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## Reviewing some water resources management strategies (Globally, Arabic, local)

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### Abstract:

The issue of water has taken a large place in the writings of researchers and decision-makers at global, Arab and local levels, especially in arid and semi-arid regions for many reasons. Water resources, especially those shared by more than one country, are also a source of conflict and tension between countries and will constitute the arena of future conflict under the name of (water war). There are many international studies concerned with the strategic management of water resources, and each study took a specific aspect according to the priority that researchers see in diagnosing the problem, which confirms the existence of a water crisis at the global level. Researchers have differed in presenting strategies for managing water resources, some of them gave priority to the stakeholders in solving the problem, while others focused on environmental analysis, still, some indicated the importance of strict internal management, and others found that the legal and political axis is the most important in strategies. In Iraq, the water problem is complex. It consists of all the previous axes, and this requires formulating a strategy based on an accurate analysis of these factors to come up with a strategic choice commensurate with the size of these challenges to address this serious crisis. Therefore, our choice of international, Arab and local studies similar to the case of Iraq will contribute to clarifying the proposed strategy to shorten the effort and time; this is done by analysing the strategies in question to benefit from them in drawing the features of Iraqi strategy.

**Research type:** Literature review

**Keywords:** Strategic Management, Integrated water resources management, Water shortage, Water poverty, Riparian countries.

### **1.Introduction:**

Managing water resources from a strategic perspective is not an easy task, as it is one of the biggest problems facing the world today. Water is the most vital element that governs the existence of humans and living organisms on the surface of the earth. In addition to its connection to health, social, economic, environmental, and even political factors for individuals and communities as a whole, the water crisis that is sweeping the world and its devastating effects on populations cannot be ignored. It is observed that one-fifth of the world's population does not have access to clean drinking water, and half of the world's population does not have proper sanitation systems. Moreover, potable water is not available in developing countries. All of this is a natural result of the increase in population and the increased demand for water, food, and energy in domestic, agricultural, and industrial sectors, as well as the direct impact of climate factors on water quantity. There is also competition among coastal countries to monopolize water shares in source countries through massive irrigation projects that contradict international norms and traditions by guaranteeing fair shares for riparian countries in shared international rivers. Iraq is one of the countries facing this problem for decades, and it is expected to continue in the coming years in the absence of a successful strategic management that includes the development and proper management of available water resources. Therefore, research paths will take multiple and diverse dimensions, forming a broad platform that cannot ignore any axis related to the above research topic. The water problem lies in the imbalance between available water resources and the increasing demand for them, and this persistent deficit in the water balance hinders development. That is why the water file occupies a significant place in the strategic orientations of countries, considering it a cornerstone in ensuring their future, especially since many political orientations and relevant expectations indicate that the water file will be the arena for future conflicts under conditions of scarcity and increased needs. Therefore, we will shed light here on the analysis of some strategies that have dealt with water resource management (Globally, Arabic, and Local) to provide a clear picture of the landmarks that can be used as a starting point towards studying the strategic management approach for water resources in Iraq. This approach should be characterized by flexibility and keeping up with modernity, considering the shift from abundance to scarcity of water. The analysis of these studies and highlighting their key points regarding information interconnectivity will be conducted within a sequential framework.

### **2.Material and Methods :**

The methodology employed in this study is the analytical approach, which is one of the specialized methods used to detail scientific studies and research. It aims to clarify ambiguities about phenomena or problems to confront reality, according to the types of scientific research, to contribute to task organization, identify causes, and achieve the intended results. Typically, a single method is not relied upon in scientific research. Researchers seek to maximize the benefits by using these methods, addressing the negatives and highlighting the positives. This approach is based on dividing or disaggregating research problems into their primary elements, facilitating the researcher's accurate and convenient diagnosis of the problem and identifying the factors that led to its emergence. The analytical approach directly or indirectly intersects with the descriptive approach. The descriptive approach focuses on adopting a specific phenomenon, and formulating relevant axes in the form of research or inquiry questions. The analytical approach complements it to achieve more accurate results. It relies on fragmentation, division, evaluation, and deep interpretation of the problem throughout the research process. In other words, the foundations of the analytical approach complement the procedures of the descriptive approach. Regarding the principles of the analytical approach, they can be summarized in three axes:  
**1-Disaggregation or decomposition:** through extensive explanation in the study, with some interpretations, to identify the main causes.

