

## **Integrated Water Resources Development: Jordanian Action Plans**

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### **Abstract**

The increasing scarcity of water in dry areas is now a well-recognized problem. According to the world commission environment and development, approximately 80 countries with 40% of the world population already suffer from serious water shortages. In Jordan, for example, renewable water resources are very limited, and at present, Jordan is among the countries of lowest amount of water resources per capita. Since several decades and due to the rapid population growth, the average annual per capita of renewable water is rapidly decreasing, which categories Jordan as "below the level of chronic water stress".

Agricultural sector is by far the largest user of water in the world. On a consumptive use basis, 80-90% of water had consumed in agriculture, Jordan, for example, agricultural sector consumes about 70% of its water budget. Unfortunately, the water use efficiency in this sector is poor not exceeding the 40-50% with more than 50% water losses, and thereby, enormous water saving could be achieved in the agriculture sector comparable with the others sectorial water uses. The growing competitions between the sectors on water increases the importance of managing the water efficiently especially in the most consumable sector, agriculture. Presently, water shortages have led most of arid and semi-arid countries, including Jordan, to increase food imports because the local agriculture sector is not able to produce sufficient food to fulfill the existing food gaps. The increasing food gaps is posing serious challenges beyond the economic and political capacity required for the necessary adjustments concerning the allocation and use of water in all sectors, particularly the agriculture.

The growing water scarcity and the misuse and management of the available water resources are nowadays major threats to sustainable development for the various sectors, especially domestic, industrial and agriculture. At the heart of the question of whether a water crisis can be averred or whether water can be made productive, increasing the water use efficiency its productivity through effective water saving and by introducing non-conventional water resources as an additional irrigation water sources are central to producing food, to fighting poverty, to reducing competition for water and to ensuring that there is enough water for nature.

### **Introduction**

In recent years, the fact that world faces a water crisis has become increasingly clear. Challenges remain widespread and reflect severe problems in the

management of water resources in many parts of the world. The increasing scarcity of water in dry areas is now a well-recognized problem. According to the World Commission Environment and Development, approximately 80 countries with 40% of the world population already suffer from serious water shortages. These problems will intensify unless effective and concrete actions are taken.

Water necessity is well aware in essence for maintaining human health and dignity and none of the water necessity facts are dispute. The availability of water has been taken for granted, as if are an abundance of the resource. This assumption has now been challenged and found to be untenable. In recent years, the availability of and access to fresh water have been highlighted as among the most critical natural resource issues facing the world.

Jordan, as many other countries faces sustainable environmental challenges, which are aggravated by the scarcity of water supply, deterioration of water resources, land contamination, desertification, mismanagement of land use and air pollution. However, for the time being, these problems are relatively manageable; growing demand is still under control and limited resources have generally been dealt with efficiency. Jordan Agenda 21 offers a more comprehensive and sustainable approach to dealing with such problems to ensure that Jordanian developmental gains are enjoyed not only by the present generation but also by the future generations. In the Agenda 21, environmental problems have been identified and analyzed scientifically, means to solve, or at least, to alleviate them presented, achievable projects and proposals covering most elements of resources have been highlighted. In parallel, the Agenda has come up with specific recommendations and legislative reforms leading not only to environmental preservation and protection, but also emphasizing Jordan's commitment to the principles of sustainable development pledged at the Earth Summit in Rio de Janeiro in 1992. However, problems and issues of environment, regardless of their scope and nature cannot by any means, be dealt with solely at the national level, they require regional and sometimes international cooperation and interventions.

### **Integrated Water Resource Management in Jordan**

Jordan is considered generally a dry country due to the scarcity of its water resources, which is dictated by climatic conditions. It is classified as a low rainfall country and most of its land could be termed either arid or semi-arid. The average annual rainfall ranges from 600 mm in the northern highlands to less than 50 mm in the desert and southern Ghor. The total estimated available water from surface and groundwater is about 1136 MCM, in 1995, of which about 747 MCM is surface water and 389 MCM is groundwater. With the exception of springs and King Abdullah Canal (KAC), surface water resources are at present used exclusively for irrigation. About 146 MCM of surface water are being stored behind the existing dams. Most of the municipal water supply systems and industry in Jordan presently depend upon groundwater and springs.

