

POLICY BRIEF

Towards comprehensive integrated
water resources, sanitation and
hygiene management in Palestine for
developing responsive strategic plans
to manage impacts of climate change

Global Water Leadership Programme

Global Water Partnership

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1. Executive Summary

- Brief overview of the policy brief

Integrated water resources management (IWRM) in Palestine is a complex issue due to the limited access to water resources and proper sanitation. The water resources in Palestine are de facto fully controlled by Israel, and the division of groundwater is subject to provisions in the Oslo II Accord. The level of development in water infrastructure and services is far less in Palestine compared with Israel. The Palestinian Water Authority (PWA) has developed several plans and strategies, including the Integrated Water Resources Management Plan (2003), the National Water Strategy for Palestine (2012), the National Sector Strategy: Water and Wastewater (2011-2013), and the National Water and Wastewater Policy and Strategy for Palestine (2013 – 2032). However, the implementation of these plans and strategies has been hindered by the lack of resources and political instability in the region. The inadequate access to water resources and proper sanitation is detrimental to general welfare and a direct economic liability to society. The international community has supported many projects to construct new water networks or to rehabilitate existing ones. The establishment of Water Supply and Sanitation Utilities in the West Bank and Gaza Strip is planned to take over the responsibility for water and sanitation operations. The proposed utilities are divided according to the Palestinian Standards for Wastewater Treatment and Reuse (2005), which recommends guidelines for the limit values for effluent from wastewater treatment plants and sets.

The promotion of the safe reuse of treated wastewater in Palestine involves a complex interplay of technical, social, economic, and political factors, here comes the importance of cross sectorial analysis and consultation with stakeholders to ensure the sustainable reuse of such increasing water resource and to ensure the public acceptance for wastewater reuse practices, the Global Water Leadership Programme (GWL) is a vital example of the need to initiate and support national consultations to identify priority gaps then develop national responsive strategies including the financing of activities related to: socio-cultural acceptance, governance and legal framework, and impact on agriculture to manage and overcome these priority gaps.

Building local capacities to enhance development of aligned response strategies and designing efficient Monitoring & Evaluation (M&E) protocols was another priority which was supported by the GWL to improve organizational processes, leadership, and overall performance.

2. Introduction

The limited main sources of water in Palestine are:

Surface Water: The Jordan River is the main surface water resource in the West Bank. It is shared by five riparian entities: Palestine, Israel, Jordan, Syria, and Lebanon

Groundwater: Groundwater aquifers are the primary source of freshwater in Palestine, accounting for 69% of its water resources. The Western (Mountain) Aquifer is a significant groundwater resource, of which Israel controls over 80% of the underground water resources. Additionally, the Coastal Aquifer is another vital groundwater source, particularly in the Gaza Strip

These sources are essential for meeting the water needs of the Palestinian population. However, the control and allocation of these water sources are significantly influenced by the Israeli, posing challenges to water management and sustainability in Palestine.

- Context and importance of water resources and sanitation in Palestine

Water resources and sanitation are of critical importance in Palestine due to several factors:

Limited Access to Water: Safe and sustained access to water in Gaza remains extremely limited, with people having access to just 1 to 3 liters of water daily. This scarcity raises fears of dehydration, kidney failure, and other critical health consequences, particularly for already vulnerable people.

Environmental Hazards: The lack of fuel has led to the total shutdown of wastewater treatment plants, resulting in the daily release of over 130,000 cubic meters of untreated sewage into the Mediterranean, posing a grave environmental hazard.

Health and Safety Risks: The absence of an effective wastewater treatment system poses a health and safety risk to the Palestinian population, particularly in the Gaza Strip.

Economic Consequences: The deficient domestic water supply, in quantity as well as quality, is not only detrimental to general welfare but also a direct economic liability to society, through increased load on the health and social services.

Climate Change: Climate change models predict that warming in the southern and eastern Mediterranean will be greater, with annual precipitation rates expected to fall by 10% by 2020 and 20% by 2050, further exacerbating the water crisis in the region.