**2-Critique:** closely related to the existence of previous studies to evaluate them in a correct scientific manner.

**3-Conclusion:** represents the synthesis of concepts and results, in other words, deduction, whether it is deduced entirely or partially.

The analytical approach focuses on the fragmentation and detailed details to convince the reader of the main orientations of the research, adopting the principle of objectivity. Here, it is considered one of the components of structured research and is commonly used in management, philosophy, administration, sociology, and psychology research.

### **3.Literature review**

When choosing to analyse some previous studies on water resources management strategies, will contribute to greater flexibility in dealing with this issue, as well as gaining experience and reducing effort, time, and costs in the solutions, especially in studies similar to the Iraqi context that include management of rivers and coastal waters involving multiple countries. Consequently, it will open a wide window from which to embark on water resource management strategically and in line with the rapidly changing and uncertain environment. Here, the previous literature will be presented gradually, as we will start with global studies, then Arabic, and then local studies, taking into account their chronological progression. The field of benefit in the analysis of the studies under research will be very large and will help to draw the features of the proposed appropriate strategy for the management of Water Resources in Iraq.

The choice of strategic management in water resource management lies in its ability to set goals and objectives and determine the appropriate direction in an environment characterized by complexity and high dynamics. It also involves continuous monitoring and evaluation, optimal resource allocation, and support for strategic thinking for decision-makers. Moreover, it provides opportunities for participation at all levels in the industry and in making future decisions that include the best available options (AL-Dawry, 2005). Strategic management will also help managers and employees gain a deeper understanding of developments and seize new opportunities through a comprehensive and unified perspective. It will enhance work methods, performance standards, and in-depth analysis of the internal and external environment (Al-Anzi et al., 2014).

Global, Arab and local literature covered strategic management phases beginning with a strategic analysis representing follow-up and analysis of variables in the internal and external environment, highlighting their importance in shaping the future and contributing to strategic plans and alternatives (Mohammed Ali, 2010). Formulate a strategy that is interested in defining the organization's mission, objectives and strategic options (Al-Kubaisi and Al-Jubouri, 2021). The implementation phase of the strategy, the so-called work phase of the strategic management process, focuses on the implementation of planned activities and projects to maintain the Organization's competitive position for development and growth (Al Naimi, 2021). The strategic evaluation process is therefore one of the final stages of strategic management and one of the key and important steps to be taken after the implementation of all stages of the strategic management process ( Al-Kubaisi and Hamid, 2018). The evaluation of strategic performance is reflected in the effectiveness of the Organization's achievement of strategic objectives and plans to make appropriate decisions to address weaknesses and aspects of support (Maktou and Abd AL-Hassan, 2022). The strategic leadership of decision-makers is a product of strategic management and not a substitute for it, as it represents the organizations' transition from their current realities to the desire to achieve what decision makers wish to achieve (Said and Abbas, 2017).

### **3.1 Global Literature review:**

There is many of global literature on strategic water resources management, some of which will be reviewed in chronological order by my agencies:

Gohari et al. (2017) focused on the possible scenario based on external factors and their impacts on the challenges that the Zayandeh-Rud River Basin in Iran will face, including non-uniform temperature increases over time and reduced rainfall, which will decrease water supplies by mid-century. With the expected increase in spring temperatures and decreased winter precipitation, the study used an analytical system model to analyze adaptation strategies while considering feedback between water resource development and the sub-systems of biophysical, social, and economic aspects. The results indicate that infrastructure improvements, strict water demand management (e.g., replacing high-water-demand crops like rice, corn, and alfalfa with less water-consuming crops), prioritizing regulatory measures based on the ecological system, complemented by increased supply, can temporarily alleviate water stress in the basin.

