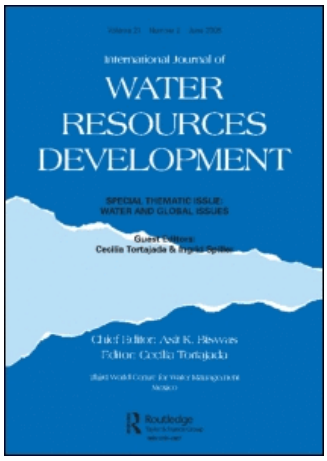

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Scenarios for Public–Private Partnerships in Water Management: A Case Study from Jordan

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ABSTRACT *The aim of this paper is to document the experience of public–private partnership (PPP) in the management of the domestic water sector in Amman city, Jordan. It also intends to reflect on the transformations in water management after the introduction of PPP using metaphors from ecology. Scenarios for water management are developed and assessed based on financial viability and political feasibility. Four scenarios for sustainable water development in Amman city are developed under two major drivers, i.e. importance and uncertainty. The scenarios developed in this paper are intended to illuminate possible ways that could affect the future of PPP for domestic water in Jordan. Based on document analysis, observations and lessons learned from ecology, scenarios for water management are developed. The process of building scenarios involves a number of steps, which include: (1) identification of focal issues and key decisions; (2) identification of key factors in the local environment; (3) listing and ranking driving forces by importance and uncertainty; (4) ranking driving forces by importance and uncertainty; and (5) considering implications. The outcomes under each critical uncertainty are assessed. Combinations of these outcomes will determine the general characteristics of each scenario. Lessons learned from the evolution of living organisms in nature, i.e. from innovation, growth, improvement and release, were utilized to characterize the water sector in Amman city after the introduction of PPP.*

Introduction

It is argued that public water and sanitation services are often plagued by inefficiency (Bosch *et al*., 2000). Several reasons are given as to why private sector involvement in water services is likely to be beneficial. These include: (1) private utilities are likely to work under greater scrutiny than public systems because of the controversy surrounding privatization; (2) the government itself is more likely to criticize and act against a private operator than a government corporation; (3) a private utility has a greater incentive to reduce losses because lost water means lost profits; and (4) private operators are more likely to draw upon international experience and know-how than are government utilities.

Traditionally, governments in various developing countries around the world have handled the provision and management of water resources. Control over the water sector naturally tended to take the form of a monopolistic market. Monopoly in the water sector often results in a decline in efficiency and innovation and control of prices. Nevertheless, due to the importance of the water industry, governments have attempted to overcome these hurdles and

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have sought various forms of privatization and/or public–private partnership (PPP) in the water industry.

Decline in assistance from international agencies and limited public funding have made it cumbersome for governments to finance and operate the water utilities sector. Therefore, governments have been inclined to develop PPP. PPP brings with it substantial know-how to public water entities and may improve the efficiency of the service delivery. Furthermore, PPP can tremendously enhance the technical capacity, efficiency and innovation of the water industry, thus building upon the technical expertise within the industry.

Moreover, on the administrative level, managerial and operational efficiency may also be enhanced, as the private sector may implement innovative administrative strategies. The need for subsidies may also decline through PPP, as government subsidies may be reallocated or redirected to serve other areas. Responsiveness to consumer needs, preferences and complaints may also be more efficiently achieved.

Although these benefits seem extremely tempting and lucrative, PPP has often been the subject of uncertainty and thus approached with caution. Specifically, in order to involve the private sector, in a public utility, numerous issues must be considered by the government. These include: an assessment of the state of the utility, such as its performance standards and the conditions of its assets; and, furthermore, an assessment of the consumers' ability to pay for the services. Therefore, the option that the government finally opts for must be feasible technically, financially and politically. The solution must be consistent with the existing legal framework and must be financially acceptable to end users yet lucrative for the private sector. Besides, the respective roles of the private and public sectors must be properly defined.

A number of different options for involving the private sector may be implemented by the government. The scale of involvement can range between the various options, as can the different functional responsibilities and forms of regulation. In order to determine the most suitable option, governments must address a number of questions, some of which include the nature of the problem that they are attempting to solve; the implications regarding the increases in coverage and quality of tariffs that the end users will be expected to pay in return for the service. The different options for choosing a PPP model depend on the distribution of roles and responsibilities between government and private sector. However, common practice has shown that hybrids have often been formulated and tailor-made to suit each country's requirement. Some of the options available for PPP implemented in public utilities may include service contracts, management contracts, leases, concessions and build, operate and transfer (BOT) options.

The aim of this paper is to assess the water sector in Jordan during the PPP scheme and to develop scenarios for water management in Jordan. Prior to assessing the water sector in Jordan, a critique of privatization will be presented to justify the need for PPP.