Political Constraints: The Palestinian water problem is primarily a political one, with Israel controlling the water resources and using them as a tool to control the Palestinians.

To ensure the well-being and economic development of the Palestinian population, there should be crucial response to these challenges to improve water resources management and sanitation service leading to mitigating health and environmental risks associated with inadequate access to water and proper sanitation.

- Objectives of the policy brief

The objectives of this policy paper are:

1. Promote Sustainable and Improved WASH Sector: Leverage IWRM as a key strategy to achieve sustainable improvements in the WASH sector, focusing on enhancing community water supplies and sanitation for improved social, economic conditions, and health.
2. Enhance Integration of WASH with IWRM: Strengthen the integration between WASH sectors and IWRM, considering the specific contexts of Palestinian territories, to fulfill the Sustainable Development Goals.
3. Develop Context-Adapted IWRM Approaches: Identify and implement practical, context-adapted IWRM strategies and entry points that are suitable for Palestine's unique challenges and opportunities in water management.
4. Focus on Livelihood and Poverty Reduction: Align IWRM objectives with the enhancement of livelihoods and the reduction of poverty, by placing IWRM in the broader context of integrated natural resource management and livelihood approaches.
5. Foster Stakeholder Dialogue and Participation: Develop a facilitated process of stakeholder dialogue for concerted action in water management, particularly at local and sub-national levels, to formulate shared visions and strategies.
6. Enhance Knowledge Management and Learning: Emphasize learning and knowledge management in the water sector, particularly concerning the importance of water, changing habits, and collaboration to ensure sustainable access to water and sanitation.
7. Integrate Environmental Sustainability: Incorporate environmental sustainability into WASH strategies, aligning with the sustainable development goals and focusing on water resource management and ecosystem conservation.

3. Current State of Water Resources and Sanitation in Palestine

- Overview of existing water resources

The current status of water resources management in Palestine is characterized by several challenges and limitations. Key aspects include:

- Political constraints: The Palestinian water problem is primarily a political one, with Israel controlling the water resources and using them as a tool to control the Palestinians
- Inefficient water use and water losses: The water sector in Palestine faces inefficiencies and losses due to the lack of proper infrastructure and management
- Institutional weaknesses: The Palestinian government's management in the water sector has failed due to the control of the Israeli authorities and the non-recognition of Palestinian water rights
- Financial issues: The Palestinian population has to purchase water from the Israeli water company "Mekorot" to cover their water needs, which poses financial challenges
- Climate change: The environmental effects of climate change, such as anomalies, warming, and reduced precipitation, are expected to have significant consequences for the Palestinian population, further exacerbating the water crisis in the region
- Data availability: Information on the water sector in Palestine is hard to come by, and data are not widely published, making it difficult to assess the situation accurately

Despite these challenges, Palestine has taken measures to address the environmental impacts of Israeli control on water resources, such as improving infrastructure and services, promoting social change, and seeking international support. However, the overall water management and environmental sustainability in Palestine remain affected by the Israelis and the resulting political, economic, and environmental constraints.

- Current state of sanitation facilities

The lack of sustained access to safe water and proper sanitation has led to a severe humanitarian crisis. The limited access to water resources and inadequate sanitation facilities have resulted in a scarcity of water, with people having access to just 1 to 3 liters of water daily, raising fears of dehydration and critical health consequences. The lack of fuel has led to the total shutdown of wastewater treatment plants,

