

Building blocks of effective water governance in the Arab region

This chapter provides an in-depth description of the major building blocks of effective water governance. These building blocks include reorienting water policy, enforcing legislations and regulations, financing the water sector, developing organizational capacities, monitoring and evaluating, managing data and information, coordinating regional and international cooperation, educating and raising awareness, promoting stakeholder participation and empowerment, ensuring water rights and social equity, increasing water use efficiency and improving links between research and management.

Effective water governance in the Arab region consists of several mutually reinforcing blocks, including policy reorientation, institutional reform, stakeholder empowerment, and R&D. The ultimate goal is to establish efficient water management practices that align with socio-economic and environmental conditions. Overall local, regional and global governance affect water governance, as do socio-economic realities and aspirations. Other influencing factors include food security, climate change and the water-energy nexus.

Reorienting policy

Formulating water policy involves many decisions, actors and processes. There are two policy-making models. In the first—the linear, idealized, input-output model—the typical stages are inputs (the policy’s basis), content, implementation and a feedback loop. In the second, nonlinear model, actors with different interests, stakes and powers try to influence

the outcome. The actors and process depend on the challenges the policy is intended to address. The nonlinear model reveals some of the critical factors that now shape policy. Because policy must be implemented at local levels, local organizations and regulations greatly affect water management and the potential for effective water governance.¹ Interventions and priorities may change depending on the situation or place.

Shifting from crisis management to sustainable effective governance

The region’s natural water scarcity puts continual pressure on water systems and institutions. Water management has functioned mostly in crisis mode to meet rapidly escalating demands. The objective has been simply to provide water to as many people as possible. Unfortunately, principles and practices of effective water governance have been ignored and social, economic and environmental dimensions disregarded. Effective governance practices, including engaging stakeholders

and addressing equity issues, have rarely been implemented. Short-term solutions to “put out fires” have prevailed over long-term planning. In many cases, institutions responsible for formulating policy have had conflicting and/or ambiguous mandates and little effective coordination.

Several countries, such as Bahrain, Djibouti, Egypt, Jordan, Lebanon, Libya, the State of Palestine, Saudi Arabia, Syria, Tunisia and Yemen, have national water policies, plans or strategies that incorporate many IWRM elements, and thus effective water governance. Several have striven to improve accountability and stakeholder involvement in water decisions. But these efforts are not yet reaching their intended goals. Transformation to a more flexible, adaptive water management system must go hand-in-hand with growth and economic diversification. People must better understand the forces that lead to policy development and ensure that policies are implemented. Improved accountability and other governance mechanisms inside and outside the water sector will be crucial for this transformation.

Despite progress, the Arab region still faces water scarcity due to inadequate physical resources, organizational capacities and accountability.² Governments have invested heavily in engineering-based, supply-driven programmes and projects. Wells have been dug, water channels extended and dams erected to enhance supply and storage. But the challenge of meeting escalating water demands persists.

A new approach to water governance is urgent. To address the widening gap between supply and demand, one should encourage practices and policies that can sustainably manage demand. The top priority for adaptation in the water sector should be reducing the vulnerabilities of poor and disadvantaged people.

The political will to provide effective water governance

Strong political will is a fundamental requirement for good water governance. It is a prerequisite for economic, legal and institutional implementation of plans for effective water governance.

The Global Water Partnership Framework for Action stated that the “water crisis is often a crisis of governance” and identified effectiveness as one of the highest priorities for action.³ Effective water governance has been reinforced and built upon in many declarations and conference statements at the global level by ministers and heads of states (for example, the 2000 Hague Ministerial Declaration, the Bonn 2001 Freshwater Conference, the UN 2000 Millennium Assembly and the 2002 World Summit on Sustainable Development). At the Bonn Freshwater Conference in 2001 ministers recommended action in three areas, with water governance being the most important. They proposed that each country make applicable arrangements for water governance at all levels and accelerate water sector reforms where needed.

But despite these commitments, there seems to be only limited success. The most important impediment is the dominance of hierarchical and market-led—rather than distributed—governance systems (Box 5.1).⁴ We must raise the political will to overcome obstacles to change; we must develop and reform our water institutions and establish an enabling environment for IWRM principles and policies. Examples of good, though limited, water management practices in the Arab region include:

Consolidating fragmented water institutions under one authority and separating the water authority from agriculture (the main water consumers) (for example, Saudi Arabia, Yemen).

Establishing higher water councils for setting water policies and coordinating water institutions (for example, Algeria, Bahrain, Egypt, the State of Palestine and Qatar).

Implementing demand management in agriculture based on community actions and cumulative knowledge (for example, Tunisia)

Developing water policies and strategies based on consultations with stakeholders, including government officials, politicians, water user associations, local communities and the private sector (for example, Egypt, Jordan, Morocco, Tunisia and the State of Palestine).

Hierarchical governance: Part of modernization is the evolution of governance from top-down, hierarchical systems with centralized institutions to more decentralized administrative settings. There is no evidence that decentralized systems are more effective than centralized ones. But what works in particular settings? There is an ever-widening gap between countries that have moved towards subsidiarity—performing functions at the lowest effective level—and countries that remain centralized and stagnant. The above-mentioned forces for change will have an even greater impact in poorer countries, as expectations rise for a better quality of life. There is a growing dissatisfaction with ineffective but costly state machinery, lack of vision or leadership, weak financial discipline and political dictates that cripple administrative functions. In distributed governance, rich and poor countries are growing apart; more mechanisms exist in developed countries to establish the required new governance systems. Less developed countries must establish their own governance systems by learning from, but not imitating, models from richer countries with different historical and cultural backgrounds.

Market-led governance: With the end of the cold war, many proposed the market as the solution to economic growth, social equity and environmental problems. This led to deregulation, greater private sector involvement

and a changed role for the civil service and civil society. This restructuring reduced government control and promoted private enterprise, with the market as the superior resource allocation mechanism.

Today the laissez-faire market-led model is often considered simplistic (hierarchies may not work well, but markets do not necessarily work well either in all situations) and not representative of wider societal values. More people are examining new instruments and forms of exchange between state and society to ensure political control and societal support, such as partnership, co-management, co-governance and distributed governance.

Distributed governance: Local networks (civil society, private sector) and global networks (international organizations and NGOs), even as they support the state's development goals, are challenging the state's role of "directing" or "steering" society. Many politicians (mainly in the West) now see the state as part of the problem rather than the solution. Reversing the post-Second World War ideology of a hierarchical central state caring for its citizens, they are calling for a return to smaller government. Neither the state nor the private sector can solve societal—especially socio-environmental—problems alone.

Source: Rogers and Hall 2003.

Decision-making processes: Centralization versus decentralization

Community organizations and non-governmental organizations (NGOs) in the Arab region are becoming more involved in planning processes.⁵ Consulting with stakeholders and, if necessary, revising investment programmes will strengthen accountability in water governance and management. Decentralization could improve relations between central agencies and local communities in water production and distribution. Democratic decentralization would promote cooperation with central agencies and encourage poor people to express their demands and satisfy their needs.

