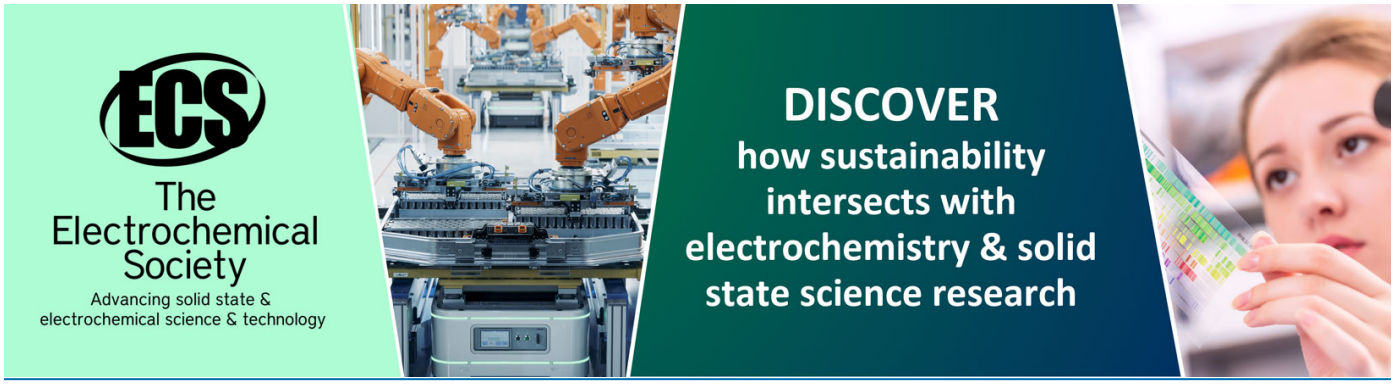
Management of Natural Iraqi Water Resources, Aims And Challenges



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Management of Natural Iraqi Water Resources, Aims And Challenges

Ala H. Elaiwi[1] & Karima Hasan[2] and Mufid Al-hadithi[1]
[1]Middle Technical University/ Technical Engineering College, Baghdad, Iraq
[2]Middle Technical University/ Institute of technology, Baghdad, Iraq
Corresponding author: mufidalhadithi@yahoo.com

Abstract: There are a number of reasons that contributed to the water scarcity problem in Iraq, represented by the water policy by shared countries with Iraq, climate changes in the last few years and the mismanagement of the water resources in Iraq that faces many challenges such as the increased demand on water due to the abnormal growth of population, as well as the high river sediment and neglecting the sanitation systems and mix them with rainwater, in addition to discharge them directly to the rivers which led to rivers pollution and deteriorate their quality. The drought of Mesopotamian Marshes had a significant effect that resulted in environmental changes and increased the impact of desertification. Thus, solving the problem of water is done through the existence of a strong federal government that develops plans which follows a water policy suits the geography of the area and overcome the Iraqi's riparian states competition

1. Introduction:

While Iraq has been facing internal conflicts and external wars for many decades, Turkey has built many dams and water reservoirs on Tigris and Euphrates huge rivers, which are considered the main source of water in Iraq, specially that Turkey sees the river resources as its right and it can invest them to its projects and doesn't recognize the international form of Tigris or Euphrates, where Turkey refer them as (cross-border Rivers).The reason for the ancient Iraqi civilization emergence is primarily the water availability that Iraq area enjoyed since ancient times, where the immortal Tigris and Euphrates had a significant role in the subsequent Iraqi urban advancements. Any dangerous defect in these two rivers might be reflected significantly on all aspects of life in Iraq, thus water problem shouldn't be viewed depending only the current stage and reach to temporary solutions, instead of that, a long term work should be carried out to attempt to provide water and food security for the Iraqi society.

The low average of annual rainfall in the Arab world with maximum levels of (166 mm) and the reduced amounts of water flowing from upstream countries to downstream have contributed to the strategic importance of the water shortage in the Arab world for its high impact on the economy and development [1] [2]. Studies indicate that the water situation will be worst in the future, where the area will suffer a greater shortage in water resources whether they were surface or groundwater [3]. Iraq was affected by this condition, being mainly dependent on surface water represented by Tigris and Euphrates, and there are no other alternative water resources suit the consumption.