Privatization Assessed

The 1992 Dublin Water Conference described water as a social and an economic good. Moreover, the *World Water Vision* called for full-cost pricing to encourage water conservation, to ensure more water is available to go around and to pay

Table 1. Privatization models and corresponding responsibilities

Model	Responsibilities
Operations and lease contracts	Governments will outsource specific tasks to private firms. Investment funds are often provided by development bank loans to the government.
BOT contracts	The private partner must build and operate the system and transfer all assets to the government immediately or following the contract term.
Concessions	Full operational responsibility and commercial and investment risk are placed on the private sector.
Divestitures	Ownership is completely transferred to private interests.

for the proper operation and maintenance of infrastructure, including sewage treatment to prevent water pollution (Cosgrove & Rijsberman, 2000). The four different privatization models are described in Table 1. These models range from the most to the least degree of public control (Yaron, 2000).

This transformation from public to private or to PPP encounters many challenges. For instance, one argument against privatization states that since water is a vital social need, governments should provide water free or greatly discounted to the poor. In contrast, Serageldin (2000) argues that the high prices that the poor often pay for water rarely have anything to do with privatization. The unserved poor pay 10–20 times the price that the served non-poor pay per unit for water precisely because subsidized water prices mean that public utilities do not generate adequate funds to serve the poor. Urban water rates in less developed countries are typically less than one-sixth the full cost of water provision. The average, however, is typically about US\$1/m^3, or one-tenth of one penny/litre. In other words, while the non-poor may be paying prices as low as US\$0.20/m^3 the unserved poor typically pay about US\$2/m^3–US\$4/m^3, when the same, and frequently better-quality, water could be purchased for US\$1/m^3, from the municipality (Faruqui, 2002).

For the poorest families who cannot afford this price, regulators can mandate a lifeline tariff that requires utilities, privatized or not, to deliver basic water requirements to all its customers for a minimal cost or for free. For example, South Africa's water law guarantees the first 25 litres/person/day free as a right for all its citizens. Another alternative is to offer targeted and transparent subsidies to the poor (Cosgrove & Rijsberman, 2000).

In most cases in developing countries, switching to private water operations will probably enhance equity, provided that the private sector is regulated to address accountability and equity. However, this is not true in every case. Specifically, in many countries where the supply of water services has been entrusted to public agencies, they have become inefficient, unregulated and unaccountable (Cosgrove & Rijsberman, 2000). Lessons learned and successes of privatization in the Ivory Coast, Bolivia and Argentina were documented by Bhattia *et al.* (1995) and Bosch *et al*. (2000).

On the other hand, problems with privatization are also evident. These include: (1) contracts that provide insufficient incentive for the concessionaire to provide services to the poor; (2) contracts that discriminate against customers who do not hold property titles; and (3) governments that shirk their regulatory duty.

Moreover, it is interesting to see that the best-run utilities in the world are public. Using unaccounted-for water (UFW) as an indicator, which includes both physical losses (leakages) and commercial losses (meter under-registration and illegal connections), the best-run utility in the world in 1996 was Singapore with UFW of 6%. Tokyo was second, with UFW of 15% (Yepes & Diandras, 1996). Both are public utilities and both have improved their performance even further. Compare this to privatized utilities in Great Britain, where government data for the same year show that through leakages only, Thames Water lost 38% and Yorkshire Water lost 33% (Turton, 1998).

According to the World Bank, successful reforms of inefficient, publicly run water utilities in the developing world are rare, and failed reforms are much more common (Bosch *et al*., 2000). In Brazil, the world's largest water utility, which serves Sao Paulo, has undergone extensive restructuring. In 1995 alone, the water supply coverage increased from 84% to 91%, and sewerage coverage increased from 64% to 73%. Operating costs were reduced by 45%, partly due to outsourcing (Lobina & Hall, 2001). It should be mentioned that the best-performing utilities, and those that provide greater water coverage, are those that are run as self-sustaining commercial enterprises and accountable to the people. Whether ownership is public or private is less important.

PPP: A New Avenue

An option often neglected by both proponents and opponents of privatization is public–public partnerships. In many developed countries, there are very efficient public utilities, such as in Singapore, Tokyo and Stockholm. Therefore, in such countries there is no need to move to PPPs. By contrast, in most cases, public utilities offer poor service and incomplete coverage in many developing countries because of a lack of resources and expertise, and weak institutions. PPPs and international twinning programmes are a means for transferring the institutional strength of the public sector in one country to another without involving the private sector. The stronger public partner helps the weaker one build capacity through consultancy, training and management services (Lobina & Hall, 2001; Hall, 2000).

This approach offers several advantages. First, PPPs are often cheaper than private consulting services because public sector employees' time is often offered at cost or may even be subsidized by their national governments or municipalities. Secondly, training under such programmes is usually very effective because it takes place in a utility, and is run by the utility's staff. Spending time and learning on the job in a well-run public utility in another country, and then applying that knowledge at home, is invaluable for institutional strengthening. PPPs are common in Scandinavia and Finland and former Soviet republics such as Estonia and Latvia.

