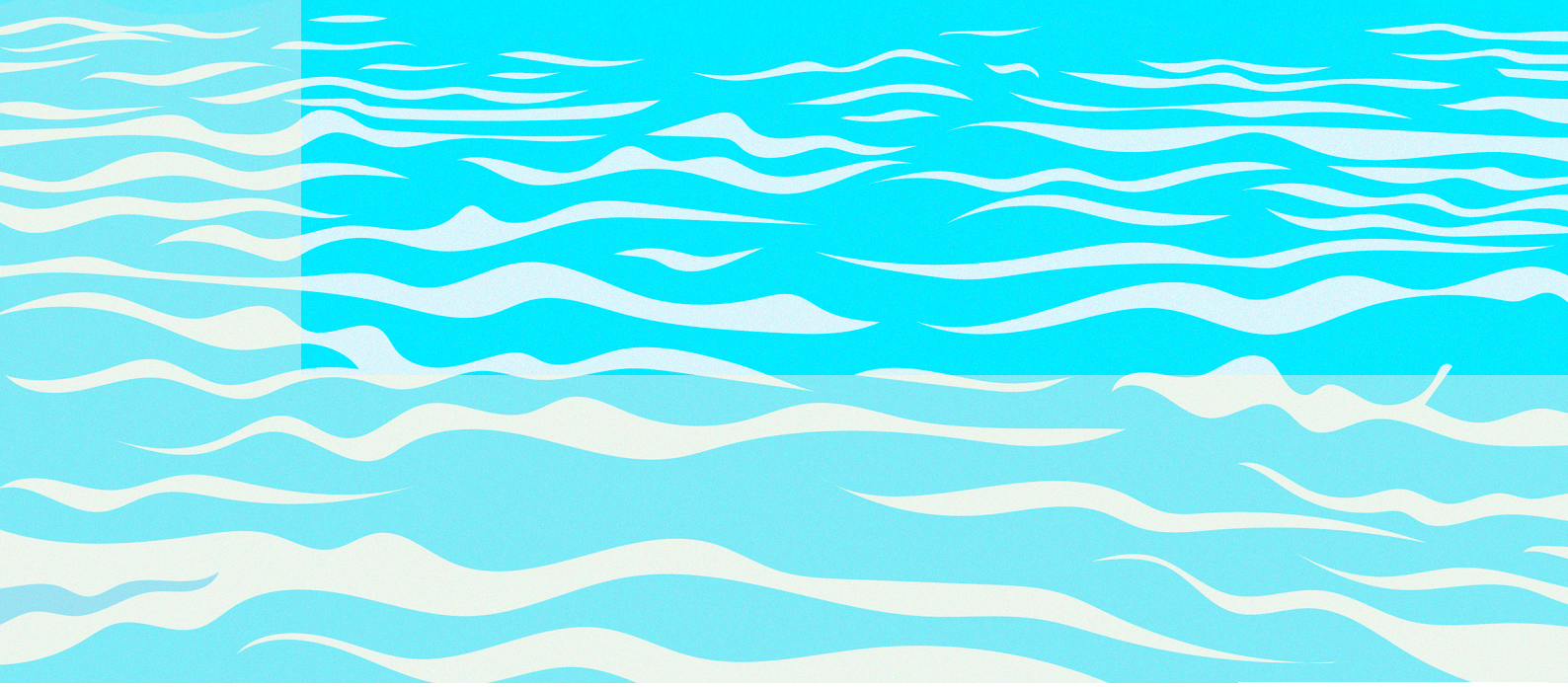
Roadmap: Water Dialogue

A sustainable vision for managing water resources in Iraq

October 2021 - Iraq



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CLEAN TIGRIS

Roadmap: Water Dialogue

A sustainable vision for managing water resources in Iraq

October 2021 - Iraq

Project Responsible: Alisha Molter
Project Manager, elbarlament Organization - Germany

Project Coordinator: Ramy Syriani
Project Coordinator, elbarlament Organization - Germany

Preparation and moderation of sessions: Dr. Sameh Wissam Al Muqdadi
Expert in Water Resources Management / Green Garter Foundation - Germany

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Contents

Introduction

The file of water resources management in Iraq has a great strategic importance, especially as it is directly related to a large number of vital sectors and contributes significantly and fundamentally to influencing any future development plans. The most prominent challenges and obstacles that characterize the reality of managing the water file in Iraq are:

1. The troubled population growth in Iraq and the repercussions caused by the phenomenon of climate change.
2. The lack of water resources as a result controls the upstream countries over water sources.
3. The security and political instability that Iraq has witnessed for decades.

In addition, working on the interpretation and trying to finding solutions to these challenges requires an organized and strategic platform that includes all stakeholders by gathering them at a dialogue table and concerted efforts to come up with a unified and comprehensive vision that contributes effectively to the consolidation of the concept of integrated water resources management in Iraq in an institutional manner. During 2020, and in the context of the project "Clean Tigris- dialogue programme for sustainable peace" initiated by the German Organization elbarlament and funded by the ifa (Institute of Foreign Affairs), with funds from the German Federal Foreign Office, elbarlament focused on collecting facts and addressing the basic challenges of water resource management within different sectors in Iraq. Several workshops have been held to solve water disputes, climate change and developing the necessary legislation. In 2021, four Water Dialogue workshops have gathered diverse stakeholders from the water sector: politicians, executives, NGOs, academics and private sectors and media. The direct dialogue allows an open discussion among these sectors to protect, sustain and improve the management of water resources in Iraq. In total, four workshops have been held; Three of them focused on an accurate description of the current situation, mentioning the main challenges and proposing practical solutions at the local level for the Northern, Southern and Central parts of Iraq. The workshops took place between June 27 and May 20, 2021. While the fourth workshop gathered all the participants from the previous workshops at the end of October 2021, the participants from different governorates signed the present roadmap for Iraq.

Objective

The Water Dialogue's ultimate objective is to deliver a comprehensive and sustainable action plan that all the participating sectors would agree on and support, and frame this action plan in a roadmap to be signed by all Iraqi partners. Its final version is submitted to the legislative bodies (the Iraqi Federal Parliament and Kurdistan Regional Parliament and all relevant parliamentary committees) as well as to the executive bodies of the Federal government and the Kurdistan Regional Government of Iraq.

The ultimate objective of the Water Dialogue is to present an appropriate, comprehensive and sustainable action plan that is agreed upon and supported by all the participating sectors and that presents a framework for this action plan in form of a roadmap. The roadmap is to be endorsed by all Iraqi partners and its final version is submitted to the legislative bodies (the Iraqi Federal Parliament and Kurdistan Regional Parliament and all relevant parliamentary committees) as well as to the executive bodies of the Federal government and the Kurdistan Regional Government of Iraq.

This action plan agreement also includes a scheme that is the first of its kind to clarify the complex system of stakeholders in the water sector in Iraq. It highlights challenges and provides realistic recommendations to deal with those local challenges in order to reach practical solutions. One of the most important outputs of this work will be the establishment of a national network to represent all sectors related to the water sector to ensure long-term sustainability.

Methodology

In addition to the sectoral and professional diversity of the selected stakeholders, the geographical diversity was taken into consideration, as every region has its own characteristics. Therefore, the work was geographically divided into three areas: a) The area of northern Iraq, which is represented by the Kurdistan regional government, the Nineveh Governorate, the Kirkuk Governorate, b) the central Iraq region represented by the central government, the capital Baghdad, the Anbar Governorate, the Middle Euphrates and Karbala Governorate and c) the southern Iraq region, represented by the Basra Governorate and DhiQar Governorate.

To ensure a comprehensive and integrated vision, six main sectors were selected for study, which directly and vitally overlap with the water file. These sectors were embodied in the integrated water resources management system called EES GMT, which symbolizes the six sectors, which are: Water and Environment, Water and Economy, Water and Socio-cultural sector, Water and Management, Water and Governance, and ends with the Water and Technology sector. The following is an overview of each of these sectors:

1. Water and Environment Sector:

Climate change is a mutual global challenge and Iraq ranks among the top five countries that will be severely affected by climate change. The lack of planning for water scarcity in this context will cause material damage to Iraq's environment and ecosystem. Wetlands, such as marshes and natural lakes, will be at risk of depletion. Human activities and the lack of implemented policies, such as: oil production, mining and industrial waste will pollute the water bodies and the groundwater system, which will require large resources for its rehabilitation in the future. This sector will highlight key challenges and opportunities in terms of the local context.

2. Water Sector and the Economy:

Water is closely related to various economic factors. It is greatly affected by irrigation for agriculture, hydropower generation, domestic and industry water use, environmental purposes, and sustainable oil production. This section will focus on water as a commodity and the impact of the local economy. For instance: 70% of the water resources used in the agricultural sector directly affect food security. The oil production industry compose for more than 90% of Iraq's national revenue, as each barrel of oil needs 3-5 barrels of water.

