

Water Demand Management in the Kingdom of Saudi Arabia

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Abstract: Water is one of our most precious and valuable resource, in fact it is number one factor effects the Saudi development plans. The scarcity of fresh water resources is a major challenge facing Saudi Arabia. The major purpose of water management is to conserve water and protect it against quality degradation, check the capital intensity in the development of infrastructure, and to maximize the benefits from the use of a unit flow of water. This means checking water demand, minimizing water losses, maximizing overall water transport and use efficiency, and arresting water wastage and loss by quality degradation. Demand for fresh water is on the rise, there is no longer sufficient water to meet our daily needs. 95% of water comes from aquifers, 4% from desalination and 1% from waste water reclamation. Thirty percent of household water comes from desalinating and users of desalinated water in the world representing about 26% of world total. At the present time and in the future we have to shift from supply side to demand management and conservation side, which means that we must use our water resources efficiently taking into account, economics, social and environmental conditions.

Keywords: Water, scarcity, water management

Introduction:

Scarcity of fresh water resources represents one of the major challenges facing the world generally and the Kingdom of Saudi Arabia (KSA) especially. KSA which suffers from absolute water scarcity is witnessing ever decreasing water per capita in addition to continuously increasing water consumption due to population growth, household consumption patterns and the ever increasing of production sectors. This, in turn has led to rapid growing increase in fresh water demands for different purposes ⁽¹⁾. The world is currently shifting its interest from emphasizing on water production or supply, to more balance between supply and demand through considering the management of water demand in a way that ensure the application of necessary and efficient measures to achieve fair and effective utilization of water. The main objective of water demand management is to contribute to more efficient and equitable provisions of water and sanitation services.

The cost of developing new sources or expanding existing sources are getting higher and higher, the cost of desalinating water per cubic meter is around \$2 in Saudi Arabia ⁽²⁾. Saving water rather than the development of new sources is

often the best source of water. Water demand management is seen to be the preferred alternative to meet increasing water demand in our country, this will improve efficiency and sustainability. Curbing the growth in water demand can be achieved through different measures, such as educating the people, extension out reach, pricing policies and laws that govern the use of water for house holders and residential units, leakage detections and repairs, tools of rationalization, conservation behaviors, distribution system and water metering and monitoring.

Integrated Water Resources Management (IWRM):

Water demand management is the integrated concept for a number of water sub-sectors, which ensures that social, economic, environmental and technical dimensions are taken into account ⁽³⁾.

The IWRM is the activity of planning, developing, distribution and optimum use of water resources under defined water policies and regulations (en. Wikipedia.org/wiki/) in this regard it has been agreed in the “Dublin Principles” ⁽⁴⁾ to consider water as a finite and economic commodity taking into account of affordability and equity criteria on order to emphasize on its scarcity. The Dublin Principles are

1. Fresh water as a finite and vulnerable resource, essential to sustain life, development and the environment.
2. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
3. Women play a central part in the provisions, management and safeguarding the water.
4. Water has an economic value in all its competing uses and should be recognized as an economic good, taking into account of affordability and equity criteria.

Water Demand Management:

Reclaimed water losses and increased efficiency of water use constitute the greatest and most easily accessible water resource in water scare countries (KSA) must have an effective strategy to increase available water supply is water demand management. An effective strategy necessary to increase available water supply is water demand management which involves water conservation and increased water use efficiency ⁽⁵⁾.

The main objective of water demand management is to contribute to more efficient and equitable provision of water and sanitation sources.

With regard to the domestic consumer, water demand management measures can be divided in ⁽⁶⁾:

1. Water conservation measures:

Leakage detection, Reduction of illegal connections, In house retrofitting, out of house water saving measures

2. Water Pricing measures:

Water metering, Tariff structure

3. Informational and educational measures.

Awareness raising, Public involvement, In-school education

4. Legal measures:

Rules and regulations that form the basis of WDM policy, Regulations on resale of water.

Water Conservation:

Upto 30% of fresh water supplies are lost due to leakage in developing countries and in some major cities, losses can run as high as 40% to 70%, while in KSA leakage losses are about 35% ⁽⁷⁾.

Water Resources in KSA:

Saudi Arabia is a desert country with no permanent river or lake and very little rain fall. Water is scarce and extremely valuable and with the country's rapid growth, the demand for water is increasing day by day.

