Hydrology
Current Research

Shaban, Hydrol Current Res 2016, 7:1
DOI: 10.4172/2157-7587.1000222

Review Article Open Access

New Economic Policies: Instruments for Water Management in Lebanon

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Rec date: Dec 09, 2015; **Acc date:** Jan 09, 2016; **Pub date:** Jan 13, 2016

Abstract

Social, economic and environmental aspects should be taken into consideration for IWRM implementation in Lebanon. This would be helpful to formulate policies required for improving water sector. Likewise many countries, Lebanon do not implement water policies on the formal level. This is critical since policies are initiative for legislation, strategic planning and operational management. Hence, water resources in Lebanon are threatened by population growth and climatic variability and imbalanced supply/demand. Thus, the interrelation between supplier and consumer should be harmonized since there is large amount of water is lost due non-uniform water supply and partitioning approaches, besides lack of awareness and absence of wise-use of water resources. Therefore, economic policies should be adopted in Lebanon and water pricing must be set to give incentives to user for efficient water use in their various applications. Thus, treating water as an economic good recognizes that water carries an opportunity cost. This paper presents the existing economic status of water in Lebanon in the absence of legal economic policies. It, therefore, extends new Economic Policies Instruments (EPIs) is required for better IWRM.

Keywords: IWRM; Per capita; Privatization; Supply equity; Water shortage; Water tariffs

Introduction

Lebanon is a country under water stress, and the depletion of water resources becomes a dominant phenomenon. Lebanon is located in semi-arid region with variation of climatic variability i.e. increased temperature and changing rainfall patterns [1] and remarkable increase in population growth followed by increased water demand. Therefore, it is not an exaggeration to say that despite various programs status of water sector has not improved, even slightly, since the last three decades even though there are excessive number of projects, studies and programs.

There is increasing trend in water demand in Lebanon, and it is also changing by different sectors. Thus, it is estimated that domestic demand is 467 mm^3/year. The demand in (2030) will require 1258 mm^3/year for domestic, and it will increased from 163 to 440 mm^3/year for industrial, and from 900 to 1220 mm^3/year for agriculture, which is equivalent to 44%, 16% and 40% [2].

There are several avenues proposed to conserve water resources in Lebanon and to secure water the supply/demand in the view of the existing challenges. Yet, legal policies are not well identified whether in the view of their aspects or in the implementation. This has been exacerbated in the lack of governmental controls and appropriate legislations that can support implementing the required policies on the institutional and individual levels.

As a successful instrument for water management, the Economic Policies Instruments (EPIs) have received widespread attention over the last few decades, and they are increasingly implemented to achieve better environmental policy objectives. Even though, EPIs have been successfully applied in some policy aspects (e.g. climate, energy and air quality, etc.), there is practical difficulties in implementing water management on drought, water scarcity, water quality control. Thus, an assessment of the effectiveness and efficiency of EPIs for water management issues and the identification of relevant preconditions is of particular importance to help to overcome these difficulties.

Also, this needs fostering multidisciplinary efforts, in particular in the social sciences, to understand how our institutional arrangements affect water use; increasing the ability to monitor water supply/demand; and documenting the strengths and weaknesses of economic instruments in well-designed comparative case studies, as well as in new projects, by a commitment to the development of adaptive management frameworks that make conscious efforts to learn from policy implementation. However, this requires clarification for the primary objectives for using EIs, which has more often than not been left relatively vague and multifaceted.

Presuming EPI, in this study, aims to support the governmental sector in achieving water policy goals and to highlight on the preconditions under which they complement or perform better than alternative policy instruments. The specific objectives of the proposed EPI include:

Identification of major aspects of economic instrument (or group of instruments) to be implementable, effective and/or efficient in given socio-economic, hydrological, cultural and institutional conditions of an under-developed country like Lebanon. This will substantially contribute identify the appropriate instrument to be applied.