3. Water Sector and Social Cultural Dynamics

For a long time, water has had a significant impact on the social and cultural structures of society. It is the crucial element in the emergence and prosperity of all civilizations.

The lack of enforcement of laws, poor water supply infrastructure, displacement and waves of refugees, and social influences and stability are all factors that need to be investigated on in depth to understand the level of community awareness, the contribution of civil society to water decision making, and the level of trust between the public and the authorities. It shall provide development plans for any country for public access to safe drinking water, adequate sanitation and hygiene.

4. Water sector and government

This section will deal with the role of the government, governance, public policies, political/executive decisions, and aspects of conflict and solution. Water policy as a term means how to use water as an element to impose or modify a political agenda. Decision makers influence future generations locally and regionally by adopting a specific water resource management strategy. The policy and political dimension of water resources on the availability and quality of water resources affects human development at the national and regional levels.

5 . Water and Management Sector

Work without measurement can not be managed. Integrated water management is a necessity to tackle a range of challenges as one package. The first step in this context is to map the water stakeholders and define their roles and responsibilities. Coordination and facilitation of cooperation between stakeholders will ensure better on-the-ground results of water resource management. Without a clear water stakeholder mapping, making decisions will not be easy.

6. Water and Technology Sector

There is a strong need for water technologies to reduce the gaps between water demand and supply. The use of innovative methods and smart solutions will greatly help in reaching the sustainable development goals. The use of water treatment and recycling will reduce pollution and reduce the release of chemicals and hazardous substances, preventing the proportion of untreated wastewater. This would push the country to mitigate the risks of water scarcity and deal with critical challenges such as climate change and rapid population growth.

Each workshop lasted for three days. On day two and three, the participants were divided into three groups to cover the six sectors and to discuss the current situation and local challenges. They wrote down recommendations for the various actors in a specific sector (one of the six sectors mentioned above). In each working group there was representatives of different levels and stakeholders: from the level of the relevant ministries, the governorate level, the local level, the NGO sector and academia. (Annex: work methodology and details of managing sessions in their detailed form). The participants also registered to the special dialogue platform under www.cleantigris.com to stay informed about all background information and results of the three workshops. In addition to this, a detailed report on each workshop was sent to everyone to be able to give feedback within three months (from May 21 to mid-September 2021), to review it and state their suggestions and comments. Also, a fourth workshop was held that included all the participating governorates to finetune and produce the final version of this road map.

In addition and to ensure the greatest degree of social and geographical participation, a questionnaire was distributed to various segments of Iraqi society. More than 300 participants have been informed about the six sectors overlapping with the water file and their opinions have been taken. in addition to conducting three dialogue seminars for local communities and in cooperation with Iraqi local organizations concerned with the affairs of The environment and water, where the cities included Mosul in the north of Iraq, Ramadi in the west of Iraq and Nasiriyah in the south of Iraq.

Methodology

The results will be reviewed based on the geographical scope and from it to the mentioned six sectors by giving an overview of each sector and what are its most prominent features, in addition to a brief explanation of the current status of that geographical scope and each sector and then a review of the most important challenges and concluding with the proposed recommendations, as follows:

Working groups:

In each workshop, the participants have been divided into three groups during the 2nd and 3rd days to discuss the current situation, local challenges and write down recommendations to different actors: the related Ministries level, the governorate level, the local level, the NGO sector and academia. The exercise instructions and orientation:

- Dividing the participants into three groups where each group will select one topic. (Ensure the team includes different backgrounds: political, Academic, Civic society and Executives).
- The team will describe the water situation and focus on the local level for a particular region (North, Centre or South of Iraq).
- The team will use the guiding questions list to assure oriented & productive discussion.
- The team will discuss the challenges, gaps, shortages and demands of the water related topic (i.e. if the topic is Environment, the discussion will be: Water resource interlinks with the Environmental aspects).
- The team will suggest applicable solutions that might develop the water resource management for the region level /country level.
- The team will propose specific recommendations targeting the Legislature and Government levels.
- The team will present the challenges, suggested solutions and proposed recommendations to the other teams, there will be an open discussion to develop the working group's results.
- The team will nominate the presenter/s to reflect the team propositions & feedback.
- All the above challenges, suggested solutions and proposed recommendations that has been improved will be collected and documented and to be prepared for fine-tuning at the final session.
- The co-ordinator will ensure the exercise is clear for the participants by describing clearly all the above instructions to participants before starting the working groups.
- The co-ordinator will follow up with each group to ensure answering any question or monitoring and watching the time of the exercise.
- The co-ordinator will manage the presentation and the discussion.

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1 Water and the Environmental Sector

1.1 Current Situation

Clearly, the climate change impact for the last couple of years on the water within different levels, quantity and quality of water resources. This has been severely reflected on the water and security where the desertification and displacement phenomenon affected degrade the ecosystem. Climate change also influences climate, which is evident within Northern Iraq (particularly KRG), where an arid region replaces the northern region climate characterized as a semi-arid region. It is also true for the humid aria that is replaced by semi-arid. The Northern part is aware of the strategic climate change adaptation plan that was recently set by the UNEP.

1.2 Main Challenges

- The intensive heat waves and a significant reduction in the precipitations.
- Soil degradation and soil salinity increasing in farming areas and the shortages of vegetation cover.
- The significant reduction in the water depth for underground water (i.e. from some area in the northern region from 30m to 300 m. depth).
- Increase in pollution (water, soil and air) that negatively affects the ecosystem and species diversity, which is reflected in losing the opportunity to invest in tourism. An example is the Tangero river in Sulaymaniyah, considered one of the essential water assets for agriculture and livestock in southern Sulimaniyah. Unfortunately, this river is suffering from considerable pollution because of the following: the remediation site is only 500m from the river, the direct sewage system for factories (illegal refineries) throwing the waste (including Oil) directly into this river without any treatment. The river is no longer proper for fishing or swimming. Many fishes and species were dying near Halabja

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- The dams built by the upstream countries, particularly Turkey and Iran, caused an evident shortage on the water surface allocations that led to worsening the environment in the northern region. The Tropical Water Project (TWP) in Iran aims to develop the agriculture sector in Iran by building more water infrastructures on the tributaries of the Sirwan-Diyala river without consultation with Iraq as a downstream country. The TWP will build 14 dams with a total capacity of 1.9 Billion m^3, 150 Km long tunnels that divert over 1 billion m^3. The project will reduce the capacity of the Darbandikhan dam by up to 77%. This significant water share reduction would severely harm the environment generally in Iraq and particularly the KRG. For example, in 2019, The lower Zab river flowed 50%. Currently, the surface water flow from Iran is almost zero, where the Sirwan-Diyala river is relay on the internal recharge, which does not exceed 7-8 m^3/sec. This challenge will be inherited from the rest of Iraq. The financial dimension is one of the critical challenges where the northern region, particularly KRG, is limping with a lack of funds and accommodating the budget to solve the water-related environmental challenges where most of the projects were suspended or postponed.
- Mosul dam is still considered an unstable dam, and the grouting operations are still not sustainable.
- No one from the northern region, particularly KRG, is involved in the UNEP strategic plan for climate change adoption. Also, the strategy didn't consider specialists.

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1.3 Recommendations

- Comprehensive strategic plan focuses only on the northern region of Iraq to monitor the situation and has steady statistical records that could be used as a reference.
- Accommodate a budget to build small-medium dams (less than 100m high and less than 3 Billion m^3 capacity) that could help water harvesting.
- Adopting an effective Water treatment and recycling for the sewage system.
- Practicing innovative irrigation techniques to enhance soil efficiency and reduce water used.
- Enforce the regulations and set binding policies for any illegal activities that would harm the water and environment (i.e. Tangero river, Sinjar and Tal Afar) and implement the obligations to monitor all factories and treat their wastewater use filters to their factories. Also, add restricted conditions to limit fish farming.
- The KRG delegation discussed the Iranian project TWP with the Iraqi Federal government to develop a solid conclusion to negotiate an agreement with Iran. The aim is to secure a sufficient water share and coordinate with Iranian relevant entities on how to manage the water resources equally considering the drought and wet years and climate change adoption.
- As a sustainable solution, besides the grouting operations at the Mosul dam, Iraq should build the Badush dam as a prevention dam to stop the wave of water flood in case Mosul dam will fail.
- Increase the awareness of using the water and highlighted the influence on the water shortages on the environmental aspects adopting Dublin Principles (Jan.1992) for water and sustainable development and empowering women in this context.