Implementation and monitoring

Governments often fail to implement and monitor policy reforms. "There is a tendency to separate policy-making processes from implementation and monitoring. The problem is that policy-making is ascribed to decision-makers,

while implementation is linked to administrative capacity. This way of thinking is too rigid and fails to acknowledge that policies are often modified as they move to local levels for ultimate enforcement. Policy-makers should not escape the responsibility of implementation and making sure that adequate capacities and funding is available for effective implementation."⁶ Monitoring is the "interactive link" between formulating policy and implementing reform. With effective monitoring, policies can be fine-tuned, allowing for financial reallocation between reform priorities. Stakeholders must also be able to monitor the quality of decisions and how they are implemented. Noncompliance with and unenforceability of water reforms are due mainly to lack of inspection and monitoring capabilities; lack of procedures and rules for investigating violations and assessing penalties; and lack of empowerment and authority to compel compliance through court actions. Arab countries should develop

monitoring indicators for water reform progress and impacts. Establishing a regional monitoring system—particularly for transboundary waters—could contribute to better understanding of problems and promoting solutions. Indicators should be structured to monitor and assess the enabling environment, institutional frameworks and management instruments.

Many Arab countries are changing their water governance practices through policies, legislation, regulations and monitoring systems. The Third International Forum on Water Governance in the MENA Region in Marrakech, Morocco, 9–13 June 2008, identified the main impediments and action mechanisms for policy implementation. The forum strongly recommended establishing effective water monitoring systems with clearly defined benchmarks and indicators.⁷

Reforming institutions

Institutions are more than organizational structures. They consist of three interactive components—law, policy and administration—that create norms, rules and legal systems affecting natural resource governance and management.⁸ Institutions comprise systems of laws, regulations, decrees, organizational arrangements, customs, markets, and economic and financial instruments.⁹ Institutional frameworks are influenced by the socio-economic, political and resources-related conditions they operate in, but can significantly affect incentive and disincentive structures. If appropriate, such structures can serve environmental protection and social needs.¹⁰ Institutions involve not only formulating and enforcing policy, but also distributing decision-making among authority levels, both vertically and horizontally.

Arab countries are behind in reforming their water sectors.¹¹ Weak institutional frameworks are frequently to blame. Implementing new legislation proves to be rather slow because of lack of financial resources, insufficient technical equipment and human resources, lack of political will to enforce legal regimes that contradict local institutional regimes, and the vested interest of political and economic elites. The

efficiency of existing institutions, the extent and effectiveness of enforcement capabilities and the potential net benefits of their enhancement affect the enforcement of laws and regulations.¹²

There is almost a consensus about a few basic principles. “A good framework for initiating and advancing water policies will not be achieved without an interaction of knowledge and politics within an institutional setting. However, the water policy environment in Arab countries is far more influenced by the politics of entrenched interests and asymmetric power relations than by a knowledge-based discourse. Water stakeholders do not have well-developed institutional mechanisms to get their voice heard.”¹³ Proper institutional arrangements can directly contribute to the success or failure of good water governance practices, including designing, executing and managing water projects.

Human resources cannot develop fully without adequate institutional capacity, including the resource base and management capacity. The resource base comprises the organization’s personnel, facilities, technology, knowledge and funding; management capacity comprises procedures, programmes and external relationships.

Several Arab countries are improving water and sanitation institutions to address problems “such as unclear lines of responsibility for operations, low tariffs and political interference in staffing policies and other aspects of operations.”¹⁴ They are shifting to more client-oriented approaches and making governance more efficient, transparent, accountable and equitable. Successful examples from Egypt, Jordan, Morocco and Tunisia mostly involve private companies.

Capacity building and development

Deficiencies in human resources are key contributors to water scarcity. Capacity building, training and organizational development constitute a cornerstone for developing the water sector.

Capacity development requires enhancing human resources, strengthening institutional capacity and creating an enabling environment to end the current divides that hinder sustainable

development. A successful organization should develop an efficient decision-making structure, an effective partnership with all stakeholders, “a spirit of transparency, sharing responsibility and delegation with accountability, a sense of ownership by all involved and attractive term of services for its employees.”¹⁵ The 2008 establishment of the Arab Water Academy of the Arab Water Council as well as the Arab Water Ministers Council may provide important opportunities for capacity development.

Coordinating institutions

Good governance requires good relationships between relevant organizations with separate mandates and responsibilities. Most of these organizations—whether community- or government-led—have little formal or practical authority and insufficient resources. Interagency competition for budgets and other resources impedes coordination. As competition for water from sectors (for example, hydropower and agribusiness) and users (for example, upstream and downstream) increases, major challenges remain, such as clarifying mandates, coordinating agencies, collaborating across sectors, managing disciplinary and administrative boundaries, and planning multisector/multi-stakeholder consultations. Governance must be both top-down and bottom-up and embedded into all spheres of water management.

Coordination between different water-related institutions in any Arab country is a major water governance issue (Box 5.2). Rivalries between water institutions are common, and the responsibilities of each body are not always clearly established. Inefficient water delivery is often the outcome. There is an urgent need for institutional reform in almost all water-related institutions.

Transparency and accountability

Dialogue and participation are not enough to achieve good governance. They must be targeted towards correct decisions based on clear consensus. Stakeholders must be able to monitor the quality of decisions and how they are implemented and compare performance with that of other regions or countries. This process will improve the likelihood of good decisions.

Box 5.2

Polycentric governance

Polycentric governance systems disperse political authority to separate bodies with overlapping, non-hierarchically related jurisdictions. Adaptive management literature suggests that a management system should have multiple centres of power (polycentric) rather than one (monocentric). Skelcher (2005) suggests that even with state-centric models, governance was never completely monocentric. Today the “old-fashioned” mutual exclusivity between jurisdictions operating at the same level and the rational, hierarchical ordering of jurisdictions at different levels has been abandoned. Replacing it is a system with a more diffuse underlying order, a different division of authority and a more complicated set of hierarchical relationships and “political spaces.”

The suggestion behind polycentric governance was that local communities all face their own problems and that their skills and local knowledge place them in the best position to address these problems. Polycentric governance systems are supposed to be more resilient and better able to cope with change and uncertainty. Issues with different geographical scopes can be managed at different scales, and polycentric systems have a high degree of overlap and redundancy, making them less vulnerable—if one unit fails, others may take over its function. Polycentric governance systems may also exhibit certain disadvantages. Economies of scale may be lost, for example, especially if the basic units in the system are very small. Collective decision-making is also difficult because of the need to accommodate spatial and functional patterns and complexities. Coordination becomes crucial. If coordination fails, unnecessary duplication of efforts and counterproductive actions may result.

All water management systems are polycentric in different degrees and ways. Tasks and competencies may be shared within the governmental sector, but also between the government and the non-governmental sector. There is little evidence that polycentric systems are more flexible and less vulnerable than monocentric systems, or that they reflect local conditions and preferences better or allow more experimentation and learning. But many case studies of individual polycentric water management systems suggest that this type of management is indispensable.