resulting in the daily release of over 56 MCM meters of untreated sewage water, posing a grave environmental hazard. The deficient domestic water supply, in terms of both quantity and quality, is detrimental to general welfare and a direct economic liability to society, through increased load on the health and social services. The situation is further exacerbated by the impact of the Israelis and restrictions on Palestinian water sector development. The limited financial and technical capacities of the Palestinian local authorities also pose challenges to addressing the water and sanitation crisis. The population in the Gaza Strip is in urgent need of clean water, and the current water consumption has been reduced to three liters per day, which includes hygiene and cooking needs. The lack of sustained access to safe water and proper sanitation (approximately 63.4%, are not connected to wastewater networks and rely on cesspits for wastewater disposal) has led to a severe humanitarian crisis, with the population resorting to consuming saline groundwater, increasing the risk of contracting diseases such as cholera and diarrhea. The situation is further compounded by the damage to more than half of the water supply infrastructure, which is currently in need of repair. The lack of sustained access to safe water and proper sanitation has led to a severe humanitarian crisis, with the population resorting to consuming saline groundwater, increasing the risk of contracting diseases such as cholera and diarrhea.

- Challenges and limitations

The main challenges in managing water resources in Palestine are political constraints, inefficient water use and water losses, institutional weaknesses, financial issues, climate change, and inadequate access to water resources and proper sanitation. The water resources in Palestine are de facto fully controlled by Israel, and the division of groundwater is subject to provisions in the Oslo II Accord. Israel uses water as a tool to control the Palestinians, and every war between the two countries has severely harmed the water and wastewater infrastructure, particularly in the Gaza Strip. The lack of a sufficient, safe, reliable, and affordable water supply, as well as the absence of an effective wastewater treatment system, not only adds to the daily suffering of the people but also poses a health and safety risk. The level of development in water infrastructure and services is far less in Palestine compared with Israel, and the implementation of plans and strategies has been hindered by the lack of resources and political instability in the region. The inadequate access to water resources and proper sanitation is detrimental to general welfare and a direct economic liability to society. The international community has supported many projects to construct new water networks or to rehabilitate existing ones, and the establishment of Water Supply and Sanitation Utilities in the West Bank and Gaza Strip is planned to take over the responsibility for water and sanitation operations.

The financial challenges faced by Palestine in implementing IWRM and WASH include:

Limited Financial Resources: Palestine faces constraints due to limited financial resources, which hinders the implementation of water management and sanitation projects

Dependence on Israeli Water Company: Palestinians have to purchase a significant amount of water from the Israeli water company "Mekorot" to cover their water needs, leading to financial difficulties and dependence on external sources for water supply

Inadequate Infrastructure Investment: The level of development in water infrastructure and services is far less in Palestine compared with Israel. Limited investment in infrastructure hampers the improvement of water and sanitation services

Operational and Maintenance Costs: The operational and maintenance costs of water and sanitation utilities pose a financial burden, particularly in the context of limited financial and technical capacities of the Palestinian local authorities

Addressing these financial challenges is crucial for the effective implementation of IWRM and WASH in Palestine, and it requires both domestic and international support to improve water management and sanitation services in the region.

The impact of the Israelis on water resources in Palestine is significant and multifaceted. Israel's control over the water supply has led to political constraints and the use of water as a tool to control the Palestinians resulting in severe harm of water and wastewater infrastructure, particularly in the Gaza Strip, leading to a lack of sufficient, safe, reliable, and affordable water supply, as well as the absence of an effective wastewater treatment system. This has posed a health and safety risk to the Palestinian population. The disparity in access to water between Israelis and Palestinians is substantial, with Palestinians consuming on average far less water than Israelis. Israel's restrictions on the construction of new water infrastructure and the extraction of water have further exacerbated the water crisis in the region. The Israelis also led to the depletion of water resources, with the Coastal Aquifer in Gaza being insufficient for the population's needs and increasingly contaminated and depleted. Overall, the Israelis had a detrimental impact on the management and availability of water resources in Palestine, contributing to a protracted water crisis in the region

The specific policies of Israel that have impacted water resources in Palestine include the nationalization of water sources and restrictions on Palestinian access to them, as well as the use of water as a tool to control the Palestinians. The Israelis led to the depletion and contamination of water resources, with restrictions on the construction

of new water infrastructure and the extraction of water. Military actions, such as the deliberate targeting of wells and water infrastructure, have exacerbated water scarcity issues. Additionally, the control of cross-border water sources by Israel has further complicated the management of water resources in Palestine. The lack of recognition of Palestinian water rights and the significant amount of water purchased from the Israeli water company to cover the water needs of the Palestinian population have also contributed to the water crisis in the region. The crises included various scales including:

