iraq is among the top five countries most severely impacted by climate change. A staggering 92% of the country's land is at risk of desertification, and the temperature is increasing at a rate seven times greater than the. this has made it incredibly challenging for farmers to sustain their livelihoods. Consequently, many agricultural families have been forced to migrate to urban areas for employment opportunities (Schaer, 2023). So, these effects can be addressed as follows:

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The Increase in Internal and External Conflicts Resulting from Water Shortages

The tensions along the Tigris and Euphrates streams are expected to intensify due to the effects of climate change. The river basin is seen as one of the most vulnerable watersheds globally, with temperatures increasing at a rate twice as fast as the global average. Increased surface evaporation is likely to increase pressure on communities that depend on the river for survival, especially after the region witnessed the second-lowest average rainfall in four decades between the years 2020 and 2021, With the decline in the flow of the Tigris and Euphrates rivers by 29% and 73%, respectively (Chibani, 2023).

Consequently, water shortages lead to an increase in internal conflicts on a tribal and national basis, or an increase in external conflicts on a regional basis.

Increased Internal Conflicts on a Tribal and National Basis

It is predicted that domestic water consumption in Iraq will significantly increase from 5.3 bn cubic meters in 2020 to 10.94 bn cubic meters by 2035, causing the country to move from a state of water scarcity to an urgent water emergency. As a result, the gap between demand and supply is expected to be 11 bn cubic meters annually, with a potential water deficit of 37%. This makes the water sector in Iraq more vulnerable to climate change, depleting faster, and increasingly likely to face drought and scarcity. In fact, the Water Stress Index has predicted that the scarcity levels will reach 3.7 on a scale of 0 to 5, and may go up to 4.6 by 2040. This represents the absolute level of water scarcity, a sign of complete drought, scorching sun, and toxic atmosphere (Khalaf, 2022). Water scarcity in certain areas has led to concerns about potential tribal conflicts. Some tribal groups have warned the federal and local governments that if they do not properly organize the allocation of water shares and address the water crisis, armed conflict may erupt. Although water resources have been allocated according to the needs of each province, Certain tribal groups hold the belief that the authorities are involved in discriminatory practices by using factors such as the socio-economic weight of the governorate, history of mobilization and protests, tribal group strength, as well as local political and security framework, quotas can be allocated (Hameed, 2022). Many tribes have traditionally made informal agreements to share water. However, due to increasing competition and water shortages, conflicts have been arising between them. Some tribes are diverting the river's course, which prevents downstream farms from receiving water. Roughly 10% of the tribal conflicts in Iraq stem from water shortages. For instance, Tribes residing near the borders of the Maysan Governorate have accused neighboring tribes in the Wasit Governorate of obstructing the flow of water through temporary diversion routes, while those claim that tribes upstream are using water more than their allotted shares. This caused a chain reaction until these accusations escalated into violent clashes (Al-Bayaa & Mashhad, 2023).

There has been a rise in tribal conflicts related to a dispute over water in the northern Basra Governorate. This has resulted in dozens of deaths and injuries. The number of incidents has doubled between 2019 - 2020 and will continue to rise in 2021. More than half of the incidents occurred in the three governorates most exposed to Iraq's water shortages, namely Basra, Dhi Qar, and Maysan. In some cases, these conflicts have led to the displacement of residents. Between December 2021 and March 2022, 25 families were displaced in the Al-Hay district of Wasit Governorate due to disputes of tribal groups over access to water. At times, tribal communities resort to violence against government authorities due to water-related issues. For instance, in Mosul Governorate, local groups armed themselves to prevent officials from digging wells for nearby villages, fearing it would cause water scarcity. Similarly, In December 2021, members of the Shuwailat tribe, who reside close to the Gharraf oil field located in Dhi Qar, fired a missile and heavy weapons at a police patrol. The attack took place close to the irrigation canal in the Al-Rifai district and was carried out to protest against water shortages (Younis, 2022, 10-11).

