REGIONAL SOLUTIONS FOR WATER SCARCITY IN WEST ASIA & NORTH AFRICA

WANA forum

منتدى غرب اسيا و شمال إفريقيا
West Asia - North Africa Forum

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WEST ASIA & NORTH AFRICA

A Policy Brief based on the WANA Forum Consultation:

"Toward Supranational Mechanisms in Addressing the Challenges of Water Scarcity In WANA"

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FOREWORD

In the midst of the trials and tribulations facing the West Asia and North Africa region the issue of water stress and water scarcity are often overlooked.

According to the World Health Organization (WHO) almost one fifth of the world's population - or around 1.2 billion people - live in areas where water is physically scarce. One quarter of the global population also live in developing countries that face water shortages due to a lack of infrastructure to collect water from rivers and aquifers.
The problem of water scarcity and stress is not independent of the challenges facing the region. In fact, almost every conflict in the region is borne out of or compounded by the lack of water. From a socio-political perspective, water scarcity threatens security and economic prosperity. It is a 'threat multiplier' – an ongoing source of friction in a fragile region.
The people of the WANA region - the silenced majority - are acutely aware of the problems they face. The fact remains, however, that their governments have failed to develop an overarching and sustainable water policy. What the region needs is a regional water and energy community that emphasizes trans-boundary cooperation and promotes innovative solutions.

For many years I have proposed the possibility of creating the equivalent to an Arctic Council or an Antarctic Council for water and energy for the region. The Fertile Crescent has seen successive wars and as a result of these wars, it is now rapidly becoming a futile crescent. We have no intra-independence between the oil-producing region in situ and the human-resource region of the hinterland. The Japanese Diet said very clearly in 1988 that there can be no stability for the oil states unless there is stability for the hinterland, whether in the Caucasus, Central Asia or in the Gulf region. Creative solutions are needed to solve the problems the region faces today and will face in the future. Carbon dioxide emissions in West Asia and North Africa are increasing faster than any other region in the world except for South Asia and East Asia. Most of the countries in the region are the least responsible for the greenhouse effect but are also the most vulnerable to climate change. A one-metre rise in sea levels could create millions of refugees across the eight Nile Basin countries.

Water has always been an essential facet of human civilization– many modern cities in the West Asia and North Africa region sprang from pre-historic settlements along the embankments of rivers, lakes, tributaries and oases. Before we can think about ways our collective society can thrive and prosper we must ensure its survival - which is dependent on the finite amount of water available to us and to future generations.

Today aspirations are abound in the WANA region as citizens actively seek ways to make their voices heard. Going forward, we must stress regional cooperation over unilateral action, or in this case, non-action. My hope is that we are entering a new era where the good ideas outlined in this brief will be adopted and implemented, not only for the benefit of the citizens of one region, but for all of humanity.

Prince El Hassan bin Talal
Chairman of the WANA Forum

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*Indicates that the author was also a participant in the consultation.

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1 SUMMARY FOR DECISION-MAKERS

The Context and Challenges

Water scarcity, energy, climate change, and drought, are the most pressing environmental challenges that face the West Asia North Africa region. The Region is facing one of the severest water scarcities in the globe where most of the Arab countries are suffering from water poverty. Water is considered the essence of life and is vitally important for agriculture, industry, environment and social development. Addressing the water scarcity challenge is central to successfully achieving sustainable economic growth. The regions groundwater is victim of depletion, siltation, and overexploited yet many of which is shared among many countries.

Water management policies and institutions both at national and regional levels remain underdeveloped, and fundamental relevant policy questions remain unanswered or are inadequately addressed: Because over 60% of the freshwater in the WANA region is considered transboundry water, regional cooperation bounded by regional policies is needed to overcome many of the water resources challenges. Integrated Water Resources Management (IWRM) implementation in the WANA region should be a priority given the scarce natural water resources and the increasing water demand. Introducing water governance program in the region should contribute to the WANA countries in achieving the Millennium Development Goals (MDGs), and environmental sustainability. In addition, the climate change adaptation, mainstreaming, and raising awareness are issues of importance to enable the region meet the MDGs.

The effectiveness of adopted policies to cope with the multifaceted dimensions of water scarcity in the WANA region is by far below the anticipated goals to achieve sustainable water development. The time set by our countries to meet the MDGs is coming to end, but still very little progress to cope with water scarcity issues have been achieved to date.

The failure to achieve progress in water disaster risk management, primarily to cope with water scarcity under currently adopted policies, will have tremendous impact on the political will to further engage in sustainable funding. A clear impediment to the political agenda and political will of mainstreaming water scarcity, is the declining number of innovative options proposed to tackle the complex issues of water scarcity and water governance in general.

SUPRANATIONAL RESPONSES NEEDED:

Creating supranational water policies requires a closer look at implications for national sovereignty. These include: a) Initiation of a broad policy dialogue that focuses on addressing water resources management concerns in a cohesive and responsibility. b) A strong effort to harmonize water legislation and development of regional standards. c) Broad legislation that create enabling frameworks for water management – including allocation of water user rights, engagement with broader public, standards for water quality for human and agricultural consumption. d) Investments into water-related green businesses at the regional scale. e) Trigger and catalyse action through the creation of a supranational Water Development Fund (WDF) for green water initiatives. f) Establishment of a consolidated monitoring and data sharing institution established to underpin the WDF as well as to quantify the impact of supranational legislation. g) Coordination amongst the United Nations and regional organizations, such as the Arab League, to play a monitoring and supporting role in water resources management, and member states to become key players in water resources management through their representation in the UN. h) Coordination and development of UN agencies' programs for guidelines on technical knowhow on demonstration method and their practical application to formulate an integrated water management plan. i) Reduction of regional water consumption through irrigation-water-management & Water Demand Management policies (WDM). And finally, j) Development of proper adaptation methodologies that deal with climate change impact in the region.

LEGAL FRAME WORK AND ETHICS

Adoption of a regional legal framework for managing shared water. It is recommended that governments should examine examples of regional frameworks to develop and enforce their own regional water legal system.

It is recommended that the Arab Ministerial Water Council extends Resolution 4, Item 3, to neighbouring States of the Arab region. The Arab Water Ministerial Council (AMWC) identified shared water resources as a regional priority, and passed a resolution during its second session in July 2010 in view of preparing a draft legal framework on shared waters within the Arab Region (Arab Ministerial Water Council, Session 2, Resolution 4, Item 3 (AMWC, 2010)). This should be made applicable to shared waters between Arab States and their neighbours.

It is also recommended that such a regional instrument, while taking its basis and inspiration from the principles of international water law, adopts an approach taking into consideration the specificities of the region such as, inter alia, water scarcity, arid environment, and population growth. Also, National legal and institutional settings play an important role in the management of water resources, even when these resources are transboundary or shared.

A specialized institutional body at a national & regional level - such as a water disaster commission – is required to create the momentum for synergy between national water development sectors on adopted policies and implemented measures to cope with water scarcity. It is expected that such a measure would minimize the current institutional fragmentation of responsibilities through improved national information exchange, strengthening the coordination of local actions, and enhance the liability of the decision making processes to cope with water scarcity. The national and regional water commissions would play a leading role in policy formation which is currently ambiguous and has poor involvement of all stakeholders. A policy based on crisis management or "crisis driven" approach, especially those undertaken by isolated water development sectors at the national level is a narrow vision of the dynamic challenges of water scarcity.

It is vital to incorporate ethical perspectives into integrated institutional and technical frameworks for better water resources management under water scarcity. The role of belief systems should be enhanced in policymaking processes. Policymaking is more than just "a struggle over ideas", it is about struggle over ideas and values within their cultural perceptions. Legitimacy is an important issue for any public policy debate. Raising public awareness through a study that assesses environmental awareness followed by making information available through education, training programmes and curriculum reform is crucial and requires shifting public patterns of consumption and government patterns of production.

FUTURE OUTLOOK

The concluding recommendations of the 3rd WANA Forum in 2010 advised the need to develop a breakthrough index "to capture reality on the ground and document best practices for knowledge sharing". The way forward can be achieved through the development of a water scarcity policy index that measures water scarcity management. The Water Scarcity Policy Effectiveness Assessment Index (WSPEAI) will be developed based on clear regional targets backed by clear set of relevant indicators that can be adapted and tailored to national conditions with regards to local realities and prospected new dimensions and challenges of water scarcity issues.

Integrated Water and Land water Resources Management (IWRM) should be redefined with a new focus-on equitable allocation strategy that should not only consider Blue Water (as at present) but to consider the whole water balance (Blue, Grey and Green water). This means the physical processes affecting green balance components of the water resources models needs to be understood. Hence, there are many technical challenges to initiate the new green revolution.

The concept of ecohydrology can play an important step forward in addressing land-use change: the impact of land-use change on blue water resources is an important factor not only to water resources but to the land resource as well. Calder (2005) argues that many land and water polices failed because of the "mismatch between were more often based on 'land and water myths' than modern science.". Calder (2005) proposes an IWLRM. The concept of ecohydrology might be a useful basis for a sustainable land use management programme. Application of this concept entails three steps (Gouder de Beauregard et al 2002): (1) A comprehensive ecological study of the catchment (climate, soil science, vegetation, human occupation). (2) Implementation of a water quality catchment modelling system to assess the long term management strategies. (3) Implementation of technologies to restore the ecosystem

Furthermore, virtual water must become part of a water security policy. The concept of 'virtual water' should be included in formal water policy assessments to appreciate the real potential of water resources in a given county.

The region must establish water-land-sea interface by linking IWRM and Integrated Coastal Zone Management. There is a lag of concern for coastal waters in river basin legislation, policies and strategies and vice versa.

SCIENCE POLICY INTERFACE

As the region suffers from multi-level water scarcity; there is a need for a Science –Water Policy Interface. One of the main obstacles to implementing IWRM is institutional inadequacy. In other words, a lack of workable policies in addition to inadequate consideration for ethical and cultural dimensions in policy making process.

Technology will have an important role to play, as the new shift in policy paradigm has to attain an adaptive and innovative technical strategy. On the social side, this shift in policy needs to be coordinated with the farmers and macro levels (e.g. market forces). A shift of agricultural policy towards rain-fed or dryland agriculture is needed as expanding blue water consumption (that is irrigation) is not a sustainable option.

Building a Water Knowledge management Platform and Information Database is crucial for better management of the water in the WANA region. Also the building of Regional Water Networks can help in promoting best practices and innovative solutions.

Investment in Water Desalination Technologies is recommended as the region produce up to 60% of the desalination industry. Also, the potential of the Bio Saline agriculture has to be further investigated to alleviate water irrigations shortcomings.

INTERLINKAGES WITH CLIMATE CHANGE AND WATER SCARCITY

Promoting energy conservation and minimizing fossil fuel dependency through the use of the most abundant source of energy in WANA – solar power is one way to alleviate fossil fuel energy dependency. Energy and water are security priorities which cannot be ignored; nevertheless, environmental concerns remain viewed as technological or extra-political despite possessing substantial potential to contribute to peace, regional cooperation, global security and a thriving environmental (Green) economy.

Land and water resources, essential to development and livelihoods, are particularly vulnerable to impacts of climate change. Actions to adapt to climate change through an integrated approach to land and water management are urgently needed. Recognizing the fundamental importance of land and water linkages for livelihoods, food security, shelter, ecosystem services and economic growth, efficient and coordinated management of land and water resources is essential for building resilience to the impacts of climate change. Adaptation must be addressed in a broader development context, recognizing climate change as an added challenge to reducing poverty, hunger, diseases and environmental degradation.

FINALLY, WATER HAS TO BE CONSIDERED A BASIC HUMAN RIGHTS ISSUE. NATIONAL POLICES HAVE TO CONSIDER THAT PEOPLE ARE ENTITLED TO SUSTAINABLE WATER AND SANITATION.

2 CHALLENGES IN SUPRANATIONAL WATER RESOURCES MANAGEMENT

WATER SECURITY CHALLENGES IN A WATER-SCARCE REGION:

Throughout the WANA region water scarcity is a common theme. This is underpinned by a low aridity index[1] and high population growth rates; both of these trends are projected to get worse in the next few decades due to climate change and the so-called "youth bulge" in the WANA region coming to fore.[2] The signals for both of these are also quite noticeable today with prolonged droughts and the so-called "Arab Spring" led by the youth. Addressing the water scarcity challenge will be central to successfully achieving sustainable economic growth.

A particular victim of the increasing stresses on water resources is hidden both physically, and from public consciousness: groundwater. Numerous studies point to fast depleting and overexploited aquifers, many of which cut across national borders. Key examples of such transboundary aquifers in the WANA region are: Northwest Sahara Aquifer System (Libya, Tunisia, and Algeria); Nubian Sandstone Aquifer System (Chad, Egypt, Libya, Sudan); Eastern Arabian Palaeogene Aquifer (Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, UAE, Yemen); and Syrian Steppe (Iraq, Jordan, Saudi Arabia, Syria). At present, adequate supranational management of these transboundary resources is largely missing.

Water resources management policies and institutions at a national level show mixed effectiveness. The laws and legislations present in the WANA region are often archaic, dating back to the Ottoman Empire, and commonly lacking key elements of contemporary integrated water resources management (IWRM) principles[3]. The situation is further exacerbated as a result of inadequate implementation and enforcement of existing legislation; these inadequacies are often underpinned by lack of information and capacity. Successful implementation of legislative frameworks requires significant investments in capacity development, particularly creation and strengthening of policy-focused institutions.

Water resources management policies at regional scale are non-existent. While there are numerous efforts to initiate dialogue both at the level of the Arab League and smaller sub-regions (e.g., the GCC region), there are few existing tangible examples of cooperative and cohesive policy formulation that would trickle down from regional to national and sub-national scales. No effective supranational framework exists today that would tackle issues at regional or sub-regional scale and provide substantive inputs.

Lack of regional policies to deal with water resources, in the face of increasing stresses, could open the door to water insecurity. The consequences of the lack of water security could include a direct threat to food and energy security. Food production, as the largest fraction of water consumption in the WANA region, which represents for example 78% of water usage in the GCC countries, would be directly impacted as water availability further reduces. It is often argued that food insecurity, coupled with water insecurity, could also contribute to large-scale political unrest – numerous examples of public protests in 2011 over rising food prices are a case in point. However, the notion of all-out wars over water resources alone remains a very unlikely prospect; as no historic assessment or present research has been able to substantiate the prospects of the so-called "water wars."

SUPRANATIONAL RESPONSES NEEDED:

Creating supranational water policies would require a closer look at implications for national sovereignty. A broad policy dialogue needs to be initiated that focuses on addressing water-resources management concerns in a cohesive and proactive manner by recognizing them as a regional responsibility. This may require further thinking along the notion of "Responsibility to Protect" (or R2P, in short) as a way to protect societies from internal and trans-border threats; this notion has been actively pursued by the United Nations Security Council in recent years. One may argue that supranational policies must adopt a similar stance if water resources are to be managed in the broader interest of the WANA societies.

A strong effort to harmonize water legislation and development of regional standards is critically needed. Broad legislation that create enabling frameworks for water management – including allocation of water user rights, engagement with broader public, standards for water quality for human and agricultural consumption – are a must. A caucus of Water and Finance ministers should be established for such a purpose. However, it is important to note that a grouping of water ministers alone is unlikely to yield significantly actionable framework, in part due to the relative "weakness" of the water ministries in their respective cabinets.

Investments into water-related green businesses must be made at the regional scale. Such investments would be the driving force for economic reform and would also lead to significant

1 The long-term mean of the ratio of an area's mean annual precipitation to its mean annual potential evapotranspiration is the Aridity Index (AI).
2 "Nearly one in five people living in the Middle East and North Africa (MENA) region is between the ages of 15 and 24—the age group defined as "youth." From: Ragui Assaad and Farzaneh Roudi-Fahimi, 2007.

improvement in human wellbeing. Supranational policies that offer incentives to the commercial and industrial sector for creating more green jobs are critically needed. Particular attention should be paid to: simplifying bureaucratic roadblocks; direct economic incentives like tax relief; and direct investment into relevant research and development. It can be demonstrated that policy reform and broader regional prosperity would strengthen markets and would allow the WANA region to emerge as an economic powerhouse.