Nationalization of water sources: Israel has taken control over the water resources in Palestine, including the Jordan River Basin, the Mountain Aquifer, and the Coastal Aquifer, which pass through Israeli and Palestinian borders

Restrictions on Palestinian access to water: Israel has restricted Palestinian access to water, presenting a potent tool for exerting pressure. Military actions, often in the form of infrastructure destruction, are an integral part of the Israeli strategy and have been documented in previous conflicts. Wells and water infrastructure, essential for Palestinian communities, have been deliberately targeted or rendered inoperable, exacerbating water scarcity issues

Control of cross-border water sources: Israel has control over the water resources in Palestine, and the division of groundwater is subject to provisions in the Oslo II Accord

Extraction of water: Israel extracts up to 86% of the potential yield of the water from the Mountain Aquifer, which lies in most part under the West Bank and is divided into three groundwater basins: the Western Aquifer, the Eastern Aquifer, and the North-eastern Aquifer

Restrictions on water consumption: Israel has restricted the water consumption of the Palestinians in the West Bank and the Gaza Strip, which has become a problem for citrus producers and vegetable farmers, whose crops are dependent on irrigation

Expansion of Israeli water control system: Israel has expanded its water control system to serve the requirements of agricultural projects established by settlements.

4. International and Regional Benchmarking

International organizations play a crucial role in supporting water resources management in Palestine, they have contributed to various projects aimed at improving water supply, infrastructure, and sanitation in Palestine. They provided reports and assessments on the water situation in the region, helping to raise

awareness and mobilize support for water resources management in Palestine. Some of the key organizations involved include:

United States Agency for International Development (USAID): Since 1994, USAID has been committed to improving Palestinian infrastructure, including water supply and sanitation projects

United Nations Development Programme (UNDP): The UNDP has been working on improving the water supply in Palestine, conducting projects aimed at improving water supply, such as building water tanks and improving water networks

World Bank: The World Bank has assessed the restrictions on Palestinian water sector development and provided reports on the water situation in Palestine

Palestinian Water Authority (PWA): The PWA is responsible for regulating the water sector and maintaining water resources and services in its territories. However, water management in Palestine remains highly complex due to Israeli dominance in water resources and decision-making

5. Policy and Regulatory Framework

Effective water management, especially in the context of IWRM, often necessitates harmonizing different policies and fostering collaboration among various institutions. This approach is crucial for the sustainable development, management, and utilization of water resources

- Overview of existing policies and regulations

The existing policies and regulations related to Integrated Water Resources Management (IWRM) and Water, Sanitation, and Hygiene (WASH) in Palestine are influenced by the unique geopolitical and environmental challenges faced by the region. The following provides an overview of the existing policies and regulations based on the available sources:

A. WASH Technical Manual - WASH Cluster - State of Palestine, June 2021:

The WASH Cluster partners, in coordination with the relative local authorities, have developed the WASH humanitarian response plan based on five main components: access to water, access to sanitation and hygiene, access to WASH services in institutions, floods mitigation and prevention, and solid waste management

B. National Water Policy and Strategy June 2013:

The document presents a framework for action in the water sector for the sustainable management of water resources in the State of Palestine. It refers to all natural

resources, including ground and surface waters, and the water and wastewater services provided to the people of Palestine. The policy applies to the State of Palestine, including international territorial water, and East Jerusalem

C. Water Resources in Palestine:

The level of development in water infrastructure and services is far less in Palestine compared with Israel. After the establishment of the Palestinian Water Authority (PWA) in 1995, many projects have been implemented to construct new water networks or to rehabilitate existing ones. The ongoing control over the vast majority of shared water resources complicate sector regulation by the Palestinian Government and the PWA