2. Study Area:

Iraq is located in the northeast the Arab world, southwest Asia, laid between the latitudes 29° and 37 and the longitudes 38° and 48° (figure 1). Iraq's total area is 438317 km^2, of which is land, while water body area is 950 km^2 of that total area.

Figure 1. The map of Iraq and its surrounding countries.

Location of Iraq makes it subjected to sever weather effects as for cold and hot waves, dust storms and other conditions. Also Iraq's geographical location made it subjected to sever weather phenomena, where desert climate and semi-desert climate which are characterized by high temperature, clear weather and focused solar radiation, cover most of its areas, that increases the amount of evaporation, hence a sever water shortage.

Water for dry regions in Iraq is considered the main element that determines the frame of productive land possibilities. The reason of decreased irrigated land is the lack of rivers and watercourses, service or underground, as well as the misusage of some and non-usage of others. As noticed, large areas require dams and reservoirs to control the river. Despite the deference in the amount of rainfall among the parts of Iraq surface, from one part to another and from one year to year, however, three-quarters of cultivated lands depend on rain as a basic source of irrigation.

3. Aim of study:

This study aimed to evaluate the water reality, attempt to address the causes of water scarcity and crisis and present strategic suggestions that could avoid Iraq from subjection to willingness of neighboring countries (Turkey, Syria and Iran) in future.

4. The basic factors of the water problem in Iraq:

In the past few years, the main goal of building water projects in Iraq is organizing the flow of water to avoid the danger of floods, generate electricity and irrigation, but with the technology advancement and life's development, the water demands have increased, so, neighboring countries invested this development through establishing huge water projects which negatively affected the levels of supplied

water required by Iraq, thus Iraqi Government should have keep up with this development and work on providing water facilities that can achieve the old and abovementioned hales and move toward large storing projects.

Generally, the water crisis in Iraq can be viewed as being related to three basic factors, two of which are external factors that can't be controlled by the Iraqi Government they include climate changes and water resources that come from outside the border. The third factor is internal related to the poor planning and managing of water resources.

4.1. Climate changes and their effect on the water reality in Iraq:

Climate change and global warming in the Middle East have led to drought across the region, not only Iraq, which has resulted in a significant decrease in rainfall and snowfall and a noticeable decline in water revenues. It is right to say that climate change one of the largest challenges faced in Iraq, and it can have significant harmful effects on water resources and hence the environment and economy especially in the agricultural sector.

The Middle East in general is one of the most affected regions by climate change [4], suffering from drought and has reported high record temperatures [5], which are expected to increase and effect both populations significantly [6]. These climate changes will lead to a large reduction in the amount of rainfall in Iraq which was covered in the studies addressed the rainfall amounts on the Iraqi territory [7], this in turn will reduce the discharge of Tigris and Euphrates. In case the neighboring countries continued the execution of their water policies and future plans in term of their water projects the rivers Tigris and Euphrates will be dried [7] [8].

These studies also have shown that the amount of rainfall will be relatively short with high concentration, which will lead to soil erosion and then agricultural production degradation, additionally, these soils will sink in the tanks of dams causing a reduction in the storing capacity of underground tanks due to the low amounts of filtered water resulted from short rainfall period and concentration.

4.2. The major resources of water in Iraq

Since ever, the water of Tigris and Euphrates rivers represented the basic resource of water that flow from the neighboring countries Turkey, Iran and Syria to Iraq without barriers or dams till the begins of 1970s of the 20th century, where these countries have established many water projects without considering the international norms, they think that the water of these river will provide a national wealth equals the wealth of Oil producing countries in the region, which as stated by the pervious Turkish president Suleyman Demirel at the opening ceremony of Ataturk Dam: the water of Tigris and Euphrates are Turkish, and the resources of this water are also Turkish resources, thus Turkey is determined to execute its projects regardless the well-established principles of sharing available water resources, despite the agreements between Iraq and Turkish government over the past decades. Thus, the neighboring countries had the largest role in the crisis experienced by Iraq in the previous years of water scarcity.