Main constraints to achievement water policy goal (e.g. good ecological status of water bodies, flood protection, reducing risk and uncertainty in water availability), either directly (via changing use/consumption behaviour) or indirectly (via raising financial resources for implementing water policy protection measures). Thus, this will help searching suitable approaches to overcome such constants for successful instrument application.

Efficiency implications of economic instrument, that is to what extent they contribute to an optimal allocation and use of water resources (or goods and services provided by aquatic ecosystems) also

in situation in which not all use- and non-use values are known or fully accounted for. This will be an indicator to evaluate the feasibility of the use instruments.

Current ESE Scenery

In Lebanon, there are several economic, social and environmental (ESE) problems, and they result unfavourable scenery for the water sector, while the country is known by available water resources. This motivates calling for rapid implementations to be taken through governmental actions and applying new management instruments. The following are the most problematic socioeconomic and environmental aspects in Lebanon:

Economic value of water supply exceeds the consumption value, thus water is not treated as an economic good that carries cost. This led to unwise-use of water consumption which has been increased in both rural and urbanized areas (Figure 1). However, it is obvious that water consumption in the rural sector is larger than that in the urban one. This can be attributed to the fact that water sources can much reachable in the rural, while they are almost limited in the urban sectors.

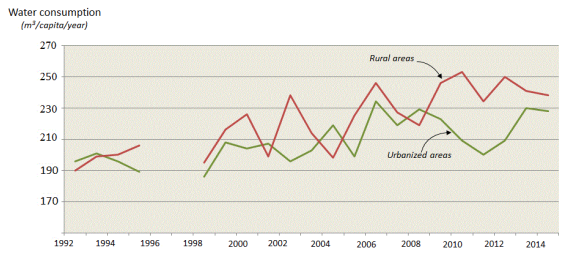

Figure 1: Water consumption per the major three sectors in Lebanon as it was applied to rural and urbanized areas. There is obvious increase in water demand over the last few years, and this is exceeded in rural areas than urbanized ones.

Increased pollution level in surface and groundwater resources and the resulting water-related diseases.

Lack of proper sanitation systems and infrastructures (e.g. leakage exceeds 50%) in many of the Lebanese regions and this has been exacerbated with population growth.

Exaggeration of water and the per capita have been decreased by 50% in the last few decades [3].

Decrease of water in rivers and spring due to climate variation by about 60% [4].

Due to topography, unexploited water goes to the sea.

Unmanaged shared water resources.

Implemented Actions

In Lebanon, actions to secure and enhance water sector become a priority. This has been lately given attention by local and foreign entities, including public and private institutions, and it has been supported by the implementations obtained by regional and international entities (e.g. UNDP, USAID, IDRC, etc.) as well as the foreign donors in coordination with the governmental sector.

Yes, actions taken by international entities and donors have the most impact in improving the water sector in Lebanon and then followed by the regional ones (Figure 2). This is merely attributed to the financial resources introduced by these entities. Besides, the national actions are almost applied with limited impact if compared with the former two ones (Figure 2).

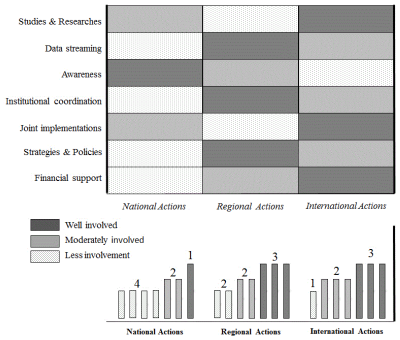

Figure 2: Actions obtained by local and foreign entities to secure and enhance water sector in Lebanon. There are several aspects of contributing action (in the left column). It is clear that the international action occupies the principal role (3-well, 2-moderately and 1-less involvement), and then the regional is the second, while the national is still with least role.

National actions

This includes action and plans adopted by the Lebanese government. The introduced actions are found to treat the problem of water supply as a major target. The principal action taken by the government are: Execution of Law 221: It was put for the separation between policy-making and service provision Separation between policy-making and service provision. Therefore, four new water establishments (WEs) for different regions in Lebanon were generated. It is a legal framework to set measures for optimal water and wastewater facilities [5].