D. Options and Strategies for Planning Water and Climate Security in the Palestinian Territories:

The document highlights the challenges faced in the water sector, such as limited access to water resources, inadequate sanitation, and the impact of the ongoing Israeli control of water management and climate security in the region

E. Toward Water Security for Palestinians: West Bank and Gaza Water Supply, Sanitation, and Hygiene Poverty Diagnostic:

The report provides a diagnostic assessment of water supply, sanitation, and hygiene (WASH) services in the West Bank and Gaza, highlighting the challenges and gaps in WASH services, including access to improved water and sanitation facilities

These sources indicate that while there are policies and strategies in place for water management and WASH in Palestine, the challenges posed by the Israelis, limited access to water resources, and inadequate sanitation continue to impact the effective implementation of these policies and the provision of WASH services to the population.

- Gaps and areas for improvement.

The existing policies and regulations of Integrated Water Resources Management (IWRM) and Water, Sanitation, and Hygiene (WASH) in Palestine face several challenges and areas for improvement:

Policy-Implementation Gap in Water Service Policymaking: There is a notable gap between the design of water-related policies and their implementation in the West Bank, Palestine, due to geopolitical realities created by the Israelis. This includes control over Area C and most water resources, along with restrictions on Palestinian

water extraction and transport. This gap results in a fragile water governance structure and undermines the two-state solution.

Inadequate Integration of Technical, Economic, and Institutional Factors:

Integrated frameworks are needed to support water policy and guide management choices, as demonstrated in Israel's context. Such frameworks help in addressing environmental requirements, scarce water, domestic use demands, and peace agreements.

Challenges in Concrete Implementation of IWRM: Implementing IWRM raises new questions for policy analysis, particularly regarding water regulation, policy instruments, and participative and multi-level policy processes.

Fragmented Water Governance in Palestine: The water governance structure in the West Bank, Palestine, is characterized by fragmentation. Some dimensions such as water quality and responsibilities are less in need of improvement, while political and social status dimensions are highly restrictive.

IWRM Discourses and Water Justice Issues: a case study of Nepal shows how the IWRM discourses have limited the range of policy and institutional choices, promoting an apolitical and techno-managerial vision of water development. This has implications for addressing social justice issues related to water resources.

Interconnected Challenges of Food, Water, and Energy: Global assessments of land use, socioeconomic policies, and climate change are crucial to meet future demands for food, water, and energy. Integrated approaches are needed to address these interconnected challenges.

Water Loss Management in Intermittent Water Supply Systems: Prioritizing water loss reduction options in intermittent water supply networks is critical. In Palestine, strategies like controlling and managing operational pressure can effectively reduce water losses.

Israeli Hydro-Hegemony and SDG 6: The current political situation under Israeli demonstration impedes the achievement of Sustainable Development Goal 6 (clean water and sanitation for all) for Palestinians. Israel's control over water resources denies water sovereignty to Palestinians, affecting WASH efforts.

Rainwater Harvesting for Sustainable Agriculture: Implementing agricultural rainwater harvesting techniques in high water-poor areas of the West Bank can be a sustainable water management option, contributing to agricultural sustainability and improved food security.

These gaps show the urgent need to develop a multifaceted approach, taking into account geopolitical realities, integrated frameworks, governance structures, and

sustainable management strategies to respond to these gaps and areas for improvement in IWRM and WASH policies in Palestine.

6. Stakeholder Analysis

- Key stakeholders in water resource and sanitation management

To conduct a stakeholder analysis for Integrated Water Resources Management (IWRM) and Water, Sanitation, and Hygiene (WASH) in Palestine, we have to explore aspects of water resource management and stakeholder engagement in similar contexts. Some of the relevant aspects to be considered when analyzing stakeholders:

Centralized Water Systems Management in Palestine: The Palestinian water sector faces challenges like poor capacities, high political instability, and inadequate funding. A centralized approach to water resource management is proposed, which includes strategic decision-making and integration of water sector management.