## **Program Areas**

### **A. Integrated Management of Water Resources.**

#### **Basis For Action**

Integrated water resource management is of paramount importance to Jordan. It is a prerequisite for the development of all socio-economic sectors. In the absence of a reliable evaluation of water resources potentialities, appropriate planning for sustainable development is a difficult task. The future of irrigated agriculture in Jordan is severely constrained by water scarcity. With current trends and policies unchanged, Jordan nonrenewable groundwater reserves will be exhausted in 50 years. By then, the country will have to depend exclusively on renewable water resources. Therefore, water demand management is an urgent policy option for Jordan.

#### **Objectives**

- a. To satisfy the future needs in line with the national strategy of socio-economic development and the standard of living targeted within the natural and financial resources of the Kingdom.
- b. To find new methods to evaluate, develop and manage the water resources of Jordan.
- c. To establish strong and coherent institutional arrangements needed to ensure the efficient collection, storage, processing and analysis of hydrological data and the availability of data to potential users.
- d. To provide a scientific database for rational water resources utilization and to predict possible imbalances between supply and demand
- e. To ensure sustainable yield of renewable groundwater aquifers
- f. To improve networks to meet accepted standards for the provision of data on water quantity and quality for surface and groundwater.
- g. To protect existing resources from further degradation and improve efficiencies of water uses.
- h. The management of water sources should integrate all the demand aspects of the resources including quality, economic values, unity of the managing institution and the legal framework. A successful management should achieve the following:
  - Promoting a dynamic, interactive, iterative and multi-sector approach to water management.
  - Planning for sustainable and rational utilization, protection, conservation and management of water resources
  - Designing, implementing and evaluating projects and programs that are both economically efficient and socially appropriate.
  - Identifying and strengthening or developing, as required, the appropriate institutional, legal and financial mechanisms.

### **Activities**

There are many options for minimizing, or managing the gap for future supplies. There are also some measures needed to create the enabling environment for the Ministry of Water and Irrigation or any water agency to perform effectively, to apply developments priorities through tariff policies, legislation, standards, and enforcement procedure. The following activities were proposed:

1. integration of measures for the protection and conservation of fresh water resources
2. development of interactive data bases
3. optimization of water resources allocation
4. implementation of allocation policies
5. Flood and drought management
6. promotion of scientific research
7. development of new and alternative resources of water such as:
  - supplying treated sewage effluent to meet industrial and agricultural demand
  - recycling and reusing industrial wastewater
  - using mostly surface water in the wet years to allow recharge of aquifers to be used in dry years
8. National policies, with specific approaches, such as:
  - Regulations regarding the use of water in rural and urban areas
  - Regulation regarding river pollution
  - Use and control of ground water and inter-basin transfers
  - Applying the concept of cost recovery
9. Improvement of community knowledge and behavior in using water, including rivers and wadis.

## **B. Water Resources Assessment**

### **Basis For Action**

Water resources assessment and monitoring are key issues in water resources development, management and planning. The planning and policy formulation for the utilization of water resources should be based on reliable assessment of these resources. Currently, there is a monitoring network for surface and groundwater resources, which consists of both manual and semi-automatic devices. Records show gaps, errors, and missing data due to malfunctions and/or human errors in data collection or processing.