National Water Sector Strategy-NWSS: This has been established with the participation of national stakeholders and international donors. However, water sector in Lebanon is still under stress and the efficiency of the applied strategy did not occur [3].

Building up water establishments: This includes five establishments assigned by regions in coordination with the MoPW in order to govern water supply and monitoring.

The MoPW implements a number of local action plans and applied enhancing knowledge and technical capacity building. This was applied to water supply, wastewater treatment, institutional framework and constructions related to water sector,

The MoPW lunched a number of capital water projects on the national level. This includes mainly the execution of large-scale dams, supply systems, groundwater extraction domains and treatment planets.

Regional and international actions

These are joint actions that often taken by the international bodies (UN entities, donors, etc.) in combination with the Lebanese government; where they almost indirectly teat the water sector and its related aspects. In other words, these actions are concerned with the striking challenges, notably the climate change issues, environmental assessment and new management approaches.

In this respect, many actions have been done whether as executive projects or as research studies. Thus, the following are selective actions taken by the international/governmental combination:

Lebanon's 1st National Communication on Climate Change obtained by UNDP and Ministry of Environment-MoE.

Environmental fund for Lebanon by the German Ministry for Economic Cooperation and Development –BMZ in 2006,

Climate change mitigation project by Italian Cooperation & MoE in 2011,

Lebanon's 2nd National Communication on Climate Change Vulnerability and Adaptation obtained by UNDP and MoE [6],

Improved Water Management for Sustainable Mountain Agriculture by ICARDA in 2012,

Lebanon's 3rd National Communication to UNFCCC, obtained by UNDP and MoE, 2015 [7].

Difficulties for action´s implementations

There are difficulties facing water supply in Lebanon, even though there are several implementations and actions taken on different levels and in different geographic regions of the country. In a broad sense, this can be attributed to the:

Gaps in legal/regulatory framework are mainly leading to delays in water sector reform and PSP in capital projects. In the investment planning and capital spending, responsibilities are scattered among various players with weak coordination. The lack of some technical capacity, financial autonomy and accountability are preventing full takeover of responsibilities. Focus of WEs is only on water supply with virtually no wastewater and irrigation activities performed so far. The implementation of reform 221 is still incomplete with discrepancies between legal and de facto responsibilities. Environmental issues are affecting water resources with a direct impact on quality. Absence of volumetric charges for water is limiting incentives for conservation at the consumer, and production at the water establishments.

Water Policies (WPs)

Current status of WPs

Lebanon is known with it available water resources, but the status quo does not reflect this fact, notably in the view of the recently existed climatic variability and population growth (~2%). Based on this unfavorable situation, water policies must be implemented and adopted by the government and by end beneficiaries as well.

In this regards, water policies cannot be constant; therefore, they must consider the significant changes that may occur during the past decade, and also the changes that are likely to occur in the coming years. Hence, future policies must address rapidly diversifying social interests and agendas that are likely to be awash in chaos, convicting views, rapid technological changes, new researches, globalization, relentless economic competition, political uncertainties and steadily increasing human aspirations [8]. In addition, these policies should:

Be multi-sectorial and not conservative,

Focus on water quality and quantity and the striking challenges,

Not follow the too hierarchical and top-down scheme,

Consider past and current experiences,

Give consideration to the future trends and developments,

Consider adequate linkages with energy, agriculture, health and industrial policies.

For a country like Lebanon, a number of policies can be taken, but they can fulfil the scope of water security if all these policies are integrated together in one system. The majority of policies to be applied in Lebanon are shown in Table 1.

Proposed economic policies instruments (EPIs)

As a major issue of concern for water sector in Lebanon, the economic situation plays essential role, and the economic policy becomes a priority issue. Therefore, this study proposes the optimal economic policies to be applied in Lebanon as a supporting instrument for enhancing the water sector on all levels. Nevertheless, this primarily needs to diagnose the aspects of water supply in order to figure out the contribution of the governmental sector in providing water to consumers, and this will motivate the integrity and behavior of consumers in paying for the supplied water from different sector private and public. For this purpose, a survey has been obtained in this study on three identical cities in Lebanon including the capital Beirut (Figure 3).