IWRM and WASH Sector Improvement: Implementing IWRM is key to achieving a sustainable and improved WASH sector. This approach addresses water supply and sanitation, which are crucial for social, economic, and health improvements. However, challenges such as weak infrastructure, water shortages, and unclear roles and responsibilities can hinder progress.

Stakeholder Participation in Water Resources Management: Stakeholder participation is essential in planning and decision-making for water resources management strategies. Identifying stakeholders' preferences regarding management objectives can improve water governance and ensure more commitment from stakeholders.

Collaborative Modelling for Decision Making: Collaborative modelling enhances stakeholder participation in decision-making processes, managing conflicts among water users, and promoting social learning. This approach is crucial for inclusive water development.

Learning Alliances for Technology Introduction in WASH: Building capacity around technology introduction in the WASH sector is vital. However, the lack of government involvement in early project stages can hamper the uptake of new technologies.

To develop effective IWRM and WASH in Palestine, a centralized management approach that ensures stakeholder participation, adopting collaborative decision-making models, developing national capacities for technology introduction, and a focusing on environmental sustainability.

7. Technological Innovations

- Role of technology in water and sanitation management

There is limited information on technological innovations in Palestine to advance IWRM and WASH. However, some initiatives have been implemented to improve water management and sanitation services in the region. These include:

WASH Cluster-State of Palestine: The WASH Cluster partners, in coordination with the relative local authorities, have developed the WASH humanitarian response plan based on five main components, including access to water, sanitation, and hygiene. The WASH Cluster-State of Palestine has more than 53 partners, including NGOs, UN agencies, international organizations, and local authorities

GAZA H2.0-Palestine: This project represents a sustainable and pioneering initiative to promote efficient water supply, water loss reduction, and knowledge transfer

Innovative Solutions for Clean Water in Green Street: This initiative focuses on Integrated Water Resource Management (IWRM) implementation in Palestine

National Water Policy and Strategy: The policy provides a framework for action in the water sector for the sustainable management of water resources in Palestine.

There is potential for technological innovations to improve water management and sanitation services in Palestine. However, the challenges posed by the Israeli, limited access to water resources, and inadequate sanitation continue to impact the effective implementation of these initiatives.

- Case studies of successful technological implementations.

Some examples of technological innovations used in IWRM and WASH in Palestine include:

Matchmaker II: This project demonstrated Water-Energy-Food-Ecosystems (WEFE) Nexus local technical solutions in Palestine in a cross-country context, combined with promoting employability and entrepreneurship for youth and women, while elaborating and disseminating knowledge and policy tools that enable scaling-up of such interventions and promote Water-Employment-Migration (WEM) objectives as described for Action 2030 (Water Agenda) which engaged regional and national partners in its implementation.

GAZA H2.0-Palestine: This project represents a sustainable and pioneering initiative to promote efficient water supply, water loss reduction, and knowledge transfer. The project aims to reduce water losses in the supply system of Khan Younis Municipality, increase the availability of water through the application of sensor- and analytic-based approaches, and improve water resources management and efficiency

through Smart Water Networks pilots in two neighborhoods of Khan Younis municipality

Innovative Solutions for Clean Water in Green Street: This initiative focuses on the implementation of a Sequencing Batch Reactor (SBR) system and WaterGen technology in Abasan Al-Kabira, Palestine. The project aims to improve the livelihood conditions of the population by reducing water losses and water costs, and to enhance the knowledge and governance of water service providers and national water regulatory institutions in the Gaza Strip

These examples demonstrate the potential for technological innovations to improve water management and sanitation services in Palestine. However, the challenges posed by the Israeli, limited access to water resources, and inadequate sanitation continue to impact the effective implementation of these initiatives.