### **Objectives**

Five specific objectives have been set accordingly, as follows:

- a. To make available water resources assessment technology that is appropriate to the country's needs, including methods for the impact assessment of climate change on freshwater

- b. To allocate financial resources to water resources assessment in line with the economic and social needs for water resources data
- c. To ensure that the assessment information is fully utilized in the development of water management policies
- d. To establish the institutional arrangements needed to ensure the efficient collection, processing, storage, retrieval and dissemination of information to users regarding the quality and quantity of available water resources at the level of catchment areas and groundwater aquifers
- e. To have sufficient numbers of appropriately qualified and capable staff recruited and retained by water resources assessment agencies and provides them with the training needed to carry out their responsibilities successfully

#### **Activities**

The Ministry of Water and Irrigation is upgrading the computer network and procedures used to store, process and analyze hydrologic data, in order to make such data and the forecasts derived from them available to potential users. The following activities were proposed:

1. Establish databases on the availability of all types of hydrologic data at the national level.
2. Identify the need for water resources data for various planning purposes.
3. Analyze and present data and information on water resources in the forms required for planning and management of the country's socio-economic development, for use in environmental protection strategies, and in the design and operation of specific water-related projects.

### **C. Protection of Water Resources, Water Quality and Aquatic Ecosystem**

#### **Bases of Action**

Degradation of both surface and groundwater resources is a major concern in Jordan due mainly to increased industrial activity, overexploitation and population growth. The avoidance of further deterioration of water quality and the ability to control the high consumption levels require serious action.

#### **Objectives**

- a. Maintenance of ecosystem integrity, according to the management principle of preserving aquatic ecosystems, including living resources and of effectively protecting them from any form of degradation, on a drainage basin bases.
- b. Public health protection, a task requiring not only the provision of safe drinking water but also the control of disease vectors in the aquatic environment, and appropriate wastewater treatment.
- c. Human resources development, a key to capacity building and a prerequisite for implementation water-quality management.

**Activities**

1. To identify the surface and groundwater resources that could be developed for use on a sustainable basis. Programs for the protection, conservation and rational use of these resources on a sustainable basis should be initiated.
2. To identify all potential sources of water supply and prepare outlines on water protection, conservation and rational use.
3. To initiate effective water pollution prevention and control programs based on an appropriate mixture of pollution reduction at source strategies, environmental impact assessments and enforceable standards for major point source discharges and high-risk non-point sources, commensurate with their socio-economic develop.
4. To participate as far as appropriate, in international water-quality monitoring and management programs such as the Global Water Quality Monitoring Program (GEMS/WATER) the UNEP Environmentally Sound Management of Inland Waters (EMINWA), the FAO Regional Inland Fishery Bodies, and the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention).
5. To reduce the prevalence of water-associated diseases.
6. To establish, according to capacities and needs, biological, health, physical and chemical quality criteria for all water bodies (surface water and groundwater), with a view to an ongoing improvement of water quality.
7. To adopt an integrated approach to environmentally sustainable management of water resources, including the protection of aquatic ecosystems and living freshwater resources through:
  - Rehabilitation of polluted and degraded water bodies to restore aquatic habitats and ecosystems
  - Control of noxious aquatic species that may destroy certain other species.
  - Conservation and protection of wetlands.

**D. Drinking Water Supply and Sanitation****Basis of Action**

Water demand in Jordan exceeds the available renewable water supply, as a result, groundwater levels are declining and water quality is deteriorating. The present rate of groundwater abstractions cannot continue and must eventually be reduced by almost half. The efficiency of service delivery for both irrigation and urban water supply is very low. The great proportion of renewable surface and groundwater resources has been utilized and exhausted. The remaining usable resources for future are gradually diminishing. The present water policy in Jordan includes elements of both supply expansion and demand management. Demand management may be less expensive, more sustainable and easier to implement than supply expansion. The surface water forms 65% of the total available resources. For this reason, the surface

water should be managed carefully to support the groundwater resources, which are being exhausted.

**Objectives**

1. Protection of the environment and safeguarding of health through integrated management of water resources and of liquid and solid wastes.
2. Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behavior, and the full participation of women at all levels in sector institutions.
3. Community management of services, supported with measures of strengthens local institutions in implementing and sustaining water and sanitation programs.
4. Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

**Activities**

- a. Create a comprehensive water quality monitoring system consistent with the resources management and regulations.
- b. Enforce water quality standards on the effluents of industrial and commercial units provided with water-use rights.