Scenarios for the Future: The Four Scenarios

The water and economic policies in Jordan recognize that the continued recovery and future growth of the economy depend primarily on a more proactive role of the private sector and a redefinition of the role of the government in the economy. Therefore, PPP and privatization initiatives were developed to enhance enterprise efficiency. Consequently, a series of policy initiatives were launched to downsize the government's direct participation in the productive sectors and allow the private sector to manage these sectors in a more efficient and cost-effective manner. A privatization programme was implemented to include several entities within the telecommunications, tourism, energy, industrial, transportation, mining and water sectors. With respect to water, a four-year performance-based management contract was awarded to an international firm for the management of the water in Amman city.

Scenario Building for PPP: Conceptual Framework

Scenarios serve as a tool for helping us to take a long view in a world of great uncertainty. They can capture a variety of possible interactions between driving forces. Schwartz (1991) describes scenarios as follows:

> Scenarios are stories about the way the world might turn out tomorrow, stories that can help us recognize and adapt to changing aspects of our present environment. They form a method for articulating different pathways that might exist for you tomorrow, and finding your appropriate movements down each of those possible paths.

The process of building scenarios involves a number of steps, which are outlined below.

(1) Identify focal issues and key decisions. Scenarios are usually oriented towards a particular audience or organization. In this paper the organization to be assessed is the Water Authority of Jordan (WAJ) and LEMA after PPP was practised. When building a scenario, a set of key issues and important decisions facing the organization must be identified.

(2) Identify key factors in the local environment. A variety of internal factors help form the context for a scenario. For instance, what type of information is necessary for making decisions about a water system? Decision makers must have adequate information about quantities and qualities of available and utilizable water. How will success be defined? It may be defined by profitability, return on investment, improved predictability or manageability of the water system and satisfied customers. What internal factors affect decision makers and decision outcomes? Factors to consider include financial resources, accountability, predictability of the system, capital and labour productivity and the degree of collaboration between water system managers and the public, and other stakeholders. All these factors are not the driving forces in scenarios; rather, they are parameters that determine which forces are most important to consider when building scenarios.

Table 2. Projected annual water supply, demand and deficit in Jordan (MCM)

Year	Supply	Demand	Deficit
1995	882	1104	222
2000	960	1257	297
2005	1169	1407	238
2010	1206	1457	251
2015	1225	1550	325
2020	1250	1658	408

Source: WAJ annual reports.

(3) List and rank driving forces by importance and uncertainty. Through observations, document analysis and personal interviews with water professionals in WAJ and LEMA, driving forces were identified. The driving forces were grouped under six areas: management; finance/economics; policy institutions; technology; environment; and society. The list of driving forces was reviewed and ranked. Critical uncertainties were identified. Driving forces can be ranked according to their likelihood and importance. They can then be mapped in a two-dimensional space, as shown in Figure 1.

(4) Select central scenario drivers and scenario plots. A small number of the defined critical uncertainties will be selected as a central driver. For each critical uncertainty chosen as a central driver, the scenario builders will assume a small number of outcomes. Combinations of these outcomes will determine the general nature of scenarios.

(5) Consider implications. Develop narratives to illustrate how the world will look in the future. The narratives revolve around the unfolding of the central critical uncertainties. They usually include stories about how the world gets from the present to each envisioned future. This is followed by an analysis of how a particular decision or strategy performs under each scenario. Reflecting on the scenarios with stakeholders is a sound approach to draw out useful ideas and implications. The scenarios developed in this paper are intended to illuminate possible ways that could affect the future of domestic water in Amman city under PPP.

A Scenario Matrix for the Water Sector in Jordan

In examining the future, one is confronted with myriad forces, factors, trends and potential events to consider. One cannot evaluate all possible combinations of forces, since the dimensions of uncertainty are simply too numerous. A common approach to scenario building is to choose two driving forces that are both very important and uncertain or unpredictable. For each of these two 'critical uncertainties', we assume two different but plausible future outcomes. Combining the two outcomes for the two forces yields a scenario matrix of four different futures. Two critical dimensions of uncertainty were chosen for developing the scenario for WAJ after PPP. These include the following.

(1) The government role in water management. The dimension of uncertainty was chosen in order to explore questions concerning future government regulatory, policy-making and managerial powers and responsibilities. Movements to shift management and even ownership of many water systems to lower levels of government, and in some cases to the private sector, have been explored and examined. Government involvement in water management has covered areas of water policy formulation, water resources development, monitoring and data collection. For two scenarios, it was chosen to characterize them as *dominant*. In such futures, the government would continue to take the lead on standard setting and would have strong involvement in enforcement, water allocation and centralized data collection. The other two scenarios envision a *reduced* government role. In these cases an attempt is made to capture the potential devolution of some governmental powers, roles and responsibilities.