2 Water and the Economic Sector

2.1 Current Situation

Globally the water consumes about 70% of agriculture, 20% in industry and ~10% for domestic use. However, Iraq and the northern region have a poor management in using water in those three sectors where agriculture has the lion share by consuming nearly 90% while 5% only for industry and 5% for domestic uses (~2 million m^3/day). This poor structuring for water consumption influences the national economy. Water in this context is affecting the food security and source for living for many inhabitants and an opportunity for creating jobs and alleviating the risk of unemployment. There are 13700 job opportunities in the water supply and sewage system sector, and at least 4100 persons are working in this field in the Mosul governorate. Currently, the KRG provides 98% of the water demand for the region, while this percentage is less in Ninawa province.

2.2 Main Challenges

- The water tariff is improper (very low) in comparison with the cost of water supply. The local government subsidizes about 70% of the actual cost. The existing water supply cost is reaching 150 billion Iraqi Dinar, and the return from this sector is 30-40 billion Iraqi Dinar only.
- 70-75% of the diseases are due to poor water quality. The cost of health care related to water diseases is very high. In 1999, a case study in Sulimaniyah where random illegal drilling of water wells led to the spread of Cholera disease when the sewage water pumped out along with the groundwater and rapidly spread in the villages and rural areas where thousands of people were infected.
- Generally, Iraq is losing ~ 15% of its water resources due to evaporation. Using the open system canals is a familiar old technique that costs government water resources and lost opportunities. Particularly in Ninawa province, where the farmers use this outdated irrigation system.

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- Due to the topographic challenges and geological settings, there is a unique challenge to implement an adequate water supply system in KRG and Ninawa province. The irregularity in accommodating the budget is hindering any plans.
- The absence of water - infrastructure protection law and insufficient awareness is another burden that indirectly costs the government in terms of the water economy. (i.e. 40% of the car wash water is wasted while using a recycling system would help to reduce the water consumption in this sector). Also, the type of machines used in irrigation, farming and domestics are outdated and need to be more feasible from an economic perspective.
- The rapid population and urban growth, which is happening irregularly and without proper planning, where no idea how much water would be needed for the next couple of decades and the capacity required for the water supply/sewage system to cope with that growth.
- Since 2015, Iraq joined the Paris agreement for Climate change and the cost of adoption. So far, Iraq still doesn't know how much this adoption might cost. This would need a regular reporting system and transparent data to realize the amount.

2.3 Recommendations

- Providing sufficient water to the vital sectors to guarantee progress and prosperity by creating a sophisticated and innovative system that links the supply with incentives. The system should consider the basic needs for domestic use equally and efficiently and adopt a double tariff at least covering the operational cost and further maintenance. The action plan should include the following: 1) set the metering system and activate a fair penalty fee 2) revisit and update the water tariff regularly 3) increase the public water awareness.
- Enhancing the quality of water supply and activating/regulating the water quality control intelligent system to prevent different diseases and leakage on the subsurface pipeline system. In this context, it is worth keeping the effective cost of water-related disease versus investing in water quality which might be more affordable from an economic perspective. In this case, we suggest to use a part of the health care budget to develop the water quality and water supply system.

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- Enforce by law using the closed pipelines system for water supply to reduce the water evaporation and invest in innovative techniques and infrastructure such as artificial recharge to save and harvest the water resources. Where new standards and coding systems are required to be adopted by the government for any project, particularly that related to the agriculture sector.
- Accommodating the budget to the water infrastructure is essential and should be considered an urgent national demand.
- Develop/review the water protection law and water awareness rules and deliver these rules to the legislatures. The law should emphasize importing only the feasible-economic tools and machines and link this with incentive systems such as less import tax for the wholesaler (such as tap water system, wash machines, bathrooms, irrigation systems..etc.) and adopting a sophisticated quality control system.
- Investing in small scale projects in the rural areas that could help deliver a successful story and build on this experience to expand the good practices. The GIZ innovative project in Duhok city is highly recommended to be used as a good example. The 30 million Euro multi phases project targeted to build modern sewage and low-cost techniques for the water treatment system to reuse the water in the agriculture sector, and building the capacity for the local staff. The project also provides intelligent solutions to restructure the management and reporting system and highlights customer services and data management shortages.
- Since the UNEP is working recently within a three years project to set the adoption strategy to climate change, it is highly recommended to share the outcomes of this strategy and provide it to the legislatures to consider the cost of adoption for climate change in the context of Iraq.

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3 Water and the Sociocultural Sector

3.1 Current Situation

Water is an essential element for human stability and mental health. It is part of the basic need on the base of the property pyramid. The high difference in the vital services between the regions, cities, and towns is pronounced, particularly for water supply. Sinjar, a region in which over 100,000 people recently returned to their villages, is an excellent example of how the lack of water supply and basic needs influence the sociocultural dimension. However, most of the returnees lately were forced to be displaced again due to the lack of essential services and the lack of water infrastructure. This re-displacement leads not only to demographic changes, but also mental health issues in particular for women, economic challenges and severe health concerns.

3.2 Main Challenges

- The severe lack of essential services in water infrastructures for the cities considered war zones and suffered from the terrorist attacks, Ninawa provenance is an example of the town destroyed during the military operations against IS in June 2014. People lived in camps with limited access to basic needs for over six years, particularly for water and sanitation. This terrible experience will continue if no proper services will rebuild the destroyed cities and get people back.
- The poor public and state awareness to value the water as a commodity is considerable were timid attempts from the media to cover and shed light on such a vital challenge. The statistics say there are four advertisements only per year that could talk about water awareness.
- The weak organizing and distrust between the civic society and the governmental authorities and the local NGOs are not active in this context were over 200 local NGOs in KRG specialists in water and environment aspects. Still, they are passive due to the limited access to funding. Also, the role of women is still passive while women are the actual end-users that deal with water daily at home either through cooking, washing or using the relevant machines that consume water.

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- The limited vision from the local authorities to compete for the water illiteracy, where no strategic plans have been implemented to educate the importance of water resource management, besides the academics and women were isolated from involvement in the decision making.
- The inadequate legislations and implementations in the context of water rights and public awareness. i.e. the random and illegal water well drilling tends to lose the strategic reservoirs where the KRG demands from the wells are around 6000 while the collective amount of water wells (registered and non-registered) is over 24,000, which means four times more than the demand. Also, in terms of drilling distance between the water wells, the local authorities in KRG have sorted three types of distances 500m, 600m and 700m. However, there is no compliance from the beneficiaries.

3.3 Recommendations

- Giving priority to rebuild the basic needs and water infrastructure for the cities suffering from terror and help people to return home by enabling them to access the water services. In addition, cooperation with the international and local NGOs would allow them to settle and go back to their normal life and, most importantly, reduce the social implications and demographic changes.
- Develop a comprehensive campaign for water awareness targeting different levels: Ministry of education, Ministry of culture, Universities, Tourism authorities, Media, NGO directorate, Water authorities institutions and the worship places such as mosques and churches. One good practice is the GIZ project in Dohuk, since their campaign encouraged people to reduce the water consumption by 10-20% by referring to phrases from the holy books Quran and Bible. Another example is Iran's experience with 15 years of water campagne to obtain a significant difference. It is highly recommended that each media agency should link its social mission with promoting water awareness.

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- Empower the local NGOs through the NGO directorate in KRG by urging the international NGOs to accommodate 20-30% from their environmental projects to the local NGOs that work in the same field. This would help the local NGO be active on the ground and reduce the gap and alleviate the distrust between the civil society and the local authorities.
- Develop targeted campaigns that address f.e. women in particular, who are doing household related tasks to encourage them to rationalize water consumption on a house hold level.
- Develop a syllabus on water education to be part of the education system. The syllabus will target the ministry of education and starting from the primary school level. It is also recommended to involve the academics as consultants at the governor office for any related projects. Customizing capacity building for the local authority staff is also essential to obtain sustainability.
- Fasting to regulate and enforce the water law (which is already available in KRG parliament) by the legislatures after comprehensive study of the technical conditions and revisit the limitations. It is also recommended that water wells distance be identified based on the sort of basin and the geological setting determined by the specialists. The water well should be owned by the local municipality and under their control, monitoring and responsibility and set a metering system on each well. Also, backfilling the non-registered water wells.

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4 Water and the Governance Sector

4.1 Current Situation

Governance is the process of governing; currently, there is a weakness in policy implementations related to the water resources sector, which needs to be reviewed and updated. Collectively the stakeholders map showing gaps in terms of decision structure, communications and responsibilities that also need to revisit.