Creation of a supranational Water Development Fund for green water initiatives is a way to trigger and catalyse action. A Water Development Fund (WDF) that underpins green economic growth, new research and development, and continuous regional monitoring is essential to achieving successful supranational water management. A number of innovative ways could be used to populate the fund: levying a surcharge on water-intensive industries; earmarking philanthropic contributions to have 10% contribution to fund; and re-directing a fixed fraction, say 5 or 10%, of all ODA investments into the WDF fund. The fund should, in turn, be used to catalyse new businesses that ensure environmental and water sustainability as well as ensuring job security.

There must be a consolidated monitoring and data sharing institution established to underpin the WDF as well as to quantify the impact of supranational legislation. It may be quite possible to consolidate existing mechanisms at the national scale, thus achieving a significant economy of scales. Existing resolutions from the Arab League clearly point to the need for such an effort. Such regional institutions would also attract significant resources, particularly finances, from outside the region.

3 TOWARDS ENHANCED WATER COORDINATION AT THE REGIONAL LEVEL

The WANA region will be facing a major challenge of a widening gap in water supplies and demand by 2025. This is attributed to limited renewable water sources and anticipated high population growth. The increases in water requirements for the dynamic socio-economic development of the region will also be affected negatively by climate change. Overcoming the expected water deficit in 2025 will require an estimated at 237 billion cubic meter (bcm) will make it necessary to augment supply through increased dependency on desalination, increased reuse of adequately treated wastewater sources and the mining of the non-renewable groundwater.

The past rigid short-term water policies of the last four decades must give way to new management tools to develop flexible policies coordinated with the other relevant sectors. These include agriculture, finance, social, environment, energy, urban, trade, and industry; all of which will need to be integrated into water policies that address water scarcity through securing adequate supplies and services with good water supply and sanitation. Only through integrated management can the region expect to meet the MDG targets, especially in the urban areas where the expansion of irrigation schemes have lead to over-intensive groundwater mining (see Integrated Water Resource Management for further details).

Governments must recognize the shortcoming of supply provision limitation from renewable water sources. More attention must be paid to the development of water policies in line with the internationally known integrated water resources management approach (IWRM) with longer planning horizons to cope with the expect water deficit challenge. Governments have already endorsed the World Summit for Sustainable Development (WSSD) recommendation to formulate integrated water resources management plan by the year 2005. This target has been achieved with mixed result as only a few countries have formulated their water resources management plans.

Effective water resources management framework in line with the Integrated Water Resource Management (IWRM) approach must emphasize enhanced water use efficiency and justified allocation in all development sectors. Such complex IWRM approach will enable government of the region to shift from rigid traditional approach of supply augmentation and as services providers to the implementation of more flexible integrated management measures and as regulator of services. This short note discusses suggestion to enhance regional coordination and cooperation on water resources management with focus on United Nations and regional organizations.

The level of coordination amongst international bodies has produced mixed results. This is due to the overlapping of water management activities, competing roles combined with a lack of joint programming initiatives, an absence of an institutionalized coordination mechanism and Member States' weak program ownership and inactive participation. Moreover, this is made more difficult through a lack of funding to support regional water management projects. These major constrains have contributed to fragmentation and implementation of similar activities leading at times to the duplication of outputs particularly on capacity-building initiatives, uncoordinated technical advisory services and few regional water resources management projects.

SUPRANATIONAL RESPONSES NEEDED

Water resources management at the regional level requires coordination among leading United Nations and regional organizations active in the water and water related fields. These institutions can play crucial roles in enhancing cooperation and coordination of their water management programs to enhance the impact of capacity building initiatives, implementation of regional projects, creation of think tank centres and act as neutral and credible players in assisting countries in studies and IWRM plan formulation and implementations. The existing two coordination frameworks; the UN Regional Cooperation Mechanism (RCM) and the UN Development Assistance Framework (UNDAF) as well as the existing international and regional conventions, instruments and the recommendations of major water summits and conferences represent viable tools to coordinate all water management activities at the regional level.

The existence of a considerable number of organizations active in the water management field make it necessary that they further enhance their coordination on water management issues. This should be done through the two UN regional coordination tools, the Regional Coordination Mechanism (RCM) and the United Nations Development Assistant Framework (UNDAF). The RCM can be strengthened by expanding its membership to include other regional organizations and funding institutions such ISESECO, AOAD, ICARDA, CEDARE and the Arab Funding Institutions; the Islamic Development Bank, AGFUND, Arab Water Council, and IDRC in order to avoid duplication and to streamline their activities, formulate and implement joint activities, rationalise their financial resources for efficient use and increase funding for regional water projects.

The Arab League should play a central role in monitoring and evaluating of the levels of the RCM. The coordination of all UN organizations biennium programs should occur prior to their finalization and reporting to the UN Headquarters. The independent UN-ACABQ committee's reviewing process of proposed UN programs must check if program coordination and cooperation is achieved with the member states and the Arab League and other regional organizations in order to strengthen program effectiveness in addressing regional priority issues such as water resources management and rationalize budgetary requirements. Furthermore, the Arab League active participation in the program planning process can eliminate overlapping as well as enhance joint implementation of activities.

Member states are in a strong position to become key players in enhancing the regional coordination of water management program through their representation in the UN. Member states must understand their influencing role in emphasizing water management priority issues in UN proposed programs. It is essential that they under take extensive reviewing and evaluation in advance so as to actively participate in raising their concerns over the proposals as well as insuring that program-coordination is achieved among and within UN and other regional organizations. The Member States' active participation can lead to the enhancement of the ownership of UN programs, can strengthen joint programming initiatives and can help the UN organizations in acquiring funds from WANA funding institutions and donor communities for regional projects. Also it will enhance the effectiveness and accountability of programs delivery towards effective management of water resources.

Funding institutions and international donors should be forthcoming in providing adequate funds to UN, as well as other regional organizations, water networks, associations, NGOs, and research centres. The Arab region has suffered from weak extra-budgetary funding which significantly hinders the advancement of the water management issues, limited research and development activities which has in turn contributed to the 'brain drain'. The Arab Aid Coordination Group presents a viable coordination mechanism to channel funding for regional water resources management activities

All regional organizations should cooperate and coordinate their programs to address water management priority issues; formulation and implementation of regional water management projects that emphasis development of practical integrated water management (IWRM) materials and manuals, shared water resources management studies, training or workshops, and expert group meetings, documentation and dissemination of lesson learned, technical exchange visits. They must provide financial support to sustain existing water networks and NGO functions, innovated research and the establishment of water science and technology centres, parks and incubators.

UN agencies should coordinate their programs to develop a guideline on technical know-how on methods and their practical application to formulate an integrated water management plan. This can be done at the basin and the national levels with an emphasis on: data collection and analysis; the delineation of the required coordination of all development activities; required water and water related expertise; public participation role; and financial and human resources requirement. Case studies at a basin or at a small-scale level would help national experts enhance their knowledge on the practical aspect of IWRM formulation, planning and implementation. The Arab Water council can take the leading role in the implementation of such activities.

The UN and regional organizations need to coordinate water management training workshops and expert group meetings in order to establish complimentarily among the issues and sustainability of activities. Focus should be placed on training to enhance national capacity and expand dissemination of knowledge on all IWRM and shared surface and groundwater sources aspects in order to enhance confidence building measures between national experts as it can facilitate information and expertise exchange and enhance the negotiation and technical skills to draft agreement and joint management. The joint organization of training workshops and expert meetings on specific water management issues can be implemented by an agreement on a leading role in exercises on a rotational bases among the organizations in order to eliminate duplication, to rationalize financial resources and avoid domination by any single entity.

The funding of regional projects on shared surface and groundwater sources among WANA countries can facilitate cooperation. This will optimize the utilization of shared sources and eliminate future tensions. The current, un-coordinated development of shared sources is leading to extensive depletion of groundwater sources and land degradation which impacts biodiversity along coastal zone due to increased salt-water intrusion. Such regional projects represent a priority issue.

UN organizations should work together to formulate project document, solicit funding and work on a complementarily basis for its implementation. Organizations that may be involved; UNESCO, UNEP, CERARE, ACSAD, Water and Arab Water Security Studies Centre, Observation Du Sahara Et Du Sahel. Arab Funds, donors and GEF and Islamic Bank Funding can provide partial or complete contributions towards integrated, cooperative projects.

Irrigation-water-management is a significant issue as it is the main source of water usage in the WANA region. Regional projects need to address agricultural policy in relation to food security, water scarcity and impacts of desertification and biodiversity degradation. Suggested projects need to focus on irrigation efficiency and their association to water allocation especially for the domestic, virtual water, water harvesting, traditional knowledge, land use, investment inside and outside the region, and finally, the biodiversity of freshwater coastal zones. The FAO, ICARDA, ESCWA, ACSAD and AOAD can cooperate to formulate and implement such regional project. Leading roles can be designated to the UNFAO or AOAD and potential funding sources could the Arab Fund, and international donors.

The development of methodologies to deal with climate change is equally important. Flooding, arid and extreme arid conditions, and the ensuing emergency relief will require extensive formulation of emergency plans and policies, as well as structural and non-structural measures to be undertaken in the near future by all governments and international organizations in WANA. Policy formulation and training activities on emergency planning under natural uncertainty for water supply provision and protection are paramount to regional and local water security. Formulation of modern water legislation to deal with non-renewable ground water sources including shared sources will need to be addressed.

Research and development projects need to focus on the development of water assessment methodology. This should take into account the conditions of arid land, as well as the evaluation of practical water management measures that take into consideration the environment, economic, social, cultural and religious conditions of the Arab region. The institutionalization of technology; desalination, solar energy, water-saving devices, appropriate and low cost wastewater treatment need to be given strong support by supporting the existing technology centres and science parks such as the recently established by ESCWA Technology Centre in Jordan and the Science Parks in Dubai and Qatar and desalination centres in Oman and Saudi Arabia. Furthermore, more should be done to encourage the establishment of new institutions. Such initiatives will lead to the availability of well-trained scientific and technical cadres, reduce the 'brain drain' and attract water scientists to the region. Organizations that can be involved are ESCWA, UNDP, UNESCO, ALESCO, ISESCO and MEDRIC and other centres and leading universities.

4 LEGAL FRAMEWORKS OF SHARED WATER MANAGEMENT

WATER SECURITY CHALLENGES

Besides being scarce, another characteristic of the water resources in the WANA region, whether surface or groundwater resources, is that they are often shared between two or more States. Some of the shared groundwater resources is found in non-recharging aquifers such as the aquifers in the Arabian Peninsula, or in the northern part of the African Nubian Sandstone Aquifer System (Chad, Egypt, Libya and Sudan), and North West Sahara Aquifer System (Algeria, Libya and Tunisia). The region faces here a major challenge. States sharing a water resource, can be directly affected by decisions and developments made in the riparian States.

Water resources that cross national borders place the countries sharing the resource in a state of interdependence. Therefore, cooperation in managing shared water resources in a water scarce region becomes imperative in order to ensure resource preservation and its sustainable development. Both water quantity and quality aspects, and proper access to water, have regional dimensions when the water resources are shared.

Numerous shared water basins are still managed in a unilateral way by the concerned States, without any cooperative effort. Such a situation can affect adversely the water resources, especially in the case of shared groundwater, a hidden resource. In the few cases where agreements exist, the cooperation modalities are often limited to exchange of data and developing models and information systems. Actual joint management of shared water resources is still lacking. Therefore, much effort still needs to be exerted before the region's shared water resources can be beneficially used sustainably, equitably, and in accordance with the principles of international law, and more specifically international water law.

This is in contrast with other regions of the world where international relations have evolved to a point that initiatives to establish formal, inclusive legal frameworks can be articulated. The WANA region can engage towards an improvement of the situation of its shared water resources by integration the principles of international water law, by following other regional examples which have adopted a framework for shared waters, and by enforcing its national capacities in the management of water.

ADOPTING A REGIONAL FRAMEWORK FOR SHARED WATER

It is recommended that governments should look to examples of regional frameworks abroad, to examine how it might be able to develop and enforce its own regional water legal system. In Europe, the UN Economic Commission for Europe (UNECE) adopted the Convention on the protection and Use of Transboundary Watercourses and International Lakes (1992). The Convention entered into force in 1996, and has been ratified by thirty-eight States. It applies to all transboundary waters, without any restriction. The Convention is guided by the equitable and reasonable use principle, the precautionary principle and the sustainable development. It includes provisions related to procedural rules giving specific obligations to Riparian countries such as establishing and implementing joint programmes for monitoring. The Convention has served as a reference to numerous agreements in Europe such as the Danube River Protection Convention (1994), the Convention on the Protection of the Rhine (1999), or the Convention on the protection, utilization, recharge and monitoring of the Franco-Swiss Genovese aquifer (1st January 2008).

There should also be legal research done on the Southern African Development Community (SADC) adopted in 2000 the Revised Protocol on Shared Watercourses. The Protocol is based on the UN Watercourse Convention, and applies to international watercourses in the same way as the UN Convention. Strong consideration of the Resolution 63/124 on the law of transboundary aquifers has taken place in SADC, and as a result of the dialogues engaged it was decided to give high priority to generate a complete understanding of transboundary aquifers with adequate groundwater data and information to allow for the implementation of cooperative arrangements, either as part of existing agreements on surface waters or through other modalities. This might form the basis for a similar arrangement being established in the WANA region.

It is recommended that the Arab Ministerial Water Council extends Resolution 4; Item 3, to neighbouring States of the Arab region. The Arab Ministerial Water Council (AMWC) identified shared water resources as a regional priority, and passed a resolution during its second session in July 2010 in view of preparing a draft legal framework on shared waters within the Arab Region (Arab Ministerial Water Council, Session 2, Resolution 4, Item 3 (AMWC, 2010). This should be made applicable to shared waters between an Arab State and its neighbours. It is also recommended that such a regional instrument, while taking basis and inspiration from the principles of international water law, adopts an approach considering the specificities of the region such as, inter alia, water scarcity, arid environment, and population growth.

National legal and institutional settings play an important role in the management of water resources, even when these resources are transboundary or shared. While being transboundary, they are also national resources and are managed at the first instance at the domestic level. It is therefore fundamental to have strong institutions governing the water resources, with a clearly defined mandate and responsibilities, as well as a legal setting ensuring sustainable development and use of waters, giving prime importance to the well-being of humans and the environment.

5 INNOVATIONS TO MAINSTREAMING THE WATER AGENDA

CHALLENGES

The effectiveness of adopted policies to cope with the multifaceted dimensions of water scarcity in the WANA region is far below the anticipated goals to achieve sustainable water development. The time set by our countries to meet the Millennium Development Goals (MDGs) is coming to end, but still very little progress to cope with water scarcity issues have been achieved to date. The WANA countries must engage in revolutionary cooperation processes to define innovative options on policies for water conservation, water use, water restoration and recycling.

Water scarcity is a malign disaster, which if not properly diagnosed and treated from the first stage, will propagate to damage all sectors of water resources management. The challenges and threats imposed by the new dimensions of water scarcity driven by climate change, declining water sources availability, degradation of water quality and inadequate water management will require from all governments in the region to bring water scarcity management high in the political agenda.

The failure to achieve progress in water disaster risk management primarily to cope with water scarcity under currently adopted policies will have tremendous impact on the political will to further engage in sustainable funding. A clear impediment to achieve better political will to mainstreaming water scarcity high in the political agenda is the declining number of innovative options proposed to tackle the complex issues of water scarcity and water governance in general. Countries failing to do so will amplify their vulnerability to water scarcity and will weaken their resiliency to water disasters. These nations will lag behind in the need of the future water demands imposed by the paradigm shift of our cities and social dependency on water.