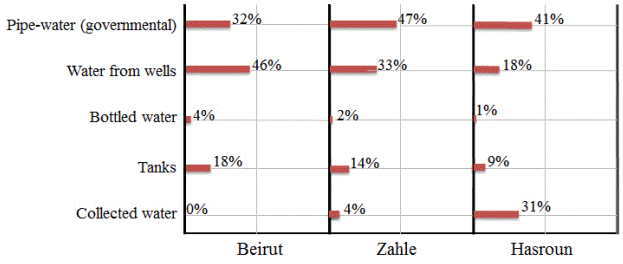

Figure 3: Different aspects of water supply in three typical Lebanese cities including the capital Beirut. It is obvious that water supply form the formal water sector does not exceed the 50% of water demand in all cities. While private well have a major role in this respect. Also water sold from private tanks contributes in considerable portion, notably in Beirut. Besides, the collected water by different aspects, mainly mountain lakes for harvesting, and the rural areas such as in Hasroun.

Policy	Key issue	Target
Awareness	Knowledge dissemination for public	Wise-use and conservation
Legal	Effective regulations and water laws	Performance control

Economic	Water metering and effective supply cost	Enhancing financial resources
Planning	Road maps considering future change sand needs	Preparatory actions
Technical	Improving technical knowledge and methods	Productivity improvement
Coordination	Bi-lateral and Multi-lateral	Participatory approach

Table 1: Major water policies required for Lebanon.

There are five major aspects of water supply in Lebanon. One aspect is the formal water sector supply through pipes, and four private aspects as shown in Figure 3. Results show the contribution from each aspect of supply where the pipe-water provided by the formal water sector does not exceed 50% in the selected typical cites. While, the rest water volume (i.e. more than 50%) is in-charge of the consumers. This motivates the consumer refrain from paying even the cost of water supplied by the governmental sector.

In this respect, the economical setting of water sector can be categorized among one of the following three levels:

1) Cost paid by consumers exceeds production cost,

2) Equity should be exist between consumption and production,

3) Cost does not cover water production.

However, Lebanon can be attributed to the third level where the implantations taken to supply water to the consumers exceeding the money paid by the consumers, and this can be attributed to the following reasons:

Lack of effective governmental legislations and laws for water cost,

Absence of gauge waters (i.e. water metering) in many regions of Lebanon,

Partitioning of water (1-2 days/week) motivates consumers to ignore paying the cost of supplied water,

Lack to maintenance and improvements on water supply systems, in addition to the quality deterioration,

Self-dependant to establish small-scale management approaches obtained by consumers, such as ground ponds, mountain lakes and water storage.

Increased water trading, and thus water becomes a commodity. This in turn makes the consumers paying for water (e.g. bottled water, tanks, etc.) and not compelled to pay for the government,

The political situation also governs water development projects towards the impetration of projects in different regions,

Lack of obvious water governance to set the effective and appropriate regulations and systematic approaches for water supply.

In consistent with the above reasons, the EPIs should be implemented in Lebanon. They are best suited to foster an efficient allocation and use of water, reduce harmful exposure and impacts on the communities and environment, and protect natural capital. The following are the major EPIs aspects that are feasible for Lebanon:

Water tariffs activation (WTA)

It is a water cost reimbursement. Thus, "Tariff" by less than the production cost is a common criterion known in many regions of the Arab Region where governments subsidize the difference between production cost and the applied tariffs. However, tariff is still absence in most of the Lebanese regions, and it has two aspects: 1) tariff per consumption and 2) Sum lump tariff.

The Implementation of WTA can be obtained by activating Tariffs in Lebanon needs following regular water pricing which can be achieved by fixing water gauges for water metering.

WTA aims to control consumption behavior by consumers. The objective of having tariff is to create financial resources to support production, operational and maintenance approaches for water supply, as well as to catalyze individuals to consume water efficiently.