According to a report by the Ministry of Water Resources, there are predictions that conflicts may increase in the future due to climate change and reduced water levels. The report states that the Tigris and Euphrates rivers are expected to dry up by the year 2040. Additionally, the rising temperatures and erratic rainfall caused by climate change are exacerbating concerns about water scarcity in Iraq. According to the ministry, Iraq's water imports are declining at a rate that began slowly and will reach 30% by 2035. The report stated that a decrease in supply to 30% of normal levels would lead Iraq to obtain 11 billion cubic meters annually,

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and Iraq's water consumption needs 53 billion cubic meters annually. This means that by 2025, severe droughts will impact the country as the deficit will rise to 80%, with the Euphrates River drying up almost completely towards the south, and the Tigris River turning into a waterway with limited resources (Aldroubi, 2021).

Conflicts may arise on a national level, as the Kurdistan Regional Government has taken unilateral measures. (KRG) plans to construct new dams in northern Iraq to cope with the expected reduction of 50% in the flows of the Tigris and Euphrates rivers by the year 2030. Although this might limit the water supply to other parts of Iraq, the Kurdistan Regional Government believes these new projects, combined with the 17 existing dams, are necessary to generate electricity and supply water for agriculture, fishing, and tourism (Keynoush, 2021; Arif, 2023).

Notably, the Kurdistan Regional Government, which controls a large portion of the water flow, threatened to reduce water supplies to other parts of Iraq due to disagreements with the Federal Government of Iraq in 2016. The (KRG) also cut off water flow to Arab provinces after Iran reduced water supplies to the Little Zab River in 2018 (Al-Aloosy, 2021).

Increasing External Conflicts on a Regional Basis:

The decline in water resources of the Tigris and Euphrates rivers, caused by climate change and unequal water distribution between Turkey and Iran, may result in violent conflicts between Iraq and these two countries, as well as with Syria, the other neighboring country (Adamo et al., 2018b, 54).

Increasing Climate Migration

Rising sea levels are expected to cause floods by 2050, and areas located primarily in southern Iraq (Basra, Maysan, and Dhi Qar) may be partially submerged as a result. So, saltwater intrusion into aquifers could exacerbates the disruption of agricultural and irrigation operations, increases pressure on arable land, and leads to the evacuation of entire communities. Rural depopulation and loss of social capital in rural areas is an emerging concern of undermining community cohesion. Given the lack of alternative sources of income, depopulation from abandoned farmland can increase criminal activity and pose security risks to the remaining community (International Organization for Migration, 2022, 11-14).

As of December 2022, more than 11,000 displaced families (about 68,000 individuals) have been displaced in the central and southern governorates for reasons of drought, land degradation, and increased salinity in many rivers and tributaries. Dozens of families were displaced in Hor Umm al-Nia'aj in Misan Governorate and were forced to abandon their original lifestyle in the swamps and go to areas near oil fields, refineries, and urban areas (Dawood, 2023, 19).

The High Rate of Desertification

Recent reports indicate that desertification affects 39% of Iraq's land, with an additional 54% under threat. Iraq loses approximately 100 sq km of arable land every year. This reduces local agricultural production on the one hand and increases migration to urban areas on the other hand, creating higher competition for resources and jobs with local people. The process of desertification, which involves the spread of sand, has a significant impact on irrigation and development projects, as well as the survival of various plant and animal species. This phenomenon can lead to changes in the distribution of these species geographically. The government must invest considerable funds to restore the affected areas. The annual cost of protecting against and reducing desertification depends on the degree of land degradation. For slightly degraded riparian irrigated land, it is estimated to cost between US$100 and US$300 per hectare to correct. However, severely degraded riparian irrigated land can cost between US$3,000 to US$5,000 per hectare to correct. If these impacts are left unaddressed, they can become powerful security threats, which was evident when ISIS targeted struggling farmers for recruitment (Alfardan, 2021).

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High Poverty Rates

Climate change exacerbates poverty by decreasing water supply by 20%. Also, it reduces unskilled labor demand in agriculture by 11.5% in the medium term and decreases the demand for unskilled labor in other sectors. The estimated amount is 4.9%. In fact, any significant and lasting decline in agricultural activities reduces the demand for skilled and unskilled labour, then increases poverty rates (World Bank Group, 2022, 46), especially with expectations that by 2050, temperatures will increase by 1 degree °C and precipitation will reduce by 10%, leading to a 20% decrease in available fresh water. Therefore, by the middle of the century, Iraq will witness that approximately 30% of irrigated lands will not receive water (Arif, 2023).