RECOMMENDATIONS ON WATER INNOVATION

Planning to cope with water scarcity requires an integrated management approach within a unified disaster risk management agenda and involving all water partners. The immediate challenge that must be addressed by WANA countries is the institutional fragmentation of responsibilities and uncoordinated actions within the water development sectors that is directly or indirectly affecting policy progress in water scarcity management. The way forward must be achieved by parallel actions at both national and regional levels with the creation of national and regional institutional bodies or water commissions specialized on water disaster risk management with a primary focus on water scarcity management.

At a national level, a specialized institutional body - such as a Water Disaster Commission - is required to create the momentum for synergy between national water development sectors on adopted policies and implemented measures to cope with water scarcity. It is expected that such a measure would minimize the current institutional fragmentation of responsibilities through improved national information exchange, strengthening the coordination of local actions, and enhance the liability of the decision making processes to cope with water scarcity. The national Water Disaster Commission should create the platform to all water partners to engage in focused studies and actions that would identify the national specifics of the multifaceted dimensions of the water scarcity issues in a way leading to mainstream water scarcity in the policy agenda and fill the existing void in the legal framework on water and socio-economic development.

The "regional water commission" specialized on water disaster risk management will play a leading role as primary focus to identify the crosscutting regional strength and weaknesses in expertise and professional human capacities to cope with water scarcity. Based on proper information and data sharing on adopted national policies it is possible to develop policy indicators that would promote regional mechanisms for funding as well as a platform for the public and the private sectors to engage in improving water services, explore opportunities to transfer national know-how, promote expertise and best practices in policies for water scarcity management to other countries in the region.

The national and regional water commissions will play leading roles to enhance the role of stakeholders in policy formulation. Policy based on crisis management or a "crisis driven" approach - especially undertaken by isolated water development sectors at the national level - is too narrow for the dynamic challenges of water scarcity. In other words, the debate about the advantages and disadvantages of the proposed policy options can help lead to the most widely acceptable choices and pave the way for the creation of a roadmap for water and socioeconomic development. Therefore, governments must enable regulations that compel policy leaders and policy makers to involve all related entities from the public and private sectors in drafting new policies for water scarcity management.

The creation of a sustainable funding mechanism for research, education and technology on water scarcity management options will ensure the creation of national human assets and professional cadre of regional experts advocated to the field. This can be achieved through government's engagement to allocate a specific percentage of the national GDP and advocated commitment of the private sectors in the technology research. To ensure sustainable engagement of the private sectors there is a need to overcome any existing national and regional shortcomings in legal policy that would hamper the development of water technology research such as protection of intellectual property rights. It vital to enhance related regulations to private-public partnership through participatory approaches that ensure that key policies are developed under win-win conditions.

We must enforce water scarcity issues and water governance in general in the education curricula. Governments are aware of the significant impact of raising public awareness in integrated water resources management. Nevertheless nations in the WANA region still suffer from almost negligible public awareness for sustainable water governance. To foster sustainable social engagement and social ownership on water scarcity issues there is a vital need to enforce water scarcity issues and water governance in general in the education curricula from primary school to university. By doing so we ensure that future generation would be more proactive and perceptive of the threats of water scarcity.

We must focus on the development of Water Scarcity Policy Effectiveness Index. Poor definitions and ambiguous categorizations of water scarcity in the mind of policy makers will hamper any tentative re-think of policies to cope and mitigate water scarcity at country level and consequently, slowdown any cooperative actions at the regional level. Definition and categorization based on currently exiting indices (such as Falkenmark Water Stress Index) can still provide adequate information regarding the general state of water stress and water scarcity, but their role to enhance policies is proven to be limited. To mainstream water scarcity management in the policy agenda, it is never enough to provide policy makers with a general figure on the state of water scarcity without detailed breakdown and assessment of the shortcoming of current measures and effectiveness of adopted policies.

It is essential to continuously improve our knowledge on these interplaying factors hindering governments and communities to formulate and implement synergic and sustainable water management measures. At the centre of these impediment factors is the weakness of water disasters risk policy, particularly policies to cope with water scarcity. Unfortunately, in most countries the weaknesses in existing policies are only recognized after catastrophic events strike in view of the fact that there is no proper system in place to evaluate the effectiveness of adopted policies.

The concluding recommendations of the WANA Forum 2010 advised on the need to develop a breakthrough index "to capture reality on the ground and document best practices for knowledge sharing". The way forward can be achieved through the development of a water scarcity policy index to assess the effectiveness of adopted policies and efficiency of implemented measures in water scarcity management. The Water Scarcity Policy Effectiveness Assessment Index (WSPEAI) will be developed based on clear regional targets backed by clear set of relevant indicators that can be adapted and tailored to national conditions with regards to local realities and prospected new dimensions and challenges of water scarcity issues

The primary target to be achieved through WSPEAI is the assessment of the effectiveness of national and regional investments and budget allocations to cope with water scarcity. The implementation of WSPEAI will have tangible impacts to: improve transparency and instil political and professional accountability for implemented measures to cope with water scarcity; ensure better engagement of all stakeholders in the funding process of water scarcity issues and creation of key regional infrastructures as recommended by the WANA Forum 2011[2]; initiate the momentum of trust to support the creation of a Cohesion Fund as basic funding platform to promote political and technical cooperation.

The development of the Water Scarcity Policy Effectiveness Assessment Index will also instil new momentums for data and information sharing. The index will be formulated based on sets of tangible indicators to be identified based on the regional categorization of the multifaceted dimensions of water scarcity issues. To this end, EMWIS (Euro-Mediterranean Information System on know-how in the water sector) can present a valuable regional platform for data sharing and policy documentation related to the development of WSPEAI.

6 WANA WATER INFORMATION SYSTEMS AND SCIENTIFIC KNOWLEDGE TO COPE WITH WATER SCARCITY AND DROUGHT

Data availability and reliability are of essential for the national water master plans. However, adequate data is generally not available for efficient water planning in most countries of the WANA region, and a large part of the data is often considered unreliable. In addition, the absence of an accessible information system means that some of the data collected in the past remains unavailable or inaccessible to water management planners and experts. Good planning depends on the availability of reasonable amount of correct data.

All planning must give considerable thought to what type of data is required, how it will be used and for what purposes. During the last few years, many organizations & initiatives across the WANA region have made an effort to establish regional water knowledge bases or information systems. Lessons learned indicate clearly that the absence of accessible information systems is the main cause of being unable to govern water resources, their efficient allocation as well as mismanagement and inefficient use.

Most nations in the region face the challenge of water scarcity and a high risk of water shortage in the next few decades. Water shortage is generally ascribable to increasing demand despite the limited renewable water resources (which are often of high spatiotemporal variability and affected by climate change). In some places it is exacerbated by poor water quality. To analyze in depth the drought and water scarcity occurrence and its extended impacts, one needs to look at the Drivers, Pressures, State, Impacts, and Response –DPSIR - associated with these phenomena.

Since decision-making must be based on high-quality information, knowledge and data collection need to be improved. An information system on water scarcity and drought throughout WANA region should be developed, based on the existing water information systems in WANA countries, on an annual WANA assessment using appropriate indicators, and on information obtained from other regional initiatives & information systems. The following organizations might aid or take part in such a process: ESCWA, EMWIS, ICARDA, UNU-INWEH, FAO, ACSAD, CEDARE, and the COWFS-Arab League.

Research and technological development opportunities should also be encouraged. Water Scarcity and Drought produce a complex mix of economic, social and environmental impacts that are very difficult to assess in quantitative and monetary terms. While data may exist in a number of countries, it remains decentralized across different agencies, thus making it difficult to collected and assess. While it may be easy to obtain figures on impacts for drought events (because they are limited in time and impacting specific sectors), the impacts and the costs associated with scarcity are largely more difficult to obtain.

The process of using common data and indicators reinforces exchange of experiences between the WANA countries, allowing a clear understanding at the operational level and facilitating the communication between stakeholders. This provides a basis for integrated water management at river basin scale, and allows for the assessment of mitigation strategies in those countries.

The way forward is to clearly define and improve categorization of water scarcity issues. It is possible to achieve that through the development, under a common working framework, of a policy index to assess the effectiveness of adopted policies in coping with water scarcity. The policy effectiveness index shall be based on clear national and regional targets backed by clear set of relevant indicators that can be adapted and tailored to the countries specifications with regards to current and prospected water scarcity issues in the region.

The process of developing the policy effectiveness index will contribute to the process of priority setting, policy formulation and evaluation and monitoring of progress. It should be emphasized that indicators should ideally be developed as part of the overall policy and planning process, if they are to have policy relevance and practical application.

It is necessary to select a combination of the most suitable hydrological indicators in order to portray the evolution of drought over time across the affected socio-economical-environmental systems. This must take into account in account the different drought characteristics (meteorological, agricultural, hydrological, socio-economic) and base its selection on specific criteria (e.g. robustness, data availability, reproducibility, capacity of integration of the indicators etc.).

It is also necessary to monitor the water availability per sources, the water abstraction, and the water uses & demands for the different economic sectors involved. This is necessary in order to evaluate and individuate the reasons of the imbalances and activate proper measures. In both cases, characterization of the events should include preliminary analysis of the sources of information, including data reliability, and selection of the appropriate spatial and temporal time scale.

Central coordination of regional, national and local data is necessary to ensure the standardization of field data collection. Furthermore, significant communication and collaboration between the relevant drought-monitoring and disaster-planning bodies is essential for the timely flow of information, as drought early warning systems require the participation of meteorological, agricultural, natural resource networks and professionals, as well as policy planners to best determine how to act on the information they receive about water availability and drought effects.

Drought information exchange in the WANA region should be institutionalized and greatly enhanced. Drought early warning would benefit greatly from enhanced collaboration between responsible ministries and institutions within a country, as well as within the region. In addition, insufficient communication and collaboration between relevant drought-monitoring and disaster-planning bodies hinder the timely flow of information essential to early warning and vulnerability assessments.

Easy and unlimited access to data is crucial to effective early warning. This could be enhanced by the use of the web to facilitate information delivery for both national and regional information exchange. Many countries have also worked to enhance their GIS technical capacity for drought monitoring and other purposes. Recent efforts have

led to the establishment of new regional drought networks, such as the ICARDA NEMEDCA. The Network services several countries from the WANA region: Egypt, Iraq, Jordan, Lebanon, Palestine, Syria, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates and Yemen.

Data management is a key issue and an essential one for making reliable predictions of supplies to formulate allocation strategies. Modern computerized data processing systems need to be installed, with the training and manpower development programmes that they imply, for water data base development, for water management, and for timely dissemination of information.

An integrated information system is needed to regularly record and disseminate climatic data. This will include rainfall, and data from hydrological networks and river gauging stations as well as those of groundwater and land use planning. It would benefit from the establishment of an institutional framework for conventional remote-sensing data programming and the use of geographic information system (GIS) technology. The ICARDA NEMEDCA, EMWIS, the Arab Database on shared water resources and other regional networks, can be used as examples to build on in meeting a crucial need.

There must be support for regional drought networks and information exchange to streamline the flow of information on monitoring tools and technologies, on assessment methodologies and early warning data. Networks also serve to build national capacity by promoting professional contacts, study tours, expert group meetings and training courses. Thus, networking provides opportunities to share experiences and lessons learned. In addition, networks can serve as focal points for regional drought monitoring, vulnerability assessment, and early warning, thereby supporting national drought-monitoring institutions in WANA countries.

There is a widespread need to share the results achieved with, and to raise awareness among, all decision-makers, managers and end users, including the general public. There are three elements to be considered: (1) the underlying assumptions (IWRM, sustainable development, decision making perspectives (2) stakeholder participation and (3) DSS interface. In order to achieve the science-policy interface, two objectives must be attained: (1) the user-friendly technical assessment tools (such as DSSs) should be designed to accommodate non-technical experts (common users); and (2) they should yield easily interpreted or understood evidence (data/information). Based on these two objectives, a science-policy interface integrated methodological framework a unique analytical approach that can establish the links or interfaces between technical and policy and institutional frameworks. The integrated framework provides an interface between policy and science by (a) linking socio-technical Driver-Pressure-State-Impact-Response (DPSIR) assessment framework with Institutional Analysis and Development (IAD) Framework; and (b) providing a basis for good governance by integrating ethical and cultural aspects within the DPSIR framework.

It is vital to incorporate ethical perspectives into integrated institutional and technical frameworks for better water resources management under water scarcity & drought situations. Policies to deal with water scarcity in WANA region are influenced by cultural and ethical aspects that represent a dimension of the community attributes that has to be considered in any policy analysis exercise.

Water scarcity management requires integrated management approach involving all water partners. The formulation of such an approach can only be achieved by bringing all the water partners under a unified policy think-tank. The immediate challenge that must be addressed by our countries in the WANA region is the institutional fragmentation of responsibilities and uncoordinated actions directly or indirectly affecting policy progress in water scarcity management within the water development sectors. The way forward can be achieved through institutional bodies specialized in water scarcity management at both national and regional levels.

Water scarcity & drought monitoring is an essential element in the decision making process for planning proper measures of prevention and mitigation of the impacts. This would provide information over the possible duration, intensity and extension of the events. The distinction between water scarcity and drought is not a simple task due to the difficulties in differentiating the natural impact of drought from the anthropogenic pressure and improper management of water. There is a gap of knowledge and tools at WANA region level on the demand side of the water scarcity and a lack of reliable information, thus the formulation of an adequate indicators' framework could provide a powerful tool for building a common basis for policy and decision-making.

It is essential not only to fortify the process of data collections, but the validation and quality assurance as well, since reliable information is the basis for all assessments. Water quantity monitoring is often undertaken on a project-based approach with external implementing agencies financed by Technical and Financial Partners. It is necessary to move from a project approach to a sector approach for more efficient investments and water management.

Data collection, analysis and dissemination are necessary for water master planning, identification of programme of measures and their monitoring. Different types of indicators are necessary to respond to the needs of stakeholders' categories, e.g. politicians, managers, famers. Based on the various end users and purposes, there is a need for simple, descriptive indicators that relate to monitoring and assessment of drought and water scarcity conditions, which can easily communicate a message. Moreover, more elaborate operational indicators that can trigger responses and mitigation actions are required.

Efforts must be intensified to gather fundamental water data, organize them into usable and accessible forms, and disseminate them to all who need them. Regional data collection and sharing is an important part of the rational management of any resource. Basic water resources data must be considered, classified or withheld from other nations. Unless, nations share hydrological data, no satisfactory agreements on allocation and responses during shortages, flood management, or long-range planning can be reached.

In brief, the following recommendations are made under the framework of the WANA Forum

- Reinforcing the collection, exchange and availability of water scarcity & drought related data and indicators.
- Improving communication on water scarcity related measures and policies.
- Setting-up a range of indicators (including vulnerability indicators) related to the extent and impacts of water scarcity and drought, agreed by the WANA countries,
- Encouraging WANA countries to organise the collection of information, according to the set indicators,
- Testing these indicators at local and pilot basin levels, and demonstrating the usefulness in decision making process, mitigation and preparation plans and participatory approaches,
- Enhancing the knowledge-base regarding climate change impacts and the vulnerability to them so that appropriate policy responses can be developed based on reliable data and information on the likely effects of the phenomenon and the costs and benefits of different adaptation options,
- Enhancing transparency and liability in the decision-making processes undertaken by individual water sectors' developers.
- Developing of scientifically sound scenarios on future development in cooperation with the academia has to be improved particularly at the regional and the local level.
- Creating a science-policy interface based on linking social (policy) and scientific methodological approaches through an exchange mechanism among outputs of the frameworks used in the DSS.
- Facilitating the creation of an experience-sharing regional platform/network and start working towards the establishment of an effective WANA drought information system by discussing the steps and (financial & human) resources needed, to offer a framework for integration of vulnerability and hazard information for planners and decision makers,
- Identifying and monitoring impacts of water demand management measures in terms of environmental, social and economic consequences, and
- Increasing regional and transboundary cooperation and assistance to cope with emergency situations arising from those phenomena.