Myrzahmetove et al. (2018) defined the concept and presents some proposals for implementing an integrated water resources management strategy for the Republic of Kazakhstan. It emphasizes achieving a qualitatively new state for the water sector, the main components of the current state water policy, the key mechanisms for its implementation, and the implementation stages. The study mentions that optimal solutions to water problems in Kazakhstan can only be achieved through the application of integrated water resources management principles, ensuring the unity of development, utilization, and protection within a framework of fair and equitable access to water. Integrated water resources management is a process that enhances the development and coordinated management of water, land, and other resources to achieve maximum social and economic well-being based on fairness without compromising the resilience of ecological systems. Integrated water resources management plans and efficient water use are considered the starting point for sustainable development. Implementing an integrated water resources management plan and ensuring water efficiency will guarantee the long-term water policy of the state to protect the legitimate rights and interests of citizens and economic entities, ensuring water security for the country. ----Yan et al. (2018) focused on the challenges posed by climate change and socio-economic development that will affect the availability and use of water in the Pearl River Basin in China (the third largest river in the country). This can lead to conflicts over water resources among water users and cause water scarcity during dry seasons. To assess this, researchers analysed and explored four different water allocation strategies. These water allocation strategies prioritize water use at the source, the use of Pearl River Delta water, irrigation water use, and industrial water use, respectively. The impact of the four strategies on water use and relevant economic output was evaluated under different scenarios of water availability and use. The study realistically showed that almost all areas in the river will face water scarcity under the four strategies, with increasing water demand contributing significantly to the shortage. However, all four water allocation strategies are insufficient to solve water scarcity in this river. The economic losses vary among the four water allocation strategies, necessitating continuous improvement of the strategies throughout the research.

Water competition exists not only between upstream and downstream regions but also among different water use sectors. The two main sectors of water use in the river are irrigation and industry. The novelty of this study lies in presenting an approach to integrating water supply and use management in a changing and complex environment. Adapting to future water scarcity requires considering both supply and use. By assessing the combined impacts of climate change and socio-economic development on water supply and use and identifying water allocation strategies to mitigate the intensity of competition over limited water resources. Additionally, regional scenarios will provide a useful tool that operates across different disciplines and various sectors of society, integrating different spatial and temporal scales. The results show that future water use will be much higher than water supplies through widespread increases. The expansion

and development of irrigation and industrial projects in the upstream areas will affect water revenues for the downstream regions.

Regarding water scarcity in the municipality of Dili, Timor-Leste, Takeleb et al. (2020) clarified that several factors in the water system in Dili are responsible for the water scarcity issue in the city. Therefore, there is a need for strategic plans that can be used as guiding principles to improve the water system. The objective of this study was to formulate a strategic plan for water resource management in Dili. The process began by identifying external and internal factors. The quantitative Analytic Hierarchy Process (AHP) was used to weight the results in the input stage. Alternative strategies were formulated using a Strengths, Weaknesses, Opportunities, and Threats (SWOT) matrix, and the quantitative strategic planning matrix was used to select the prioritized strategy in the decision-making stage. Based on the results, a total of 13 internal factors and 13 external factors were identified, while five alternative strategies were formulated. Furthermore, the selected strategy for implementation was characterized by its ability to develop water resource management infrastructure in Dili, as well as improve the performance of the water supply system in meeting the water demand in urban areas.

Shen (2021) discussed the most stringent water resource management strategy, which emerged in the critical conditions experienced by China around 2008, mainly due to weak governance. The strategy aims to establish a modern system for water resource management by implementing three red lines for water resource management:

- The first red line involves developing water resources by implementing comprehensive control over usage volume.
- The second red line focuses on water use efficiency by controlling water waste.
- The third red line is about controlling pollution in water bodies.

Coelho et al. (2022) relied on international agencies, non-governmental organizations, technical experts, and academic circles, the necessity of supporting water resource planning and strategic environmental assessment with indicators that can be used to describe, evaluate, and monitor water resources against management goals was emphasized. In addition to using indicators to measure the performance of implemented actions and providing simple and useful information to stakeholders, the objective was to engage stakeholders in selecting key indicators to support water resource planning and strategic environmental assessment by adapting indicators to river basin areas in Portugal and using them in successive cycles of the planning process. The process included four main stages (collecting suitable indicators, examining and analysing them, stakeholder workshops, and producing outputs with a set of appropriate indicators). The researchers made an effort to select 35 key factors based on their relevance to the research scope, as perceived by stakeholders in a participatory workshop. The final analysis resulted in a set of factors organized into four dimensions: resources, socio-economic, governance, and risks. The study demonstrated realism by acknowledging that this set of key factors may not cover all the specific goals for all river basin areas.