(2) The future nature of the financial environment. Municipal water systems are very capital-intensive. Construction, improvement and replacement of water systems components require major investments. Substantial capital requirements to meet environmental regulations, accommodate growth and address deferred maintenance are anticipated in the coming decades. Both the availability and the cost of capital will be significant concerns for water systems in the coming years. The reasons include: (1) consumers are more circumspect about increasing costs; (2) governments face budget shortfalls and increasingly difficult choices in allocating funds to many public services; and (3) investors perceive increased risks in water utility securities. Uncertainties occur over the nature and future course of regulations, potential revenue loss due to water shortages or increased conservation.

In this paper the author has chosen to envision two scenarios with generally a *weak* financial environment, where many utilities have difficulty in obtaining and affording capital. In the remaining two scenarios, generally *supportive* financial environments are envisioned in which capital is relatively available and affordable, and increased costs are mostly tolerated by ratepayers. Combinations of these two critical uncertainties, i.e. the government role in water management (*dominant or reduced*) and the financial environment (*weak or supportive*), establish the general structures of the four scenarios as shown in Figure 1.

It should be noted that many other factors will influence the future of municipal water systems besides the two critical uncertainties. In this paper, some of these factors addressed in the scenarios include: public attitudes towards protecting the environment; public concerns about the safety of drinking water; regional patterns of growth resulting from increased population and migration; changing per capita water demand; competition for water with other uses; and development in water treatment technology.

The following four scenarios, along with the stories they tell for 2020, should help water managers and citizens understand the interplay of forces that shape the future of the water sector in Jordan.

These scenarios will be modelled based on lessons learned from ecology. In these scenarios an attempt is made to develop a metaphor of the water organization, LEMA, as a living organism in an ecosystem (not a machine). This living system follows a number of principles where all creatures live, nurture and flourish. These principles are information, feedback, innovation, interdependence and succession. This living system undergoes different phases. These

include innovation, growth, improvement and release. Scenarios will be inspired by the evolution of living systems.

Nature, as viewed by Kiuchi & Shireman (2002), is a source of knowledge that humanity can tap to cultivate more profitable businesses. By drawing on the *wisdom* in nature business can profit over many human lifetimes. An ecosystem refers to any dynamic and interdependent community of living things. Such ecosystems have the capacity to respond to change without altering the basic characteristics of the system. They face the same limits that human economies do—finite physical resources and a limited flow of energy from the sun—yet develop and evolve continuously over time in a process that has carried on successfully for billions of years.

In a knowledge economy businesses run not just on fossil fuels and raw materials but also on ideas, information and inspiration. They begin more and more to resemble the creative systems of nature: systems such as the prairie, the coral reef and the rainforest. In the following scenarios for LEMA, the thesis is that the old model of business—the machine model that pitted the business against nature—is growing obsolete. From the patterns and cycles of the rainforest, for example, we can learn how the destructive phases we see in nature can evolve towards more creative, value-creating and life-affirming patterns.

As such, Kiuchi & Shireman (2002) view humanity as part of nature. They make a number of arguments. These include: (1) since business is a natural system, the principles of nature must apply to business; (2) today's economy remains largely industrial, refined by nature but not transformed by it; and (3) an economy founded on information—one whose lifestyle and ideas reflect the idea that knowledge and design are the root source of value—is where the emerging economy is headed.

The water organization may be viewed as a rainforest. For example, as a forest ecosystem grows more complex, it becomes divided into myriad niches, as species 'get out of each other's way', and find sources of support they are most adept at tapping. This subdividing of forest tasks, or co-operation, is a consequence of specialization and interdependency. One reason parts in effect 'choose' to join together as wholes is that they sometimes gain new qualities through the combination, qualities so valuable that the combination is reinforced. In this sense they 'profit' from their combination.

It is interesting to see the most valuable resources of the rainforest as a metaphor for LEMA: not the trees or other physical resources but the relationships, the complex array of designs. Each of the millions of species is different from the other; each fills a particular niche more perfectly than the others in its locale. Through species relationships the forest sustains itself in the face of limits. Species' niche efficiency is a source of net gain in the forest, a source of 'profit'. To the extent that one species is able to fill its niche—carry out its function—using fewer resources than another, it has slowed the fall of the rainforest towards its limits.

Learning from Nature: Basic Principles

The following principles learned from nature will later be used for water organizations, specifically LEMA. These principles include feedback, information, innovation, diversity and succession.

In the rainforest the evolution of every creature is shaped by feedback,

adaptation and learning. Every creature is sculpted in response to the extreme limits that are a constant reality. Through feedback and adaptation they develop a system that brings new supplies of resources—the margin they require to avoid hitting the ground—often just in time.

Every creature in the rainforest represents a unique information set, a vast collection of points of differentiation, from which emerge the specific genetic characteristics of the individual. Every distinct pattern of atoms, molecules or cells creates a new and distinct type of resource. A resource is a material building block with a set of functional capabilities. Every element of waste is a resource in waiting. Every atom, molecule or cell is made of and dependent on information. In this sense nature as a whole is not a perpetual motion machine but a perpetual notion machine. It generates a constant stream of new ideas, new information sets, each creating a new resource, in a process that has so far lasted 3.8 billion years. That is why, in business and nature, complex living systems can create more value than simple machines.