It is obvious that the water resources of a given country consist of surface and ground water resources, together called the blue water; the moisture stored in the top soil after rainfalls, called green water, and the converted types of water from raw water unfit for consumptive use to finished water fit for human and plant consumption. These are the treated municipal wastewater, called grey water, and the desalinated water that I call silver water. Together they form the water resources of a given country.

Aquifers are the major source of water in Saudi Arabia. They are vast underground reservoirs of water. Another major source of water is desalination of sea water. The saline water conversion corporation (SWCC) operates 36 desalination stations that produce more than 1000 million cubic meters a day of potable water ⁽⁸⁾. Dams are used to capture rain water, more than 260 dams collect an estimated 16 billion cubic feet of water.

Water Use:

Total Municipal water use in Saudi Arabia has been estimated at 2.1 billion cubic meters per year in (2004) or 9%, Agriculture accounts for 88% and industry for only 3%. Demand has been growing at the rate of 4.3% per annum (1999 – 2004). Household water consumption around 260 litter per capita per

day. In Riyadh, average domestic water use in 2004 was 320 liters / capita / day⁽³⁾⁽⁹⁾.

Price of water in Different Countries:

The price of water is increasing throughout the world. Over the past five years, Municipal water rates have increased by an average of 27% in the US, 32% in UK, 45% in Australia, 50% in South Africa and 80% in Canada⁽¹⁰⁾.

The price of household water in New York is about 0.75\$ per cubic meter while in London the price of 1 cubic meter of water is around 1.5\$. The price of water in Manila, Accra and Columbia are 3, 3.5 and 4.5 \$ per cubic meter respectively⁽¹¹⁾.

Price of water in Saudi Arabia: The price of household water in Saudi Arabia is almost free as shown in Table-1.

Strategy for Household water demand management in Saudi Arabia:

Scarcity of fresh water resources represents one of the major challenge facing the world generally and the Kingdom of Saudi Arabia (KSA) precisely. The world is currently shifting its interest from emphasizing on water supply to more balance between supply and demand through considering the management of water demand.

Water demand management is a managerial approach, which aims to meet the demand of water through the application of necessary and efficient measure and incentives to achieve fair and effective utilization of water.

The water requirements in Saudi Arabia are growing rapidly as a result of ever increasing populations together with improved living standards. The existing and anticipated future water requirements will exceed the available resources.

Total household water consumption increased at an average annual growth rate of 4% rising from 1,750 million cubic meters in 2004. Water consumption per capita is relatively so high in a city such as Riyadh, it exceeds 300 liter per capita per day. net work loss rate is around 30%.

The noticeable misusing of water by many citizen and residents when they use water specially during washing their cars or the house, wastage can be noticed by running water through out the streets.

A survey was conducted by Al-Zahrani which shows that the reasons for misusing of water are low prices of the water and lack of efficient monitoring measures against those who don't use water wisely⁽¹²⁾.

Since the Kingdom of Saudi Arabia (KSA) has a desert climate, it represents one of the driest countries in the world.

Based on the data and information presented in this paper, we can manage our water resources in the demand side by changing the pattern of water consumption for household consumers as follows:

1. Changing the price of water to the level that consider the environmental conditions of Saudi Arabia, the real cost of the production of each cubic meter of water by the Government, the high living standard of people, the price of other commodities and the price of water of some world cities.
2. The new proposed prices will help along with allocated money by the Government to reduce water loss rate from the network.
3. Introduce effective and efficient national water campaign to rationalize water use by consumers, based on the previous results of the previous campaign, taking into account, the women, children and house mates.
4. Introduce educational curriculum to raise the awareness of the school students.
5. Apply effective policies, monitoring measures, penalties in order to control the miss use of water.
6. The use of modern devices that minimize the wastage of water.
7. Installation of two separate distribution systems of Municipal water: One is potable and other is not, but destined to irrigate parks, gardens, and other tourisms facilities.

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Table (1): Current Prices of water (KSA)

Segment	M ³ /month	Price (SR)
1	1-50	0.10
2	51-100	0.15
3	101-200	2.00
4	201-300	4.00
5	301+	6.00

Source: Ministry of Economic and Planning report 2009.