Proposed Measures to Limit Climate Changes Affecting Societal Stability

The Iraqi governments have taken a set of measures and steps to confront climate changes. It is represented by the formation of the National Committee to implement the Mesopotamia Revitalization Initiative, supporting the implementation of national plans to adapt to climate change through its ratification of the Paris Climate Agreement, transforming the water file from a diplomatic and technical file by the Ministries of Foreign Affairs and Water Resources to a sovereign file directly supervised by the Prime Minister, and an initiative to plant (5 million trees and palm trees) in all governorates. However, these measures are insufficient and require institutional measures that limit climate changes. These measures are represented in establishing a mini-cabinet specializing in climate changes as a challenge threatening Iraqi national security. This council is headed by the Prime Minister and membership of ministers (higher education and scientific research, the Ministry of Finance, Foreign Affairs, Planning, Agriculture, Water Resources, Health, Environment, and Defence) and representatives of the private sector and civil society institutions interested in climate issues. It works according to a long-term strategic plan. This strategy contains the following objectives:

Reducing Greenhouse Gas Emissions Through Sustainable Economic Development

In 2021, Iraq took a major step in the fight against climate change by approving the final draft of its (NDCs) under the Paris Agreement. This document outlines Iraq's allegiance to reducing greenhouse gas emissions to comply with the global goal of reducing national emissions and adapting to the impacts of climate change. These commitments are set to be implemented from 2021 to 2030. Iraq pledged to reduce its emissions by 1-2% (United Nations Development Programme, 2021), and among those contributions, Iraq set goals to reduce greenhouse gas emissions by 15% less than usual emissions by the year 2035 (United States Agency for International Development, 2017, 3).

Iraq is aiming to reduce its reliance on natural gas by increasing its use of renewable energy. By 2027, the country hopes to completely eliminate natural gas burning. To achieve its goal, Iraq has partnered with several regional and international energy companies to build large-scale solar facilities. The government has declared many agreements with Arab and foreign companies to establish ten solar enterprises that will have a combined energy of 5,525 MW. In June 2021, the Iraqi Oil Minister stated that the country aims to generate up to 25% of its expected energy needs (about 10-12 thousand megawatts) from natural and self-replenishing sources. The government is else promoting the use of solar energy in homes to its citizens (Enabling Peace in Iraq Center, 2022).

It represents the first step in building local demand for clean energy solutions by asking the government ministries and directorates to monitor their carbon footprint, and to benefit from the financing opportunities provided by the Central Bank of Iraq to move to renewable energy sources (Yassin, 2023).

Water Management

The process of managing water internally, through distributing water shares to the governorates according to population density and the percentage of arable land requires submitting a draft or proposed law to the Supreme Water Council as an independent body linked to the highest executive body, whose decisions are binding. This can only be done by amending the existing loophole in Article 110, Item Eight of the

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Constitution, by making the formulation of water policy an absolute prerogative of the federal government and not an exclusive one, or by legislating the internal water management law from the House of Representatives according to Article (114) of the Constitution (Hameed, 2020).

In addition, to effectively manage water resources in the long term, a comprehensive strategy should be put in place, regardless of any changes in foreign or interior policies, based on the theory of resource dependence, which assumes the existence of human resources and positive international relationships. To achieve this plan, The Ministries of Water Resources, Municipalities, Agriculture, Environment, academics, research institutes, the private sector, non-governmental organizations, and relevant authorities must participate. Regional and international organizations should collaborate to develop a strategy, such as the United Nations Environment Programme participating, the United Nations Development Programme, UNESCO, the Food and Agriculture Organization, and the World Meteorological Organization (Al-Ansari et al., 2023, 486).