The process of evolution, leading from simple consumptive forms towards more efficient and creative ones—and often back again—can be reduced to basic, interdependent ecological principles: (1) entropy that is lost or cost, which triggers feedback, so that the system begins to learn, turning a chain into a web, closing the open loop; (2) diversification: since each specialized organism is a specific information set, each represents a new choice; (3) interdependence: each element of the whole becomes more unique, more individualized; (4) co-operation: in serving the whole, parts serve themselves best; and (5) synergy: the creation of a new resource, not present in its parts, a net gain, a profit, a whole new form.

It is insightful to learn from nature that diversity promotes sustainability simply because diversity is choice. The more diverse the organisms in an ecosystem, the more types of resources are available to deal with a challenge, the greater the likelihood of success.

Four Phases

Ecosystems of all types as well as organizations, for Kiuchi & Shireman (2002), tend to cycle through four phases. The first phase, *innovation*, is driven by processes of integration, as dissociated parts come together into unique wholes, special arrangements yielding a synergetic quality. This breakthrough innovation is the first way nature creates value by design. The second phase, *growth*, is driven by replication, as a successful design is repeated over and over without significant change. Growth multiples the value first created through innovation and spreads it. The third phase, *improvement*, is driven by differentiation, and the fourth phase, *release*, is a consequence of disintegration, as one functional system breaks down, liberating its physical components to be taken up in new forms of integration.

The essence of sustainability, in nature as in business, is learning to master not just one but all four phases. These phases of renewal, moreover, can enable a system to progress from simple towards higher, more complex stages of development. As each economic system is born, grows, develops and declines it leaves a legacy in the form of acquired knowledge, skills and wisdom. Sustainability can only be achieved through both the restoration of the old and the emergence of the new.

As we leave the machine economy behind and cultivate a living economy, we discover new drivers for business profit that nourish and renew the whole society—not the exploitation of existing accumulation of value, which spends our riches, but the cultivation of new value and the continuous renewal of our economy and culture through innovation.

Four Scenarios and Four Metaphors

There is a secret to managing a business like a living system, a secret every gardener knows. You cannot manage the business in the same way at all times. Instead, you must manage it in four different ways—a different way for every season—and learn to manage between seasons, to prepare for the transition from one to the next. Sustainability requires learning to prosper in all seasons.

It is quite different when a water organization adopts the strategies of a 'hunter', a 'herder', a 'gardener' or a 'steward'. Every role represents a scenario. In the first, innovation phase an organization has to plant many seeds, then nurture them in an environment protected from business controls, and see which one grows. In the second, growth phase an organization must grow and replicate masses to fill the available niche. In the third, improvement phase quality, variety and development become the norm. In the final phase of disintegration and re-creation, the business must dig beneath its products to find its enduring purpose as a guide to focus its resources.

Scenario A: Manage for Innovation

In the season of innovation the water business is like a laboratory. The most important form of capital is creativity. Power is for anyone with a promising idea and the vision to transform it into a product, process or service. This scenario is characterized by: free experimentation and emergent leadership.

The metaphor of an organization is *hunter*. Every pioneer species grows principally by consuming without restraint the resources that surround it. But the reign of the pioneers is a temporary one. Eventually value must be created to replenish it. Without that, it is not just plants and animals that are at risk. People and businesses are endangered species too. All value and all profit, for Kiuchi & Shireman (2002), are created by design. Business can consume profit the old way, by taking just the physical resources from nature and incrementally destroying nature in the process. Or it can create profit the new way, by mimicking the patterns, principles and ideas of nature, by learning how nature creates value sustainably.

This scenario is characterized as *reduced government role and supportive financial environment*. In this scenario, the government role in regulating water is minimal. Public funding for infrastructure is limited. National water programmes are largely oriented towards partnership with lower levels of government and the private sector. Consolidation, privatization and support from investors and affluent ratepayers enable some water utilities to finance infrastructure improvements, but others find the market-oriented times difficult. This scenario reflects to a high extent the dynamics of the existing situation in the water sector with the introduction of LEMA in the PPP programme, as will be shown in the case study below.

It is believed that LEMA was experiencing this phase of innovation. It was

passing through a pioneering phase involving the selection of special staff, launching the new idea of PPP and developing a new vision. From the evolution of events, it seems that LEMA or the experience of PPP will be moving to scenario B, i.e. from innovation to growth.

Scenario B: Manage for Growth

In the season of growth the workplace tends to be highly regimented. Power tends to be held by designated authorities who enforce rules. The most important form of capital is physical: facilities, equipment. This scenario is characterized by fast growth, mass production and standardization.