Nalbandan et al. (2023) came up with a real problem of excessive water use, poor efficiency of modern irrigation, as well as the use of groundwater and the cultivation of crops with high water consumption, so they used a composite simulation approach using the SWAT model and the water footprint accounting program to ascertain the effects of activities used in water management and their effects on the sustainability of Water Resources. The study included the expansion of modern irrigation systems, the development of rain gardens, watershed management, and the elimination of the most water-consuming crops. The results showed that the efficiency of modern irrigation systems reduced water waste by 50%, and watershed management activities increased the storage of green water by 4%, which significantly affected the recharge of the aquifer, which is consistent with water management goals. Changing the pattern of water-intensive agriculture will improve its sustainability and conserve groundwater if the rebound effects are controlled. Thus, there will be water saving of

about 110 million m<sup>3</sup> with a change in some agricultural patterns, such as switching from rice cultivation to wheat cultivation in the studied Basin.

### **3.2 Arabic Literature review:**

There is many Arab literature dealt with the strategic management of water resources, some of which will be reviewed in chronological order by my agencies:

Ashour et al. (2009) revealed that the water resource system in Egypt consists of several components and systems that encompass social, economic, and environmental aspects. The study outlined the water resources in Egypt, including the Nile River, rainfall resources, groundwater, as well as the reuse of agricultural water and treated wastewater in agricultural activities. The study indicated that per capita water availability has decreased annually from an average of 1000 m<sup>3</sup> per year to less than 500 m<sup>3</sup> per year. According to international standards, this figure indicates water poverty and necessitates urgent action to address this negative occurrence and develop strategies to deal with it.

Al-Haddad (2015) highlighted the provision of an integrated framework for water resource management and subsequently benefiting from water availability. The researcher examined water resources and demand, along with the study of regional planning concepts and comprehensive water resource management within this framework. The study encompassed all aspects of water supply management and demand management, which can be applied as follows:

- 1- Techniques for managing water supply resources in the coastal region, such as rainwater harvesting, wastewater treatment, and desalination processes.
- 2- Effective techniques for managing water demand in the coastal region, including water pricing, water legislation, awareness building, capacity building and training, modern irrigation techniques, and virtual water.

The researcher chose this strategic approach for the study due to the traditional methods of water resource management in Syria, particularly in the coastal region. The traditional approach has primarily focused on supply management for a long period, followed by the adoption of demand management while neglecting supply management aspects. Many aspects of both supply and demand management have been overlooked. Additionally, significant attention has been given to dam construction, with insufficient emphasis on other supply management tools such as rainwater harvesting, desalination processes, expanding wastewater treatment, and neglecting renewable groundwater resources, especially those close to the sea. Furthermore, there are shortcomings in water legislation, which does not consider the specificity of water basins, the inadequate enforcement of existing legislation, the absence of programs to raise water awareness and apply modern techniques in water demand management, the provision of water to the agricultural sector at nearly no cost, rendering the current pricing tool ineffective in rationalizing water consumption. Moreover, the study highlighted the neglect of modern concepts, such as virtual water, which have been globally adopted.

Regarding the role of water accounting as an important tool in addressing water scarcity, Abu Talib (2019) discussed that Egypt is located in the Arab region, which is one of the most water-stressed areas in the world due to its desert nature. The Nile River represents the lifeline and the main source of water, where the available water quantity from the Nile River amounts to 55.5 billion cubic meters annually, representing 75% of the available water resources in Egypt. The challenges include population growth, industrial and agricultural expansion, increasing needs, anticipated impacts of the Ethiopian Renaissance Dam project and potential effects of climate change on water resources, such as variations in rainfall patterns and increased water demand, especially in the agricultural sector. All of these factors pose a real threat to Egypt's water resources. This is where the role of certain institutions comes into play. The Ministry of Water Resources and Irrigation, in collaboration with several international organizations, including the IHE Delft Institute for Water Education, the International Water Management Institute (IWMI), and the Food and Agriculture Organization of the United Nations (FAO), established a water accounting unit within the Ministry in 2019. The unit is responsible for

collecting water-related data, training staff on water accounting technologies, and utilizing them in water resource planning and policy-making under normal conditions and during drought situations. The objective is to improve water productivity and enhance its management efficiency. Therefore, the Ministry of Water Resources and Irrigation needed to take serious steps in establishing a dedicated unit for water accounting to identify the obstacles that hinder the achievement of the objectives of the water resources strategy, known as the "4Ts" strategy, which stands for improving water quality, rationalizing water use, developing water resources, and creating an enabling environment for integrated water resources management.