7 WATER AND THE UPROOTED

RECOGNISING THE WATER RIGHTS OF THE UPROOTED

The magnitude and the complexity of environmental migration have increased over the past two decades and become serious concern for many countries. This concern is related to the fact that environmental change and human mobility are highly dynamic and nonlinear process, and can also be linked significantly to conflicts (Edwards: 2008). Human-environmental migration depends on the nature and the dynamic of the climate change and on non-climatic causal factors.

Droughts, water scarcity and desertification are natural processes that occur at a slower rate to earthquakes and tsunamis. As such, they are filtered through social, political and economic contexts such as rapid population growth, economic decline, inequitable distribution of resources, food deficiency, armed conflicts and lack of institutional support. This makes their governance and management far more complex, and requires a long-term planning in order to offset the ensuing instability.

It is difficult to isolate the environmental factors from others drivers of mobility and to identify the start of slow onset until it escalates into crisis. The countries of West Asia and North Africa (WANA) are one of one of the most affected regions in the world by the cumulative changes with slow insets.

The challenge for current governance systems is to provide acceptable levels of vital services This includes access to potable water and sanitation, health facilities and food security, and implementation of flexible policies and actions to address the issues. This represents a serious constraint to achieving the 2015 Millennium Development Goals. For this reason, there is an urgent need to reform the actual governance systems, which should be discussed systematically within the context of improving carrying capacity.

Of the fifteen most water-poor countries in the world, ten are in the WANA region, wherein the figures for the displaced and uprooted are among the highest in the world. Also, the people of this region are increasingly facing crisis situations concomitantly with blockages and obstacles to their movement. Although the dominant rhetoric of globalisation is salient, the reality is that people of WANA face the strongest constrictions to their mobility. People in the WANA region are increasingly faced with conflict, poverty, economic crises, political unrest, corruption, inequity, deficiency in resources, institutional failure and are met at the same time with more borders, checkpoints, visa constraints.

Some of the recent movement of population affected by environmental change in WANA region is operating in areas, which were known for their insufficiency in water and food security. In Iraq, the collapse of ancient underground aqueducts - locally known as Karez - is triggering severe water shortages, has driven over 100,000 people from many areas in northern Iraq from their homes in Dohuk, Ninewah, Erbil, Kirkuk, and Sulaymaniyah (Lightfoot: 2009). In Iran, millions of people could be displaced by what the United Nations is calling the country's worst drought for 30 years. In 2010, Syria faced one of the "largest internal displacements" in the Middle East in recent years. According to the UN (2010), more than 800,000 people lost approximately all of their livelihoods and are facing extreme hardship. Similarly in the Kurdish region - in Kameshli and Hasakeh - due to the consecutive years of drought and mismanagement of natural resources and social development programs. According the many Social Medias in Syria, such as The Damascus Bureau organisation (2010), many areas around the cities are covered by tents of families living in deplorable conditions in what it described as "tents of hunger and estrangement"

However, the vulnerability of the population to climate change is mainly caused by the lack of fair distribution of resources, discriminatory laws and mismanagement of public policies. It is not only an issue of food insecurity but also an issue of human dignity due to the fragmentation of institutional arrangements that tackle the complexity of social challenges, the weakness of the accountability of public policies and lack of social justice.

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RECOMMENDATIONS ON WATER & THE UPROOTED

Establishing a system of assessment at the national and regional levels. It is essential that the region launch a system of prediction by analysing the current exposure to water scarcity and water stresses. This system will be a model-based analysis of future impacts by providing indicators; helping to predict the displacement of the population and "repulsive zones; and to operate assessments to understand the vulnerability of livelihood of exposed communities and its interaction with the political, institutional, physical, and social environment.

Deciding to leave: the uprooted experiences require deep understanding and analysis. There is a real need to bridge the gap between people and public institutions to tackle this issue to move from crisis management to risk management by: understanding how environmental change affects individual and group decisions to migrate; how do they cope with the situation, what are their alternative strategies to move and how people make the decision to leave within a context of vulnerability, and economic or social crisis and what kind of social networks do they build. This will require an improvement in the understanding of the social capital and material culture of affected communities, which are a crucial asset for implementing adaptive strategies and an increase in the level of awareness of governmental plans and projects among the population.

Elaborating programmes for improving livelihoods. The region must capitalize on and share successful experiences of adaptation and development activities adopted in the past as a response to environmental migration such as technical measures and training that improve access to alternative livelihoods for affected people and the management of natural resources.

Governments should prepare reintegration programmes in the host communities by prioritizing the pro-poor and the most vulnerable in the national plans and strategies. This can be achieved by developing project portfolios through an integrated and participatory approach. In this context, it's crucial to strengthen the

natural resource management following local models and indigenous knowledge such as Hima and Aflaj. There is a need to map all these traditional methods of resource management and strengthening what exists, give it confidence through, friendly policies.

Strengthen governance by adopting an integrated adaptation framework. In order to address vulnerabilities and resilience, we have to bridge between policies domains - ministries and directorates - that address separately these issues, either at national, regional or international levels. Indeed, a constructive concentration is necessary to provide a dialogue platform between all actors in order to reach a holistic approach. This platform will be responsible for implementing short-term emergency steps to prevent migration by reducing environmental degradation and social vulnerability. It's putting to practice the Integrated Water Resource Management (IWRM) approach by advocating a holistic approach that emphasizes the three goals of economic development, social welfare, and environmental protection that (i) integrates management of all horizontal sectors that use and/or affect water, (ii) coordinates efforts between local, regional, national, and international water user groups and institutions.

A pro-poor governance Fund at regional level. To improve the legal frameworks at the regional level, a fund should be crated targeting the condition of the uprooted locally, nationally and regionally, and can be a significant pillar for adaptation strategies and policies. The Fund should assist countries to realise assessments of the environmental risks and human vulnerability. It will support the implementation of national and regional adaptation action plans and strategies to respond to the need of the displaced, to reduce their vulnerability, and build their resilience.

8 VIRTUAL WATER: MANAGING WATER SCARCITY IN WANA

WATER ASSESSMENT CHALLENGES

Fresh water scarcity in many nations of WANA is not simply a result of the arid climate. Water scarcity is a result of poor vegetative techniques that encourage runoff and insufficient soil moisture; drainage of large volumes of highly polluted wastewater into the natural water bodies, which is one of the principle causes of water scarcity.

Water scarcity is also a result of the mismanagement of the resources, and the inefficient methods of irrigation and manufacturing, and domestic uses. Therefore, the four categories of water (blue, green, grey and virtual) must be taken into account (Hoekstra and Chapagain 2008; Hoekstra et al., 2009). The water demands of agriculture, industries and domestic sectors in these four components must be assessed. The rate of groundwater pollution, or grey water consumption, may be more than the rate of groundwater withdrawal by illegally bored wells.

A lack of sufficient and reliable data in the water sector is the most common weakness of all of the WANA countries. No transparent data about the volume and the intensity of pollution of the water wasted by the industries are accessible (UNEP, 2009). This is also true for the aerial extent of forests and rangelands, and the extent of their annual degradation. The number of rain gauging, piezometric and hygrometry stations are inadequate in many of the WANA countries.

The virtual water concept can be implemented in assessing the different components of water. An important item in virtual water concept is the water footprint of different goods and products. The water footprint of a product is the freshwater volume equivalent of a product. The water footprint connects different components of water in an area; thus, it depends on the climatic conditions of the state. Whether the virtual water could be accommodated in an agricultural product depends on the consumed water during production of that product. The water footprint of rice, corn and wheat cultivated in central parts of Iran, for example, is more than twice that than in other regions. Therefore, it is important to calculate the water footprint of the strategic products for the given climatic conditions in different states.

Water consumption management can be conducted through reduction of the water footprint of an agricultural product. This can be achieved through enhanced water use efficiency, or by cultivating water in another region or state with a more favourable climate. Reducing the footprint of an agricultural product in a state in the WANA countries will result in an enormous saving of water for the region.

The first step in materializing this concept is to assess the water footprint through social and environmental concerns. In this regard, the virtual water the water demands are compared with the available water and the environmental flow

requirements (EFR)(Smakhtin et al. 2004); thus, the carrying capacity of the environment is considered.

Using this approach, the water scarcity index for blue, green and grey waters can be assessed for different states. These indexes are assessed through comparing the environmental capacities for supplying blue, green and grey water demands. For example, over-exploitation of the same amount of water from an aquifer with less available water will result in employing more blue water scarcity index relative to an aquifer with more available water. Through this method, the states with higher water scarcity indexes, or the hot spots, can be determined.

The water scarcity indexes can be determined by comparing the water availability and water demands in different regions or states, which are interrelated through to their water supplies. These are located in the upstream or downstream of the same regional water system. A telling example is damming a river that results in an increase in the scarcity index of the blue water in its downstream area.

The proposed strategies are:

1- Installing reliable networks for the collection of the spatially and temporally regulated data for different water components in different states.

2- Assessing the water footprint of different products and goods in different regions and states through considering their climatic conditions, and locating the optimum regions or states, which are favourable for cultivating different agricultural crops, or producing manufactured goods.

3- considering the social and environmental sustainability of large projects in water sector in different states (environmental impact assessments).

4- Calculating the scarcity index for different water components and pinpointing the hot spots in different regions and states through comparing the demands and water availabilities in interrelated locations or states in the upstream and downstream reaches.

5- Optimizing the interchange of virtual water between states so that the sum of scarcity indexes in different states is minimized; and

6- Bartering virtual water between the WANA states through exchange of energy, or energy related products, such as oil, between them.

9 DESALINATION AS A POLICY SOLUTION

CHALLENGES

The West Asia - North Africa region has minimal rainfall and limited aquifers. It is the driest region in the world with renewable water resources less than the critical level of 1000 m3 per inhabitant per year. With rising populations and continued economic development, most nations will become increasingly dependent on the desalination of brackish water to cater for their actual and future needs. This proposal argues that as a result of freshwater scarcity and a reduction in the cost of desalination, desalination as a solution to the region's water problem is becoming increasingly important.

Many regions in the water stressed countries in WANA are increasing their water supplies with desalinated water to meet the needs of the continuous growth of population and industrial, tourism and agriculture developments. Although desalination has been considered among the non-conventional water resources, it can no longer be considered as a marginal resource because some countries such as Qatar and Kuwait rely 100% on desalinated water for domestic and industrial use, whereas Saudi Arabia reliance is nearly 60%.

Presently, the total desalination capacity is around 60 million m^3/d and will reach around hundred millions m^3/d by 2015 [2,3] in which over half is produced in the region. 64.6% of the total capacity is produced by membrane processes and 34% by thermal processes. 62.4% of the feed water is from seawater and 20% from brackish water and the remaining is from surface water and wastewater.

is negligible if compared with the total capacity as renewable energies is negligible if compared with the total capacity as renewable energies technologies can run small-scale plants only. These figures are susceptible for quick changes as desalination market is growing very fast with an annual growth rate of about 55%.

SOLUTIONS

They should utilize a technology that can be relied upon for many years and can ensure a guaranteed water supply independent of climatic conditions that prevail in the area. Also, renewable energies such as solar energy could be used to desalinate salty waters in rural areas where there is no electricity grid or there is a lack of skilled manpower to operate these plants. Desalination and water reuse fit this requirement. It has been established practice in several countries such as GCC states, Algeria and Libya that their future water demand is to be met by desalination.

Desalination has a great development potential on a global scale. This is attributed to the fact that, out of 71 large cities that do not have local access to new freshwater source, 42 are coastal. Other than the fact that desalination may be the only option for some places, there are driving forces behind its development potential, making it more favourable than conventional resources. Being independent of climatic conditions, rainfall and so on, a primary force is its identification as a secure source of

Over 66% of the desalinated water is used for municipalities and 23.5% for industry. The capacity of desalination using renewable energies

Although renewable energy desalination remains at a small scale and in remote areas where other alternatives are simply not available, it is expected that commercialization of processes will lead to expansion in use. Furthermore, the region will likely witness an increase in size, and decrease in costs. Desalination by means of renewable energy sources is a suitable solution to provide fresh water to a number of regions in WANA. This solution becomes more competitive, especially for remote and rural areas where small quantities of water for human consumption are needed. Recently, more attention has been directed for improving the efficiencies of the renewable energy conversions, desalination technologies and their optimal coupling to make them economically viable for small and medium scale applications.

Since the energy requirements in desalination processes play a decisive role, it appears attractive to consider renewable energy for desalination. Solar still is the first of such systems. It is based on the humidification – dehumidification (HD) principal for desalination of sea or brackish water and has been in use for several decades. Many modifications to improve the performance of the solar stills have been made. These include linking the desalination process with the solar energy collectors, incorporating a number of effects to recover the latent heat of condensation, improving the configurations and flow patterns to increase the heat transfer rates, and using less expensive materials of construction to reduce the cost.

Renewable energy systems, mainly solar energy, which is abundant in the region, used for desalination, has proven to be reliable and could provide solutions to cuter the potable water demand in specific areas. They are the technologies of the future and will play an important role in future scenarios. However, presently they can be used only for small scale applications in remote locations where grid electric power is not available.

10 THE ROLE OF BIOSALINE AGRICULTURE TO COPE WITH WATER SCARCITY

WATER SCARCITY AND MANAGEMENT

This paper will focus on marginal quality water and land resources, and their contribution to reducing the demands on fresh water for agriculture in the water-scarce WANA region. Clearly there is a need to re-think the ways in which saline water can be used for irrigation and to develop appropriate technical and policy options for productive use in arid environment.

The allocation of the valuable fresh water resource vis-à-vis the demands has become a critical issue for the last two decades. The prioritization of different water-use sectors, the inclusion of new water use sectors and the availability of limited water resources had a direct impact on the agriculture sector that uses 70-80% of the fresh water worldwide, and 80-90% in the West Asia and North Africa (WANA) region. Many water-scarce countries have been tapping the shallow and deep aquifers (non-renewable) to meet their growing demand for water. This water has been used for all the sectors to meet the deficit and as a result un-controlled abstraction has led to intrusion of sea water and other marginal water in the aquifers. Thus, the quality of the water has deteriorated significantly.

As this water becomes more and more salinized, the impact on conventional agricultural production becomes more and more evident in terms of reduced quantity and quality of agricultural commodities. Available renewable water resources per capita across North Africa, the Middle East, and South/Central Asia are the lowest in the world and will decrease further with continuing strong economic and population growth in the WANA region. This region is currently at 1,100 m3 per year and projected to further drop by half by 2050.

In order to have a balance between the water resources available and the water-use sectors, it is imperative to (i) prioritize the water needs sector-wise; and (ii) look for additional or new water resources.

The latter will include 'marginal water' or poor-quality water, including saline/brackish water and wastewater that can be either (i) supplemented with fresh quality water; and/or (ii) replace the fresh water for growing certain crops/production systems.

Salinity has been known to significantly reduce agricultural production worldwide. Significant portion of arable land have been salinized to different extent because of water management issues, whether that is linked to irrigation practices or inefficient drainage systems. Five per cent of world's cultivated lands are salt affected. In addition, about 20% of land within the irrigated area is affected by salinity problems with over 30% decrease in productivity. Furthermore 2 m.ha of irrigated land are lost annually due to salinization.

POTENTIAL OF BIOSALINE AGRICULTURE

Biosaline agriculture is a specialized form of agriculture whereby the system has minimal, is any use of freshwater and hence the system has minimal, if any use of fresh water. In effect, crops and cropping patterns are adjusted to the prevailing conditions of saline/brackish water and land thereby reducing the need for freshwater. In addition to having conventional/non-conventional/specialized crops/plants, an important component is the management of land and water resources to optimize the production and make it environmentally safe. This leads to three important factors, the given scenarios of climate change, the prevailing land and water quality, the targeted production system (the crops to be grown and the market for the crops).