The scenario is characterized as *dominant government role and supportive financial environment.* The public in this scenario is likely to demand a very strong government (WAJ and LEMA) role in addressing water quality and water quantity concerns. National environmental agencies set high standards, enforce them strictly and are intimately involved in water quantity management across the country. A strong economy, ratepayer support and loan guarantees ease the financing of water system capacity expansions, major maintenance and treatment system improvements. Document analysis and observation in the water sector in Amman city do not support this scenario. The assessment of the external environment reveals that LEMA has not experienced this phase yet.

Scenario C: Managing for Improvement

In seasons of continuous improvement the workplace is often more of a learning community, a campus where people are motivated to apply their own intelligence and skill. People work together in teams and networks. Leadership is held by those able to facilitate functional relationships between formal and informal teams of specialists. The most valuable form of capital is information. This scenario is characterized as follows: resources become scarce; markets diversify and products differentiate; customers differentiate; and there is continuous reorganization.

This scenario is described as *dominant government role and weak financial environment.* In this scenario, government agencies (WAJ and LEMA) are likely to maintain high standards for water quality and environmental protection. But enforcement activities are underfunded. Budgets at all levels of government are severely reduced. Citizens demand high standards for water quality, but they are overburdened by taxes and the high cost of living and they resist rate increases necessary to support water system improvements. Considering the amounts of funding allocated to water by donor agencies, this scenario does not reflect the current situation of the water sector with the experience of LEMA in PPP.

Scenario D: Managing Release

Leadership moves from designated authorities or facilitators to charismatic individuals, people who from within the chaos convey a sense of purpose, clarity and certainty. The most valuable form of capital is the company's core purpose. In this phase old structures disintegrate and diversity declines and uniformity increases. Hence, there is a need to set a common vision.

To leap from innovation to growth an organization needs to be able to choose winners, and have the discipline to focus attention on them; to leap from growth to improvement one must be able to generate different and better variations on your core product and service, as well as the requisite variety of people and skills to launch them as needed; to leap from improvement to release one needs to know the vision and be able to actualize it. This suggests, for Kiuchi & Shireman (2002), one final lesson from nature. The highest mission of business is to help fully develop the human ecosystem, sustainably like the rainforest, in all our diversity and complexity: consume less and be more.

This scenario is described as *reduced government role and weak financial environment.* The scenario is characterized by a reduced role of government (WAJ and LEMA) and a lack of public funding. Government financial assistance for water and wastewater infrastructure is likely to be unavailable. Many powers, including standard setting and enforcement authority for drinking water quality and wastewater discharges, will devolve to a lower level of government. But most national and local budgets are also strapped. Despite public concern over the safety of drinking water supplies, the majority of ratepayers resist the higher bills necessary to finance needed infrastructure improvements. Although there is a tendency in the government and MWI (as will be illustrated in the case study) to provide an enabling environment for PPP and to reduce its role, the financial environment is relatively reasonable. The water sector receives high visibility from both the government and donor agencies. It is believed that WAJ was experiencing this phase through the transformation of some responsibilities to LEMA.

The following case study presents a brief description of the water sector in Jordan with special emphasis on WAJ and LEMA. The case study shows some evolutions and co-evolving between phases of release for WAJ and innovation for LEMA.

Water Sector in Jordan: Case Study

Jordan is an arid to semi-arid country with a land area of 92 000 km^2. Located to the east of the Jordan River, Jordan's topographic features are variable. A mountainous range runs from the north to the south of the country. To the east of the mountain ranges, the ground slopes gently to form the eastern deserts; to the west, the ground slopes steeply towards the Jordan Rift Valley. The Jordan Rift Valley extends from Lake Tiberias in the north, at a ground elevation of -220 m, to the Red Sea at Aqaba. At 120 km south of Lake Tiberias lies the Dead Sea, with a water level at approximately–405 m. The southern Ghors and Wadi Araba, south of the Dead Sea, form the southern part of the Rift Valley. To the south of the Wadi Araba region lies a 25 km coastline which stretches along the northern shores of the Red Sea.

Due to the variable topographic features of Jordan, the distribution of rainfall varies considerably with location. Rainfall intensities vary from 600 mm in the north-west to less than 200 mm in the eastern and southern deserts, which form about 91% of the surface area. The average total quantity of rainfall is approximately 7200 million cubic metres (MCM)/year, and it varies between 6000 and 11500 MCM/year. Approximately 85% of the rainfall evaporates back to the atmosphere; the rest flows in rivers and wadis as flood flows and recharges groundwater. Groundwater recharge amounts to approximately 4% of the total

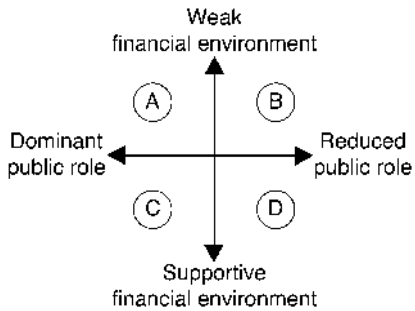

Figure 1. Scenarios for water management.

rainfall volume; surface water amounts to approximately 11% of total rainfall volume (Al-Jayyousi & Mohsen, 1999).