Source: Quoted with minor adaptation from Huitema and others 2009; McGinnis 2000; Hajer 2003.

Transparency is not an end in itself, but authorities should be held accountable. Accountability makes good governance much more likely.

Water allocations based on social priorities, not the needs of small special-interest groups, require strong mechanisms of external accountability. Increased education, urbanization,

open access to information and decentralized decision-making could help transform societies and allow them to be more critical of decision-makers. Traditional knowledge and customary practices should also be re-examined. To improve water management, the expertise of water professionals is not enough. Academia, the media, advocacy groups, water user associations and other parts of civil society should also be involved in a well-informed decision-making process. Arab countries must set up the kind of institution that ensures this role (for example, a national water council). It will also require accountability between users and governments, between governments and service providers and between users and service providers.¹⁶

Because opaque power structures can breed corruption, anti-corruption measures are central to equitable and sustainable water governance. Good water governance must combat corruption through awareness, decentralization, transparency and programmes on water integrity and accountability. Above all there must be political will.¹⁷

Data and information management and sharing

The Arab region continues to be affected by extreme weather events that are increasing in severity and frequency and putting great stress on water supplies. These conditions make reliable water data even more critical for sustainable water management. One of the biggest challenges to water management is lack of attention to the systems that collect and monitor water data. Without water data, it is nearly impossible to allocate water efficiently.

Better water data support decision-making at every scale. At the local level, access to better water data helps improve the reliability of irrigation flow. At the river or aquifer basin level, data support larger planning efforts such as balancing water demand from agricultural, municipal and industrial sectors or allocating water for environmental flows. Data can also improve the equity and transparency of decisions and support the establishment and monitoring of roles for water quality. Similarly, access to data can help farmers make better decisions about what and when to crop and how much fertilizer to add.

Options to better monitor, collect and process water data are increasing every day. Technological development can help water gauging and monitoring become cheaper, easier and less time-consuming. Once installed, many gauging stations can be monitored remotely by satellite or by mobile phone. Similarly, database and geographic information system technologies have made storage retrieval and spatial information display straightforward and easily accessible. Exciting new advances in remote sensing technologies have recently opened up the possibility of monitoring major changes in groundwater level using gravity data.¹⁸

Open, free access to water data can improve decision-making. Research centres must be the first beneficiaries of the database. Data collected has a cost and an economic value. The final objective is not to have data but to use it—most important, to determine the cost and impact of efforts to improve water management. The need for data from the watershed level is high because of the impact of climate change and of water harvesting infrastructures on the watershed and upstream dams. To develop prevision and management rules, one needs to review all data.

Collecting and monitoring high-quality data and information should be the goal of all water planning and management institutions. Modelling future water scenarios is only possible if there is access to reliable water data for essential information about responses to rainfall events, flood hazards, seasonal flow variations, groundwater level changes and the impact of major extractions on flow. Access to data is a prerequisite for understanding how water economies function and the various ways water is used, managed and shared. Access to appropriate data is also the best way to discuss transboundary water sharing, provide bases for water allocation and also provide a moving picture of the impact of climate change on water resources and the environment. Sharing accurate data can improve policy responses to climate change. It is therefore important to overcome institutional barriers to data sharing.

To ensure data quality, reliability and consistency, one authority should be responsible for data collection and standardization. To

maximize data value, data should be freely available to all stakeholders, including government agencies, farmer and user associations and the public (Box 5.3).

Legislation and enforcement

Water legislation plays an important role in formulating water policies and strategies. It provides the legal framework for water governance, institutional reform, regulatory standards, management systems and enforcement of regulations.

Most Arab countries have made efforts to develop the institutional and legislative framework for good water governance. But although they have formally adopted IWRM, they still lack legislative instruments to support its implementation. New, exacerbated challenges, such as water tariffs and cost recovery, require innovative tools, such as decentralization, the participatory approach, building local authorities' technical and financial capacities, promoting dialogue and consensus, ensuring effective enforcement and compliance and strengthening water institution performance.¹⁹ This does not negate the advancement in several Arab countries. Many new ministries or independent water management authorities have been founded at decentralized levels to support environmental protection. A series of capacity-building IWRM initiatives have been undertaken to help formulate and monitor water policy and evaluate the water system.

Other countries have focused on privatization by establishing new companies, such as the Water and Electricity Company in Saudi Arabia, or forming committees to study privatization of power generation and water in Bahrain. Several legislative steps have aimed to enhance the proposed institutional reform measures, promote decentralization and participatory water resources management and strengthen private sector involvement in water infrastructure projects (for example, Law 5/23 for power generation and water in Saudi Arabia and Sanitary Law/2002 in Qatar). In Jordan water laws have been implemented to support institutional reforms, such as Law

Box 5-3

Data and information availability

The Arab region is continually threatened by natural disasters. Although most current predictions are based on outdated information, the situation is expected to worsen. In recent years many Arab countries have suffered severe floods that have claimed thousands of human lives, such as the Algeria flood in 2001, and billions in economic damage, such as the Saudi Arabia floods in 2010 and 2011 and Oman in 2007. But water scarcity remains the severest water dilemma facing the region. Given rapid urbanization, population growth and consequences of climate change, FAO projections show that many Arab countries are expected to experience severe water shortages by 2050. As reported in the 2008 Intergovernmental Panel on Climate Change report, the MENA region will suffer from high temperatures, decline in rainfall and reduced flows. Scientists and researchers in many Arab countries lack data that would allow them to help redress government policies. Arab countries must enhance institutional regulations, use advanced scientific models, promote capacity building of skilled professionals, ensure transparent stakeholder involvement and promote public-private partnership in services and decision-making. They must also ensure a knowledge hub for collecting data and disseminating and sharing information, in line with advanced technology.

Source: El-Ashry, Saab, and Zeitoon 2010; FAO 2002; IPCC 2008; Merabtene 2011, background paper for the report

30/2001 to clarify the roles and responsibilities of the Jordan Valley Authority, Law 54/2002 on public health, Law 85/202 to regulate groundwater usage and Law 12/2003 on environmental protection.²⁰ In Tunisia the Ministry of Agriculture is updating water laws to better enforce participatory management and further preserve groundwater. Finally, in Lebanon, Laws 221 and 241, published in May and August 2000, respectively, and Law 337 issued in March 2002 established a new institutional policy for water management, setting new competences for the Water Establishments and the Ministry of Energy and Water. In 2012 the parliament promulgated a National Water Sector Strategy. Because institutional and legal frameworks vary among Arab countries, it is necessary to define roles and functions, time schedules, degree of responsibility, relations to stakeholders, communication channels and investment and monitoring plans. To ensure

Assess, update and/or amend water legislation and associated bylaws and requirements using a participatory approach involving all stakeholders to ensure public support for compliance through multistakeholder platforms.

Promote compliance by disseminating and communicating water legislation, publishing relevant information, encouraging compliance during the transitional grace period and providing technical advice, and incentives for compliance.