4.2 Main Challenges

- Unclear water stakeholders' map that needs to be developed further to reveal the gaps and interlinks between the state and non-state actors. Generally, there is a lack of collaboration between the local authorities and the federal governments, depending on the political environment reflecting the level of trust between the water stakeholders.
- Shortage in water diplomacy capacity at the regional level with riparian countries such as Turkey and Iran. The decentralized system that Iraq adopted after 2003 gave authority to local authorities and showed gaps and grey areas, particularly in the federal constitution, which needs to be revisited and explained.

  The lack of solidarity/coordination between the federal government and the KRG due to the different political interests, as a downstream region (KRG and northern Iraq) and as an upstream region for the federal government, the KRG needs to build the capacity for water diplomacy and water negotiation. A good example is the Iraqi Federal Government (IFG), responsible for the water allocations from dams, even those located in KRG and accountable for their payslips. The directorate of dams in KRG receives an annual plan of the water allocations.

However, in 2017, when Iran developed the water infrastructures on the Sirwan-Diyala river, over 70% of the water flow was reduced. The KRG dam directorate has been arguing with the federal Ministry of water resources since the water allocations have been less released to the federal territories due to the acute needs for the KRG inhabitants. The KRG tried to negotiate an agreement with Iran. Still, the Iranian government refused to do so and asked the KRG to let the Iraqi Federal Government (IFG) talk directly. Although KRG discussed and urged IFG to negotiate an agreement with Iran, the IFG didn't prioritize this case.

- Insufficiency of understanding, Formulation and responsibility of the local authorities makes the decision less effective, and the law takes time to be formulated and enforced. A good example is the name and responsibilities of the Ministry of Natural Resources in KRG is not the legal entity that is responsible for the water resources, rather limited only for the Oil and minerals to avoid the conflict of interest with the Iraqi federal government. Where water resources are represented only by a tiny scale directorate under the Ministry of agriculture.
- Unfortunately, the governing of water resources is not a priority and give it less attention by the decision-makers. The urgency interaction with the crucial water challenge is limited only during droughts or floods events and crises.
- The lack of a reliable and transparent database for water-related records makes any decision challenging to be driven or oriented.

4.3 Recommendations

- Developing the water stakeholder map for the KRG by adding other additional actors that are already addressed on the WSHM, such as the 6 KRG parliament's committees. (i.e. Environmental committee, Health committee, women's affairs committee..etc.) that are active in water and environmental aspects (enclosed the WSHM suggested development). Identifying the responsibilities and the objective for each entity to avoid any conflict of interest.

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- Establishing a new entity KRG Water authority (KRG WA) and restructuring some directorates already available. (i.e. Directorate of dams, Directorate for water resources, Directorate of water projects..etc.) all to be under the KRG WA, which gave weight and better orientation for the water decisions and better organizing with other actors. Furthermore, the KRG WA will be linked directly to the current higher water council (HWC) at the IFG. This will ensure the KRG with better representation at the HWC. Furthermore, this will encourage the solidarity of both the IFG and the KRG to come up with one vision that would firmly strengthen the bargaining power during the water negotiation agreement with riparian countries.
- Establishing the water resources databank on the level of Governorates under the KRG then linked to the IFG databank to ensure the updated records and clear statistics and helping both to be on the same page when negotiating any future agreements with the riparian countries.
- Adopting the principle of gender balance as part of integrated water management, where Women should be recognized as central to providing, managing, and safeguarding water. Gender and social disparities in terms of equitable access to and control over resources, benefits, costs, and decision making between women and men.

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5 Water and the Management Sector

5.1 Current Situation

The estimated total freshwater resources available in the northern region and the KRG is ~35 billion m^3 (surface water is ~ 30 billion m^3 and the groundwater ~ 5 billion m^3), the demand for the KRG inhabitants (6,100,000) is 1,525,000 m^3/day (6,100,000 *0.25) were 200-250 L per person/day and the KRG supplying ~ 2 billion m^3/day). Still, this situation will not remain for the next decade due to the population growth and climate change impact; therefore, an effective strategy for integrated water management is highly needed.

5.2 Main Challenges

- There is a significant shortage in data management related to water resources. Different challenges in this context are available: insufficient data, gaps and missing data required to be filled, data verification and integration, and regular monitoring and quality control. Also, there is no good coordination between the IFG and the KRG in terms of data.
- Lack of clarity and comprehensive strategy or master plan to manage the water resources. Even if it is available, a political will is required. Also, academic institutions and research centers are not involved. There are some experimental projects, but we need to have them on a bigger scale.
- The agriculture sector is the utmost consumer of water where close to 90% goes to this sector. Therefore any management plan should focus on this area to obtain the IWRM approach. However, this would need financial support, an accommodating budget and good collaboration between the water actors.

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5.3 Recommendations

- Conducting a mathematical model on a local (Iraq) and regional scale (Turkey, Syria, and Iran) for the Euphrates/ Tigris basin. This would need to have meteorological stations and use the GIS techniques to calculate the precipitation and snow recharge, make the in-depth interpretation, and analyze the discharge to obtain the water balance system for the region. This strategy will support the negotiator in setting on the roundtable reliable information and making a reasonable debate to reach an agreement. The water level should be monitored regularly by drilling deep piezometric water wells inside Iraq and close to the riparian countries borders. The wells should reach the regional aquifer to watch the water table.
- Establishing a research centre focused on strategic planning for water resources and integrated management. The centre will gather the academics with their executive's peers from different water stakeholders and those with practical experiences to provide practical solutions for water crises.
- Clustering the water allocation and budget for the provinces considering the basin scale, not the admirative borders between the governorates. This would give a sufficient understanding of the actual situation of the water resources.
- Empowering farmers by providing them with modern machinery and a sophisticated irrigation system using less water-consuming tools. Linking this with an incentive system, supporting the national products, and setting an affordable import tax for the regional crops and products.

6 Water and the Technology Sector

6.1 Current Situation

Most of the technologies used in the water sector are outdated. There are only a few monitoring stations to monitor and gather the surface water and groundwater records. However, the plenty of non-registered water wells make it challenging to watch them all and maintain the situation. Same for the agriculture sector that has poor efficiency in terms of water consumption versus productivity. Within the next couple of decades, developing and using modern technology will be a must to bridge the gaps between supply and demands.

6.2 Main Challenges

- Outdated technology used in different levels: agriculture, water harvesting and water supply. The KRG is not utilizing the desalination system in the area characterized by high salinity and poor water quality. However, Ninawa province is using on a local scale an old technique desalination system.
- The insufficiency of the dams in the KRG region due to the lack of funds where most of the available dams are old and managed by the conventional system.
- No priority was given to developing water management technology in the national budget and no support for the farmers to provide them with proper modern tools and machinery.

Northern Iraq
(Iraqi Kurdistan Region, Nineveh province & Kirkuk)

6.3 Recommendations

- Initiate a law through the legislature to enforce using the modern technology that consumes less water and helps to manage our water resources properly. However, without accommodating the budget, such a law will not be effective.
- Initiate a capacity-building campaign for the governmental staff at ministries to learn how to use modern technologies. Same for the farmers who should understand smart irrigation through governmental education campagne.
- The devices and tools used at the ministries, academic institutions, and research centers are insufficient to conduct research. Also, there is a significant shortage in the science labs and the maintenance. In the domestic sector, there is a misuse of power supply by using the heaters that consume a lot of energy generated through hydropower.
- Establishing a water treatment station for the industrial waste using the automatic shutdown system to avoid the spread of any possible contamination. Also, a modern dam control system such as SCADA prevents any hacking of the system. However, encouraging the investment in small and medium dams would be an option following the Public-private partnership (PPP) concept to manage the dams. And all the water treatment stations should be located before the main Dam wall.

Central Iraq

1 Water and the Environmental Sector

1.1 Current Situation

As a result of the policies adopted by the riparian countries and the absence of joint coordination, water imports were raised in a very large way in the Radala and Euphrates basins, where imports were reduced by almost half. This led to the impact of the agricultural sector clearly through the quality of crops and the use of traditional irrigation methods, as well as the impact of the livestock sector. The lack of water resources has left a clear impact on the vegetation cover and forests, which caused a disturbance in the ecological balance and the occurrence of migration and demographic change, as desertification increased by 100,000 dunums and the returns of the Euphrates River decreased between 200-300 cubic meters per second, not to mention the increase in the proportions of salt and carbon dioxide emissions. From different sectors (oil extraction operations, electricity sector and waste incineration).

1.2 Main Challenges

- The obvious environmental pollution in the central regions of Iraq, which causes a disturbance in the ecological balance, which is negatively reinforced by the extension of the phenomenon of climate change.
- Drying marshes and water bodies as well as the turbulent increase in exploration, drilling and oil extraction.
- Practicing unlicensed and uncontrolled industrial activities.
  Weak environmental awareness and culture among citizens and institutions alike.
- The impact of dams, especially the large ones, internally and externally, on the quantity and quality of water imports, as they contribute to increasing the risks resulting from the natural conditions to which dams are exposed, such as floods and earthquakes.