Two approaches have been associated with the concept of improving agricultural production systems; (i) improving/developing high yielding crops/varieties – these are usually less tolerant to environmental stresses; and (ii) developing/adapting crops and systems to the prevailing stress conditions. It is widely accepted that the first approach may be feasible up to certain extent of stress (salinity) levels, since most of the crops (glycophytes) have a genetic make-up that has been pushed up to its maximum threshold for salinity tolerance. The threshold salinity level only in case of some species have made a real progress, otherwise for most of the species, the increase in tolerance limit has not been significant. Flowers and Yeo (1995) suggested options to develop salt tolerant crops in terms of priorities: (1) develop halophytes as alternative crops; (2) use inter-specific hybridization to raise the tolerance of current crops; (3) use the variation already present in existing crops; (4) generate variation within existing crops by using recurrent selection, mutagenesis or tissue culture, and (5) breed for yield rather than tolerance.

Another approach to improving agricultural production within the context of biosaline agriculture is to move towards the environment-based strategies where crops are selected/developed based on specific site criteria's. This has become more important since the increase in salinity is far rapid than the development of crops/species (conventional crops). In general, most of the irrigated areas that have turned saline either are newly saline areas (EC: 4-10 dS.m-1) or that has gone through the process of secondary salinization, with salinity ranges between 10-25 dS m-1). There also exist areas where salinity is more than 25 dS m-1 and only limited type of agricultural production systems can be practiced successfully.

Crops and production systems can be placed into different categories based on the genetic make-up of the plants and the salinity tolerance levels. These include food, feed/forage, fuel, oil, fibre crop**s,** fail to grow economically beyond 5-6 dS m-1, whereas, a number of glycophytic crops can grow up to 10 dS m-1 salinity level. The latter group still requires land and water managements to avoid any salinity build-up over period of time. At salinities of 10-25 dS m-1, the major categories of production system includes forage and landscaping plants (few glycophytes and mostly halophytes), whereas, at higher salinities of >25 dS m-1, only halophytes can support forage, fuel and coastal rehabilitation systems. Sea-water based production systems are very few.

The introduction of alternate forage production systems are essential under such salinity conditions. With increase in salinity levels of water and soil, it becomes less economical to grow alfalafa, maize and other conventional forage grasses, because of high water needs and relatively lower yield (being low to moderately salt tolerant). In some cases, more salt tolerant plant species are available but their water requirements are still very high (e.g. Rhodes grass). These plant species need to be salt tolerant, have a high water use efficiency, should have a good forage quality (in terms of digestibility an palatability), should not have any negative environmental impact and should make the whole system economically viable.

Biosaline agriculture will play an important role in the future of agriculture in many arid and semi-arid countries and present an excellent opportunity to relief pressure from dwindling fresh water resources. All further expansion and/or sustaining the current agricultural areas will largely depend on how marginal and saline land/water are used for improving food, feed and fuel demands. Improvement in genetic makeup through conventional breeding, biotechnology, etc. will remain focussed for high value crops, whereas, forage and fuel production sector will eventually be limited to use of the marginalized land and water resources. Effective management practices and better genotypes (selected from wide range of wild species) followed by on-farm optimization for yield, will be the key to provide immediate relieve to the farmers as short-term strategy. In spite of all the development, a long-term planning for agriculture (other than food) represents a major challenge to the professionals and others to come with feasible solutions for sustainable production systems using marginal resources.

CASE STUDIES

11 ALLOCATING ENVIRONMENTAL WATER REQUIREMENTS: AN ECOHYDROLOGICAL APPROACH

CASE STUDY AREA: THE LARGEST SALT-LAKE IN WANA REGION

Lake Urmia Basin (LUB) covers the northern slopes of Mount Zagros and the eastern slopes of the mountain ranges between Iran and Turkey with arid-semi arid climatic conditions. LUB lies in three provinces, Kurdistan, East and West Azerbaijan. This catchment can be classified as an endorheic (closed) drainage catchment and Lake Urmia acts as a sink. The actual lake has a surface area of about 5100 km2.It is considered to be one of the 'most important and valuable ecosystems in Iran' (WRI, 2005) and had been declared as a National Park, Ramsar Site (since 1971) and UNESCO Biosphere Reserve since (1976). In addition, the lake is surrounded by equally internationally important freshwater wetlands; including Ramsar sites.

There are 17 permanent rivers, 12 seasonal rivers and 39 floodways that terminate at Lake Urmia. Although, the basin is only 3% of the total area of Iran, it contains more than 7% of the total available freshwater resources. Therefore, it is of vital importance within the water resources management and planning strategies.

Recently, Lake Urmia has been shrinking with severe environmental consequences such as negative water balance, lower lake level (up to 7 km of coastal retreat), hypersalination and loss of biodiversity. T Therefore, Lake Urmia is very sensitive to the surface inflows as only receives a fraction of groundwater discharge (up to 210 MCM). The rivers' discharge flows vary in time and space due to temporal and seasonal variation in precipitation. Average rainfall based on 1969-2010 period is 329.6 mm.

Population growth and urbanisation explosion have resulted in almost 500% increase in of urban land use had occurred in the sensitive ecological zone around Lake Urmia (Yekom, 2000) for the period 1990-2000. The trend lingers on. Inter-provincial conflicts have risen as a result of the increased urbanisation and population rate. The demand for water resources has risen as well.

Permanent lakes, such as Aral Sea and Lake Urmia, have been affected by the diversion of surface water mainly for agriculture. A total of 74 dams are to be completed. Lake Urmia has a striking similarity with the Aral Sea. In the last 10 years, surface water diversion has affected the salt concentration and water balance of the Lake. For a decade, inflow into Lake Urmia has been in the order of a tenth of the average long-term inflow. The precipitation in the basin has been on a downward trend. The salinity has increased, which has caused the demise of the only organism in the Lake; namely Artimea. Many birds, such as pelicans and flamingo, have lost their habitat and so the Lake is on its death-bed, if the current situation persists.

MINIMUM ECOLOGICAL WATER REQUIREMENT

The 1971 Ramsar Convention on Wetlands asserts that providing water to wetlands is not just a matter of meeting its hydrological requirements. Therefore, it is much more than calculating environmental in-stream flows.

Based on the ecohydrology concept[1] , an appropriate an ecohydrological model was devised (Abbasspour & Nazaridoust, 2007) to calculate the minimum ecological

1 Ecohydrology is a transdisciplinary and applied science. It uses the understandings of relationships between hydrological and biological processes at the catchment scale to achieve water quality improvement, biodiversity enhancement and sustainable development (Zalewski, undated: 1)

POLICY IMPLICATIONS: A NEW WETLAND POLICY

In policy terms, the role of ecohydrology concept is to streamline or link ecological and water policies in a coherent way. The fundamental basis of hydro-ecology is dual regulation as described by Zalewski as 'regulation of biota by altering hydrology, and regulation of hydrology by shaping biota'. Hence, a new eco-hydrological policy on wetland conservation should consider this dual regulation with a perspective:

- **to harmonize ecohydrological measures with necessary hydro-technical solutions and**
- **to integrate various regulations acts in a synergistic way to stabilize and improve the quality of water resources**

The core aim of the policy is to achieve sustainability which is manifested by the dual process and can be achieved by: dealing with pressures (threats) such as lessening the impact of point and non-point pollution; reducing the vulnerability of the system i.e. dealing effectively with catastrophic floods and droughts and use of biota as impact indicators (Artima was a biota indicator in Lake Urmia case study). Enhancing the resilience of the water resources system (i.e. socio-economic, environmental and institutional components) by increasing the robustness of the ecosystems through good governance (institutional arrangements).

IMPLEMENTING ECOHYROLOGICAL POLICY

The good governance principles of IWRM seeks to achieve ecological integrity of the water resources system i.e. integrating land and water governance based on environmental and ecological principles. Hence in policy terms, the new ecohydrology paradigm is by large represented by the IWRM ideals. This is a critical conjuncture in which the implementation of IWRM is linked to the ecohydrological conditions of the ecosystem. This is also, convenient since IWRM has been the focal point of water policy reforms in the WANA region (and worldwide) and so it can be incorporated in existing policy integration mechanisms. Furthermore, these reforms, which are essentially shaped by the IWRM paradigm stemmed from the 1992 Dublin Statement on principles of water resources management, have been profoundly promoted by international organizations such as the UN and the World Bank.

LESSONS LEARNED FROM LAKE URMIA CASE STUDY

An important lessons learned is the use of existing polices and legislations to reinterpret or redefine them in the light of the new Ecohydrological paradigm. Policy integration is not an easy endeavour especially in highly bureaucratic governance systems.

Existing polices and legislations were used to support the new policy paradigm including:

- The 50th Article of The Iran's Constitution which is one of the most comprehensive and progressive law with regard to environmental protection in the world;
- The 45th Principle that makes a statement about the

- a great range of legislations relevant to the environment such as
- The Environmental Protection and Enhancement Act (1974),
- The Game and Fish Law (1967),
- The Protection and Utilisation of Forests and Rangelands and Law Amendments,
- The coastal Created Property and Land Law (1974),
- Coastal and Reclaimed Land Regulation (1975),
- Executive By-Law of the Environmental Conservation and Improvement Law –National Parks,
- EIA legislation (1998),
- Top Soil Erosion legislation etc.
- and existing water law which is called the Fair Water Distribution Act (1982),

The Fair Water Distribution Law (1982) sets the rules for the conservation and distribution of water for different uses such as urban, industrial and agricultural uses. Notably, it does not consider allocation of water to the environment. It also neglects the economic value of water. Hence, Lake Urmia water allocation was not feasible under the existing legislation. Also, the inadequacy of the legislations lies in unaccountability of threats originating from outside the protected ecosystem. Therefore, a basin-wide policy was needed.

STREAMLINING WATER AND ECOLOGICAL POLICIES

The opportunity came in 2003 when the principles of IWRM were officially adopted. An important policy document called Long Term Development Strategies for Iran's Water Resources' was approved by the council of Ministers in 2003 (IWRMC, 2004) with 18 articles. It refers to the management, development, consumption, quality and protection of water resources. Ministry of Energy (MoE) in a very wise and calculated move incorporated the policy document in the 4th 5-year Development Plan (2004-9) which sets 6 qualitative and 19 quantitative goals for water sector (IWRMC, 2006). It encourages: an integrated approach to management, consideration of economic aspects of water supply, sustainable development, raising finance, and strengthening public contributions. Articles 17 and 67 referred to the protection of Wetlands and to establish an Ecological Management Plans(EMPs) for Iranian wetlands and referred to Lake Urmia as a specific case.

IMPLEMENTATION OF THE NEW POLICY ON WETLANDS

In 2005, UNDP/GEF Conservation of Iranian Wetlands (CIWP) was started as a joint project with the Department of Environment (DoE). Unlike Aral Sea, and as a result of CIWP, Lake Urmia has now an institutional mechanism to be managed in a systematic way. The Memorandum of Understanding (MOU) was signed by all relevant parties in September 2008, is an outstanding achievement to save the lake for future generations. The Ecosystem Management Plan (EMP) was adopted as part of the agreement. In the EMP, the non-economic (atheistic, scientific, recreational and cultural) value of Lake Urmia has been considered and its water requirement or right has been acknowledged. Therefore, a new water allocation strategy takes into account the Lake's water requirement. Ministry of Energy (MoE) is obliged to deliver an agreed amount of water for the lake based on historical water inflow and Lake's water quality (optimum salinity for Artima's growth) and quantity (Lake Urmia's water level) criteria.

PARTICIPATORY WATER ALLOCATION DECISION OUTCOMES

Water allocation in Iran is highly centralised and MoE allocates water based on recommendations from its Water Policy and Allocation Commission. However, CIWP faciated a participatory process in which all the major stakeholders participated in the water allocation for the lake and the three provinces. For this purpose an institutional set up was arranged. A Regional Council (RC) comprising of all the provincial stakeholders was established. Water and Agriculture Working Group (WAWG) comprising of major stakeholders in the basin from all the three provinces was established under the auspices of the RC to come up with a decision on water allocation. The RC will recommend to the National EMP Implementation Council presided by the First Vice President. There three major issues that have to be considered in any water allocation decisions:

- The impact of surface water diversion on the balance of the Lake.
- Salinisation of the Lake Urmia basin
- The impact of anthropogenic climatic and atmospheric change.

Studies have shown the Lake requires 3.1 BCM in normal conditions. This was accepted by the WAWG group after it was debated. Since then, has been established to reach agreement and facilitate the implementation of the MoU within an evolving national and provincial institutional set up.

THE WAY FORWARD

The case study has shown that ecohydrological policy integration has been influenced by political will and support. Lake Urmia's diabolical predicament and deteriorating environment has made it into an agenda status. There was a national outcry to save the Lake at the highest political level. This has helped the policy shift to occur. Ecohydrological Policy within IWRM framework can enhance the struggle against water scarcity in the WANA region by considering the relationship between plant physiology and water availability or water stress conditions for plant growth. Vegetation type and distribution relate directly the soil moisture dynamics. The spatial distributions of plants as a result of hydrological factors are a major topic in ecohydrogeology. Hence, issues of land cover and land use policy can be enhanced and well understood in the new integrated policy. The WANA region is mostly situated in arid and semi-arid conditions. This calls for a greater urgency for a transnational (supranational) eco-hydrological policy in the region.

12 WATER SUBSIDY A TOOL FOR POVERTY ALLEVIATION FOR EXTREME POOR FAMILIES IN PALESTINE

INTRODUCTION:

Since the start of the Second Intifada, in 2000, the social, economic and political conditions have been deteriorating resulting in a high unemployment level (25.3% WB, UNDP data, 2007) and a rise in the poverty line (53.7%), (47% WB, 2005). say that about 60% of the families in the Palestinian area (WBGS) rely on work in Occupied Areas 1948 "OA's 1948" for generating income. The closures and the Israeli restriction on movement have prevented thousands of Palestinian workers from entering "OA's 1948". Goods were also prevented from being imported and exported (Palestinian production of vegetables and olives) to and from the WB and G. The construction of the Apartheid Wall has further complicated the situation in addition to the election of the Hamas government that caused a sudden cease of budget support and grants from western donors to Palestinians. This has maximized and widened the unemployment problem and increased the threshold of poverty to encompass a wider sector of the community. About 3.8 million Palestinians are placed in the lower middle–income group of the countries. The Gross Domestic Product (GDP) in the Occupied Palestinian Territories has declined by 40% by the end of 2004(WB, 2005). The World Bank definition of the poverty line (2 US$ per capita per day) is generally considered the threshold, and all locals with an income less than this threshold are considered poor. According to a study done by Palestinian Hydrology Group PHG, more than 60% of the people in the study area are below the national poverty line. The average monthly income per family in the study area was estimated at 292.7US$ (PHG, 2008), (1US = 4.00 NIS (New Israeli Shekel)).Standards of health and education are likely to suffer long term damage, and social stability is negatively affected. The loss of jobs – for the reasons mentioned above- is considered the main reason for the increase of the poverty level in the (Occupied Palestinian Territories) OPT.

Creation of jobs and of income generating projects for marginalized families will help overcome part of this problem.

It was estimated that more than 40% of the total population in WB & G suffer from food insecurity; they don't meet the minimum nutritional requirement (FAO, 2005). The agricultural sector is the most active sector in the area. In similar area's in the north, a study conducted by PHG estimated that 47% of the total income comes from working in the sector, while the rest comes from skilled labour, free labour, work in OA's 1948, local markets, social subsidy, transfer from outside and finally from trade(based on data collected from field). In other words the locals have good experience in agriculture especially in managing farms to cover part of the basic needs and marketing some of the products to gain financial revenues. Unfortunately, this sector suffers from a number of problems mainly resulting from the poor economic conditions of the farmers that prevent them from purchasing basic needs for their farms and from restrictions imposed on them by Israelis ranging from movement and marketing limitations to land confiscation.