Enforce legislation by:

- Developing competent inspection capacities, credible monitoring, accredited and standardized measuring systems, a registered chain of custody and a certified reporting system.
- Preparing procedures for investigating violations and rules for assessing penalties.
- Identifying measures to compel compliance without resorting to formal court action using administrative actions.
- Developing measures to compel compliance through court action by engaging well-trained judiciaries.

Source: UNDP-WGP-AS 2011.

policy coherence and to enhance cooperation and coordination among stakeholders, it is vital to set up a national interministerial water council (NWC) at the highest political level. Several Arab countries have already done this (Annex II). Current water laws and regulations should also be modernized to implement IWRM policies and plans. Compliance with standards and regulations in the water laws in coordination with other enforcement channels would not be ensured without the empowerment of inspectors and officials in water, health and environmental institutions.²¹

Compliance with water regulation in the Arab region is weak. Overlooking enforcement has led to the spread of a “social value or a culture” that tolerates noncompliance and considers the cost of compliance avoidable. Relevant government bodies (local administration, police, legal, etc.) must work hand-in-hand to enforce water law, bylaws and decrees, especially in regulating groundwater abstraction and preventing illegal well drilling. Community-based water management is a critical component of overall water resource

management and enforcement of laws and regulations, so water user organizations (for example, irrigation councils) should be an integral part of water resource management and decision-making and should be empowered to generate income from membership or other services to support their functions and assist in enforcing laws and implementing water management plans.²²

Several measures are needed to promote compliance with Arab water legislation (Box 5.4) and its enforcement. These include information dissemination; technical assistance; economic incentives; involving NGOs; public support and partnerships; publicizing success stories; and education and awareness for all stakeholders, including journalists, reporters and judges of water conflicts. Several measures are also needed to improve capacity building among water users. These measures can include improving monitoring and inspection capacities, establishing self-monitoring, self-record keeping and self-reporting systems, enhancing area monitoring capacities, encouraging citizen complaints, developing criteria to ensure predictable responses to violations and developing capacities to produce credible evidence for indictment when water law violations occur.

The 2011 UNDP-WGP-AS report suggests three feasible approaches for enforcing water legislation in the Arab Region: a command and control approach, a market-based/economic incentive approach and a risk-based and participatory approach. The command and control approach advocates regulators as the centralized authority for spectrum allocation and usage decisions; the market-based/economic incentive approach relies on market forces to correct for producer and consumer behaviour; and the participatory approach involves stakeholders in management and aims to enable them to exchange views and opinions on problems. These approaches can vary among countries, but it is important to keep good governance in economic, environmental and social perspectives. Many experts argue that promoting compliance and enforcement is the most effective strategy to ensure equitable and sustainable sharing of water resources

Empowerment: exploring new levels

Stakeholder participation

Integrating all relevant stakeholders into the discussion around distributing water resources is a very important aspect of good water governance. It is essential to provide marginalized people with a voice in the discussion process—for example, to defend water requirements for preserving ecosystems and their values and functions.

Water governance in many Arab states has traditionally taken place at the local level. Oasis communities in many areas continue to allocate water among individuals, and quality is maintained through resource ownership responsibilities.²³ Informal irrigator councils around the springs in Mount Lebanon still govern the resource without government intervention. In the 20th-century drive towards developing supply and irrigation, new institutional structures emerged to manage the nation's water resources.

Until recently water management in the Arab region was highly centralized and managed mostly at the national level with little local stakeholder or civil society participation, resulting in ineffective, fragmented structures. Water responsibilities were scattered among government departments, bureaucracy and inefficiency influenced decision-making, and action was slow and non-transparent. Various actors had their own roles, rights and responsibilities, with often conflicting interests in managing water resources.²⁴

Local community stakeholders and user associations are established in Egypt, Jordan, Lebanon, Libya, Morocco, Oman, Tunisia and Yemen. The Arab region's recent experience shows that some of the water user associations have been established through a bottom-up consultative approach, where authorities have conferred with ordinary water users (Box 5.5). This helps to bolster participation, improve farmer welfare and develop irrigation and drainage by providing an alternative to public utility monopolies.²⁵

Interest groups ensure that policy-makers and service providers are subject to the consequences of good and bad performances. The

Box 5.5

Pioneering water user associations in Lebanon: the Association of the Friends of Ibrahim Abd El Al

When the Lebanese government launched the “Conveyor 800 scheme” for irrigation and potable water in South Lebanon, it recognized water user associations' central role in implementation. The project, which will irrigate an area of 14,700 hectares and provide potable water for approximately 100 villages, is vital to an area that has suffered decades of Israeli occupation.

The Association of the Friends of Ibrahim Abd El Al (AFIAL) initiated a pilot project to establish a work methodology for the designated area. The pilot project was funded by the Lebanese Recovery Fund (LRF), under the management of the United Nations Development Programme and in partnership with the Litani River Authority. This project sets the infrastructure for the distribution network, shows the advantages and efficiency of modern irrigation techniques, proposes new cropping patterns in the region with their socio-economic impact and supports the establishment of water user associations, with a direct impact on the livelihoods of at least 1,250 households within 5 communities impacted by the July 2006 war in Lebanon, covering an area of 522 hectares and benefiting more than 1,259 farmers.

AFIAL is responsible for preparing the legislation and the creation and implementation of the pilot water user associations. It implemented communication campaigns with the farmers and conducted capacity-building workshops locally and in Italy.

Source: UNDP 2011.

Box 5.6

Public participation in water management

Public participation in water management should take full account of the rights and responsibilities of the public and public authorities. At the national level, states are encouraged to guarantee legal rights for the public on access to information, public participation in decision-making and justice in environmental matters. States should adapt their national legal systems as necessary.

Source: UNECE 2000b.

more inclusive, transparent and accountable systems are, the more likely it is that the changing political circumstances will lead to opportunities for beneficial water reform. Stakeholder involvement is central to improved water management and governance, especially in decision-making. Water users, water service

In 1986 Jordan's Royal Society for the Conservation of Nature (RSCN) introduced environmental conservation clubs in single-gender primary and secondary schools throughout the country. The eco-clubs initiative aimed to protect the country's indigenous animals. In the face of increasing water scarcity and a rapidly growing population, RSCN introduced the water conservation focus in the mid-1990s. USAID/Jordan asked GreenCOM, an environmental education and communication project active in 28 countries, to provide technical assistance to this new programme in research, teacher training, evaluation and curriculum development and implementation.

In 1994 GreenCOM conducted formative qualitative research on a sample of RSCN eco-clubs representatives from 10 schools in different parts of the country. The themes included in the interviews and focus groups covered knowledge of Jordan's water situation; water shortage and pollution; attitudes towards water problems and roles and responsibilities in solving those problems; and water conservation practices at home, in school and in the community. Initial findings indicated high levels of awareness of water shortage and pollution among teachers and students. Nevertheless, respondents were not convinced that they could take effective action to ameliorate Jordan's water problems and felt that any solutions were the government's responsibility. The unavailability of technical materials on water conservation in the eco-clubs was also noted.