Central Iraq

1.3 Recommendations

- Activating and re-amending the environmental laws related to water and its uses, in addition to enacting the Water and Wetlands Law.
- Institutional cooperation and partnership between the federal government, the governorates and the region, in addition to cooperation with civil society organizations, international institutions and organizations.
- Adopting water and environmental policies based on solid scientific studies and research, which requires a joint effort between the concerned departments and academic institutions.
- Monitoring the activities of the oil sector and energy generation through its contribution to addressing environmental and water problems, especially through licensing contracts, with imposing strict control on environmental polluters and encouraging laws and legislation.
- Adopting modern technologies in the field of water monitoring and treatment in dealing with sewage, agricultural drainage and industrial water.
- Developing a national strategy based on statistics, data and information derived from field surveys, studies and research related to water management and ecosystem development.

2 Water and the Economic Sector

2.1 Current Situation

There is uncertainty in the water and economy dossier, as this delicate sector suffers from a lack of information and statistics related to the extent of the impact of water on the economic aspects or vice versa. For example, there is no clear, transparent and applicable pricing on the agricultural side, which is the largest consumer of water resources, and there is a widespread belief in the unfairness of distributing water quotas as there is a part of the society that consumes more than the rest, and there are no priorities in the water supply, whether it is for the agricultural sector, industry or household uses.

2.2 Main Challenges

- The fluctuation in the amount of incoming water prevents economic planning to invest these resources in their optimal form and focus efforts only on setting short-term and even annual plans to support the local economy.
- The lack of economic and accurate statistics regarding the water file and its need and for the various sectors.
- The absence of a clear tariff for water with poor collection, which leads to large losses in the government sector and its inability to cover the operational expenses related to the water file.
- The ambiguity of the legal aspect and its application with regard to the protection of water resources and the nature of the overlap in the water file, including the economic aspect.
- Wastage as a result of old and dilapidated infrastructure, which causes depletion of water resources and the high economic cost resulting from that waste.

Central Iraq

2.3 Recommendations

- Enhancing regional cooperation with the riparian countries on the one hand and internally between the governorates and the region.
- Defining management levels, defining tasks, and strengthening the legal aspect of protecting water resources.
- Accurately identifying and knowing the needs of water quotas for each sector to create an economic model that shows the size of the loss or profit achieved in that sector and the comparison with the real cost of infrastructure development.
- As a result of the lack of water imports in agricultural projects, setting a fair cost that contributes to covering operational expenses.

Central Iraq

3 Water and the Sociocultural Sector

3.1 Current Situation

Water is still a wasted and unappreciated societal wealth for the citizen as a result of the lack of awareness and the lack of enforcement of laws by the executive authorities in a firm manner against transgressors, in addition to the most dominant characteristics represented in the lack of trust between the citizen and the authorities. Also, the impact of climatic changes and the increase in the phenomenon of desertification and the displacement of farmers from their areas to cities has caused social problems and demographic changes negatively reflected in the depletion of water and the destruction of infrastructure and its social effects. Tribal conflicts as a result of the abuse of water quotas have become a prevalent phenomenon, and the apparent absence of government media and awareness plans for water problems has become a cause for consolidating the lack of awareness of this vital dossier, and the wrong policy of partisan quotas by choosing the non-competent executive authorities has complicated the water scene and increased its impact on society.

3.2 Main Challenges

- Desertification and displacement are the most obvious features of the lack of water resources, which directly affected the society in central Iraq, as the families that were displaced as a result of terrorism in the areas of western Iraq tried to return after the liberation of those areas, but the lack of basic services, especially water, was a major reason to prevent their return.
- The scarcity of water also directly affected food security, which affected areas in central Iraq, and led to an increase in poverty rates, leaving agricultural lands and applying for government jobs, as government institutions are suffering from a slack of cadres. Unemployment, crime and drug use increased.
- The escalation of tribal and clan disputes and conflicts as a result of the lack of water imports. For example, the water releases to the Shatt al-Hilla, which benefit the cities of Hilla, Samawah and Diwaniyah, located south of Baghdad, are 230 cubic meters per second during times of rainfall, while those rates decrease to reach 80 cubic meters per second only, which reinforces those conflicts.
- Citizens' reluctance to pay fees due to lack of trust between citizens and the government.

Central Iraq

3.3 Recommendations

- The use of modern methods of irrigation and domestic uses leads to saving at least 20% of the water consumed today, which contributes to strengthening community stability.
- Treating wastewater for use in agriculture and enhancing vegetation cover and afforestation will reduce desertification and provide the equivalent of 2-8 billion cubic meters annually, and also contribute to reducing heat waves and displacement.
- The harvesting of groundwater contributes to the stability of the citizen and the lack of displacement and abandonment of their land, which contributes to providing an area of one million acres of agricultural land, but the harvesting must be carefully studied to avoid the depletion of the underground water reserves.
- Implementing laws, effectively and justly collecting fees, holding negligent people accountable, and handing over the water dossier to specialists away from partisan quotas and political trends.
- Cooperation between universities and academic institutions to develop scientific programs to address the water scarcity crisis and to encourage applied scientific research in this framework.
- Supporting farmers financially and in kind through advanced mechanization and fertilizers, in addition to activating the system of protecting the national products and its impact on food security and reducing displacement.

B

Central Iraq

4 Water and the Governmental Sector

4.1 Current Situation

There is a need to involve all stakeholders involved in the water dossier in decision-making at various levels in order for the water dossier to have a real centralization to avoid the overlap of decisions, which requires developing a method for participatory work that had been planned for more than a decade, represented in the formation of a higher water council. The council is within the framework of the Ministry of Water Resources, in addition to the joining of a number of delegates from certain ministries, but this council has not been effective until the present time as a result of many obstacles and limitations such as the absence of an integrative vision, the lack of administrative and organizational compatibility, the absence of a legislative framework for the council and the absence of adequate coordination between members.

4.2 Main Challenges

- The phenomenon of corruption in Iraq is one of the most intractable problems that successive governments have faced for more than two decades. This phenomenon arose as a result of the upheaval in the political system based on conflict and partisan argument, which casts a shadow over all dossiers, including the water dossier.
- Increasing demand for water as a result of population growth at high rates, which requires serious planning for the country's water future, offset by a decrease in community awareness in dealing with water resources.
- The lack of accurate and transparent digital information regarding water and its uses, which makes it difficult for any reform or regulatory project by providing sufficient financial resources or imposing certain fees.
- Weak legislative structures and the implementation of decisions issued related to water and the environment to take into consideration the developments taking place at the various global, regional and local levels.

Central Iraq

- The ineffectiveness of the Supreme Water Council in its current form as a result of the lack of its legal and legislative form, as well as the difficulty of gathering members at one table, especially since they have other governmental obligations, and the Council is not represented by all stakeholders, for example, there is no representation of civil society organizations.

4.3 Recommendations

- Starting the legislation of the Supreme Water Council as an independent body to which members belong to all stakeholders and is directly linked to the highest executive body and its decisions are binding on all ministries and government institutions to ensure the centrality, diversity and effectiveness of the decision making related to the water dossier.
- Determining the tasks of all government institutions and stakeholders in the water dossier, including the powers and tasks of local governments.
- Dealing with the water dossier as a sensitive national dossier that falls within the scope of national security and considering it a priority.
- Cooperating with international organizations to formulate public policies and the method of negotiating over shared water sources, to bring points of view closer and to benefit from them as mediators.
- Reconsidering some constitutional loopholes related to the water dossier, particularly the controversial articles 110 and 114, by clarifying the absolute responsibility regarding the water dossier.
- Introducing the concept of water quality as well as its quantity in the context of distributing water resources among stakeholders.
- Adopting a general policy for harvesting groundwater that takes into consideration its sustainability as an important water source that supports surface water, especially during periods of drought.

Central Iraq

5 Water and the Management Sector

5.1 Current Situation

Water administration is carried out through the Ministry of Water Resources and implemented by the National Centre for Water Resources Management, where the shares are distributed to the governorates through the public authority to operate irrigation and drainage projects in cooperation with the public authority for dams and reservoirs. A full understanding of water management and the achievement of national and local demands needs periodic monitoring and follow-up. It also requires cooperation with universities and research centres to provide studies and research on an ongoing basis, in addition to the competencies available at the Ministry of Water Resources and the availability of data. As a result of the absence or reluctance of financial allocations, and dumping water from the sewage and draining systems directly into rivers without treatment is one of the most prominent characteristics of poor management.