**E. Water and Sustainable Urban Development**

**Basis of Action**

A very high percentage of the Jordanian population lives in the urban centers. The urban-related environmental problems cut across several water resources management issues, such as:

- a. The introduction of sanitary waste disposal facilities based on technologies that is environmentally sound, low-cost and suitable-for-upgrading.
- b. Implementation of urban storm-water/runoff and drainage programs.
- c. Promotion of recycling and reuse of wastewater and solid wastes
- d. Control industrial pollution sources to protect water resources
- e. Protection of watersheds with respect to depletion and degradation of their forest cover, and harmful upstream activities

**Objectives**

- a. To ensure that all urban residents have access to at least 100 liter per capita per day of safe water to satisfy the population needs and to sustain the health situation, that 75% of the urban population are provided with on-site or community facilities for sanitation
- b. To improve the existing quantitative and qualitative discharge in the light of internationally acknowledged guidelines and in congruence with the national needs of the various socio-economic sectors and their sustainable development.

- c. To have ensured that 75% of solid wastes generated in urban areas are collected, recycled, or disposed of in an environmentally safe way.

#### **Activities**

1. Progressively integrate the management of storage and primary water delivery systems so as to optimize the management of the total resources in a flexible and efficient manner.
2. Prepare systematic water audits and master plans for municipal systems.
3. Improve and extend the water delivery service in an efficient manner.

In its attempts to adopt a progressive pricing system to secure the financial viability of water delivery agencies, the government will:

4. Enhance the existing block tariff system in urban areas so as to cover the O&M (Operation and Maintenance) costs of delivering municipal water services.
5. Regulate private water deliveries in urban areas consistent with resource management objectives and regulations of the quality of water used for drinking and domestic uses.

## **F. Water for Sustainable Food Production and Rural Development**

### **Basis of Action**

As a result of population growth in Jordan, improvement of standards of living, urbanization and industrialization, the demand on water by sectors other than agriculture has increased immensely. The agricultural sector today suffers from acute water scarcity. Encroachment of urban areas on agricultural land also reduces the area of rain-fed agriculture. These circumstances have adverse effects on attempts to achieve national food security.

The significant decrease in the amounts of water available to the agricultural sector makes it essential to consider all possible ways for the efficient management of irrigation water, the adoption of new water saving technologies and the improvement of rain-fed agriculture. These can be achieved through human resources development, applied scientific research, technology transfer, farmers' participation and institutional interaction.

Other common problems facing the agriculture sector include soil erosion, inappropriate agricultural practices, financial and market constraints and inability to consistently deliver products in adequate quantities and quality.

### **Objectives**

- a. Management of water resources for agriculture must be developed to: i) increase food production per unit volume of water, ii) improve human health, iii) improve the socio-economic conditions of the rural population, and iv) provide high level of food security at the national level.



- b. Groundwater resources should be considered as a finite resource having an economic value. Therefore, protection and conservation of groundwater resources should have high priority in the government policy when using this source for agriculture.
- c. Local communities shall be encouraged to participate in all phases of irrigation water management.
- d. Planning, developing and managing water resources for agriculture must be done in an integrated manner to meet present and future needs for agricultural production, taking into consideration environmental consideration.
- e. The development of new irrigation projects and the adoption of new technologies must be accompanied by an assessment of their environmental impact. Also, any new proposal should have the objective of increasing efficiency and productivity, with the involvement of water user groups.

#### **Activities**

- 1. Encourage cropping patterns that provide a high return on water or which make use of brackish water or treated wastewater, taking into account other constraints.
- 2. Promote modern irrigation techniques that achieve water savings on-farm while optimizing crop returns and farm incomes.
- 3. Reduce water losses in irrigation distribution systems by converting water conveyance from open canal to closed pipe system.
- 4. Support research institutions to enhance their activities related to the determination of crop water requirements, irrigation water management and optimum water use.
- 5. Prepare soil and water conservation and water harvesting projects for different river and Wadi basins.
- 6. Carry out research on the impact of reusing treated wastewater in agriculture and on new approaches for treating wastewater.
- 7. Carry out research to assist the effect of recycled water on plants, soil human health, and the environment.
- 8. Establish detailed legislation and standards that govern the reuse of treated wastewater in agriculture without endangering public health.
- 9. Have farmers manage water distribution along the line, ending the need for farmers to confirm deliveries individually.
- 10. Ensure that effluent quality conforms to water quality standards for use irrigation.
- 11. Provide training to farmers and JVA staff
- 12. Support the appropriate use of brackish water for irrigation.
- 13. Develop data, information, and standards for the reasonable water needs of each economic activity.