This strategy aims to implement a new pricing policy for water usage, treating it as an economic commodity. To achieve this goal, strict rules must be enforced to collect tariffs for two purposes. firstly, to discourage water wasteful usage. secondly, to fund its servicing. Traditional irrigation methods must be replaced with drip watering for orchards and vegetable cultivation for better water conservation. Sprinkler watering will be carried out widely for cereals and comparable crops. To minimize losses and enhance transportation efficiency, maintenance and development of water supply distribution systems will be prioritized, including closed canals in watering transportation systems to minimize the amount of evaporation and leakage, preserve more arable land, and protect irrigation water from contamination. Additionally, drainage networks in cultivated lands must be improved to enhance soil percolation and lessen soil salinity. Modern techniques of drainage, like systems of field drainage of perforated pipes, will also be implemented to collect wastewater effectively and prevent the direct return of wastewater to rivers (Al-Ansari et al., 2023,486-487).

In addition to that, new networks must be established in areas that do not contain these networks, and the suspended networks must be completed. In this context, the relevant bodies must provide the remaining funds necessary to complete the New Aden Project to develop the marsh areas. It is a project to design wastewater in the marshes in southern Iraq. The project consists of two main parts: wetland construction (one-third of the project) and cultural design (two-thirds of the project). The first third of the project has been constructed, but participants are still waiting to receive the $2 million of funding necessary to finish the project area and its cultural design that extends over an area of 29,500 square meters. It ensures the creation of a wetland (10,000 square meters) using sustainable wastewater recycling technology; the wastewater will go to a "subsurface wetland" that will clean the water and provide nutrients to plants using bacteria to convert organic materials into Minerals (Mehdi, 2023).

Externally, the government must work to reduce the intensity of the conflict in the Tigris and Euphrates River basin through diplomatic steps. A multilateral arrangement can be reached among the four riparian countries. Given their location in the middle of the river and its downstream, Syria and Iraq will benefit from a long-term agreement regulating the consumption of water. This requires coordinating positions with each other that emphasize common interests to persuade Turkey and Iran to commit to more equitable arrangements in water use (Hamid, 2020).

The collaboration between Iraq and Turkey could be significantly improved by exchanging common interests in water management. Iraq could benefit from Turkey's mountainous regions by using them to store water. Storing water in high areas with narrow and deep valleys would considerably decrease the stored water evaporation. Iraq could pay storage fees through its oil and gas exports in exchange for this service. This arrangement could also create a mechanism for multilateral cooperative management of river basins, which could serve as a basis for wide cooperation on various issues. This cooperative arrangement could save the marshes in the south of Iraq. By releasing water from dams in the spring coordinatingly, flood waters' historical cycles can be reproduced, and the biodiversity of the marshes could be replenished. Moreover, managing water in the basin can lead to better management of other resources. For instance, Iraq could schedule maintenance of fossil fuel plants during spring as decrease electricity demand. In the same context, Turkey can schedule the release of water from reservoirs before the melting snow in spring,

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generating more hydroelectric power that can be sold. This will also restore the flood action that existed prior to building dams (Alwash, 2016, 2).

Combating Desertification through Planting Green Spaces

Combating desertification requires stopping urban expansion and extensions in cities, and main road axes, which have transformed large areas of agricultural land into houses, factories, tourist sites, and service uses, causing a lack of arable lands. This can only be done by legislating new laws despite the availability of valid ones, like the Environmental Conservation and Advancement Law No. (27) of 2009 regarding the protection of land, water resources, and the environment in general, it is also necessary to legislate a law that ensures the protection of agricultural lands from urban sprawl and random expansion of residential and service uses in rural areas, especially areas near cities and main road axes (Al-Rawi & Al-Ani, 2023).

Moreover, large lakes can be created distributed among the desert lands and filling them with a canal that begins to flow from the Arabian Gulf and flows into these lakes. This desert can also be cultivated from groundwater, provided that strategic crops should be planted such as palm trees, olives, pistachios, and wheat, which have low water consumption in places where there is an abundance of groundwater. Besides, these crops tolerate different environmental conditions and help stabilize sand dunes (Jabr, 2022).