5.2 Main Challenges

- The fluctuation of Iraq's water returns directly affects the water management dossier, especially in the dry seasons, where water returns reach half or a third of what it was in the previous decades during the eighties of the last century.
- The lack of sufficient funds to complete important infrastructure projects in the water sector, in addition to the delay in the completion of joint research, which led to the accumulation of a large number of uncompleted projects, either fully or partially, this accumulates over time to become a very complex problem.
- Abuses of water quotas between governorates and even within the same governorate by influential people and random drilling of wells and their direct impact on water reservoirs and their depletion.
- Due to the lack of approval of the Social Security Law, in addition to the security situation, this caused a shortage of cadres and capabilities required for management, not to mention the need to develop local cadres and build their capabilities to manage the water dossier.
- Lack of transparency in the provision of information by various departments to universities to support the scientific efforts.

Central Iraq

5.3 Recommendations

- Continuing governmental pressure on the upstream countries to reach a fair agreement to provide adequate water quotas and to use the wetland dossier as a pressure card (example is the World Heritage Convention on the Marshes of 2016).
- Allocating sufficient funds to implement lagging and strategic projects and to complete research related to the water sector.
- Implementing special laws that prevent and limit abuses of water quotas, especially within the governorates, limit the domination of influential people, and stop the random draining of wells.
- Activating water user associations to engage in dialogue and benefit from the experiences of others in water distributions.
- Facilitating the tasks of obtaining data by all concerned parties to cooperate in developing the research sector related to the water dossier.
- Rational use of water and the development of community awareness through the management of campaigns to raise awareness on this important dossier.
- Sustaining and maintaining irrigation projects on a continuous and periodic basis with the dredging of the Tigris and Euphrates rivers, and the commitment of the owners of industrial and governmental private projects, especially hospitals, not to throw heavy water and waste into rivers.
- Obliging the Ministry of Oil and oil licensing companies to work with national and international standards through their work throughout Iraq to preserve surface and groundwater.

Central Iraq

6 Water and the Technology Sector

6.1 Current Situation

There are monitoring systems for surface water quality and quantity and for monitoring groundwater, in addition to control systems for water flows with desalination systems, for example, in the province of Baghdad, the number of stations is 13 stations on the Tigris River (Al-Muthta Bridge - Diyala), there are also the Houran and Al-Rutbah dams in the west, as well as the eastern borders in Badra, but there is no water harvesting in home systems, and there are no industrial feeding systems, with the lack of water desalination systems and in limited areas. The volume of renewable groundwater resources is estimated at about 4.8 billion cubic meters, but there are not enough treatment plants, as there are only 40 plants distributed in central and southern Iraq. Iraq has sufficient dams and a storage capacity of approximately 150 billion cubic meters, but there are no smart technologies in homes, factories and the agriculture sector, also the power stations available on dams do not give more than 5% of hydroelectric power, this is the use of closed-pipe irrigation techniques on a small scale in the field of agriculture, as in Karbala, where this technology provides 40% of the water.

6.2 Main Challenges

- Weak infrastructure of water distributing networks, as most of them are open and cause waste that occurs as a result of evaporation.
- The absence of systems or networks to benefit from rain water to feed surface and ground water.
- Lack of updating data and dealing with advanced technology to monitor and analyse that data with a lack of customizations targeting implemented projects.
- Weak international joint cooperation to transfer and learn technology and benefit from global experiences.
- Lack of financial allocations to different sectors such as treatment, desalination and control plants.

Central Iraq

6.3 Recommendations

- Using modern techniques to increase irrigation efficiency by treating wastewater and sewage water before dumping them into rivers.
- Allocating sufficient budgets for applied research and to support solid research and patents.
- Reducing the pressure on surface water used in energy production through the work of desalination systems for saline water.
- The possibility of re-updating the infrastructure related to water and agriculture and using remote monitoring techniques.
- Applying the concept of water footprint and relying on it in formulating water management and agriculture policy.
- Urging and committing water polluting companies to follow modern technology in the use and treatment of water in their various activities.
- Spreading technological awareness, especially in agricultural, industrial and domestic uses.
- Maintaining dams periodically and using remote monitoring methods to assess the situation of the dam.

Southern Iraq

1 Water and the Environmental Sector

1.1 Current Situation

The total water revenue reaching the far south in Iraq, represented by Basra Governorate, is about 90 to 95 cubic meters per second. It is considered a suitable water share to push the salt tongue coming from the Arabian Gulf and to prepare liquefaction stations with water suitable for human use, as well as providing oil companies with water portions to contribute to the development of oil fields and increase oil production in addition to securing water quotas for agriculture.

The environmental situation in general is deteriorating in southern Iraq and continues to deteriorate as a result of increasing gas emissions, specifically carbon dioxide, and the work of oil companies, in addition to the significant increase in water salinity over the past two decades, as well as the rise in temperatures and the increase of the phenomenon of desertification and the lack of vegetation.

The decrease in groundwater levels is a clear phenomenon during the last decade, as the depth of water connection and drilling of water wells has changed and decreased threefold from 15 meters to 45 meters today, in addition to the deterioration of the water quality in general and the rise of its salinity, as it turns out that there is a clear depletion of the groundwater aquifer. The number of drilled wells increased for the two years between 2000 and 2019, jumping from 2000 wells to 7000 wells.

The climatic situation in southern Iraq was characterized by a shift from a dry climate to a desert climate, where heat waves increased by 40%, dust waves by 30%, and rainfall decreased by 40-50%, and the population density, specifically in the city of Basra, increased significantly as a result of migration and displacement to the city from the southern governorates mostly due to water scarcity and economic deterioration.

Southern Iraq

1.2 Main Challenges

- Climate change is one of the first challenges faced by southern Iraq, as the rate of desertification has reached 250 square kilometres per year, and drought conditions have increased by 30%, in addition to the sharp rise in temperatures by 4-5 degrees Celsius difference from the general average, and the phenomenon of Internal displacement, as about 100,000 to 150,000 people migrate annually from the countryside to the cities for reasons related to water scarcity, environmental degradation and climate change.
- Significant increase in pollution rates from several sources, including industrial liquid waste, sewage and sewage water leaking directly into the tributaries and streams of the Shatt al-Arab without treatment, in addition to agricultural drainage water and the penetration of the salt tongue into the Shatt al-Arab. As a result, the rate of concentrations of dissolved salts has increased ten times more than it was in the seventies of the last century, offset by a sharp rise in bacterial pollution from bacteria, parasites and viruses, in addition to chemical pollution from heavy metals such as arsenic, as well as physical pollution represented by increasing the turbidity of water, sediments and plankton and the increase of water temperatures.

1.3 Recommendations

- Ensuring the water share at a rate of 90 cubic meters per second from behind the Nazim Qala'at Saleh in southern Iraq.
- Treatment and management of solid and liquid waste and its recycling.
- Adopting advanced means and methods for irrigation systems and using modern technologies such as drip irrigation, closed irrigation and sprinkler irrigation.
- Establishing wastewater projects strategically to reduce pollutants in Shatt al-Arab.
- Using filters to reduce gas emissions contributing to the increase in global warming.
- Establishing a green belt to reduce desertification.
- Reducing dependence on fossil fuels and encouraging renewable and alternative energy sources.
- Adopting an early environmental awareness program to confront the crises of water scarcity and pollution.

2 Water and the Economic Sector

2.1 Current Situation

The current rate of water discharge to southern Iraq, specifically the Shatt al-Arab through the Regulator of Qala'a Salih, is about 90 cubic meters per second, and this share is distributed as follows: 40-50% of it goes to the sea in order to block the saline tongue, 10% to the oil fields to develop production and via water injection to oil wells, 20% of which goes to the agricultural sector, and the remaining 20% goes to other sectors. To clarify the extent of the economic damage caused by water scarcity, all earthen fish farms have been completely halted since 2010, while operational floating fish cages are estimated at about 3% only, as there are only 11 floating farms out of 380 farms. As for the date palm sector, the fatalities in newly planted date palms range from 75% to 100% in southern Iraq, where the number of palm trees fell dramatically from 13 million palm trees in the fifties of the last century to two million palm trees only in 2017. Also, the grain production sector, specifically Wheat has decreased its cultivated areas during ten years by 50% from 65350 dunums in 2008 to 30,128 in 2018. As a result, the percentage of workers in the agricultural sector has decreased by nearly half of the total population, as it constituted 60% of the population in the fifties of the last century to become Now 30% in 2009. There is also a significant deterioration in the irrigation and drainage system that depends on the tidal phenomenon, in addition to the noticeable increase in saline concentrations, which caused large areas of agricultural land to go out of service, which caused a social shift towards the migration of the agricultural sector and orchards and converting them into Residential lands.