Turkey had the main role in that, where the River-basins of Tigris and Euphrates flow from it, and it covers a total of (705500) Km^2. The flow of the rivers has registered a noticeable drop over the past ten years, reaches (7 billion and 660 million) cubic meter, compared to (20 billion and 930 million) cubic meter per second, which was driveled to Iraq annually until the early 1990s. It was estimated by Planning Ministry of Iraq that the annual flow of Tigris River will be (15.37) billion cubic meters, while the total flow of its tributaries is estimated to be (24.23) billion cubic meters. Therefore, the total flow of Tigris river is (39.60) billion cubic meter or 72.3% of the total flow of all rivers combined. The annual flow of Euphrates river is approximately (15.15) billion cubic meter or 7.27% of the annual total flow of Tigris and Euphrates.

Since their establishment, the Iraqi governments have tried to conclude several agreements and meetings with the Turkish side, but without reaching any agreement, while Turkey continued to build dams on the Tigris and Euphrates rivers and it established the first dam, Kabian dam and agreed with Iraq to provide it with water through discharging (350) cubic meters per second from the Euphrates River [28].

Its last project was the enormous (Southeastern Anatolia Project) GAP project to revive the southeastern Anatolia region - which led to a significant reduction in the water supply of the Tigris and Euphrates rivers, the project consists 22 dams, 19 hydroelectric power plants, and various other projects in agriculture, industry, transportation, irrigation and telecommunications.

GAP project considered the largest project in terms of space and capacity, where it covers nine Turkish provinces and will irrigate approximately (1.8) million Hectare, or about (19%) of the total irrigated land.
Iran had a role in the water crisis in Iraq during the past few years where it built dams on the tributaries of Tigris River. Iran's actions can be summarized as follows:

- Establishing a dam on Alwand River on 1962, which led to turning the water off on Khanaqin city, and then it continued building three diverting dams on the same river.
- Diverting the water of Sirwan River which is one of Diyala river brunch.
- Building dams on seasonal rivers close to the Iraqi borders to block the water in order to guarantee that water will not flow to the Iraqi lands.
- Building dams on Karkheh River to divert its water.
- Establishing projects on the Karun River and divert its water into Iran .

4.3. The management of water resources in Iraq:
The mismanagement that was included in the previous policies of the former governments since the establishment of the modern Iraqi state and till the current time, led to a delay in the development process and service degradation in water resources sector, the governments didn't give an adequate attention to water issue, neither set clear plans to be used, so many achievable and useable projects were neglected, as well as setting necessary plans to maintain these projects and well operating them was ignored. All that led to a drop in the Iraqi water resources, while the administration of Iraqi water management has faced many challenges, most important of which are:

4.3.1. The increment of water demand:
There are three main related reasons that lead to a higher demands on water, they are: the growth of population, the development requirements and excessive water consumption. Over the past four decades, the population growth has been tripled from about (10 million) in 1980 to about (37.5 million) in 2016, which makes the current average of population growth approximately 15%, this represents one of the highest levels of population growth in the world. With this high level of population growth in Iraq, the demand on food became higher, and the agricultural sector turned into the largest water consumer.

The population of Iraq needs about 66.8 billion cubic meters or 77 billion cubic meters for industrial, civil and agricultural purposes, according to a study conducted by [9] [10] respectively, but the amount of available water is 43 billion cubic meters in 2015 [11]. This water becomes salty as we head south of Iraq, where the salt reaches the amount of 2000 parts of million at city of Basra [12].

4.3.2. Poor water distribution and sanitation networks:
Sewage networks in Iraq are worn out and need maintenance and rehabilitation, as 70% of the amount of water discharged from these networks seeps into rivers without purification [13]. In addition, the poor condition of these networks causes sewage mixing with drinking water and spreading diseases [14]. Most areas of Iraq do not have sanitation services, where 14 out of 252 cities have sanitation; also the amount of treated water serves only 8% of the population [15]. As well, the efficiency of water distribution networks in Iraq is very poor and does not exceed 32% of the total operational capacity of the networks [16], where the demand for water is about 11 million cubic meters per day, while the actual water supply is half of this amount [17].