14. Introduce abstraction penalties for groundwater as compensation for depletion or deterioration of the source.

## **G. Impact of Climate Change on Water Resources in Jordan**

### **Basis of Action**

Air pollution in Jordan and the contribution of Jordan to world emissions causing the greenhouse effect and global warming, are minimal. It is estimated that 12 million tons of gaseous fumes are produced by the power plants. As average of 575 tons/annum of Chlorofluorocarbons (CFCs) is imported, of which 200 tons are re-exported in industrial products. This would amount to about 0.05% of total world consumption. As global warming scenarios for the next 50 years have been predicting a rise in global temperatures, this would result in a decrease in rainfall in Jordan with a disastrous impact on agriculture and water resources which would also be experiencing demographic pressures.

In the long term, Jordan is likely to be confronted by a severe shortage in the basic natural resources, water, which could be overcome to some extent through increased regional cooperation. Environmental problems and issues in Jordan are dominated by the critical need to manage the scarce common resource of water and cultivate land more effectively to meet the growing needs of population. These factors make Jordan very vulnerable to the impact of potential future climate change. As a result, there is an imperative need for Jordan to develop new policies or adopt existing ones of social and economic development that take into account the potential impact of climate change.

At present there is a limited database on the sources of Greenhouse Gas (GHG) emissions in the Hashemite Kingdom of Jordan and the potential options to reduce or control emissions. The current greenhouse gas emissions are estimated to be equivalent to over 1 million ton of carbon dioxide per year, but no thorough study has been undertaken to estimate the emissions by source. Similarly, no inventory of the sinks has been prepared. In short, the country capacity to develop adequately and assess the data needs that is mandated by the Convention on Climate Change needs to be urgently built up.

### **Objectives**

The very nature of this topic calls first and foremost for more information and greater understanding of the threat being faced. This topic may be translated into following broad objectives:

- a. To understand and quantify the threat of the impact of climate change on freshwater resources.
- b. To facilitate the implementation of effective national measures, if and when the threatening impact is seen as sufficiently confirmed to justify such action;

### **Activities**

1. To study the potential impact of climate on areas prone to droughts and floods.
2. A new will be undertaken on capacity building in Jordan to respond to the challenges and opportunities created by the national response to the Framework Convention on climate change. It will be funded under the Global Environment Facility.

## **H. Fresh Water Supply**

### **Basis Of Action**

Most of the freshwater supplies in Jordan are categorized as conventional groundwater resources. These resources are limited and in many case over drafted. The developed groundwater quantities in 1995 were 445 MCM/year from renewable aquifers and 62 MCM/year from non-renewable basins. The safe yield from the renewable aquifers is estimated at 276 MCM/year, which means that about 170 MCM/year are being over-pumped. This over exploitation of freshwater resources imposes a major constraint on sustainable water development. Over 80% of the tapped water is fresh groundwater exploited with different quantities and qualities at varying depths ranging from few meters to more than 1000 m.

A number of constraints are recognized within this program area. This can help in defining the action plans for achieving the objectives. These constraints are described as follows:

- a. Shortage of conventional surface and ground water resources in the country.
- b. Growing demand for first water in all sectors (municipal users first, irrigation second and food industries third). This will widen the gap between demand and supply.
- c. Developing new freshwater resources is very expensive and cannot be afforded by certain sectors such as agriculture.
- d. Due to the over-exploitation of groundwater, and the mixing of the surface water with reclaimed wastewater, part of the fresh water been changed into brackish.
- e. The most important conventional fresh water resources are shared with neighboring countries, including the DISI Aquifer in the south and Yarmouk River in the northern part of the country. No water agreements are available at present for these two sources.
- f. Fresh water losses and the unaccounted-for-water in the national distribution network amounted to 80% in one of the Governorates (Mafraq).
- g. Using the fresh water resources for irrigation purposes with low efficiency and high losses, such as the irrigation in the highlands and at Disi-Mudawara area.