The project partners to develop a secondary school water conservation curriculum used these findings. The curriculum was divided into five units covering the natural water cycle and water sources in Jordan: irrigation, pollution, home gardens, household water consumption and groundwater and surface water. The curriculum emphasized the importance of engaging students in discussions and hands-on experiments to help them understand the topic's relevance and the need to change their water consumption habits. One activity required students to take some simple water-saving actions at home. They were asked to compare household water bills received before and after the experiment to observe the reduction in water use and expense.

GreenCOM introduced the new curriculum to eco-clubs

by first training RSCN staff, which later held a series of two-day teacher training workshops with 163 leaders from 72 selected clubs. Trainees practiced using the manual and conducting some of the experiments. Many of the teachers reported that it was the first time they had encountered an interactive teaching methodology.

After the trained teachers had used the new materials in their clubs for four months, GreenCOM conducted post-implementation surveys to gauge the curriculum's impact. The curriculum had a strong positive influence on the number and kind of water activities teachers implemented in their clubs. Most teachers who received the curriculum training implemented almost all of the recommended activities with their students. An overwhelming majority (90 per cent) said they would use the curriculum again. Implementing the curriculum did little to change teachers' beliefs about the advantages of interactive teaching methods and their confidence in using those methods. Despite this finding, the research suggests that using interactive methods could change teachers' preferences over time. On the other hand, students from eco-clubs that used the curriculum had more positive scores on knowledge, attitudes and beliefs about water conservation than students from non-participating clubs. Students who were exposed to the new curriculum had more positive scores on an aggregate scale of social behaviours than students with no exposure.

GreenCOM's work on the water conservation curriculum for secondary school eco-clubs demonstrated several important results:

- **Professional development:** Skill building for staff members of RSCN's education department was a major component of this project.
- **Dialogue about water conservation:** The new curriculum helped to open a public dialogue on water conservation.
- **Introduction of interactive teaching methods:** The curriculum introduced Jordanian teachers to interactive teaching, which contrasted sharply with their traditional lecture-based methods.

Source: USAID/Jordan 1996.

providers, water resource managers and multi-stakeholder platforms have therefore come to the fore as logical companions to IWRM.²⁶

Principle 10 of the Rio Declaration on Environment and Development emphasizes that "environmental issues are best handled with the participation of all concerned citizens, at the relevant level (Box 5.6)."²⁷

Other widely recognized international policy documents emphasize the need for an adequate role for the public, including NGOs, in environmental and water management. Examples are the Dublin Statement on Water and Sustainable Development, Agenda 21, the Noordwijk Political Statement and Action Plan (Ministerial Conference on

The Heroes of the UAE is a national press campaign jointly developed by the Emirates Wildlife Society in association with the Worldwide Fund for Nature (EWS-WWF) and the Environment Agency-Abu Dhabi, and endorsed by the Ministry of Energy, the Ministry of Environment and Water, MASDAR and the Abu Dhabi Water and Electricity Authority. This campaign aims to raise awareness of the importance of rationing energy consumption to avoid shortages. The campaign involved the press and outdoor and radio advertising in early 2009, as well as a website (www.heroesoftheuae.ae). Information was made available to everybody to learn more about the problem's causes and also find out what they can do to help reduce energy consumption.

Principal features of the website include an animated sequence that explains the present energy and environment situation in simple, graphic terms, along with a long list of energy-saving tips, a calculator that enables households to establish exactly how and where they can make real savings on their consumption, and a unique pledge facility that enables households to positively state their intention to make a difference.

As part of the school Heroes campaign, EWS-WWF organized an Energy and Water Reduction Competition inviting all government and private schools in the United Arab

Emirates to participate. The competition aimed to raise awareness among students of the urgent need to conserve energy and water to mitigate the impact of climate change.

More than 70 schools from all over the United Arab Emirates participated in the three-month competition. Participating teams were expected to come up with innovative methods for conserving energy and water in their schools using their utility bills for February, March and April 2010. Consumption units in these three months were then compared with the respective months in 2009 to identify how awareness and behavioural changes could have a positive impact on consumption habits.

The panel of judges had a tough time choosing the winners. The quality of entries indicated the keen interest among students to bring about positive changes in their environment through simple behaviour modifications and basic technological innovations. Students also commented on an increased sense of team spirit while carrying out these activities and their willingness to gently switch to a more sustainable lifestyle to ensure longevity of our planet's resources.

Source: Heroes of the UAE 2010.

Drinking-Water and Environmental Sanitation in Noordwijk, 1994) and the Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-Making (Environment for Europe Conference, 1995).²⁸ Awareness and education: the change factor

Public awareness is a major foundation for effective good water governance. It is the first step for meaningful participation and tangible action. By promoting behavioural changes and good practices, it can save water and thus enhance water security. Although various ministries and agencies, the private sector and nongovernmental organizations have launched innovative public awareness, training and education programmes on conserving water resources, most of these campaigns are ad hoc and not tailored to the needs of user groups. NGOs could be key actors in raising awareness, but they need further support in that role.

A long-term awareness programme needs to be instituted that takes into account local and

regional socio-economic and ecological dimensions.²⁹ Inefficient water use in irrigation (around 40 per cent) and water loss in networks (over 50 per cent) indicate low water awareness.

NGOs and UN agencies can play a pivotal role in raising water awareness. A survey of farmers in Lebanon showed that 70 per cent thought their agriculture practices had no negative impacts on the environment, despite evidence. In southern Lebanon, where many NGOs are working, farmers demonstrated more awareness of environmental impacts was found in the south of Lebanon where there are many NGOs working (for example, AVSI, Mercy Corps, World Vision, AIDA). Bad agriculture practices in Lebanon include improperly disposing of unused agrochemicals and their containers, overusing pesticide applications, using counterfeit chemicals, and excessive irrigation. The best management practices promoted there include safely disposing of agrochemicals, improving terracing, accurately applying fertilizers and pesticides and planting trees as wind breaks.³⁰ Jordan introduced

Good governance can help decrease gender inequalities through the following:

- “Ensuring that poor women’s and men’s human rights and fundamental freedoms are respected, allowing them to live with dignity.
- Introducing inclusive and fair rules, institutions and practices governing social interactions to improve outreach to the vulnerable, such as poor men and women, and the younger and older generations.
- Ensuring that women are equal partners with men in decision-making over development, use, technology choice, financing and other aspects of water management.
- Ensuring that the environmental and social needs of future generations are reflected in current policies and practices.
- Focusing water development policies toward eradicating poverty and improving the livelihoods of women and men.”

The above principles also apply to effective water governance. To maximize and improve the efficiency of women’s participation in all decision-making, the particular social, economic and cultural roles assigned to men and women should gain emphasis. Agriculture and the water sector must be made gender aware, a process that should begin with training programmes for water professionals and the community on gender approaches and methodologies. Reforms must also be introduced at various levels of local communities for an effective integration of gender and participatory approaches into local and regional businesses, especially to empower women in conflict zones and agricultural and poor communities.

Source: UNDP 2003.

environmental conservation clubs to promote awareness (Box 5.7).