DESCRIPTION OF THE STUDY AREA AND POPULATION:

The study area is a block contains 4 small villages (khirab): Wadi U'beid, Khirbet Salama, Fuqeiqis ,and Imreish , the total population of the block was estimated at 2397 (1210 males, 1227 females) (Palestinian Central Bureau of Statics (PCPS), 2007) , table no. 1 shows current population and projections for the 4 locations and the case of the 38families (study sample) up to the year 2015 (Expected end of " DEEP: Deprived families Economic Empowerment Program ", asset date for achieving Millennium goals(G1)), the estimation based on the following formula: Pn=(1+r)n * P0 . In which Pn: projected population, r : growth rate(see growth rate table no.2) , n : number of years , and P0: Existing population. The four location are located in the southern area of Dora town at 3.5km(kilo meters) up to 9Km far from the centre of Dora , in south of Hebron which is located to south of the WB, at 40km's to the south of Jerusalem. These locations aren't connected to water networks, however they are accesses to other services such electricity and telephone networks. Generating Income of the families depends mainly on working on agriculture .in particular, sheep raising and planting of lands.

OBJECTIVE OF THE STUDY:

To what extend water subsidy participating to improve social safety conditions for poor and hardly hit families in the in marginalized areas in West Bank through creating income provider families instead of recipients of assistance so that they are able to improve their welfare conditions and to what extend individual agricultural income generating projects and water supply will eradicate extreme poverty or improve food and water security.

Methodology:

- Literature studies related to the subject were collected and studied form Palestinian water non-governmental organization and form Palestinian Authority related ministries (planning and international cooperation, Ministry of social affairs and labour ministry)
- Poverty cards and livelihood assessment application were filled for 38 families "In which a wide socio-economic information were collected by participation of representatives from village counsels to investigate to what extend the targeted families are poor taking income as main indicator.
- Cost benefit analysis were done for 38 families in the southern area (Hebron district, one of the poorest area as classification of Palestinian authority and working non-governmental organizations).
- To result in a relation between the poverty line and the water index , analysis was applied for a series of data collected for 38 families that represent locals that are locating under the extreme poverty line. Those families represents some 15% of the total families inhabited in the area (some 266 family).
- The 38 families were selected based on program designed by DEEP-UNDP, 2007). Evaluation of a list of information in the poverty card is able to calculate position of any family form poverty line. Form of the PC (Poverty Card) is attached. Those families were selected out of 80 families. They - in reference to the PC and to the field visits- reflects extreme poverty and poor living conditions due to food and water insecurity . The analysis were done by using excel software. The analysis include the following items: family#, Family size, Extreme poverty line, Food insecurity, average expenditure , water consumption (domestic and agriculture), water cost, water subsidy, income generates through small projects, poverty gap, drop down in gap, farm size, roof catchment, average rainfall, cisterns capacity, collected rainfall, savings
- Based on the analysis the current situation will be assessed for the 38 families in terms poverty gap shortening , option for improvement of food and water security for Extreme Poverty Families, then a projection for the situation will be estimated for the next 6 years (up to 2015) .

CONCLUSIONS

As a result of this subsidy for the extreme poverty families through water subsidy and rainwater, the poverty gap was minimized by 18.5 %. Still those people need additional support through supplying water to them for the next coming next year (2010 up to 2015), information shows EPL/capita, current per capita income, saving due to water supply and rainwater, income improvement due to micro –

Based on the above mentioned debate, it is very clear that the water sector development remains at the heart of struggle for poverty reduction, sustainable development .In some developing countries (e.g. Palestine) the challenge of managing water legacy is almost without precedent. Yet, if these challenges are not met, sustainable growth and poverty eradication cannot be achieved. There is a re-emerging consensus that water sector development is essential to generate wealth, mitigate risks, coop with uncertainties and alleviate poverty; that poverty demand that Palestine a will need to make large investment in water sector at all levels; and that development must be undertaken building on the lessons of experience, with much greater attention to institutional development and policy formulation.

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13 JORDAN: NATIONAL WATER DEMAND MANAGEMENT POLICY

INTRODUCTION

In 1997, the Ministry of Water and Irrigation developed Jordan's Water Strategy and the following four policies, which include:

- Water Utility Policy
- Irrigation Water Policy
- Wastewater Management Policy; and
- Groundwater Management Policy

The following two policies were drafted in 2006:

- Irrigation Equipment and System Design
- Policy
- Irrigation Water Allocation and Use Policy

When used with current water supply management approaches, water demand management offers the prospect of greatly improved water resources management. A National Water Demand Management Policy needs to be developed to provide a framework for water demand management programs. Water demand management is briefly mentioned in Jordan's Water Strategy, which states that "resource management shall continually aim at achieving the highest possible efficiency in the conveyance, distribution, application and use" of water resources.

More specifically, in the demand management area, the Water Strategy cites the following:

- Achievement of the "highest possible efficiency" in water conveyance, distribution and use;
- Adoption of measures to "maximize the net benefit from the use of a unit flow of water",
- Definition and assignment of roles in water conservation to be played by the different sectors of society,
- Promotion of systems and devices for water saving and water reuse.

THE ROLE OF WATER DEMAND MANAGEMENT

The idea of water conservation is not new to Jordan because in this region of low rainfall the people have historically had to survive by harvesting rainwater and minimizing their water usage. Given the general scarcity of water in the region, water demand management and water conservation will continue to play an important role in achieving sustainable use of freshwater resources in Jordan. The resultant water savings will provide monetary savings by reducing or delaying the necessary investments in water supply and wastewater disposal and saving energy.

As its main objective the Water Demand Management Policy is intended to result in maximum utilization and minimum waste of water, and promote effective water use efficiency and water conservation, for social and economic development and environmental protection. Sustained implementation of this water demand management policy will generate water savings that will be an important source of additional water to help bridge the gap between supply and demand and advance economic growth and social development.

industry, tourism, agriculture and other activities of national importance. Many provisions of this policy are either under consideration or already in practice.

Given the specificity of the urban and irrigation sectors, the Water Demand Management Policy is presented hereinafter, in two components, one for the urban sector and the other for the irrigation sector.

A. IN THE URBAN SECTOR

The urban component of the Water Demand Management Policy consists of the following statements, which provide guidance for the development and implementation of demand management measures and programs in all regions of the country.

ON INSTITUTING WATER DEMAND MANAGEMENT

Water demand management functions, responsibilities, and linkages in the urban sector shall be identified and instituted, and the role of each stakeholder in the supply chain shall be clearly defined.

Present Legislation and regulations shall be reviewed and if necessary modified to institute water demand management functions in the urban sector.

ON CODES AND EQUIPMENT CERTIFICATION

Jordan shall include water use and water efficiency within the definition of national security to ensure technical specifications are enforced for all water using products.

Jordan shall periodically update codes and technical regulations to require the lowest water use and maximum efficiency for all plumbing fixtures, appliances, and equipment while maintaining the intended performance. These regulations specify the maximum water use in liters per minute or liters per flush for all plumbing fixtures that are installed in newly constructed buildings.

Technical specifications for all plumbing products such as pipes, tools, and other materials shall be adopted in Jordan because it will save large quantities of water by ensuring only high quality products are used, thereby minimizing water leakage in households.

Programs should be established to replace all inefficient plumbing fixtures, appliances and equipment with the latest most efficient models.

Jordan should actively promote the transition of local manufacturing to the production of water efficient products.

Jordan should ensure that other important national initiatives, such as membership in the World Trade Organization, does not constrain the ability of Jordan to prohibit importation of inefficient or poor quality water using products.

ON REDUCTION OF NON-REVENUE WATER

Existing laws shall be amended to clearly prohibit illegal use of water including procedures for disconnection and other appropriate penalties.

Universal metering of water use is part of Jordan's Water Strategy. The accurate consumption of every water consumer should be recorded and billed in order to send the appropriate price signal and to correctly track actual consumption. Meters shall be periodically tested or replaced, and adequate records maintained, to ensure their accuracy.

In order to encourage consumers to use water more efficiently, utilities shall set an example by demonstrating to consumers that they are effectively managing the water supply. Effective management should be demonstrated through adequate investment in leak detection and planned maintenance including repair and replacement programs. An effective maintenance management system and standard operating procedures shall therefore be developed and implemented by all water utilities.

New technical specifications for utility water pipes and fittings shall be developed and adopted to ensure that only good quality materials are used for construction work.

ON WATER PRICING

Establish a dynamic mechanism to structure water tariffs and increase cost recovery gradually to recover the cost of operation, maintenance, and depreciation.

Water tariffs shall be structured to encourage and motivate efficient water use taking into consideration low income consumers.

Water meters shall be read in a timely and frequent manner and water bills should include consumption data and be issued periodically and immediately after meter readings in order to give consumers current knowledge of their water usage and send a clear pricing signal to the consumers.

Best management practices should be developed, implemented and followed to reduce the cost of production and increase energy efficiency.

ON WATER SUPPLY AUGMENTATION USING RAINWATER HARVESTING, GRAYWATER AND ON-SITE TREATED WASTEWATER

Rainwater harvesting systems should be required for new construction (residential, commercial, industrial, tourism, etc). Rainwater harvesting can provide a non-potable water source that can augment existing water supplies.

Plumbing designs for new residences and buildings should be changed to accommodate rainwater harvesting systems and safe storage for all structures; and graywater use for rural structures, not connected to a central sewer system.

Rural residences not connected to a central sewer system shall consider use of graywater for home gardens. Regulations need to be adopted to address any health and environmental issues that may be associated with graywater use. Graywater use could be supplemental source of water taking into account the impact on centralized sewer systems.

On-site wastewater, graywater treatment and reuse shall be required for certain new commercial and residential developments. There are significant opportunities for treating and re-using wastewater on-site for high-rise and high-density buildings.

Financial or tax incentives to encourage rainwater harvesting, graywater use and on-site treated wastewater use shall be implemented.

ON REUSE OF TREATED WASTEWATER

Jordan shall adopt a strategy of maximizing the use of treated wastewater for nonpotable water uses in urban areas.

Treated wastewater shall be maximally reused for the highest available value purpose and storage shall be provided when the use of the wastewater is only required seasonally.

ON PROHIBITION ON WASTING WATER

Regulations shall be implemented and enforced to prohibit water resources from being wasted in Jordan. Below is a list of some of the practices that result in the waste of water:

- Car washing with hoses
- Ornamental ponds
- Water features without re-circulating pumps or timers
- Washing of sidewalks, driveways, and streets
- Dripping faucets and other plumbing leaks
- Storage tanks that leak or overflow due to poor maintenance
- Single pass cooling

ON COMPREHENSIVE WATER-USE AND WATER DEMAND MANAGEMENT INFORMATION PROGRAM

A centralized national water demand management information program shall be developed to optimize water allocation and protect resources. Realistic estimates of water use for different consumer classes are essential for understanding the effects of spatial and temporal patterns of water use on the quality, availability and sustainable use of existing water resources.

ON EDUCATION AND PUBLIC AWARENESS

Consistent with Jordan's Water Strategy, an ongoing public awareness and outreach activities, and school educational programs shall be implemented to increase and maintain high levels of public awareness of the importance of water efficiency.

An annual awards program recognizing achievements of business, institutions and individuals in the field of water efficiency shall be implemented.

ON WATER DEMAND MANAGEMENT PROGRAMS

The initiation, development and implementation of WDM programs shall be carried out by WDMU, utilities and other relevant institutions..

ON INDUSTRIAL WATER DEMANDS

Regulations shall be developed and enforced requiring industries to use water more efficiently, recycle water within the industrial facility, use lower quality water wherever possible, reuse treated wastewater for industrial processes wherever possible and adopt technologies that can accomplish the same production output with less water.

Awareness programs that target workers and employees shall be implemented.

ON TOURISM WATER DEMANDS

Programs to increase water efficiency in the tourism industry in Jordan shall be developed and endorsed. Such programs include efficient water use technologies, gray water reuse, rainwater harvesting and treated wastewater reuse.

Water efficiency standards for new hotels shall be developed and endorsed. Retrofits of hotel buildings with water efficient technologies shall be mandatory.

Awareness programs that target tourists and employees shall be implemented.

ON WATER-WISE LANDSCAPING

Develop, implement and enforce regulations to ensure the adoption of water-wise landscaping principles for efficient landscape water use in public parks and spaces as well as by all retail water consumers (residential, commercial, hotels and resorts, etc).

ON WATER EFFICIENCY ASSISTANCE FOR LOW INCOME CONSUMERS

Assistance programs shall be developed and implemented to ensure low income consumers can afford water efficient products.

ON TRAINING AND CAPACITY BUILDING

Water demand management training and capacity building programs shall be implemented for stakeholders in the water sector as an integral part of a water demand management strategy.

ON WATER DEMAND MANAGEMENT RESEARCH AND DEVELOPMENT

In order to support the implementation of Water Demand Management, studies and research shall be conducted to support implementation of Best Management Practices.

ON BEST MANAGEMENT PRACTICES

Water Demand Management and water use efficiency Best Management Practices (BMPs) shall be developed and implemented. BMPs are policies, programs, practices, rules, and regulations that guide stakeholders to more efficient water use.

ON WATER EXCHANGE OPTION

A Water exchange option shall be evaluated, studied and established at the Ministry of Water and Irrigation to institute a transparent socially and economically viable mechanism for trading between water users, subject to MWI allocation policy considerations. This mechanism would encourage reallocation of water to users, and seek a balance between water uses that create higher value products per unit of water, and maintain food security.

ON FINANCIAL MECHANISMS FOR IMPROVING WATER EFFICIENCY

Financial programs shall be developed and implemented to encourage offering products and services that improve water use efficiency. Such programs might include, but not be limited to, low cost loans, tax incentives, grants, and fee waivers.

ON KEY PERFORMANCE INDICATORS

Key performance indicators for water demand management in the urban sector shall be developed and monitored to ensure compliance with National Agenda goals.

IN IRRIGATED AGRICULTURE

Water demand management in irrigated agriculture will lead to significant savings in the water sector. The MWI and other stakeholders shall undertake all necessary water demand management measures (economic, technical, and regulatory) to support more efficient use of water; and in turn help sustain or increase agricultural production. WDM in irrigated agriculture will also offer water savings that will provide additional supplies to the various sectors while preserving or increasing agricultural production.

The agriculture component of the Water Demand Management Policy consists of the following statements, which provide guidance for the

development and implementation of demand management measures and programs in all regions of the country.

ON LEGISLATION AND INSTITUTIONAL ARRANGEMENTS

Water demand management functions, responsibilities, and linkages in the irrigation sector shall be identified and instituted, and the role of each stakeholder in the irrigation water supply chain shall be clearly defined.

Present Legislation and regulations shall be reviewed and if necessary modified to institute water demand management functions in the irrigation sector.

Nonconventional water use in irrigated agriculture shall be instituted.

Substituting Freshwater with Nonconventional Water shall be continuously pursued.

Groundwater control bylaw shall be amended to include new quotas and bring abstractions to safe yield values.

Groundwater Users Associations at the Groundwater Basin level shall be established. Participatory approach to ensure cooperation with decision making authorities in controlling and reducing abstractions shall be promoted.

Legislation shall be reviewed and updated regularly to support advanced practices and technologies at the distribution and on-farm level.

Legislation shall be reviewed to establish and legalize the status of water user associations or any other relevant associations involved in irrigated agriculture in Jordan, including clear definition of their role in the irrigation water supply chain. In addition, the relationship between water users associations and decision making authorities shall be defined and responsibilities delineated and instituted.

An integrated irrigation advisory service shall be established to advise farmers on efficient irrigation water use and crop production in an integrated manner.

Volumetric measurement of irrigation water use must be mandatory.

ON ENFORCEMENT

Enforcement mechanisms must be introduced to ensure efficiency and address illegal use of water.