### **Objectives**

- a. Define the balance of water demand and supply for the different sectors (Municipal, Irrigation and industrial).

- b. Define the gap of fresh water in Jordan vis-à-vis the different purposes for the short, medium and long term planning.
- c. Introduce the solutions, ways and means to bridge the gap.

### **Activities**

In order to reach the sustainable development of the available fresh water, taking into consideration the previous constraints, the following activities were proposed:

1. Raising the efficiency of water supply networks to reach the standard of the developing countries (85%).
2. Setting a priority scale for different purposes. The first priority of using the fresh water is for the municipal sector, then the food processing industrial sector, followed by the irrigation sector and finally other industries.
3. Developing the available conventional water resources after conducting the required feasibility studies and securing the financing.
4. Activating and concluding water treaties with the neighboring countries to achieve our water rights for the surface and ground water.
5. Developing a number of non-conventional resources, such as desalinating the brackish water in the areas close to the demand centers. Seawater desalination may rise in the future after becoming economically feasible.
6. Rationalizing fresh water usage by the domestic sector,, to safeguard water quality.

## **I. Institutional and Financial Structure**

### **Basis for Action**

Present institutional arrangements in the water sector are demonstrably inadequate to meet the challenges facing Jordan. Institutional restructuring is an essential requirement for better water resource management. Other requirements include: evaluation of the quantity and quality of renewable and non-renewable groundwater, completion of specific studies on brackish water and deep groundwater and modernization of the surface water and groundwater monitoring systems with respect to both quality and quantity.

Public and private sectors have to recognize that water is an economic commodity rather than social entitlement and that charging a price reflecting the real cost for its use is the best incentive to all consumers to value it, protect it and use it efficiently.

Cost recovery requires efficient and effective services that will recover the cost of water supply and deal with metering and billing, as well as the costs of wastewater collection, treatment and disposal, illegal connections and leakage. Although the costs of rehabilitation projects for the government are estimated at JD 201.5 million, financial and economic analyses are not yet available.

### **Objectives**

It must be recognized that, in order to achieve or to implement a successful and sustainable water resources management, the institution serving as Authority must be strong, organized and empowered. The following broad objectives were identified:

- a. A practical policy on tariffs, which includes the generation of revenues to cover operation and maintenance costs and debt servicing, and to provide an adequate contribution towards capital investment financing.
- b. Incentives for working in both the collection departments and operation divisions.
- c. Creation of a national committee empowered and well equipped to resolve water rights issues, determine priorities, and establishes rules and regulations for the protection of catchment areas, rivers and aquifers from pollution or excessive use and to integrate land-use planning with infrastructure strategies.
- d. Legislation and enforcement preventing the discharge of untreated industrial wastes into watercourses.
- e. Encouragement of industries to implement modern recycling and wastewater reuse techniques, which minimize waste.
- f. Enforced metered connections by applying fines and penalties to illegal users.
- g. Encouragement for industrial development which favors least pollution industries.
- h. A fee-system for industrial waste discharge based on both quality and quantity that would significantly encourage on-site pretreatment to control effluents according to standards, or to combine their discharges for treatment in a common facility. However, a fee-system approach must go in parallel with efficient monitoring and enforcement. The fee-system would reduce water usage and waste disposal, especially after being coupled with the program to minimize industrial waste.

### **Activities:**

1. Institutional and legislative changes
2. creation of a national agency empowered and well equipped to resolve :
  - Water rights issues.
  - Undertake water allocations
  - Protect catchment areas, rivers and aquifers from pollution or excessive use
  - Integrate land-use planning with infrastructure strategies.
3. Strengthen the role of Ministry of Water and Irrigation.