4.3.3. Poor water quality

The establishment of storage dams and irrigation projects by the neighboring countries have led to a shortage of water flowing to Iraq, which in turn negatively impact on the quality of water and increased salinity so that the quality of drinking water in Iraq in general does not conform to the specifications of the World Health Organization for drinking water [18].

It qualities varies from the upstream to the downstream area, where in the Tigris River, the amount of salts is considered to be acceptable when entering the city of Mosul, it is about 280 mg / l, but it significantly increases towards the south. For the Euphrates River, the salt amount is acceptable at the city of Qaim with value of 600 mg / l. It also increases dramatically as we head south to more than 1,300 mg / l at Samawa [19].

4.3.4. Desertification

Vast areas of land in Iraq have turned into wasteland due to the shrinking of river drainage, poor water quality and increased soil salinity where the ration of lands affected by desertification is about (45%) of the total area [20], accordingly, dust storms have been increased and agricultural lands reduced by (40%), which forced the residents to immigrate and leave their regions.

Since 2007 to 2009 are approximated to (20) thousand persons [21], statistics indicated that in 2009 (4%) of irrigated land have become extremely salty, (50%) of them are moderately salty while only (20%) of the lands are of low salt level [22].

4.3.5. The drought of the Mesopotamian Marshes

The drought of marshes has led to many environmental changes, and their regions have been partially used in the process of oil exploration, also they were planted by some citizens, so their full rehabilitation is impossible now. Only (70%) of the marshes can be rehabilitated, this requires about (13) million cubic meter of water [23].

5. Conclusions

From above it is noticed that the main reason for the water crisis in Iraq is the water policy followed by riparian states Turkey, Iran and Syria, in addition to the current climate changes in the past few years and the mismanagement of water resources inside Iraq. It was also shown that Iraq is facing many challenges to managing the water crisis, led by the increased demand on water caused by the enormous population growth, also the increment of sedimentation which affected the capacity of dams' storage and not separating it from the rainwater, in addition to the excessive consumption of water at every level. The solution of the water crisis can only be achieved by a strong federal government that can develop long-term strategic plans following a water policy commensurate with the geography of the region through investing in infrastructure projects, perform basic improvements in water supply to address the problem of water scarcity and building check barrier, especially in Diyala,Wasit and Amarah governorates to make use of the floods coming border mountains with Iran, and in Anbar and Karbala governorates for the floods coming from the western valleys.

6. Recommendations:

- Establish a higher committee consists of organization linked to the Prime Minister, an executive group from ministry of water resources and experts in information systems in GIS and remote sensing to continuously negotiate and deliberate with the Turkish side and to manage the water flows to ensure Iraq’s water needs.
- Set a plan by Ministry of Water resources to operate the dams to increase the water storage, and conclude a method to gather rain and floods water coming from Border Mountains with Iran for the East and southeastern provinces and the floods coming from western valleys for Anbar and Karbala province. As well as the artificial recharge of the groundwater to improve its quality and then eliminate or reduce desertification phenomenon.

- Water rations shall not be granted to lands outside the irrigation zone, in contravention of all instructions and for personal interests and changing irrigation networks as appropriate for this purpose
- Prevent the cultivation of crops that consume large amounts of water, and using modern technology that increases products and reduces water consumption.
- Educating people about rationalizing water consumption.
- Calculate the amount of water that considered as dead stored water in lakes and mashes, and follow-up monitoring the quantities of salts and contaminants therein to be used in the desalination process when strictly necessary.
- Build a geographical database regarding the water security and irregularities made by the neighboring countries through modern satellite images and continuously update that database.
- The importance of Iraq's participation in the proposal, implementation and financing of strategic water projects in the Middle East to ensure international support for it in projects of developing dams and reservoirs.
- Rehabilitation the rainwater drainage networks and separate it from the sewage water network addition to establishing modern sewage water treatment plants.
- Activating the role of river police to monitor pollution resulting from Throwing of waste in rivers

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