ON WATER PRICING

Irrigation water tariffs shall aim to cover actual operational and maintenance expenses and future rehabilitation and improvement of the system and provide incentives for water demand management and improved water use efficiency.

Differential prices shall be applied to irrigation water to account for water quantity and quality taking into consideration the socio-economic aspects.

ON FINANCIAL MECHANISMS FOR ENHANCING WATER USE EFFICIENCY

Incentive programs and systems shall be reviewed, evaluated and developed to promote water useefficiency by farmers. Such programs might include the establishment of sustainable funding mechanisms to provide low interest long-term loans, tax incentives, grants, and fee waivers for efficient water use equipment.

Incentives shall be developed and implemented to encourage low water consuming high-value crops.

ON BEST MANAGEMENT PRACTICES

Best Management Practices guidelines for efficient water use shall be developed.

Highest economic return per cubic meter and sustainability of water use efficiency is the goal. Less water consuming high-value crops to replace high-water consuming crops.

ON KEY PERFORMANCE INDICATORS

Key performance indicators for water demand management in irrigated agriculture shall be developed and monitored to ensure compliance with national goals. Indicators shall include:

- Overall irrigation water use efficiency including extraction, conveyance, distribution, storage and on-farm,
- Economic return per cubic meter of water used,
- Reduction of over-abstractions of groundwater in irrigation to safe yield
- Replacement of freshwater with reclaimed wastewater as an indicator

ON IMPLEMENTING A MONITORING PROGRAM ON WATER USE EFFICIENCY

Irrigation water use and efficiency (on-farm, conveyance, and distribution) shall be regularly monitored for demand forecasting and planning purposes.

Information and appropriate databases and tools shall be developed, regularly updated and made available to stakeholders.

ON THE SUSTAINABILITY AND EFFICIENCY OF IRRIGATION SYSTEMS

Programs for preventive and corrective maintenance of the irrigation systems shall be adopted.

ON DROUGHT MANAGEMENT

Drought shall be recognized as a natural phenomenon in irrigated agriculture sector. Drought management strategy and action plans including warning systems shall be developed.

ON TECHNOLOGY TRANSFER AND ADAPTATION

Irrigation water systems shall be upgraded to adopt advanced relevant technologies.

Energy saving technologies and sustainable sources of energy shall be adopted and utilized as feasible.

Appropriate programs, models, tools, and procedures shall be adopted, to ensure uniform flow discharge and stable pressure all through the irrigation networks.

ON TRAINING AND CAPACITY BUILDING

Water demand management training and capacity building programs including training of trainers shall be implemented for all stakeholder levels in the water sector as an integral part of Water Strategy.

Training shall be provided to upgrade skills of Operations & Maintenance (O&M) operators.

Certification on “operation and maintenance” shall be established for O&M operators for the efficient management of the irrigation systems.

Programs to increase farmers' awareness and knowledge of water demand management and BMP's including demonstration and outreach activities shall be implemented as an integral part of a Water Strategy.

ON RESEARCH AND DEVELOPMENT

Applied research on water use efficiency and integrated water use, soil and crop management within the overall economic-return per cubic meter will be adopted and promoted.

Participatory research programs shall be developed based on the actual sector needs and shall target on-farm water demand management, use of brackish and treated wastewater for irrigation, and related best management practices.

Irrigated agriculture shall use research-based WDM best management practices.

Tapping into the recognized body of knowledge within and outside Jordan on salinity-tolerant plants and irrigation practices for water scarce environment shall be targeted.

14 WATER GOVERNANCE IN OECD COUNTRIES: A MULTI-LEVEL APPROACH

THE "WATER CRISIS" IS LARGELY A GOVERNANCE CRISIS

There is enough water on Earth for all, even in areas where temporary shortages may exist. Managing water for all is not only a question of resources availability and money, but equally a matter of good governance. Water is essentially a local issue and involves a plethora of stakeholders at basin, municipal, regional, national and international levels. In the absence of effective public governance to manage interdependencies across policy areas and between levels of government, policymakers inevitably face obstacles to effectively designing and implementing water reforms.

Key challenges are institutional and territorial fragmentation and badly managed multi-level governance, but also limited capacity at the local level, unclear allocation of roles and responsibilities and questionable resource allocation. As the 2009 OECD report Managing Water For All stated, patchy financial management and the lack of long-term strategic planning are also to blame, together with poor economic regulation and poorly drafted legislation. Insufficient means for measuring performance have also contributed to weak accountability and transparency. These obstacles are often rooted in misaligned objectives and poor management of interactions between stakeholders.

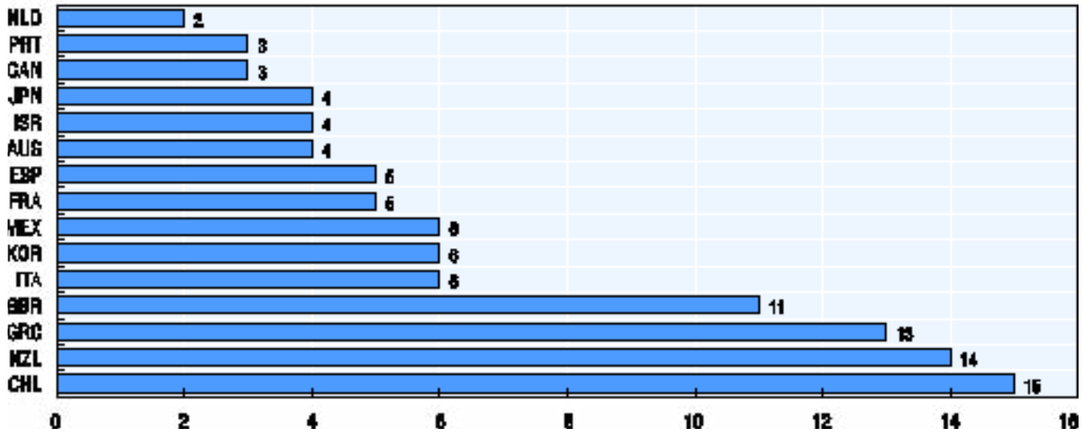
There is no one-size-fits-all answer, magic blueprint or panacea to respond to governance challenges in the water sector, but rather a plea for home-grown and place-based policies integrating territorial specificities and concerns. The institutions in charge of water management are at different developmental stages in different countries, but common challenges – including in the most developed countries - can be diagnosed ex ante to provide adequate policy responses. To do so, there is a pressing need to take stock of recent experiences, identify good practices and develop pragmatic tools across different levels of government and other stakeholders in engaging shared, effective, fair and sustainable water

policies.

A MULTI-LEVEL GOVERNANCE APPROACH FOR ADDRESSING COMPLEXITY IN THE WATER SECTOR

In most countries, regardless of the level of decentralisation, water public governance is fragmented and would benefit from a stronger rationale for efforts to co-ordinate water policy. Given the importance of local actors and territorial specificities in the water sector, policymakers should not avoid complexity by favouring traditional top-down policies but instead find ways to maintain coherence while preserving diversity.

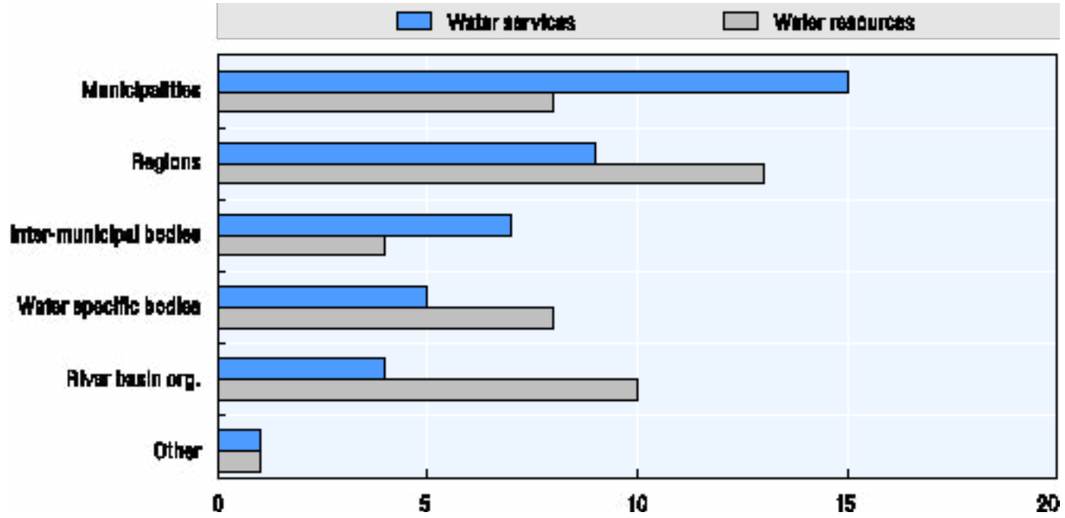
Number of authorities* involved in water policy making at central government level
(17 OECD countries surveyed)



* Ministries, departements, public agencies etc.

Source: OECD Water Governance Survey (2010).

Involvement of sub-national levels in water resources management and service delivery
(17 OECD countries surveyed)



OECD previous work on water concluded that the solutions to the water crisis do exist and are well-known. The real challenge is implementing these solutions, tailoring them to local contexts, overcoming obstacles to reform and bringing together the main actors from different sectors to join forces and share the risks and tasks. The OECD's report Water Governance in OECD Countries: A Multi-level Approach explores the co-ordination "gaps" in water policy, based on a methodological framework designed to diagnose multi-level governance challenges in decentralised public policy and identify relevant policy responses.

OBJECTIVES OF THE WATER MULTI-LEVEL GOVERNANCE STUDY

The multi-level approach used in the analysis aims to identify good practices for managing interdependencies between the many stakeholders involved in water management. It takes a close look at the processes through which public actors articulate their concerns, decisions are taken and policy makers are held accountable. Data were collected through an extensive survey on water governance in 2010 to which 17 OECD countries contributed.
The report provides a "reading template" to: i) map the allocation of responsibilities in water policy design, regulation and implementation; ii) identify common multi-level governance bottlenecks for integrated water policy; iii) suggest the main policy responses for managing mutual dependencies across levels of government in water policy design and implementation; iv) promote decision-making that integrates actors at all levels; and v) encourage the adoption of relevant capacity-building, monitoring and evaluation tools.

The OECD Multi-Level Governance Framework: Key Co-Ordination Gaps in Water Policy

Administrative gap	Geographical "mismatch" between hydrological and administrative boundaries. This can be at the origin of resource and supply gaps. ***=> Need for instruments to reach effective size and appropriate scale.***
Information gap	Asymmetries of information (quantity, quality, type) between different stakeholders involved in water policy, either voluntary or not. ***=> Need for instruments for revealing and sharing information.***
Policy gap	Sectoral fragmentation of water-related tasks across ministries and agencies. ***=> Need for mechanisms to create multidimensional/systemic approaches, and to exercise political leadership and commitment.***
Capacity gap	Insufficient scientific, technical, infrastructural capacity of local actors to design and implement water policies (size and quality of infrastructure, etc.) as well as relevant strategies. ***=> Need for instruments to build local capacity.***
Funding gap	Unstable or insufficient revenues undermining effective implementation of water responsibilities at subnational level, cross-sectoral policies, and investments requested. ***=> Need for shared financing mechanisms.***
Objective gap	Different rationales creating obstacles for adopting convergent targets, especially in case of motivational gap (referring to the problems reducing the political will to engage substantially in organising the water sector). ***=> Need for instruments to align objectives.***
Accountability gap	Difficulty ensuring the transparency of practices across the different constituencies, mainly due to insufficient users' commitment' lack of concern, awareness and participation. ***=> Need for institutional quality instruments.*** ***=> Need for instruments to strengthen the integrity framework at the local level.*** ***=> Need for instruments to enhance citizen involvement.***

KEY RESULTS FROM THE REPORT

THE INSTITUTIONAL ORGANISATION FOR THE WATER SECTOR VARIES WIDELY ACROSS AND WITHIN OECD COUNTRIES

An analysis of the allocation of roles and responsibilities in water policy in 17 OECD countries has resulted in a matrix that permits "institutional mapping" of water policy. Seventeen country/region profiles were also designed to identify who does what in water policy design, regulation, implementation at the central and sub-national levels. They suggest the following observations:

- First, it is not possible to identify a master plan generally adopted for assigning competencies across ministries and levels of government in the water sector. However, common trends across OECD countries are noticeable, especially regarding sub-national actors and their responsibilities as most OECD countries have largely decentralised their water policy making;
- Second, no systematic correlation can be found between a given country's institutional organisation (unitary or federal, for example) and the institutional mapping of water policy. Geographical, environmental and economic factors also have a considerable impact;
- Third, river basin management has been encouraged in both federal and unitary countries, by institutional factors but also hydrological parameters and international incentives or regulations (e.g. EU Water Framework Directive);

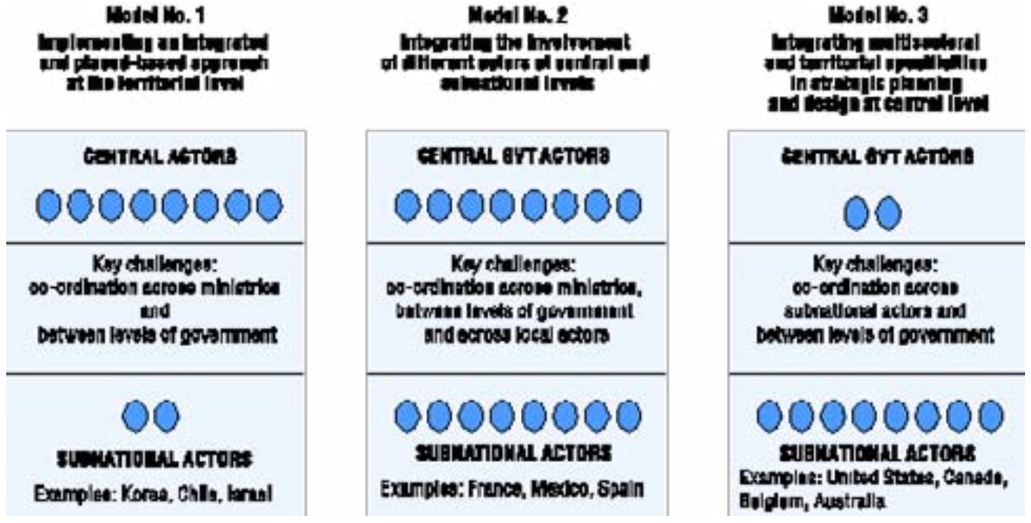
Water policy making at central level in OECD countries: a diversity of situations

Country or region	Unitary, federal or quasi-federal country	Number of principal actors in design and implementation	Number of actors in regulation	Role of central government (dominant actor, joint role with local actors, none)	Means of defining roles	Specific water regulatory agency (yes/no)
Australia	Federal	4	4	Joint	Law	Yes
Belgium (Flanders)	Federal	7	–	None	Constitution Law Other	No
Belgium (Wallonia)	Federal	–	–	None	Constitution Law	No
Canada	Federal	9	3	Joint	Constitution Law	No
Chile	Unitary	15	10	Dominant	Law *Ad hoc* Other	No
France	Unitary	5	5	Joint	Law *Ad hoc* Other	No
Greece	Unitary	13	12	Dominant	Law	Yes
Israel	Unitary	4	4	Dominant	Law Other	
Italy	Quasi- federal	6	5	Joint	Law *Ad hoc*	Yes
Japan	Unitary	4	–	Dominant	Law	No
Korea	Unitary	6	4	Dominant	Law	No
Mexico	Federal	6	4	Dominant	Constitution Law *Ad hoc*	Yes
Netherlands	Unitary	2	2	Joint	Constitution Law	Yes
New Zealand	Unitary	14	7	Joint	Law *Ad hoc* Other	Yes
Portugal	Unitary	3	5	Dominant	Law *Ad hoc* Other	Yes
Spain	Quasi- federal	5	6	Joint	Constitution Law *Ad hoc* Other	No
United Kingdom	Unitary	11	5	Joint	Law	Yes
United States (Colorado)	Federal	11	7	Joint	Constitution Law	No

Source: OECD Water Governance Survey, 2010.