8. Financial Analysis and Funding Opportunities

There are several financial analysis and funding opportunities available for IWRM and WASH in Palestine. Some of the available sources of funding and financing strategies include:

National Water Policy and Strategy: The policy provides a framework for action in the water sector for the sustainable management of water resources in Palestine. The policy includes an extensive investment program and a list of priority capital investments for implementation in the short-term

World Bank: The World Bank has been providing technical assistance to the Palestinian Water Authority (PWA) since 2006 aimed at building capacity to improve its management of water resources. The Bank has also provided funding for water and sanitation projects in Palestine

Donor Funding: Donor funding is available for water and sanitation projects in Palestine. However, many projects are delayed due to obstruction tactics by Israel

Public-Private Partnerships (PPPs): PPPs can be used to leverage private sector investment and expertise in water and sanitation projects

Sustainable Financing Strategies: The Palestinian Water Authority has developed sustainable financing strategies to address the financial challenges in the water sector. The strategies include improving budget processes, private sector participation, and improving the regulatory framework for water

These funding opportunities and financing strategies can help address the financial challenges in implementing IWRM and WASH in Palestine. However, the challenges

posed by Israel limited access to water resources, and inadequate sanitation continue to impact the effective implementation of these initiatives.

9. Policy Recommendations

- Specific, actionable policy recommendations

To improve Integrated Water Resources Management (IWRM) and Water, Sanitation, and Hygiene (WASH) in Palestine, several measures can be considered based on the provided information:

1. **Infrastructure Development:** Palestine should continue implementing projects to construct new water networks and rehabilitate existing ones. This requires commitments from both Palestinians and Israelis, supported by the international community
2. **Policy and Regulatory Framework:** There is a need to assess the adequacy of existing laws and regulations in Palestine to operationalize IWRM. This includes the establishment of Water Supply and Sanitation Utilities in the West Bank and Gaza Strip, which are planned to take over the responsibility for water and sanitation operations
3. **International Support:** Continued collaboration with international organizations and local authorities is essential. The WASH Cluster-State of Palestine, with its numerous partners, plays a critical role in planning and implementing WASH interventions to address the targeted WASH vulnerability
4. **Addressing Political Constraints:** Efforts should be made to address the political constraints and seek solutions to the longstanding Israeli and restrictions that have hindered water sector development in Palestine
5. **Climate Change Adaptation:** Given the expected impacts of climate change on water resources, measures to adapt to changing precipitation patterns and warming in the region should be integrated into water management strategies
6. **Data Availability and Monitoring:** Improving the availability of data and monitoring of water resources is crucial for informed decision-making and sustainable management
7. **To address the financial challenges faced by Palestine in implementing IWRM and WASH, potential solutions include:**
 - 7.1. **Improving Budget Processes:** Improving the budget processes and strengthening financial sustainability through strategic planning, funding, procurement, and capacity building
 - 7.2. **Private Sector Participation:** Improving water governance in Palestine by including private sector participation in the water sector

- 7.3. International Support: Continued collaboration with international organizations and local authorities to provide financial and technical support for water management and sanitation projects
- 7.4. Establishing Water Supply and Sanitation Utilities: Establishing Water Supply and Sanitation Utilities in the West Bank and Gaza Strip to take over the responsibility for water and sanitation operations
- 7.5. Increasing Investment: Increasing investment in water infrastructure and services to improve water and sanitation services
- 7.6. Public-Private Partnerships (PPPs): New framings for PPPs in WASH and IWRM have been developed, emphasizing the importance of partnerships between public and private sectors to improve water, sanitation, and hygiene services
8. Innovation and Technology: The private sector has contributed to innovation and technology development in the water and sanitation sector, leading to more efficient and cost-effective solutions
9. Capacity Building: Private sector partners have provided capacity building and training to local authorities and communities to improve water management and sanitation services

- Implementation roadmap.

The following roadmap for implementing IWRM and WASH that meets the changing climate in Palestine can include the following phases:

Initial Assessment (0-6 months):

- Conduct a detailed analysis of the current water resources situation in Palestine.
- Identify key stakeholders and form a multi-disciplinary team for project implementation.

Policy Development and Institutional Strengthening (6-12 months):

- Develop or update policies that support IWRM and WASH principles.
- Strengthen existing institutions or establish new ones for effective water management.