### **3.3 Local Literature review:**

There are many local literatures dealing with strategic water resources management, some of which will be reviewed in chronological order by my agencies:

Ali (2010) explained that there is a continuous water gap that increases with population growth and the loss of water, in addition to the uses of various agricultural, industrial, and service sectors, and the lack of utilization of modern irrigation techniques, resulting in significant water loss. On the other hand, there is a decreasing water supply due to water and economic policies of the upstream riparian countries, including large-scale irrigation projects aimed at controlling most of the river inflows. Consequently, there is a continuous decline in Iraq's water revenues. To address this problem, the researcher proposes a national strategy consisting of a package of administrative, technical, technological, economic, political, and legal policies at the local level and with neighboring countries in the upstream regions.

Fadel (2015) revealed a significant decrease in Iraq's water resources, along with their pollution and the weak application of international law to regulate Iraq's water shares with the neighbouring riparian countries (Turkey, Syria, and Iran). Moreover, it highlighted the weakness of Iraqi laws and regulations concerning the preservation of this vital resource, the absence of integrated water management, and the lack of seriousness in pricing water, which has resulted in significant waste. Additionally, the decrease in water supply is attributed to climate change, global warming, drought, and desertification. Therefore, it is necessary to adopt a strategic plan that includes a set of administrative, economic, technical, technological, and legal policies at the local and international levels to address these challenges.

Ahmed (2016) stated that the expanding gap between Iraq's water needs and the requirements of different sectors using water, along with the alarming decline in revenues from freshwater, poses one of the biggest challenges for the country. In the coming years, water imports will significantly decrease primarily due to the expansion of operational and construction plans by neighbouring coastal countries in the Tigris and Euphrates basins (Turkey, Syria, and Iran), especially in the absence of permanent and binding agreements for water sharing, as well as climate change and other factors. This necessitates a transition from traditional water resource management to an integrated water resource management strategy to achieve sustainable development and mitigate the risk of future water scarcity. The study focused on the agricultural sector as the largest water consumer in Iraq. To achieve sustainable water resource development, priority must be given to this sector through systematic and progressive implementation of comprehensive measures and reforms to optimize water resource utilization in agriculture. This is considered a fundamental element of sustainable development with its social, economic, and environmental aspects, and an important factor in facing the anticipated water crisis in the coming years.

Hussein (2017) focused on the shortage of water resources revenues in Iraq, considering that Iraq is a downstream country with its river sources located outside its borders, with a direct impact from the policies of the upstream water countries. In addition, the study addressed the population increase and the need for water use in agriculture, industry, and energy, which cast shadows on food and national security. The study also highlighted that water licensing is one of the factors that have led to the imbalance of water security in Iraq, resulting in waste, misuse,

and a lack of proper implementation of the economic requirements for water use. In light of this, the study emphasizes the necessity of adopting a comprehensive strategy to address the dimensions of the water deficit problem, while considering the economic vision and international experiences that can be applied in Iraq.

Hamdan (2021) dealt with the biggest problems that Iraq has faced in decades, which is the decline in water revenues for the Tigris and Euphrates rivers due to the water policies of the riparian countries represented by irrigation and reservoir projects, as well as climate changes, population growth, mismanagement and waste of water resources, in addition to the weakness of the diplomatic and negotiating side with these countries with the occurrence of Iraq as a downstream country for the upstream countries (Turkey, Syria, Iran), which makes it a permanent threat to these countries. The study concluded with the development of water resources and their good management and investment, taking into account the balance between supply and demand and benefiting from agricultural, agricultural, and sanitary drainage water to compensate for the water deficit.

#### **4. Discussion of Literature review:**

##### **4.1 Discussion of Global Literature review :**

Gohari et al. (2017) focused on the fact that climate change and addressing it strategically will be a major challenge because climate changes cannot be accurately predicted. Therefore, it is necessary to draw some possible scenarios. Strategic analysis has taken a large part of the study and therefore it was necessary to develop strategic scenarios based on this analysis in an environment of uncertainty to achieve a balanced strategic management of supply and demand. Focusing on strengths, such as improving infrastructure, strict water demand management (such as replacing crops with high water demand with less water-consuming crops) and prioritizing ecosystem-based regulatory systems, complemented by increased supply, can alleviate water stress. However, this alone is not enough, especially since dealing with water-related issues should be inclusive and participatory, going beyond infrastructure or crop irrigation to include community participation, strong organizational structures, and expanding water storage and management infrastructure when needed.