Jordan is facing a chronic imbalance in the population–water resources equation. The total renewable freshwater resources of the country amount to an average of 750 MCM/year. The population of 1997, estimated at 4.6million, is growing at annual rate of 3.5%. The per capita demand for water was 160 m^3/year in 1997 and declines at a rate equal to that of population increase. The renewable water resources fall short of meeting actual demand, which translates into an increase of food imports where the deficit in food balance reached US$110 per capita in 1996.

The projected supply, demand and deficit are shown in Table 2. Despite the huge investment in the water sector, a considerable water deficit will still be facing Jordan. The water deficit for all uses is projected at 408 MCM/year in 2020.

The long-term safe yield of renewable groundwater resources has been estimated at 275 MCM/year. Some of the renewable groundwater resources are presently exploited to their maximum capacity and in some cases beyond the safe yield. Overexploitation of groundwater aquifers, beyond the annual potential replenishable quantities, has and will contribute significantly to the degradation of groundwater quality in the exploited aquifers, and endangers the sustainability of these resources for future use.

The main non-renewable groundwater resource in Jordan exists in the Disi aquifer in the south, with a safe yield of 125 MCM/year for 50 years. Other non-renewable groundwater resources are estimated at an annual safe yield of 18 MCM. Of the treated wastewater discharged in 1997 (estimated at 65 MCM) about 56 MCM was indirectly reused for irrigation in the Jordan Valley. As the volume of water used by Jordan's municipal and industrial sector increases, wastewater volumes will increase. By 2020, it is expected that the volume of treated wastewater available will amount to 220 MCM/year and will constitute a significant portion of the total irrigation demand and hence supplement the demand on renewable groundwater resources.

The average resident of the capital city of the Kingdom of Jordan currently receives less than 100 litres per capita per day (lpcd), all delivered only one or two days a week. For this poor service, the customers pay an average of about JD0.377/m^3. This ranges from charges of JD1.00/m^3 for industrial customers to about JD0.10/m^3 for residential customers. Were it not for the investment in

facilities of hundreds of Jordanian dinar per building to allow the storage of enough water on rooftops to survive during the periods of no service, it seems likely that there would be loud outcries for improvements. The poor cannot afford such investments, so their situation is much worse. Farmers are extracting more high-quality groundwater than is delivered to the communities, yet are charged nothing for that water. They only pay JD0.015/m^3 for surface water used in the Jordan Valley, this despite the official policy that the price should at least cover operation and maintenance costs, a policy that is not enforced.

Water Policies in Jordan

Since 1993, Jordan has made substantial efforts towards the remedy of the water situation in the country. A bold water policy reform process was hence initiated. The process included co-operation with donor agencies in major efforts to restructure institutional frameworks, strengthen capacities, rationalize strategies, improve financial viability and widen public awareness and participation. Water resources management functions were therefore separated from service functions. Projects for the strengthening of water resources planning capabilities were also started. More emphasis was put on increasing the commercial focus of operations, and accentuating the financial viability in the water sector planning and operations. The concept of separating national infrastructure from service delivery has also become an acceptable option, and the need to mobilize all available resources, including an increased role of the private sector in systems operation, was recognized (Al-Jayyousi & Shatanawi, 1995).

Jordan's water strategy (Ministry of Water and Irrigation (MWI), 1997a) provided the foundation and initiative to formally develop policies addressing specific issues facing Jordan's water sector. Four policies have been developed and approved. These include groundwater management, irrigation water, water utilities and wastewater management.

An integrated approach to water resources management will be adopted by the MWI. Supply-enhancing measures will be adopted for surface waters. Groundwater abstractions will be controlled and reduced to be within the safe yield of the aquifers and enforcement will be strengthened. Waste water will be collected; treated waste water will comply with national standards and will be treated to a level appropriate for agriculture and possibly for groundwater aquifer recharge.

The groundwater management policy (MWI, 1998a) addressed the management of groundwater resources including development, protection, management and reducing abstractions for each renewable aquifer to the sustainable rate. The irrigation water policy (MWI, 1998b) addressed irrigation water including agricultural use, resource management, technology transfer, water quality and efficiency, but did not address or extend to irrigated agriculture. It stated that irrigation water should be managed as an economic commodity, that water price was to cover at least operation and maintenance costs and as far as possible capital costs, and that differential prices should be applied for different water quality.

The utility water policy (MWI, 1997b) stated that the MWI will continue as a governmental organization and will be responsible for policy formulation, decision making, national water planning, water resources monitoring and studies and integrating water information systems. WAJ will begin separating its

bulk water supply and retail delivery functions and move these functions and services towards private sector and commercial enterprises. WAJ will monitor retail supply contracts and will become more involved in the operational monitoring of several management contracts with private sector utilities and providers.