Water marketing (WM)

It concerns with informal local water trading, and it usually supports water supply system. Trading of water may include exchanging water rights between water purchases. In this case, water price can be harmonized according to the supply and demand, as well as with respect to the expenditures of production.

The implementation of WM needs to establish water supply stations related to the public sector. These stations, with controlled quality, must be with diverse dimensions according to the municipal localities and population size. Thus, marketing of water can be with financial interest, but within the limits of the consumers' income.

Applying WM aims to have a widespread water supply sources with acceptable price and safe water quality. This will regulate water trading obtained in informal avenues.

Liability for damage to waters (LDW)

Environmental liability systems intend to internalize and recover the costs of environmental damage to make people responsible on water pollution or damaging and pay. To that extent environmental liability laws are a fundamental expression of the polluter-pays principle [9]. Water pollution and damaging water sources and supply systems are well pronounced in Lebanon due to the lack of governmental control and proper infrastructure and sanitation systems.

In order to implement the LDW, controlling systems must be established by the governmental sector at different localities, notably where human activities are well developed. This can be supported by designating water control officers.

Penalizing individuals and institutions responsible for water pollution and sources damaging will act in reducing pollution, and this will help securing safe water sources, and thus saving financial resources for water purification.

Water abstraction charges (WAC)

The relative consumption of groundwater and surface water resources may be influenced. The abstraction of small quantities of water is often exempt from the tax, and there can be tax exemptions or reductions for farmers or industries in order to limit the impact of the tax on their competitiveness. However, this has been disrupted due to the increased need for water and chaotic water abstraction becomes a common task in Lebanon.

The implementation of WAC also needs monitoring programs to control water abstraction from different sources, notably from boreholes, rivers tributaries and from springs, as the unfavorable case in Lebanon where chaotic and uncontrolled surface water and groundwater pumping is widespread. The pumping of water must be subjected to charges after considering to the sources characteristics and consumer needs.

Applying charges on water abstraction will reduce the unwise-use and exploitation of water resources, which can conserve the water budget in the country, as well as it, will add financial resources for the water sector.

Implementing effective legislations (EL)

The legal policy instrument embraces the above mentioned instruments. Therefore, it acts as a controlling tool to reform and adjust public actions. Therefore, new legislations must be executed to treat different water issues on the individual and institutional levels.

The implementation of EL must be proposed and this can be combined with the updating of the existing legislations and laws. They must be acting on different water issues including the individual and institutional levels.

The target of EL is to promoting water legislations from virtual laws into effective actions will help controlling water management. This will help increasing water supply with better quality and less economic loss.

Privatization (P)

Privatization gives a chance for the participation of private sector in the provision of water services and sanitation. It can be considered as a tool to carry out the future overload of water supply costs. However, this needs following policies and laws to govern privatization and protect consumers as well.

Implementing P has several aspects. It can be as: 1) Full privatization where assets are permanently sold to a private investor and 2) Public-private partnership (PPPs), ownership of assets remains public and only certain functions are delegated to a private company for a specific period.

This aims to encourage the public sector making investments in water resources. Proponents of private sector participation argue that it has led to improvements in the efficiency and service quality of utilities. It is argued that it has increased investment and has contributed to expanded access.

Subsidies (S)

According to the OECD [10], subsidies are government interventions through direct and indirect payments, price regulations and protective measures to support actions that favour environmentally-unfriendly choices over environmentally-friendly ones.

Subsidies, as a governmental intervention, can be in various forms including: 1) direct (e.g. cash grants, interest-free loans, etc.) or 2) indirect (tax breaks, insurance, low-interest loans, rent rebates, etc.).

Generally, subsidies have two main objectives: it is either to compensate users for a cost they incur in response to a required action or a prohibition, or subsidies are put in place so as to set the necessary incentives for achieving a desired, but not required, actions.