The role of media should be activated at national and local levels through well-tailored and easy-to-understand programmes, dialogue and frequent meetings (Box 5.8). The newly established Lebanese Centre for Water Management and Conservation is effectively raising public awareness on the importance of water and conservation through initiatives that target residential, touristic, industrial and agricultural water sectors.

Water rights and social equity

Arab countries widely recognize that water is a public good. Ambiguous water rights, frequently sparking local tension and conflict, lead to poor decision-making on efficient, equitable water use. In most Arab countries, water rights are placed within a legal, pluralistic context. Legal instruments to regulate water allocation are lagging behind in many Arab countries. Setting well-defined, coherent water rights is fundamental to deal with increasing competition among water users:

- It can promote equitable water use and improved access to water by groups previously denied water rights.
- It can improve the efficiency of water allocations.
- It can promote the willingness of farmers and urban water users to take economic risks to make necessary investments in improved water management and practices.
- It can render other governance measures, such as pricing mechanisms, more effective.³¹

Social equity, a declared goal of effective water governance, should anchor policy choices. Policies should rely primarily on approaches that allow for meaningful participation of all relevant stakeholders. Regardless of social status, power or gender (Box 5.9), social groups should be able to voice their claims and concerns in an open, transparent environment. To realize this, countries should go beyond legislative arrangements and staged participatory processes to include cultural changes and attitudes. Reflection on social equity concerns in policy formulation, plans and programmes is a key prerequisite for effective water governance.

Financing and economics

Properly comprehending water’s value is vital for decision-making about water investments, allocation and pricing. One of the biggest faults in the Arab region’s water governance system is neglecting and/or miscalculating real water values/costs, which include social and environmental costs as well as direct financial costs of extraction and delivery.

Funding: between availability and attractiveness

To ensure the financial sustainability and viability of effective water governance, a clear water financing scheme is needed. This includes identifying (a) financing sources and “who should pay and for what” (for example, the user pays principle, the polluter pays principle, full cost-recovery); and (b) economic and financing instruments that ensure an optimal and efficient allocation of financial resources.

Themes of effective water governance and financing for water resources management intersect at many levels. Good governance is a precondition for generating the financial and human resources necessary to sustainably develop and manage water resources. Unfortunately, some of the Arab countries most in need of additional resources lack the governance conditions that will either attract new financing sources or ensure that public and private resources are managed equitably or sustainably. Sound governance practices create enabling environments that can encourage both public and private sector water investment. Specific attention should be directed to efforts that reduce risk and facilitate healthy capital markets, especially at the domestic level. Some additional guidelines on using good governance to mobilize financial resources include:

- Water should be recognized as an economic, social and environmental good; the full costs of water management and water

services should be acknowledged; and the costs should be allocated transparently, equitably and sufficiently throughout society (through tariffs, subsidies, taxes, cost recovery and the like).

- Access to capital should be available at all levels (for example, microcredit, revolving loan programmes and local bond issues).
- Accountable and transparent systems, full accounting of costs and benefits, a progressive policy and legal environment and a constructive relationship between civil society and government should be promoted.

Depending on the type of activity, different mechanisms can be proposed for financing water and sanitation projects. Some financial sources should stem from public budgets, fed by general taxes, especially when the project benefits cannot be easily quantified, as with awareness programmes for water saving or institutional reform. Some can come from users and beneficiaries of the water projects through instruments applied directly in the water sector or in other sectors (for example, reducing unaccounted-for water or increasing irrigation efficiency in agriculture). Both approaches correspond to the cost-recovery principle as well as to the user-pay and polluter-pay principle.

Public funds should be spent on services that bring pure public benefits. International best practices suggest that users should pay at least for the operation and maintenance of

Table 5.1 Possible allocation of public/private responsibilities across different water demand management options

Options	Setting performance standards	Asset ownership	Capital investment	Design and build	Operation	User fee collection	Oversight of performance and fees
Green code	Public	Public	Private	Private	Private	Private	Public
Admin loss	Public	Public	Shared	Private	Private	Public	Public
Reduction of physical loss	Public	Public	Shared	Private	Private	Public	Public
Wastewater irrigation projects	Public	Public	Shared	Private	Shared	Public	Public
Improve on farm efficiency	Public	Private	Private	Private	Private	Shared	Public
Awareness programme	Public	Public	Private	Private	Private	Not Applicable	Public
Institutions/policies	Public	Public	Public	Shared	Public	Not Applicable	Public

Source: Authors.

Using the financial analyses carried out in the cost recovery programme of the Water Authority of Jordan from 2002 to 2004 for providing water and wastewater services, we assume that 85 per cent of operation and maintenance cost and 60 per cent of capital cost is attributed to water, while the remaining 15 per cent of operation and maintenance cost and 40 per cent of capital cost is attributed to wastewater service. Thus, the full cost of water service is estimated at 179 million Jordanian dinars. As the billed water in 2009 is 183 million cubic metres and water supply is 322 million cubic metres, the average cost of water service for all Jordan can be estimated at 0.89 Jordanian dinars per cubic metre of billed water and 0.51 Jordanian dinars per cubic metre of water supply.

The low level of water tariffs made it impossible for water agencies to come closer to the long-term objective of financing their operating expenses and capital investments from their own revenue stream. In fact, the Water Authority of Jordan operations have generated annual deficits of over \$50 million from 1990 and reduced the authority's net worth from \$177 million in 1990 to zero in 1995. The authority's inability to generate sufficient surplus to finance its investment programme resulted in large debt obligations.

Source: Haddadin 2006; ECO Consult 2004.

infrastructure that brings private benefits. But determining the share of public benefits is difficult, thus complicating the task of apportioning infrastructure costs to individual users. One of the most important reforms in Arab water provision in the last decade has been the increasing role of the private sector. Government inability to raise adequate capital to finance, operate and maintain necessary water and sanitation infrastructures has encouraged private sector participation. Private sector management and technical practices can lead to more efficient services. Governments in some Arab countries (Algeria, Egypt, Jordan, Morocco, United Arab Emirates) have thus moved from directly providing water and sanitation services to playing a more strategic and regulatory role. Water economics has drawn more attention to the importance of economic instruments in managing water demand. Economic incentives, when adjusted to local settings, can curb the tendency in demand management without affecting socio-economic benefits and livelihoods.

International donors and lenders have promoted privatization of water management

and distribution to achieve full cost recovery and improve efficiency in distributing public utilities. Conflicting arguments about water sector privatization extend from feasibility to morality. Considering water a "gift from god, a public good and as a human basic right" creates conflicts within and between communities opposing its private ownership. Many argue that water privatization creates new barriers to the access of common resources and deprives vulnerable groups, especially poor people and women, of their basic water needs or rights.³² Other debates relate to public-private partnerships and their limitations and potential.

All possible approaches to privatization should be weighed in effectiveness, efficiency, equity and other elements of effective water governance. Arab states could derive greater benefits from privatization by conducting dialogue with stakeholders and considering the social and ethical issues, the community's socio-economic needs and water's status as a human right. Preparatory privatization steps, including selecting utilities, negotiating contracts or monitoring the bidding process or the performance of private investors, need institutional and regulatory reform to ensure full coordination and consultation among ministries and water institutions, as well as civil society structures.³³

The private sector could participate in capital investment, design, building and operation of green code (Table 5.1).