Myrzahmetove et al. (2018) adopted of integrated water resource management strategy analysis and its subsequent implementation stages, characterized by modernity in terms of implementation mechanisms, serves as a starting point towards sustainable development. This approach aims to achieve social justice, economic efficiency, and ecological diversity, ultimately leading to long-term water policy and water security for the country. Therefore, an integrated water resource management strategy is crucial, as all related sectors should align with a single strategic path. However, achieving this magnitude necessitates a connection between integrated management and sustainable development, requiring a comprehensive strategy that harmonizes all sectors of the state to operate in a coordinated and parallel manner. Additionally, the activation of relevant legislation and laws is essential to ensure the implementation of water policy in a guaranteed and binding manner for all, ultimately achieving water security for the country.

Yan et al. (2018) used the term "exploration" in their study title to indicate the strategic analysis of internal and external factors, from which future strategic scenarios emerge. This approach allows decision-makers to have greater flexibility by creating multiple strategies that open up possibilities to achieve a balanced water resource management strategy in China, dealing with challenges with minimal losses and achieving maximum goals. Dealing with water using this realistic strategy, considering challenges such as climate change, social and economic development, and wide water usage in agriculture and industry, requires more than strict internal management. It is essential to accompany it with a strong negotiation policy with parties upstream to minimize large-scale projects and ensure sufficient allocations for downstream regions.



Takeleb et al. (2020) clarified the strategic analysis (based on collecting, classifying, categorizing, and analysing internal and external environmental factors) served as a focal point for the researchers to understand the nature of the problem quantitatively. Afterwards, alternative strategies were formulated to address water scarcity. However, the preference for implementing the selected strategy lies in its ability to develop water resource management infrastructure and improve the performance of the water supply system in meeting demand. Nonetheless, the important question remains: Is it sufficient to prioritize a strategy that can enhance infrastructure and improve water supply performance, or are there other equally important aspects such as strict control over various water uses, raising community awareness, and utilizing modern technology in water management?

Shen (2020) built an integrated water resource management strategy that involves resource development, considering water usage volume and efficiency, as well as pollution absorption and treatment, which requires a balance between supply and demand, quantity, and quality within a sequential strategic framework. Continuous evaluation of implementation mechanisms is necessary for all components of this framework, as demonstrated in the aforementioned study. The study stands out by emphasizing the continuous evaluation process (feedback), which provides a complete picture of the proposed strategy. The evaluation process follows the completion of strategic management elements, including analysis, formulation, implementation, and continuous assessment. It contributes to the strategic success of organizations through the window of continuous improvement.

Coelho et al. (2022) used a participatory approach by involving stakeholders in strategic environmental analysis and strategic assessment processes. This has added a high level of commitment and importance of indicators in the environmental analysis process, which has provided the opportunity for strategic decision-makers to detect and address blind spots. This approach should be a general path for all strategic studies related to water, considering water as an important, vital and broad file that intersects with all areas.

Nalbandan et al. (2023) presented an environmental analysis as important factor and an essential pillar of the success of strategic management because of its role in setting policies and goals, especially in dealing with water resources, which are considered one of the most important priority areas in countries, but this is not enough because the needs related to water are diverse and wide, so it is necessary to pay attention to water pricing through the water footprint program to control the diverse use and to fill the needs in an appropriate and balanced way, but the success of programs and activities remains related to monitoring violations and abuses on water so that the strategy is effective and proceeds correctly towards achieving the goals.

#### **4.2 Discussion of Arabic Literature review:**

Ashour et al. (2009) referred to the significance of water and its connection to social, economic, and environmental aspects is evident in the alarming decline of per capita water share, reaching the water poverty line. This necessitates the development of modern and flexible strategies to address this water gap through the identification of alternative strategies derived from a deep and accurate analysis of internal and external environmental factors. This requires rethinking certain measures, such as evaluating irrigation techniques and reusing agricultural and sewage water. However, the main problem remains the Ethiopian dam, which will obstruct Egypt's sufficient share of water and significantly contribute to its decrease. Therefore, resorting to the aforementioned measures cannot be relied upon unless supported by a strong political direction leading to agreements and treaties that bind the Ethiopian side to ensure Egypt's right to Nile River water.