Activating the Role of Civil Society

To combat climate change effectively, the Iraqi government must include another actor, represented by civilian activists in the environment and climate change field. It may be crucial to involve civil society in Iraq's efforts to meet its ambitious national contributions since the Iraqi government suffers from a deficiency in the necessary capabilities to develop a comprehensive plan to adapt to climate and mitigate its effects. Over recent years, local environmental NGOs -including the Tigris River Protectors Association, have collaborated with foreign organizations to implement temporary agricultural and water projects. These NGOs have experience in implementing projects and communicating with affected communities in order to collect information and raise awareness. They also participated in many workshops and advanced training sessions provided by international institutions. Moreover, Iraqi environmental organizations have significant experience in reporting and monitoring issues related to climate and the environment, particularly issues like water scarcity, quality, and the difficulties faced by marginalized groups like farmers (Yassin, 2022).

Encouraging the Private Sector

The private sector in Iraq has been instrumental in creating a number of best applications for land reclamation and systems of smart irrigation, which can improve water and food security in the country. This phenomenon was particularly evident in the central and southern regions of Iraq. For instance, Fadak Farm was founded in 2016 by the Shiite Endowment Office in Karbala Governorate. The farm has an area of 2000 acres and relies on artesian wells to drip-irrigate beautiful palm types and other trees that are climate resistant. The farm initiated the marketing of its products in 2021 in three provinces and plans to further expand. in Basra Governorate, a private investor from Kuwait developed another land reclamation project, which is Al-Babtain Farm. It is 8,000 acres, specializing in palm planting, seasonal crops, and animal husbandry. It uses sophisticated systems to desalinate ground-water for irrigation purposes. Al-Babtain farm exemplifies regional cooperation to combat desertification and saltwater intrusion in southern Iraq (Yassin, 2022).

Conclusion

Climate changes have directly or indirectly affected societal stability in Iraq through their ability to exacerbate existing political, economic, social, and environmental conditions. Despite the government's efforts to confront these changes, it still requires more comprehensive institutional measures. It includes the establishment of a mini-council of ministers whose specialty is climate change. It works according to a

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long-term strategic plan, and introduces reforms in the relevant institutions, such as the Ministry of Agriculture and Water Resources. These reforms require training its cadres and establishing a database to be able to adapt to climate changes. In addition, the government must make diplomatic efforts with the riparian countries to guarantee Iraq's water share. Also, an awareness campaign should be carried out on the necessity of rationalizing water consumption and resorting to the use of renewable energy by granting loans provided by the Central Bank. It should call on businessmen to invest in projects to combat desertification by establishing farms using smart irrigation systems. Otherwise, the risks of climate threat will have a greater impact on societal stability. In recent years, Iraq has witnessed an increase in societal conflicts among water consumers after the water levels decreased, due to climate factors and the water policies of neighboring countries. Water shortages contribute to 10% of these conflicts and may increase in the future. In this context, the research sums up the findings of this study, the most prominent of which are:

- Climate changes lead to an occurrence of internal conflicts on a tribal basis in some central and southern governorates, especially in Maysan and Dhi Qar governorates. It can be on a national basis, such as with the Kurdistan region, due to water shortages or the lack of financial revenues due to the decline in global demand for oil and its derivatives. This causes high emission rates of Carbon, affecting climate change; Iraq emits approximately 30 million tons of CO2 into the atmosphere annually.

- Occurrence of Cases of forced displacement towards urban areas that suffer from unplanned, random population density. This migration comes from rural areas as a result of the high rate of drought and the lack of economic resources due to water scarcity. Its consumption increased from 5.3 billion cubic meters in 2020 to 10.94 billion in 2035. This means high immigration rates that cause social unrest between the indigenous population and the displaced.

- An increase in the poverty rate among families that depend on agricultural crops and animal products to provide their daily income. It is caused by the decrease in the amount of rain, the rise in temperatures, and the scarcity of water in the Tigris and Euphrates rivers. It contributes to increasing the risk of conflict over resources, leads to more social unrest, the spread of chaos, and finally a state of societal instability. Hence, the demand for unskilled labor in the agricultural sector is expected to decrease by 11.5% in the medium term, and the demand for unskilled labor in other sectors will decrease by an estimated 4.9%.

- Climate changes provide an opportunity for terrorist organizations to resume their activity by controlling infrastructure, dams, and pipelines from which their population migrates. They exploit such conditions to recruit many unemployed youths, using them to implement their own agendas by paying financial sums and increasing illegal activities.

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