Among widely used approaches for funding and public-private partnerships are the BOO/BOT modalities.³⁴ For every water BOO/BOT project, four categories of stakeholders can be identified, including the public sector authority; the contract awarding agency; the grantor, who may also be the off-taker under a long-term commercial agreement; and the private operators and contractors who participate in the concessionaire's equity and provide the technology, construction and project development skills.

Although no single structure holds for all water and sanitation BOO/BOTs, some fundamental principles apply. The best contractual structures allocate activities and risks fairly among stakeholders.

One of the strengths of public-private partnerships is that market initiatives, combining creativity, profit motivation and entrepreneurship of the private sector with the strong knowledge base and national responsibility of the public sector, can achieve desired natural resource management goals. Public-private partnerships require a roadmap that charts shared goals, a patient policy that balances market economy principles and public interests, incentives for each sector and a shared understanding of each partner's strengths and weaknesses.

Since 1990 many Arab countries have adopted an economic restructuring programme leading to a new water and sanitation management policy. For municipal water and wastewater services and systems maintenance in Jordan, the government applied the management contracts strategy funded by loans from the World Bank and other donors. Private firms were contracted to manage the water and wastewater systems with the staff of the Water Authority.³⁵

Some governments have also adopted the BOT approach to involve the private sector in financing water resource development. The government could thus expand and improve service coverage, generate resources to finance future investments, increase economic efficiency, reduce government fiscal burdens and introduce technological advances. In Jordan, for example, the government finances both planning activities and most of the new constructions, either directly or indirectly (for example, BOT system in Disi and Al-Samra wastewater treatment plant). Much of the cost associated with infrastructure construction (flood control, wastewater treatment and agricultural water supply) are subsidized by the government directly but implemented in most cases by the private sector.³⁶

Many initial successes have resulted from relatively simple management improvements that did not require large investments or sophisticated technologies. Private firms have shown a remarkable capacity to improve the operation of existing infrastructure within a short time.

Box 5.11

Operation and maintenance requirements

Operation and maintenance for public systems would require the following actions:

- Adopting a water tariff mechanism to promote cost recovery of water projects.
- Setting municipal water and wastewater charges at a level that will cover at least the cost of operation and maintenance.
- Depending on concessionary loans, private borrowing and BOT arrangements in project financing.
- Making profitable undertakings in industry, tourism, commerce and agriculture to pay the fair water cost.
- Setting differential prices for water based on water quality, the end users and the social and economic impact of prices.
- Regularly reviewing and adjusting water tariffs based on the costs of supply and operations and the comprehensive analysis of economic data.
- Moving towards the recovery of all or part of the capital costs of water infrastructure.
- Using water tariffs to drive water consumption behaviour that leads to better conservation.
- Establishing the real cost of operation and maintenance and charging for irrigation water accordingly.

Source: Hellenic Aid 2010.

The privatization experience in Jordan was successful in the Greater Amman region. Performance efficiency of manpower has improved. Collection rates have increased. And unaccounted-for water has fallen from 54 per cent to 45 per cent. This could be the result of the superiority of private sector handling of water and wastewater operations, known to require prompt responses to maintenance requests, supply of needed inputs and mobility in staff and equipment.³⁷ A number of countries have started implementing this experiment, including Morocco, Tunisia and Jordan. Saudi Arabia is also considering involving the private sector in building water desalination units.

Public-private partnership is picking up momentum in the Arab region. Dubai, Lebanon and Saudi Arabia illustrate that public-private partnership is developing under many different provision models. In countries such as Jordan and Tunisia, a centralized, public sector-funded system has recently introduced moderate private sector participation

The League of Arab States established the Arab Ministerial Water Council in 2008, reflecting a unified regional political will to promote discussion on water issues from the technical to the political level. The council's aim was to boost cooperation efforts within a joint Arab strategy to combat water challenges and bolster water security. Its main objectives were managing water demand, developing and preserving water quality and quantity, managing water resources, protecting Arab water rights and improving regional governance under the League of Arab States.

Source: Cherfane 2009.

in sanitation through service contracts and a BOT contract.³⁸

Arab countries must allow private sector participation in financing water projects under government supervision and regulation. Public-private partnerships, particularly with the national private sector in a BOT or BOO, can increase desalination capacity and municipal sectors by reducing public expenditure, managing large-scale projects and improving technical and managerial expertise.

Financial resources in most Arab countries are limited and unable to provide all the necessary funding to invest in water. Arab countries, especially nonoil countries, are encouraged to increase private sector participation in various water projects, such as desalination; irrigation systems; building, implementing, upgrading and managing drinking water networks and sewage systems; and building and operating wastewater treatment plants. Cooperation between the public and private sectors not only raises economic efficiency, but also accelerates various water projects, improving sanitary and environmental conditions in communities. In addition, effective methods of supporting private sector capacity have to be identified through public-private partnership ventures. Public utilities cannot continue to underprice water and introduce subsidies that encourage overexploitation of a scarce resource.³⁹

Many public-private partnerships have encountered difficulties, however, due to insufficient attention to the social consequences of measures such as tariff increases. Another

difficulty is the popular mistrust of institutions involved in public-private partnership projects. Unless continued access to water for the poorest sections of the population is ensured at a reasonable cost, and sufficient levels of transparency in decision-making are provided, major social resistance to public-private partnership is expected. Developing social protection schemes prior to or parallel with public-private partnerships is therefore a crucial success factor.

Economic and financial sustainability

Achieving economic and financial sustainability is important for ensuring continuation of water and sanitation provision. Responsible institutions cannot continue to function effectively and efficiently unless they are provided with the required means and finances. In most cases, throughout the Arab region, water services have been heavily subsidized to meet the escalating cost of providing water. But with rising economic pressures and demands for financial resources, calls for full cost recovery are gaining momentum.

Cost recovery in Arab countries is generally low and impacts water services' financial sustainability (Box 5.10). For example, the cost recovery in Saudi Arabia does not exceed 2 per cent. Regional water authorities do not have sufficient revenues to recover costs. The Riyadh branch, which is considered the best branch in cost recovery, had revenues of 370 million Riyals in 2004, while its operational expenses were 570 million Riyals. On average, the government is only recovering one or two percentage points of its costs. There is no recovery of the cost of wastewater collection and treatment. According to a 2000 World Bank estimate, the government paid annual subsidies of \$3.2 billion, equivalent to 1.7 per cent of GDP and 7 per cent of oil revenues.⁴⁰ These figures are expected to be much higher today.

Arab decision-makers are thus torn between pressures to meet water authorities' demands for expansion and maintenance, and public pressure to restrict water prices, particularly for poor people. Pressures from donor communities to adopt full water cost recovery aggravate the situation. Water pricing is the most

important measure in establishing effective demand management to use water efficiently and sustainably. Appropriate and adequate operation and maintenance of water systems is necessary to enable them to meet the current environmental standards for distributing safe drinking water (Box 5.11).