Southern Iraq

2.2 Main Challenges

- Decreased water intake from the regulator of Qalaat Saleh and cutting off most of the water supply sources of the Shatt al-Arab (the Euphrates, Karkheh and Karun).
- Diversity of sources of pollution in the riverbed from agricultural and industrial pollutants and the penetration of the salt tongue into the Shatt al-Arab.
- Increasing population growth (4.7 million people).
- The deterioration of the agricultural sector, both its plant and animal sectors.
- The impact of the marshes as an important economic source as a result of the deterioration of the water sector, both qualitatively and quantitatively
- The expansion of oil companies and the exploitation of most of the productive agricultural areas, which exacerbated the problems of desertification and increased pressure on arable lands.
- The poor quality of the water distribution network and the large number of violations on the network, as well as the lack of financial revenues generated from tax collection.
- The large number of diseases related to the deterioration of water quality (more than 120 thousand injuries were recorded in 2018 during several days of deteriorating water quality) and the absence of economic statistics on the cost of treatment for these cases and the modernization of the water distribution network.
- The presence of a large number of sunken shipwrecks in the Shatt al-Arab and the absence of river dredging programs.
- Poor management of the water dossier and the lack of clear visions of the local government for the water file, in addition to weak coordination and cooperation between the relevant departments, which costs successive governments a lot of effort and resources and stumbles projects without reaching effective productivity.
- The lack of a monitoring program for the quality and quantity of water covering the entire course of the river.
- Lack of awareness among the general public and the absence of real awareness programs to guide water consumption in all sectors.

Southern Iraq

2.3 Recommendations

- Increasing water discharge by no less than 100 cubic meters per second, working to raise all sources of pollution entering the Shatt al-Arab, providing sufficient water quotas to ensure the economic and environmental recovery of the marshes, and negotiating an increase in water expenditures from external sources, especially the Karun River.
- Increasing awareness about family planning and birth control programs as much as possible.
- Develop a comprehensive plan to develop the agricultural sector, implement advanced irrigation and reclamation projects, and use modern technologies for agriculture to reduce the cost of crops on the one hand and reduce the water consumption on the other.
- Approval of the law of agricultural - oil coexistence to create environmental sustainability as well as to revive the agricultural economy.
- Working to improve and develop distribution networks and liquefaction stations, while setting up an electronic collection program to ensure an increase in financial revenues to cover the costs of water processing.
- Increasing health control over water supply sources and monitoring of resources that are depleted as a result of dealing with cases of diseases and water poisoning.
- Paying attention and care to the river on a regular bases, removing sunken shipwrecks, and cleaning the banks from waste and debris, in cooperation with civil society organizations and the private sector.
- Coordination and cooperation with the governorates in southern Iraq and the relevant departments to improve the water management dossier and avoid the waste of time, effort and resources caused by the lack of coordination.
- Working on the implementation of an environmental monitoring project that includes stations along the course of the rivers, with the establishment of monitoring stations to monitor the quality and quantity of water.
- It is necessary to complete the studies related to the idea of establishing the organizational dam to be built on the Shatt Al-Arab to ensure its efficiency and to ensure that resources are not wasted with actions that may be useless.

3 Water and the Sociocultural Sector

3.1 Current Situation

The water scarcity phenomenon affects the reduction of agricultural activity and contributes later to commercial stagnation, the lack of domestic product and the failure of industries, which led to problems and social repercussions such as migration and abandonment of agricultural lands. Governments and the policies followed by them and inequality, which makes the citizen not feel that he belongs to the place or environment in which he lives. There is also bacterial contamination of water with a rate of 60%, where no less than 131,000 injuries were recorded, in addition to those that were not registered, causing poisoning, rashes and allergies. The loss of trust between citizens and governments led to protests and clashes that ended with burning of government offices and killing many citizens.

Tribal disputes over water sources are increasing, lack of awareness, uncontrolled weapons, violations on rivers and irrigation canals, in addition to the dumping of waste and debris in rivers and sewage systems, which is a prominent characteristic in society, and it has led to the complexity of the water dossier and its intractable overlap. This is accompanied by a lack of institutional awareness in hospitals, universities, factories and ships that throw waste directly into the river, in addition to the lack of enforcement of laws. The totality of those factors that are directly or indirectly related to the issue of water and society have had a negative impact on changing and managing societal behavior, as well as the increase in crime rates, suicide, drug abuse, domestic violence, school evasion, and the increase in the phenomenon of beggary and migration.

Southern Iraq

3.2 Main Challenges

- The exacerbation of conflicts between governorates, regions, and even tribal disputes over water, at an estimated rate of 20% during the last ten years, and that the lack of law enforcement has caused security chaos and politicized quotas and nepotism and led to immigration. The emergence of these local and tribal conflicts due to water scarcity during the recent times will further drive the destabilization of the community and the disruption of the societal structure.
- The increasing pace of popular protests as a result of poor services, specifically the water issue, which led to a security chaos, as a result of which many citizens were killed and others were displaced and threatened, which exacerbated the number of widows and orphans and caused a major problem in the psychological security of society, with the absence of freedom of opinion and violations of human rights.
- Poor management of resources in general and water resources in particular is also an important indicator that casts a shadow on the societal structure through weak cooperation with civil society organizations, lack of institutional awareness of governmental officials as well, weak efficiency and lack of proper and strategic planning, especially with regard to crisis management, as well as the overlap of powers of decision-making circles and the lack of transparency and access to information.

3.3 Recommendations

- Developing and encouraging societal and institutional awareness by raising awareness among citizens through direct guidance programs in the media, education or cultural seminars, using educational brochures, electronic screens and social media networks (especially through cooperation with influential people in this medium).
- Increasing awareness of the employees of government institutions regarding the use of water and the methods of optimal consumption of water at work and at home through a specialized awareness program targeting these institutions to develop the concept of rationalization of water resources.

Southern Iraq

- Integration of guidance and awareness through a special program of religious guidance in mosques, churches and places of worship and investing in these places to increase the circle of societal influence and reach the largest number of citizens and raise their awareness of the importance of rationalizing water consumption.
- Creating educational curricula and educational materials starting from kindergarten to the highest levels of higher education. Announcing a special water day in Iraq, similar to the World Water Day, which falls on March 22 of each year.
- Activating joint cooperation between civil society organizations and government institutions and benefiting from those local and international organizations to help local governments spread the culture of dealing with water resources and to show the seriousness of this dossier and the repercussions of water scarcity on various sectors. Where it is possible to encourage volunteering and create special platforms for voluntary campaigns in the protection of the environment and water and the monitoring, reporting and monitoring of violations.
- Harnessing dramatic and cinematic work on the issue of the societal repercussions of water scarcity and instilling the concept of national and moral responsibility in protecting water resources to change behaviours towards this dossier, reminding the public of the laws and rationalizing water consumption through cinematic or social characters that have a positive impact on society. In addition to harnessing the audio-visual media towards the seriousness of this vital dossier. One of the most important awareness-raising goals is to increase trust between citizens and government institutions.
- Imposing legislative and executive laws in addition to an amendment to the Environmental Protection and Improvement Law No. 27 of 2009 regarding penalties for perpetrators of harm, as these laws must be linked to incentives as well as penalties, which would motivate the citizen to cooperate. Local fines and fees are introduced for violations and abuses on the water network and rivers It is matched by the reward system by the local government for those who conserve water or support campaigns to protect and rationalize water consumption.
- Establishing academic institutions specialized in water affairs (a technical institute, an educational centres, or a college specializing in this aspect). These institutions work to provide solid studies and technical consultations in the field of water, in addition to conducting workshops and conferences specialized in this aspect.

4 Water and the Governmental Sector

4.1 Current Situation

The policies followed in water management by the central government suffer from a set of problems and obstacles, as there is an overlap and interference in decision-making regarding the water dossier between the central authorities, local authorities and the institutions concerned with this to the extent that it creates confusion in providing the actual need for water resources and their fair distribution. Weakness in the diplomacy of the Iraqi water dossier with neighbouring riparian countries, and the weakness of the Iraqi negotiator in particular, this is evident through the decrease in water revenues from the source and the cutting off of the tributaries that flow into the Tigris and Euphrates basins. There is also a deficit in water governance at the governorate level, and local disputes have emerged as a consequence, also water quota between governorates and the failure to diagnose or assess each governorate's need for water allocated to different sectors. In addition to the lack of use of governance techniques in managing the water dossier, as well as the lack of accuracy and realism in establishing water policies at the national, regional and local levels. In addition to the lack of clarity on the political map of decision-makers, which makes it difficult to adopt any water governance project.