Al-Haddad (2015) adopted an integrated framework for managing the balance between water supply and demand is crucial in strategic water management. The research revolves around the proposed trilogy: 1) Supply management, including rainwater harvesting, wastewater treatment, desalination processes, and dam and reservoir construction. 2) Demand management, including water pricing, water legislation, awareness building, capacity building and training, modern irrigation techniques, and virtual water. As for the use of environmental information systems in water resource management, what distinguishes this study is its focus on water harvesting techniques and water pricing, with a direct emphasis on capacity building and training, encompassing economic, technological, and legal aspects. However, Syria shares a border with Turkey, and therefore cannot neglect the diplomatic aspect of ensuring its water allocations with the Turkish side.

Abu Talib (2019) indicated that using a new mechanism to link water data and information based on an accounting methodology that simulates the principles and standards of financial accounting, with the aim of manage and govern it, adds qualitative momentum and effective and sound management to the strategies for managing this important file. It emphasizes the importance of the interconnection between the environment and the economy, with a reference to the necessity of exchanging experiences with international entities that have extensive experience in this field. However, legal legislation, issued instructions, and strict control remain the regulators to ensure the implementation of water accounting.

#### **4.3 Discussion of local Literature review:**

Ali (2010) clarified that the extensive coverage and comprehensive approach to these axes, which the researcher referred to as policies, are considered part of the strategic formulation. Therefore, the language of strategic management in dealing with the problem, which is the subject of the research, must be characterized by the elements of strategic management (analysis, formulation, implementation, and control and evaluation), and this sequence in adopting these steps will draw a clear picture of the intended strategy in the research title.

Fadel (2015) aforementioned water challenges require the adoption of the strategic planning that includes a set of managerial, economic, technical, technological, and legal policies at the local and external levels. However, this planning cannot be outlined without a deep and accurate analysis of internal and external factors, this is necessary for the plan to be objective and proceed towards achieving strategic objectives. Additionally, mentioning the strategies must be specific with timeframes and cannot be general, to regulate the process of evaluation and review.

Ahmed (2016) focused on addressing the agricultural reality as the sector that consumes the most water, whether in terms of irrigation needs or irrigation methods. However, mentioning the term sustainable development and linking it to the objective axes of the message makes us pause to detail its axes (social justice, economic efficiency, and ecological sustainability). This should have been translated into additional axes that mention the agricultural axis and its importance so that the picture is complete and clear to the reader.

Hussein (2017) relied on the economic components of integrated water management from a strategic perspective to address the water crisis in Iraq. What is noteworthy about this study is its emulation of the experiences of other countries in dealing with water from an economic perspective, contributing to preserving this important vital resource from waste and misuse. However, after this presentation, the question arises: Are economic axes sufficient for that? Or does the strategic perspective need to broaden its horizons to include more axes, most notably the political axis, which involves dealing with upstream countries to ensure Iraq's annual water revenues?

Hamdan (2021) presented good management and investment while benefiting from sewage, agricultural, industrial, and health water, but these treatments will still need other treatments to ensure their success, which is the interest in the political and negotiating file to ensure adequate water shares from the riparian countries for different needs and uses while adopting the enactment and updating of commensurate laws and the size of the water challenges facing Iraq, in addition to the formation of a technical and legal team to monitor violations and abuses of water resources.