Water efficiency

Effective and environmentally sound use and management of available water resources are required for closing the ever-widening gap between water supply and demand. The Arab region needs realistic water management strategies to deal with the following issues: safeguarding water to meet basic needs; allocating scarce water for socio-economic development; minimizing water losses; and protecting the environment from degradation and loss of productive capacity.⁴¹

Efficiency in water use is an essential element of effective water governance as well as IWRM. The World Summit on Sustainable Development identified two main aspects of efficiency in water use: technical efficiency and allocation efficiency.⁴² User efficiency, supply efficiency and recycling would help. Economic efficiency means using tools such as water pricing and tariffs, appropriate incentives and subsidies and realistic cost-benefit analyses. But water's social and environmental value must be taken into consideration.⁴³

Research and development: a missing link

The Arab countries are lagging behind in R&D efforts. Arab Knowledge Report 2009 stated that innovation is the weakest point in the Arab knowledge scene. The Arab expenditure on R&D (as a percentage of GDP) has been usually below the world average, ranging from 0.1 per cent to 1 per cent, compared with 2.5 per cent in developed countries. Despite ambitious plans to raise R&D spending, many Arab countries have not achieved concrete advancements yet.⁴⁴ Tunisia is considered the leading country in R&D spending, reaching 1.1 per cent in 2009, followed by 0.64 per cent

for Morocco and 0.34 per cent for Jordan.⁴⁵ A major issue is the weak linkage between R&D and production.⁴⁶

This argument applies to all socio-economic issues and sectors in the Arab region. Unfortunately, the water sector, despite its importance, is no exception. Water research organizations in the Arab region are hampered by a lack of human and financial assets and an absence of national science and technology policies. Research agendas sometimes reflect the requirements of international funding organizations rather than local community needs and national goals.

The Arab region is facing a double challenge in linking water science to public policy. First, the capacity to generate innovative scientific research is lacking. Second, systematic institutional linkages to use knowledge in policy-making are not yet well-developed. Hence, the ability to formulate and implement effective water policies is severely constrained. As a result, demand for water research is not yet a systematic component of the water policy cycle, even among government agencies that fund research organizations. Underfunded, understaffed, poorly performing research organizations, in addition to poor quality and unavailability of data, continue to dominate regional water research.⁴⁷

Research and innovation are critical to setting the stage for effective water policies that ensure sustainability, efficiency and equity in access and use of the Arab region's scarce water resources. Accordingly, Arab countries need to place high priority on research and policy analysis.

A key element in linking research to policy is the government's demand for, and systematic use of, research findings in formulating policy.⁴⁸ A survey conducted in Algeria, Egypt, Jordan, Lebanon, Morocco, the State of Palestine, Sudan, Tunisia and Yemen with case studies in four countries (Egypt, Jordan, Lebanon and Morocco) and encompassing 70 research organizations found that government demand for research appears to be extremely limited.⁴⁹ Any government interest is most likely represented through specific individuals' actions. This seems to reduce opportunities for research

organizations to contribute to positive change at the national or even regional level.⁵⁰ There is thus little effort to link science to policy.

Governance research should be directed towards identifying and assessing anticipated new drivers and changes. Among emerging research topics are water quantity and quality requirements and the indirect water-related impacts on energy, agriculture, health, the environment and social behaviour.

Water research into institutional aspects should involve identifying arrangements that may contribute to a functional, coordinated approach to important water-linked sectors such as energy, agriculture and the environment. It should include how compatible policies in the interlinked sectors can be developed and implemented, and focus on enhancing accountability and transparency by establishing clear mandates, authorities and responsibilities.

Cooperation: at the regional and transboundary level

Because of the high dependency on shared water resources, regional cooperation in water governance is essential.

The Arab region lacks comprehensive agreements on the major international river basins. The second best alternative is an international binding legal instrument that sets the duties and responsibilities of riparian countries and establishes guiding principles for coordinating, managing and allocating shared water resources.⁵¹ The international community widely recognizes the Convention on the Law of the Non-Navigational Uses of International Watercourses, published by the International Law Commission of the United Nations in 1997, as a candidate. Turkey, the upstream riparian country of the Euphrates and Tigris rivers, and Burundi, one of the upstream riparian countries of the Nile River, voted against the convention. Only nine Arab countries signed the convention (Jordan, Syria, Tunisia and Yemen with initial signatories and Iraq, Lebanon, Libya, Morocco and Qatar with accession), while three countries (Jordan, Tunisia and Syria) ratified it.⁵²

Arab countries, in cooperation with neighbouring countries, must adopt a strategic approach to translate their sociocultural solidarity into a unified political position supporting the rights of all riparian countries to fair, just and equitable shares in international water resources. The 2008 establishment of the Arab Ministerial Water Council by the League of Arab States, an important step in this direction, reflects a regional political will to elevate water issues from the traditional technical level to the more influential political level (Box 5.12). There is a need to establish and improve high-level cooperation with neighbouring non-Arab countries to strengthen the joint management of water resources by setting priorities, building consensus, nurturing and strengthening institutions and supporting the implementation of action programmes. Mutual cooperation and coordination establishing effective water governance, and hence management of shared surface and groundwater basins, will help to achieve sustainable development.

One of the best examples of cooperation in managing shared water resources in the Arab region is the North Western Sahara Aquifer System, shared by Algeria, Libya and Tunisia. With support from UNESCO and other bi- and multi-lateral donors, scientists from two of these countries have been working together since the 1960s to develop a common database and agree on the impacts of use scenarios. Libyan experts joined the cooperation in 1998. This case illustrates the advantages of processes to agree on datasets and plans and build consensus before large-scale exploitation gets underway, since it is hard to reduce allocations once the resource has become overexploited.⁵³

Improved regional cooperation on shared water development and management is vital.⁵⁴ This cooperation should take into consideration the rights of the region's peoples in an equitable and balanced manner and reform and empower relevant regional institutions and legal frameworks. Effective regional water governance can transform water issues from points of tension to points of progressive international cooperation.

Endnotes

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- ¹³ El-Ashry, Saab, and Zeitoon 2010.
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- ¹⁶ Bucknall and others 2007.
- ¹⁷ Choukr-Allah, Ragab, and Rodriguez-Clemente 2012.
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- ²⁷ UNESCO 1992.
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- ²³ Sitaraman 2008.
- ³³ Hefny 2009.
- ³⁴ BOO stands for build, own, operate, while BOT stands for build, operate and transfer, the system employed in building projects under private sector finance whereby the builder undertakes to operate the project and collect revenues for an agreed number of years.
- ³⁵ Haddadin 2006.
- ³⁶ MWI 2009; Denny and others 2008.
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- ⁴³ Placht 2007.
- ⁴⁴ UNESCO 2010c.
- ⁴⁵ World Bank n.d.
- ⁴⁶ UNDP and Mohammed Bin Rashid Al Maktoum Foundation 2009, 2011.
- ⁴⁷ Taylor, Okail, and Achy 2008.
- ⁴⁸ Carden 2009.
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