4.2 Main Challenges

- Lack of participation of decision makers related to the water file and the non-inclusion of the opinion of the masses and civil society organizations in assessing the water situation, identifying emergency problems, decision-making and crisis management.
- The central political decision controls the management of the water dossier, sometimes without taking into account the local requirements and perspectives.
- The political decision related to the management of the water dossier is subject to the political mood and the technical opinion is not taken into account in making the appropriate decisions.

- Lack of trust-building between the local central authorities concerned with the water dossier, as it is noticed that decisions are issued that do not take into account local requirements and the existence of a kind of central hegemony over the local decision, and the local decision may sometimes be adopted by the central authority.
- The cooperation between the riparian countries and Iraq is very important in enhancing the water resources in Iraq, but the cooperation in this field decreases with the passing of time, offset by an increase in water scarcity for the region as a whole.
- Reducing the possibilities of negotiating water imports with the riparian countries and Iraq, which highlights the need to adopt a more mature foreign strategy and new standards to enhance the demand for rights from Iraq's water imports.
- Activating laws and legislations to prevent violations on the ground, removing them completely, and developing a motivational system that is not based on punishments only, but also to rewards.

4.3 Recommendations

- Adopting the concept of digital governance in managing the water dossier at all levels, especially in assessing the water need for each sector and each region, by creating a dynamic model that changes with time and requirements. And the introduction and adoption of governance and its concepts in the management of water resources between the centre and the governorates.
- Developing the political decision on the technical, economic and social bases to avoid any expected problems in the future and reduce the risk margin. In addition to strengthening the diplomatic role in negotiating the water dossier and involving professionals and experts with the negotiating committees.
- The possibility of adopting the principle of bartering with neighbouring countries to obtain water in exchange for commercial goods that consume large quantities of water and the exchange of internal benefits between the Iraqi governorates in this context.

5 Water and the Management Sector

5.1 Current Situation

The delivery of raw water to the governorates in specific quantities is the task of the Federal Ministry of Water Resources, while the delivery of drinking water to the local water network is the task of the Water Department of the Ministry of Public Works. In general, we have local competencies that have a sufficient understanding of national and local requirements, and there is water quality control through conducting tests, whether for raw or liquefied water. Universities and research centres are among the practical bodies supporting the executive and supervisory bodies through the studies and research presented. The institutions concerned with water management discuss data and recommendations on a daily, weekly, bi-monthly and monthly basis, and communicate with many relevant departments. The Ministry of Natural Resources, with its representative departments in the governorates of southern Iraq, is based on studying water sustainability and putting it into practice. The current strategies used to manage the water crisis are summarized as follows: Transforming the Bid'a canal into a tube channel, implementing a trough east of the Tigris, treating erosion in the Shatt al-Arab (Kut, Akab, Al-Makhrak) and maintaining the embankment of 35 km at a cost of 11 billion Iraqi dinars, maintenance of the border dam with a length of 40 km, study of providing water for the central marshes and linking them to hammar marsh through the siphon across the Shatt al-Arab. Despite all of the above, the management of the water dossier needs to be developed and reconsidered, especially with the accompanying water crisis in 2018, which caused political unrest, which occurred as a result of the lack of fresh water releases, they were estimated at less than 50 cubic meters per second in the centre of the city of Basra. Southern Iraq, which caused the penetration of the salt tongue by no less than 1440 cubic meters per second, accompanied by high temperatures, which caused an increase in salts and pollutants and the occurrence of a health crisis.

Southern Iraq

5.2 Main Challenges

- Climate changes and its negative reflections on the water situation in the governorates of southern Iraq in the agricultural, industrial, health and other uses.
- Lack of government development programs for local cadres, which need to update their information and keep pace with modern and internationally adopted technologies.
- Failure to provide the necessary allocations by the government to implement strategic projects in the water sector.
- Weak public awareness of the citizen regarding the importance of water and rationalizing its consumption in various fields.
- Encroachments on water networks, rivers, and rain water networks, and transforming them into heavy water.
- The phenomenon of migration from the countryside to the cities, which causes population pressure in the city centres, which consequently causes enormous pressure on the water supply networks, despite their limitations.
- The water policies of the riparian neighbouring countries, which negatively affect the water reality of Iraq in general and southern Iraq in particular as a final estuary.

5.3 Recommendations

- Managing the water dossier should be in the hands of the highest authority in the country in order to work diplomatically and negotiate with the riparian countries to ensure Iraq's water share and the south in particular.
- Exerting serious efforts to ensure an adequate water quota for each governorate (for example, Basra governorate needs 90 to 100 cubic meters per second).

Southern Iraq

- Working to launch financial allocations for infrastructure projects and for the water sector.
- Focusing on raising citizens' awareness of the importance of water through the development of special awareness programs in the field of water.
- Working to activate the role of the Ministry of Foreign Affairs in drawing up its foreign policies with the riparian countries with regard to Iraq and activating the laws and legislations that pertain to the water sector.
- Working on projects to reclaim agriculture and the marshes by providing job opportunities for the residents of those areas, which will have a positive impact on the community.
- Working on creating a map of the population's water consumption in the governorate for the purpose of determining priority in emergency situations. And a regional population map of water consumption in the governorate to be an effective tool for establishing projects.
- Creating a central database in which all concerned departments participate and creating advanced predictive programs to be used as an early warning of the occurrence of the crisis.
- Carrying out a comprehensive national program to train local capacities in government institutions in the water management file, and whether this program includes training at several levels of technicians, technical experts, administrators and decision-makers.

6 Water and the Technology Sector

6.1 Current Situation

Iraq generally lacks modern technological methods in managing its water resources, whether surface or underground, especially in the context of water harvesting and artificial feeding. closed docks. Also, the poor use of technology causes waste in drinking water, sewage and industrial water, which are discharged directly into the river without treatment, causing water pollution. In addition to that, the greatest waste lies in the traditional methods used in the agricultural sector, where it is noted that approximately 12 cubic meter per second is provided for an area of 25 dunums when using laser levelling in the process of preparing land compared to traditional methods.

6.2 Main Challenges

- There is a large waste in the already limited water resources in the main sectors: agriculture, oil extraction and industry, with almost complete absence of the use of modern technology for reducing water consumption.
- Lack of budget allocations to scientific research in the field of developing water treatment technologies, modern irrigation methods and domestic consumption, as there is no adoption of scientific research products by the responsible authorities.
- The pattern of natural irrigation operations has changed depending on the ebb and flow as a result of the pollution and salinization of the Shatt al-Arab waters, and there is no support from government institutions for modern technologies, especially in the field of agriculture.
- Not using electronic systems in the internationally adopted tax collection programs. Poor efficiency of sewage networks and treatment plants, which causes a huge waste in this source of water, which can be a great opportunity for recycling.
- Lack of agricultural guidance in persuading farmers, developing their skills and changing their behaviour to follow modern methods, an example of which is the lack of use of modern technologies in the field of fish farming.
- Weakness of the electronic control aspect and the limitations of laboratories and testing devices for water quality.

Southern Iraq

- There is no real direction to adopt the use of alternative energy sources (sun, wind, tides).
- Not adopting a clear plan to encourage the cultivation of crops that tolerate high salt concentrations, such as palm trees.

6.3 Recommendations

- Focusing on the use, application and imposition of modern methods, specifically for the agricultural sector, which is the largest consumer of water by following modern non-traditional irrigation methods and in another way to regulate water rations through the adoption of electronic operating systems for water taps, whether in homes, hotels or state institutions.
- Providing an appropriate budget to support scientific research in the field of water technology, ways of managing and treating water, and reducing its consumption. The responsible authorities should adopt modern scientific ideas resulting from the outputs of scientific research in universities and research centres regarding water. In addition to intensifying research efforts to adopt alternative renewable energy projects, using advanced technology in this field, in addition to using seawater desalination techniques.
- Adopting a fair electronic collection system to obtain water imports and cover operational expenses for water supply and sewage treatment.
- Focusing on infrastructure projects in the field of sewage stations or networks, as well as improving water distribution networks and relying on modern equipment and technologies to monitor and repair cracks in underground networks in order to achieve accuracy and speed of completion and reducing resource consumption.
- The necessity of adopting modern methods of awareness based on technology to educate the community and stakeholders on the necessity of rationalizing water consumption, and providing agricultural cadres with modern scientific techniques and raising the skills of working cadres to encourage farmers and urge them to use modern irrigation methods.
- Establishing a sophisticated and integrated monitoring system for surface and ground water resources.

  Implementation of a forecast program for the water situation to develop long-term strategic plans to manage the water dossier.

Attachment

Stakeholder map for the whole of Iraq and the developed Kurdistan Regional Government.