With respect to private sector participation, the policy states that the government of Jordan intends to transfer infrastructure and services from the public to the private sector in order to improve performance and efficiency in the water sector. The use of management contracts and other private sector participation in water utilities is envisioned. The principles of BOT and build, operate and own are being considered for private sector participation. Recovery of capital costs will become part of ongoing pricing actions. The MWI will attempt to establish differential pricing for different qualities of water and end uses. Profitable markets (e.g. tourism and industry) will be expected to pay the full, fair water cost. The water utility policy states that existing water distribution systems and services will be improved and expanded. Old and damaged supply and distribution systems will be rehabilitated. Investment criteria are being developed but the policy relies partially on private sector participation and external funding.

The adoption of PPP in Jordan's water sector has already begun with a major water and wastewater management contract for Greater Amman. A special project management unit has been set up by the MWI within WAJ to monitor progress. The contract implementation, which was signed with an international French company in co-operation with a Jordanian company, Lyonnaise des Eaux–Montgomery Watson and Arabtech Jardaneh (LEMA), started in August 1999. It is expected to improve the efficiency and performance of the water delivery services in the largest domestic water market in the country.

The project management unit was created to execute the Greater Amman Water Sector Improvement Program (GAWSIP). GAWSIP is responsible for (1) the investigation and development of proposals on technical and operational improvements, (2) the promotion of private sector participation and (3) the development of strategies for the reduction of UFW.

Management Contract for Water and Waste Water in Greater Amman

A water management contract was awarded to LEMA to administrate and manage the activities mentioned hereinafter in Greater Amman and Zai Water Directorate using the water authorities' utilities, buildings, vehicles and equipment. The service area represents 37% of the total population of Jordan, 9% of the total area of Jordan, 43% of the total number of subscribers in Jordan and 37% of the total water consumption of Jordan.

The objectives of the performance-based management contract are summarized as follows.

- Increase operating effectiveness to enhance financial sustainability of the sector and to reduce UFW.
- Improve the reliability of water supply to all customers.
- Attract capital for improving and refurbishing the water infrastructure.
- Improve water quality.
- Reduce average response time for complaints.

The four-year contract is characterized by allowing the participation of the Jordanian private sector. Ownership of assets would remain with WAJ. The government of Jordan will be responsible for the water tariffs and associated fees over the four years. The operator is responsible for reducing UFW and improving system performance and efficiency. To monitor the performance of the operator, an institutional framework was established. The main components of this framework include the following: (1) a planning and management unit was established in order to manage and co-ordinate the activities taking place in the service area; and (2) an international independent auditor was appointed for the base year operating statement and performance formula. The supportive financial environment is evident since the fixed fee was about US$8 million. Moreover, incentives will be added to the fixed fee in order to encourage the operator to improve performance.

Conclusions

We are at a critical threshold in the juncture of water management and development in Jordan. Increasing population, pollution and urbanization all threaten the per capita availability and the quality of fresh water. Such a juncture requires new ways of thinking about and managing water resources. From the case study and the scenarios described above, it seems evident that scenario A, reduced government role and supportive financial environment, is likely to take place in the future. This scenario represents the innovation phase for LEMA based on the evolution of an ecosystem. However, there are some indicators that LEMA will be progressing to the growth phase by expanding this mode of management to the Jordan Valley Authority, Aqaba and other governorates.

Hence, in the anticipated phase of growth, governments and regulators will find it challenging to control these firms. However, in the long term, LEMA is likely to play the role of 'gardener' and/or 'steward' to achieve innovation and renewal. These phases should be anticipated and managed in an effective manner.

Governments and regulators must insist on transparency because corruption is far more difficult to practise in a transparent environment. A key question that privatization opponents must address is whether the *status quo* is better than what the situation would be under PPP. The above-noted criticisms, including lack of transparency, the presence of corruption and, especially, high leakage levels, are also appropriate to apply against public utilities that are no longer accountable to the public.

Government's most important role in these partnerships is to strongly regulate and to develop contracts that provide incentives for the private operator to conserve water, decrease leaks and serve the poor. However, the public–private approach is not necessarily the best in every context. While examples of successful reform of public utilities to make them more efficient and accountable are rare, they do exist. Such reforms, however, are more likely through PPPs with other strong public utilities. The *World Water Vision* suggests that not only can public and privatized operations co-exist, but also that once regulation and accountability are established for private companies, their performance should be compared to public companies. Ultimately, the greatest benefit of the PPPs may be that they force public companies to become regulated, accountable and efficient (Cosgrove & Rijsberman, 2000).

In the meantime, if exports become more common, environmental risks exist, because trade agreements such as the North American Free Trade Agreement and the World Trade Organization restrict the use of the precautionary principle. This could have a significant impact if bulk water exports begin and can only be stopped after environmental damage has already occurred. Indeed, such conditions will introduce a 'release' for the system, where renewal or decay may take place. Economic globalization is also forcing water reallocation from agriculture to industries and tourism. Whether farmers willingly sell their water rights or are simply 'cut off', policies to mitigate the social impacts must be devised.

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