### **Conclusion And Recommendation**

An action-oriented national agenda for sustainable development in the present century- Jordan's Agenda- has been prepared. The work of all national experts, which includes review the key sustainable development challenges facing Jordan and the best

way to meet these challenges, has been integrated into a single document, and what presented here is just the integrated of water resources. The important issues that will play the major role in success this Agenda include:

1. Achieving the objectives of Jordan's National Agenda-21 will require a concerted national effort involving new political, social and economical partnership.
2. To make the transition to more sustainable development, Jordan will need to build its domestic capacity for addressing a wide range of sustainable development challenges describe in detail in the national agenda. Capacity building for sustainable development will need to integrate Jordan's indigenous knowledge and cultural heritage with modern knowledge and technology.
3. Participatory process: Jordan's Agenda 21 was developed through an extensive participatory process that forged national consensus while building national capacities and strengthening the sense of ownership of the country's sustainable development agenda.
4. A sustained, concerted effort is needed to ensure effective implementation of Jordan's Agenda-21. A national Agenda-21 committee, representing government, NGO and private sector will need to periodically review progress towards the goals of agenda, and review these goals from time to time to ensure they remain relevant to Jordan's evolving circumstances.

## الإدارة المتكاملة لتطوير مصادر المياه: الإستراتيجية الأردنية

عصمت منصور الكرادشه

المركز الوطني للبحوث الزراعية ونقل التكنولوجيا - عمان - الأردن

أصبحت قضية ندرة المياه في المناطق الجافة وشبه الجافة من المشاكل المعروفة، وقد دلت الدراسات أن 80 دولة والتي يشكل سكانها حوالي 40% من عدد سكان العالم يعانون من نقص حاد بالمياه. الأردن، على سبيل المثال، من الدول ذات المصادر المائية المتجددة المحدودة، وفي الوقت الحاضر ومع الازدياد المطرد للنمو السكاني والتطور الاقتصادي بالاضافة إلى الاستخدامات المائية غير المستدامة الفائقة. فقد صنّف الأردن من الدول الأكثر فقراً مائياً والتي حصة الفرد الواحد من المياه تعدت حد الفقر المائي. يشكل القطاع الزراعي أكبر مستخدم للمياه في العالم حيث يستهلك ما معدله 80-90% من الموازنة المائية لأي دولة. فالأردن مثلاً يستهلك القطاع الزراعي ما يزيد عن 70% من مجموع مصادره المائية. ولسوء الحظ فإن كفاءة استخدام المياه في الزراعة قد لا تتجاوز 50% والباقي يضع هدراً مما يدل على أن هنالك كمية لا بأس بها يمكن توفيرها من القطاع الزراعي. ونظراً لازدياد التنافس بين القطاع الزراعي والقطاعات الأخرى على المياه فقد ازدادت أهمية موضوع إدارة المياه واستخدامه بكفاءة عالية وخاصة في القطاع الزراعي، المستهلك الرئيسي للمياه، لما له من أهمية في توفير الغذاء والتجسير بين العرض والطلب. يتركز الحل لمواجهة شح الموارد الزراعية وحسن إدارتها في العمل بمفهوم الإدارة المتكاملة، باعتباره قاعدة أساسية في السياسة المائية وتطبيق الاستراتيجيات الفعالة، اخذين بعين الاعتبار علاقة المياه بالخصائص الجغرافية والمناخية والاجتماعية والسياسية والاقتصادية والدورة الهيدرولوجية للبلد. قامت الأردن ونتيجة لإدراكها بالوضع المائي الحرج الذي تعاني منه خلال الأعوام الأخيرة بمراجعة وتطوير استراتيجياتها وسياساتها المائية، والأخذ بمجملتها من التدابير المؤسسية والتشريعية والاقتصادية التي تهدف إلى ترشيد إدارة الموارد المائية والحفاظة عليها، توصلنا إلى تطبيق الإدارة المتكاملة للموارد المائية وإعداد استراتيجية للإدارة المتكاملة لمواردها المائية المحدودة بأسلوب علمي حديث يعتمد على الظروف السائدة والمعطيات المتوفرة.