Conclusion and Discussion

Water demand management has a wide spectrum of challenges including physical, economic, social, technical, environmental, legist live and political ones [11]. Yes, there is a focus on the EPIs. They can contribute to large extent in the enhancement of water sector if they are applied properly. EPIs will give the optimal results in a country like Lebanon with limited fiscal resources, but it must be integrated with other management instruments including mainly the environmental and social ones.

Yet, there is a contradictory since the consumers realize that they do not receive the water they need from the governmental water authorities, and they also believe that the water they receive is not pure enough; and therefore, the consumers complain about this situation. Besides, water authorities believe that the consumers do not pay the cost of water supplied by water authorities, and this cost does not even cover the primary expenditures of water production.

In the view of this unfavourable status; however, the government should take actions to harmonise the relationship between the consumer and water authorities and then to treat the current situation. This will be a first step in order to be followed by implementing EPIs. In this respect, the feasibility of applying EPIs can be characterized, as well as the relevant factors for the successful implementation of EPIs should be identified.

Characterizing the feasibility of EPIs

No doubt, there will be tangible enhancement in the water sector in Lebanon if the EPIs are well implemented. It is feasible to apply the proposed EPIs, in a country like Lebanon where demand for water becomes as a national priority [6], and thus seeking new management instruments have been raised on the higher national level.

Table 2 represents the major feasible implantations and characterization of the proposed EPIs. These include fiscal, incentive, liability, legal and financial functions, and the impact with its indicators.

EPI	Major function	Impact	Indicators	Estimated saving cost
Water tariffs	Fiscal	Improving the capital resources	Financial surplus	25%
Water marketing	Incentive	Increasing water investment	Water availability	5%
Damage Liability	Liability laws	Damage recovery with strong incentives	Decreased damages and deterioration	3%
Abstraction charges	Incentive	Conserved water resources	Controlled water exploitation	10%
Legislations	Legal control	Organized and formal behaviors	Ethical water use	15%
Privatization	Incentive	Secure water availability	balanced supply/ demand	-
Subsidies	Financial	Consumers compensation	Balanced financial costs	-

Table 2: Feasibility of implementing EPIs in Lebanon.

In addition, the financial outcomes were estimated depending on the records and manifests available in water-related sectors. Thus, the implementation of water tariffs will contribute integrally in increasing the fiscal outcomes. If it is combined with the other EPIs, thus it can add an additional value to the entire fiscal status for the water sector in Lebanon. In this respect, privatization and subsides can also serve indirectly in the enhancement approach with virtual fiscal income (Table 2).

Factors relevant to successful implementation of EPIs

There are several successful stories on the implementation of EPIs, notably in Europe and South Africa, Australia [12], in addition to some Arab countries. This makes it possible to extract a number of applied tools that have proven to be useful tools or prerequisites for the successful implementation of economic instruments in water management sector in Lebanon. This can be summarized as follows:

Public education: It implies knowledge and concepts dissemination and applying programs, as well as learning about the use of new water technologies.

Capacity building: It is implemented in order to address the problem of weak enforcement, thus institutional capacities in terms of human and financial resources need to be strengthened, and the concerned authorities have to be clearly defined.

Decentralized entities: It can be applied as for the river basin organizations (as water establishments in Lebanon) in order to enable the active involvement of all users and stakeholders in the management process.

Participation of stakeholders: It promotes an integration of different water sectors, dealers and beneficiaries, and thus a coordinated management of the resource that takes all demands and needs into account, and balances economic interests and environmental protection concerns.

The earmarking revenues: These are applied to make the implementation of economic instruments, such as water pricing which is successfully raised in many countries. If charges collected were transferred to the central government and incorporated into the general budget, users would feel "taxed" which could spur their rejection of the system [13].

Transparency: It has to be clear and as easily understandable as possible what is charged for and why,

Encouraging donors and inter-governmental bodies: This can be done through the execution of projects and programs for water investment and production. It will support the local governmental sector to reach better water management.

Use of non-conventional water resources (e.g. treated water, freshwater into the sea, harvested water in mountain lakes, etc.): This will help exploiting new water sources, and thus reduce the pressure on the existing ones.

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