- Fourth, based on comparing the allocation of responsibilities at the central and sub-national levels, the report presents a tentative typology of three categories with different governance challenges for developing and implementing coherent water policies. In most cases countries have developed a series of mechanisms to address the institutional challenges mentioned below.

Tentative categories based on the allocation of roles and responsibilities in water



- Multi-level governance "gaps" in water policy design, regulation and implementation affect all OECD countries, but to varying degrees
- The next objective of the report is to identify the principal co-ordination and capacity challenges across ministries and public agencies, between levels of government, and across local actors involved in water policy, based on the OECD Multi-level Governance Framework. The degree to which effective co-ordination and implementation of water policies is compromised by multi-level governance gaps varies widely in the OECD region, but common challenges have been identified.

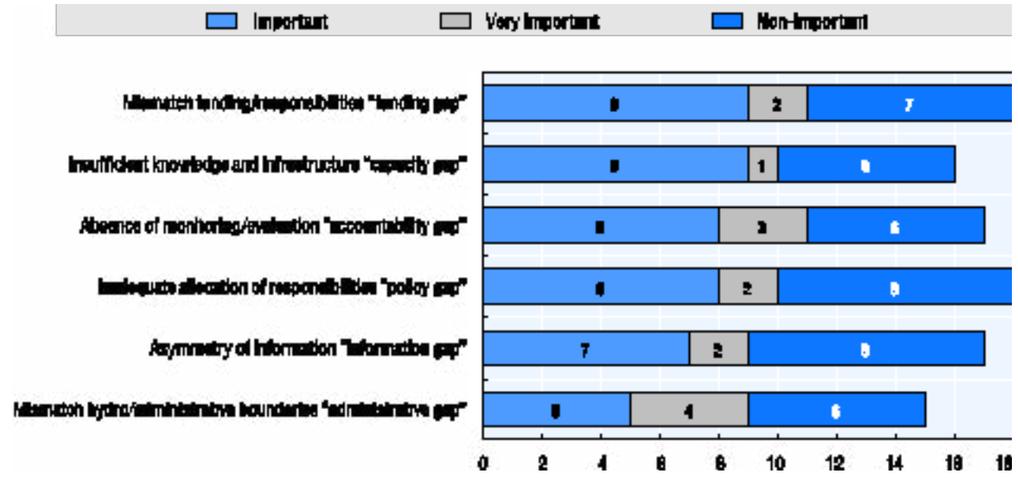
Key multi-level governance in water policy making: an overview of OECD countries

"Important" or "very important" gap	No. of countries or regions	Examples of countries or regions
Funding gap	11 out of 17	Australia, Belgium (Flanders), Chile, France, Greece, Israel, Korea, Mexico, New Zealand, Portugal, Spain, United States (Colorado)
Capacity gap	11 out of 17	Australia, Belgium (Flanders), Chile, Greece, Italy, Korea, Netherlands, Portugal, Spain, United Kingdom, United States (Colorado)
Policy gap	9 out of 17	Belgium (Flanders), Canada, France (subnational actor), Greece, Israel, Italy, Korea, Spain (subnational actor), United States (Colorado)
Administrative gap	9 out of 17	Australia, Greece, Italy, Korea, Netherlands, Portugal, Spain, United Kingdom, United States (Colorado)
Information gap	9 out of 17	Australia, Chile, Italy, Korea, Netherlands, New Zealand (subnational actor), United Kingdom, United States (Colorado)
Accountability gap	9 out of 17	Belgium (Flanders), Chile, Greece, Italy, Korea, Mexico, Netherlands, Portugal, United States (Colorado)
Objective gap	4 out of 17	Belgium (Flanders), Israel, Korea, Portugal

Source: OECD Water Governance Survey, 2010.

- In two-thirds of OECD countries surveyed, the funding (or fiscal) gap (i.e. the mismatch between administrative responsibilities and available funding) is the main obstacle to vertical and horizontal co-ordination of water policies;
- Despite the well-developed infrastructure and the regular transfer of expertise, the capacity gap is still the second most important challenge in OECD countries – especially at the sub-national level;
- Two-thirds of OECD countries surveyed still face a policy gap (i.e. the sectoral division of water related tasks) because of the fragmentation of responsibilities at national and sub-national level and the lack of institutional incentives for horizontal co-ordination between different policy fields;
- The administrative gap (mismatch between hydrological and administrative boundaries) still has a significant impact on water policy implementation, even after the adoption of river basin management principles;
- Last but not least, information and accountability gaps are major obstacles to integrated water policy in half of the OECD countries surveyed..

Multi-level governance gaps in OECD countries' water policymaking
(17 OECD countries surveyed*)



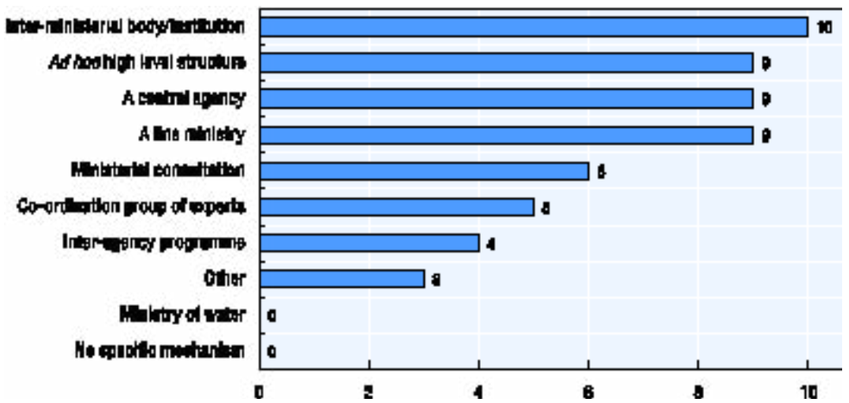
Most OECD Countries Have Made Significant Efforts to Co-Ordinate Water Policy Across Ministries and Between Levels of Government

A third contribution of the report is to identify existing governance instruments for building capacity and co-ordinating water policies at horizontal and vertical levels. OECD experience shows again that there is no panacea for integrating water policy, but that a wide variety of options exist

- All OECD countries surveyed have set up co-ordination tools at the central government level. These mainly consist in line ministries, inter-ministerial bodies or mechanisms, or specific co-ordinating bodies. Most countries have also made efforts to co-ordinate water with other policy areas, including spatial planning, regional development, agriculture and energy (OECD, 2011);

Horizontal co-ordination mechanisms* across ministries at central government level

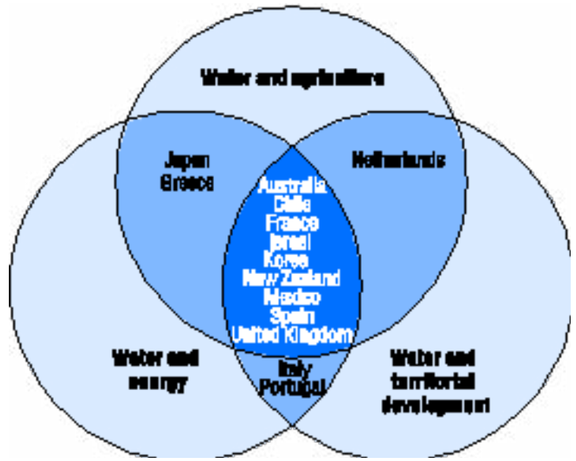
(17 OECD countries surveyed)



* A distinction is made between the line ministry which has the lead on water policy (but not only) and the Ministry of Water exclusively dedicated to water policy.

Source: OECD Water Governance Survey (2010).

Horizontal co-ordination across policy areas)

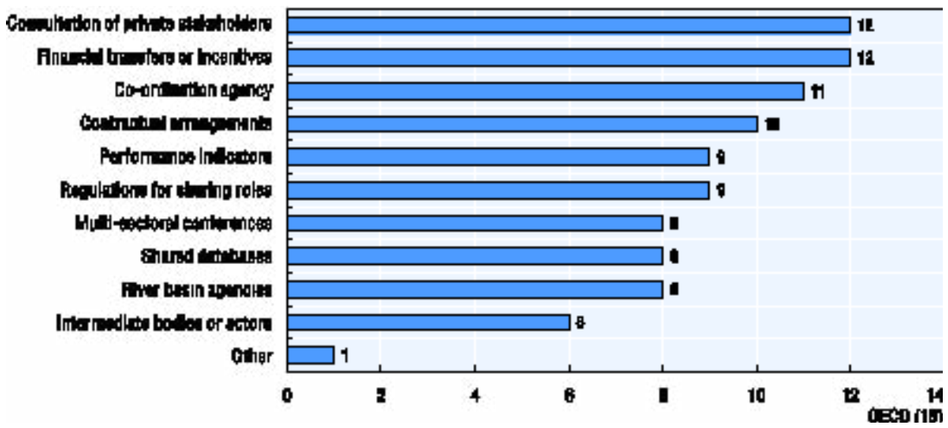


Source: OECD Water Governance Survey (2010).

- Performance measurements, water information systems and databases, financial transfers, inter-municipal collaboration, citizen participation and innovative mechanisms (e.g. experimentation) are important tools for co-ordinating water policy at the territorial level and between levels of government;

Vertical co-ordination mechanisms across levels of government

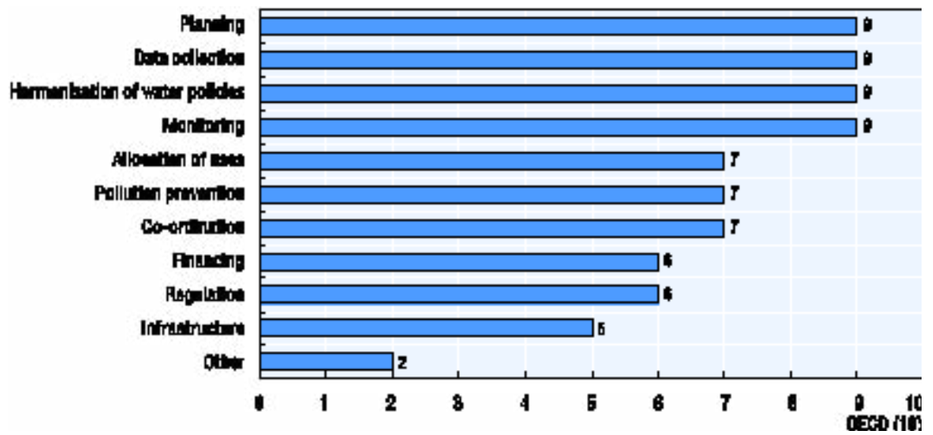
(17 OECD countries surveyed)



Source: OECD Water Governance Survey (2010).

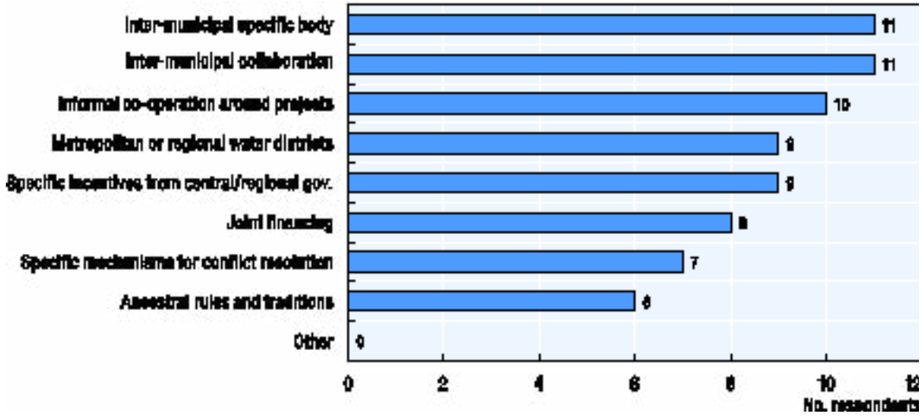
• Where they exist, river basin organisations are a powerful tool for addressing vertical co-ordination challenges and interactions at the local level.

Missions of river basin organisations in OECD countries
(17 OECD countries surveyed)



Source: OECD Water Governance Survey (2010).

Managing the interface between sub-national actors in water policy (17 OECD countries surveyed)



Source: OECD Water Governance Survey (2010).

GUIDELINES CAN HELP MANAGE COMPLEXITY IN WATER POLICY AND MAINTAIN COHERENCE WHILE PRESERVING DIVERSITY.

The report ends with tentative guidelines intended to serve as a tool for policy makers to diagnose and overcome multi-level governance challenges in the design of water policy. Such guidelines are interdependent and should not be considered in isolation. However, they can help enhance the prospects for crafting successful water reform strategies in the future. They are intended as a step towards more comprehensive guidelines (to be developed at a later stage), based on in-depth policy dialogues on water reform with countries and recognised principles of water policy, economic bases and good governance practices.

Preliminary guidelines for effective management of multi-level governance

- Diagnose multi-level governance gaps in water policy making across ministries and public agencies, between levels of government and across sub-national actors; This will help clearly define roles and responsibilities of public authorities;

- Involve sub-national governments in designing water policy, beyond their roles as “implementers”, and allocate human and financial resources in line with responsibilities of authorities;

- Adopt horizontal governance tools to foster coherence across water-related policy areas and enhance inter-institutional co-operation across ministries and public agencies;

- Create, update and harmonise water information systems and databases for sharing water policy needs at basin, country and international levels;

15 ANNEX 1 - BIBLIOGRAPHY

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16 ANNEX 2 - ACRONYMS

ACSAD	Arab Center for the Studies of Arid Zones and Dry Lands
AGFUND	Arab Gulf Programme for the United Nations Development Organizations
AI	Aridity Index
ALESCO	Arab League Educational Scientific and Cultural Organization
AMWC	Arab Water Ministerial Council
AOAD	Arab Organization for Agricultural Development
BMP	Best Management Practice
CEDARE	Centre for Environment and Development for the Arab Region and Europe
DEEP-UNDP	Deprived Families Economic Empowerment Program – United Nations Development Programme
DPSIR	Drivers, Pressures, State, Impacts, and Response
EFR	Environmental Flow Requirements
EMP	Ecosystem Management Plan
EMWIS	Euro-Mediterranean Information System on know-how in the water sector
FAO	Food and Agriculture Organization
GCC	Gulf Cooperation Council
GEF	Global Environment Facility
HD	Humidification Dehumidification
ICARDA	International Center for Agricultural Research in the Dry Areas
IDRC	International Development Research Centre
ISESCO	Islamic Educational Scientific and Cultural Organization
IWRM	Integrated Water Resource Management
LUB	Lake Burma Basin
MDG	Millennium Development Goals
MEDRIC	Medical Research Information Center
NGO	Non-Governmental Organization
OA	Occupied Areas
PCPS	Palestinian Central Bureau of Statistics
PHG	Palestinian Hydrology Group
R2P	Responsibility to Protect
RCM	Regional Cooperation Mechanism
RCM	Regional Coordination Mechanism
SADC	Southern African Development Community
UN	United Nations
UN-ACBQ	United Nations Advisory Commission on Administrative and Budgetary Questions
UNDAF	United Nations Development Assistant Framework
UNDP	United Nations Development Programme

UNEP	United Nations Environmental Programme
UNESCO	United Nations Education, Scientific and Cultural Organization
UNFAO	United Nations Food and Agricultural Organization
UNU	United Nations University
UNU-INWEH	United Nations University Institute for Water, Environment and Health
WANA	West Asia and North Africa
WBGS	West Bank and Gaza Strip
WDF	Water Development Fund
WDM	Water Demand Management
WSPEAI	Water Scarcity Policy Effectiveness Assessment Index
WSSD	World Summit on Sustainable Development