Capacity Building and Public Engagement (1-2 years):

- Train local officials, water managers, and community leaders in IWRM and WASH practices.
- Engage with communities to raise awareness and promote sustainable water use practices.

Implementation of Strategies (2-5 years):

- Implement water-saving technologies and infrastructure improvements.
- Enhance water quality monitoring and pollution control measures.
- Develop and implement strategies for equitable water distribution.

Monitoring, Evaluation, and Adjustment (Ongoing):

- Regularly monitor and evaluate the progress of the implemented strategies.
- Make necessary adjustments based on feedback and changing circumstances.

Scaling and Replication (5 years and beyond):

- Scale successful strategies to other regions within Palestine.
- Share lessons learned and best practices with other countries facing similar challenges.

10. Monitoring and Evaluation (M&E)

- Framework for tracking progress

The below framework draw upon principles and strategies that have been successful in other contexts, as highlighted in the literature on IWRM and WASH implementation in developing countries. These M&E strategies were tailored to the unique socio-political and environmental context of Palestine for effective implementation.

a comprehensive framework and roadmap are necessary. This framework should be adaptable to the specific context of Palestine while drawing on successful practices from other regions. The proposed framework for IWRM and WASH implementation in Palestine can be structured as follows:

- 1) Contextual Analysis: Understand the specific water resource challenges in Palestine, including availability, quality, and distribution issues.
- 2) Stakeholder Engagement: Involve all relevant stakeholders, including government agencies, local communities, NGOs, and international bodies, in planning and decision-making processes.
- 3) Policy and Institutional Framework: Develop and reinforce policies and institutional structures that support IWRM and WASH, focusing on sustainable and equitable water management.
- 4) Capacity Building: Strengthen the capacity of local institutions and communities through training, technology transfer, and knowledge sharing.

- 5) **Integrated Planning and Management:** Ensure that water resource management is integrated with other sectors like agriculture, industry, and urban development.
 - 6) **Monitoring and Evaluation:** Establish a system for monitoring and evaluating the progress of IWRM and WASH initiatives.
- Indicators for success.

Specific indicators are suggested to assess progress and effectiveness of the successful implementation of Integrated Water Resources Management (IWRM) and Water, Sanitation, and Hygiene (WASH) in Palestine:

1. **Water Availability and Accessibility:** Measure the extent to which water is available and accessible to all segments of the population, including remote and marginalized areas.
2. **Water Quality:** Monitor improvements in water quality, including reductions in water pollution and contamination levels.
3. **Infrastructure Development:** Track the development and maintenance of water supply and sanitation infrastructure.
4. **Stakeholder Participation:** Evaluate the level of involvement and engagement of local communities, government agencies, and other stakeholders in water management decisions.
5. **Policy and Institutional Framework:** Assess the effectiveness of policies and institutional arrangements in supporting IWRM and WASH.
6. **Capacity Building:** Measure improvements in the skills and knowledge of local water managers and communities regarding sustainable water management practices.
7. **Public Health Outcomes:** Monitor changes in public health, especially reductions in waterborne diseases, as a result of improved water and sanitation services.
8. **Water Use Efficiency:** Assess improvements in the efficient use of water resources, particularly in agriculture and industry.
9. **Environmental Sustainability:** Monitor the impact of water management practices on the environment, including ecosystem health and biodiversity.
10. **Economic Efficiency:** Evaluate the cost-effectiveness of water management interventions and their contribution to economic development.
11. **Gender and Social Equity:** Ensure that water management strategies are equitable and inclusive, paying special attention to the needs of women and vulnerable groups.

- 12. Resilience and Adaptive Capacity:** Assess the ability of the water management system to adapt to changing conditions, including climate variability and population growth.

11. Conclusion

Implementing IWRM and WASH in Palestine requires an adaptive, multi-disciplinary, addressing political challenges, ensuring stakeholder participation and policy enforcement. stakeholder-focused approach, leveraging local capacities and innovative water management strategies.