### **5. Conclusion:**

- The above studies agreed on confirming the global water crisis for various reasons, the most important of which are the policies of countries bordering rivers, climate change, population growth, and increased water needs for agricultural, industrial, and domestic purposes. Additionally, internal problems related to waste, poor management, weak laws, and regulations have an impact on water quantity and quality.
- The strategic approaches varied in prioritizing different aspects based on the researchers' judgments. Some focused on the political and negotiation aspect, while others emphasized strict internal management. Other studies gave priority to pricing and financial accounting to ensure compliance in preserving this resource. Some studies adopted the strategic alternative approach by drawing up various scenarios to adapt to emerging variables in an environment of uncertainty. Furthermore, there was a focus on modernity and technology in re-evaluating the handling of water internally, in addition to developing infrastructure. A participatory approach also emerged in one of the studies, involving stakeholders in analyzing internal and external factors through strategic analysis and evaluation.
- Accurate strategic analysis of internal and external environmental factors is the solid foundation for water strategies.
- Strategic management of water resources must create a balance between supply and demand. Reviewing the above strategic studies and providing a summary at the end of each study highlights several axes, including the origin of the problem, the challenges facing the file and its management, and the proposed solutions to address these problems. Each study also approaches the file from the angle chosen by the researchers. From what has been mentioned, we can conclude that balanced strategic planning can only be achieved through a precise analysis of internal and external environmental factors, represented by strengths, weaknesses, opportunities, and threats. From this analysis, a strategic direction and suitable strategic choices can emerge, taking into account the management of supply and demand, quantity, and quality of water resources. As for the actions to be taken, they must follow two paths: an internal and local path that includes good management by forming a homogeneous team from relevant parties, and an external path that involves balanced management of negotiation relations with coastal countries. Therefore, the researcher suggests that the strategy should take the form of a bird with balanced wings, represented by analysing internal and external factors and then taking off, soaring high by choosing the appropriate take-off until reaching its goal. This strategy is called the "parachute jump."

**Authors Declaration:**

Conflicts of Interest: None

-We Hereby Confirm That All The Figures and Tables In The Manuscript Are Mine and Ours. Besides, The Figures and Images, Which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.

- Ethical Clearance: The Research Was Approved By The Local Ethical Committee in The University.

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## مراجعة بعض استراتيجيات ادارة الموارد المائية (عالميا، عربيا، محليا)

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### مستخلص البحث:

لقد اخذ موضوع المياه حيزا كبيرا في كتابات الباحثين وصناع القرار على المستوى العالمي والعربي والمحلي لاسيما في المناطق الجافة وشبه الجافة لاسباب كثيرة منها ما هو متعلق بندرة هذا المورد، والذي يقابله زيادة في الطلب مع تزايد اعداد السكان وارتفاع مستوى معيشتهم اذ تزداد الحاجة اكثر للمياه فضلا عن استخدامهما في مجالات الزراعة والصناعة والاحتياجات المنزلية مما يجعلها عنصرا ضروريا وحيويا في حياة المجتمعات، كما وتعد الموارد المائية لاسيما التي تشترك فيها اكثر من دولة مصدرا من مصادر النزاع والتوتر بين الدول وتشكل حلبة الصراع المستقبلي تحت مسمى (حرب المياه) فهناك العديد من الدراسات العالمية التي اهتمت بالادارة الاستراتيجية للموارد المائية واخذت كل دراسة جانبا معينا بحسب الاولوية التي يراها الباحثون في تشخيص المشكلة مما يؤكد ازمة المياه على المستوى العالمي. لقد تباينت آراء الباحثين في عرض استراتيجيات ادارة الموارد المائية فمنهم من اعطى الاولوية لاصحاب المصلحة في حل المشكلة والبعض الآخر ركز على التحليل البيئي وآخرون بينوا اهمية الادارة الداخلية الصارمة وغيرهم وجدوا ان المحور القانوني والسياسي هو الاله في الاستراتيجيات لاسيما في الموارد المائية التي تشترك فيها اكثر من دولة وذهب البعض الى ان المحاسبة المائية وبصمة المياه كفيلة في السيطرة على ادارة الموارد المائية وعدوها محورا مهما في الادارة المتكاملة للموارد المائية. وفي العراق فان مشكلة المياه مركبة تتكون من مجمل المحاور السابقة وهذا يتطلب صياغة استراتيجية مبنية على تحليل دقيق لهذه العوامل للخروج بخيار استراتيجي يتناسب وحجم هذه التحديات لمعالجة هذه الازمة الخطيرة وبالتالي فان اختيارنا للدراسات العالمية والعربية والمحلية المشابهة لحالة العراق سيسهم في توضيح الاستراتيجية المقترحة اختصارا للجهد والوقت وذلك من خلال تحليل الاستراتيجيات مدار البحث للاستفادة منها في رسم ملامح الاستراتيجية العراقية.

**المصطلحات الرئيسية للبحث:** الاستراتيجية، الادارة الاستراتيجية، الادارة المتكاملة للموارد المائية، العجز المائي، الفقر المائي، الدول المتشاطئة.  
**نوع البحث:** دراسة مراجعة