Table (2): The Proposed new prices for water (KSA)

Segment	M ³ /month	Price (SR)
1	1-50	5
2	51-100	7
3	101-200	9
4	201-300	12
5	301+	15

The following diagram summarize the strategy for management of household water.

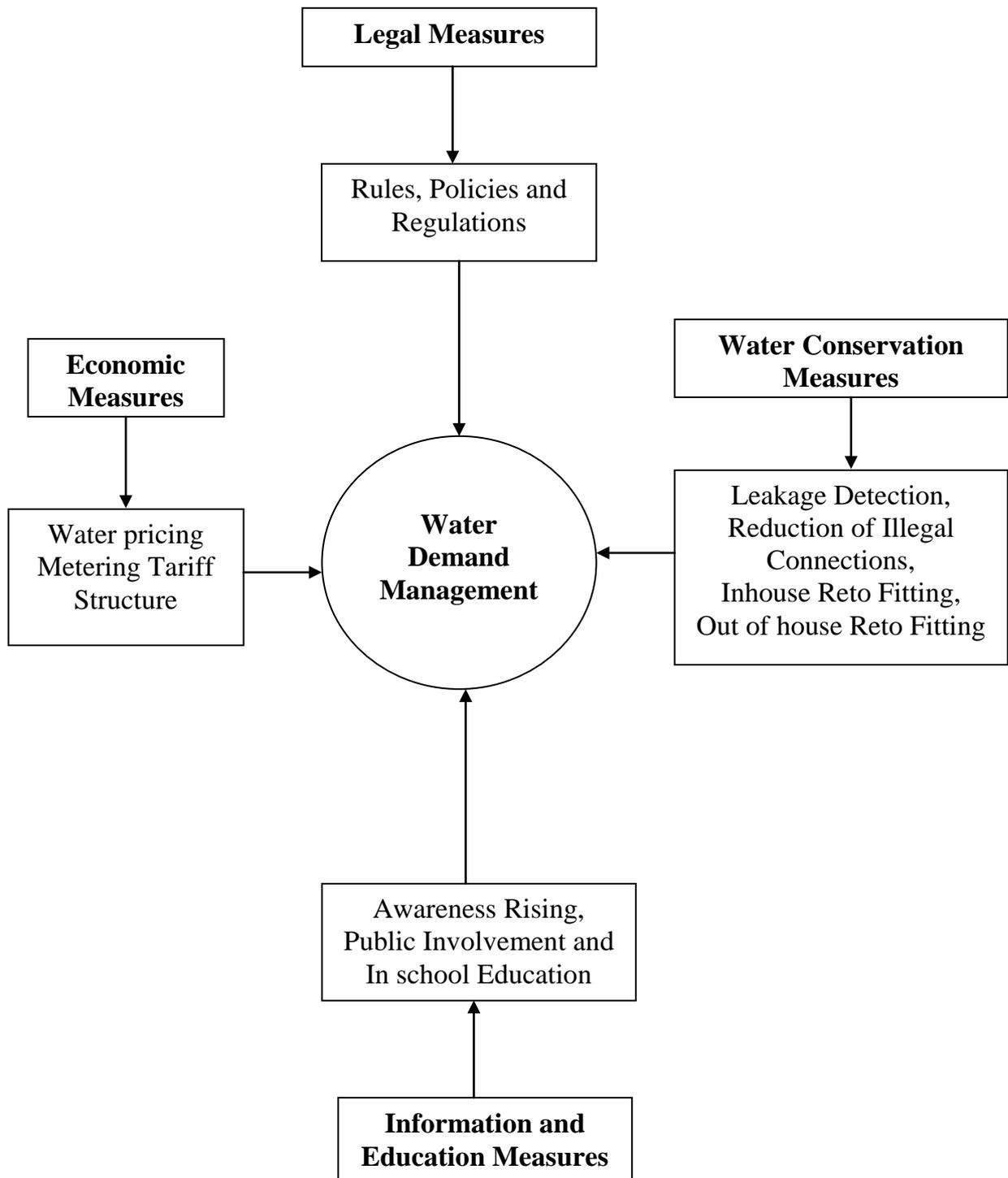


Figure (1): Water Demand Management

Figure (2): Saudi Arabia - A desert country with dry climate



Figure (3): Wastage of Water

