3.a) Use of water by Sectors and expected needs till year 2000 Million Cubic Meter/yr. (MCM/yr)

	1986	1990	1995	2000
Domestic and Industrial	120	152	196	247
Irrigation: Jordan Valley + wadi Araba	350	453	524	587
Irrigation: highlands	100	100	100	100
	570	705	820	934

3. b+c) Pricing of water

1. Amman (for use in 3 months)

from 0 to 20 m^3 (3 months for each water meter) 120 fils/m^3
from 20 to 40 m^3 " 200 "
from 40 to 100 m^3 " 400 "
100 m^3 and above " 500 "

Water meter fees 225 fils for each 3 months
base fees (least use) 1200 " " " " "

2 Outskirts of Amman + north Jordan Cities and villages

from 0 to 15 m^3 / 3 months and water meter 80 fils/m^3
" 15 to 45 " " " 96
" 45 " 75 " " " 300 " "
75 m^3 and above " " 400 " "
Water meter fees 225 fils / 3 months
base fees (least use) 1200 " / " "

3. Jordan Valley

Domestic: 100 fils/m^3, no least use, no water meter fees
Industrial: 10 fils/m^3

4. Zerka, Aqaba + Southern towns and villages
(to the south of Amman outskirts)

From 0 to 20 m³ (each two months/water meter)	80 fils/m³
" 20 - 40 " " " "	96 "
" 40 - 100 " " " "	300 "
100 m³ and above " "	400
Water meter fees / each two months	150 fils
least use / " "	1200 "

5. Water tank services

Tank capacity	in Amman	outside
5 m³	2500 fils	3000 fils
8 "	3000 "	4000 "
12 "	4500 "	5500 "

6. Irrigation Water

10 fils / m³ All over the country

7. Special prices

a. Fertilizer plant Aqaba 240 fils/m³
b. Hussein Medical Centre (Amman) 350 " "
c. Drinking water in distribution Centers (transported by the user to the use site)

200 fils / m³ in Amman
400 " / " outside

Armee, police, civil defence ... etc.

160 fils / m³ in Amman
350 " / " outside.

8. Private wells whether for industrial, ~~or~~ irrigational or any other use do not pay anything, and until now they pump the amounts they like (no water meters are installed)

3.d) Costs of production and delivery of water

— Drinking and Industrial water *

Water wells 100 - 150 fils / m^3

Deir Alla project 300 fils/m^3

Azraq project (to Amman and Irbid)
220 - 250 fils/m^3

— Irrigation water :

a- In the Jordan Valley 50 fils/m^3
(35 fils Capital cost + 15 running cost)

b- In the highlands 50 - 100 fils/m^3

* Average (domestic and industrial) water costs (running costs + Capital costs + loan interests) = 190 fils/m^3

Of the produced water about 40% are lost due to network damage ... etc. . The amount which is sold to the users equals 60% of the produced amount, hence the production and delivery cost = 310 fils/m^3

3. e) The subsidies of water are only to a very small degree reflected in the use of water:

- Farmers get only the amounts of water needed to irrigate certain land areas.
- For all other uses water is relatively expensive and no significant overuse can be registered.

(e.g. One year ago the water prices were decreased by 20%; surprisingly no increase in use was registered at all)

3. f) Reducing or removing subsidies.

- Domestic uses:

If subsidies are reduced or even removed water use will only decrease very little (insignificantly). But it is on the other hand feared that certain communities will try to reduce their water use below "health standard" which could then be reflected in worsening health situations.

- Industrial use:

Reducing or removing subsidies will result in an increase of product prices. It could also lead to water recycling within the factory which is a positive result.
It also could lead to some savings or use of other sources eventually of minor quality.

Agriculture The reduction or removal of subsidies will lead in this case to drastic increases in production cost:

the production cost of 1000 m^2 of land is calculated to be 80 Dinars (Jordan Valley area, main product vegitable) of which only about 12.5% is for water use. If the present price of water; 10 fils/m^3 is raised to the real cost of 50 fils the production cost of 1000 m^2 of land will rise to 120 Dinars with about 42% paid for water.

Also reducing or removing subsidies will certainly lead to decreasing use of water for the same irrigated area. But this decrease in turn will lead to accumulation of salts in the soil and hence to soil salinization and ~~declining~~ deminishing productivity (in this case no water will be available to flush down salts accumulated with in the soil profile).

3.4.) Alternate sources of water

It is well known that Jordan suffers from limited water ressources due to its dry climate and relatively scarce uneven rainfall. Hence the alternate water ressources are also very limited.

- Hidan-Mujib sources : Here about 45 MCM/yr. of water are available. For the time being these sources are not yet utilised. It is planned to allocate ½ of this water to the greater Amman area to meet the increasing demand for domestic water supplies. The other half is planned to be piped to the south and to be used for industrial purposes (Potash and Oilsand) at the southeastern end of the Dead Sea).

- The Yarmouk River:
  Here it is now intended to build the (Unity Dam) Magarin Dam. This dam is supposed to provide Jordan with some 80-100 MCM/yr. in addition to the present exploitation of 120-140 MCM/yr. for the East Ghor Canal irrigation projects

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3.4) Another alternative source of water, although not potential is the Euphrates Project which was suggested to bring some 160 MCM of water/yr. from the Euphrates River to Jordan.

This source is highly unsure due to the water rights raised by riparian countries especially Turkey.

- Wastewater represents also a major non-conventional source of water and is thought to supplement the irrigation water sources in Jordan by some 100 MCM/yr. of treated wastewater by the year 1995.

- The last alternative is desalination of sea water in Aqaba, which by the present development could be necessary by the year 2010 or max 2020.

3-i) private and public investment in water projects

The private sector investment in water projects is restricted to drilling of wells and in water-related projects to land reclamation and irrigation.

The average investment in private sector water projects and water-related projects was 30 million Dinars/year (1981-1986). The five year plan (1986-1990) expects an average private sector investment of 40 million Dinars/yr.

The public sector investment in water and irrigation projects has an average of 50 million Dinars/year (1980-1986). For the years 1986-1990 the five year plan of the country expects an average investment of 55 million Dinars/year in water and irrigation projects.

3-j) Private and public investment in water-related research and technology.

Research and technology in water and water-related subjects are very restricted and are mainly carried out at the University of Jordan. They are sponsored by the University or by the Ministry of planning. Studies and preinvestigations of projects are generally included in the project costs themselves, and are normally carried out by foreign companies and institutions and are paid from the foreign help (financing) to Jordan.

It is estimated that around 250 000 Dinars only are invested in water research.

The private sector do not effectively contribute in the water research and technology investments, but it adopts very quickly to new technologies like drip irrigation, use of fertilizers or biocides ... etc.

3.k) Prospects for increased efficiency and potential impact of greater efficiency.

- Industry: the total amount of water used for industrial purposes is relatively small in Jordan. Increasing efficiency will not largely affect the present resources.

- Agriculture:

Increased efficiency can be reached by:

a. upgrading the efficiency of irrigation systems
b. use of concrete (lined) canals and pipes instead of the use of earth canals will their high losses by seapage and additional evaporation from wetted surrounding soils.

The use of drip irrigation instead of sprinkler or furrow irrigation could save a lot of water which could be used to irrigate additional land areas. From experience gained from using drip irrigation and plastic houses instead of furrow irrigation ~~and~~ in open air about 30% water saving was achieved and an increase in productivity of up to 30% was reached.

Large areas of ~~irrigation~~ land under irrigation in Jordan and especially in the Jordan Valley is now under plastic covers and use drip irrigation systems.

If drip irrigation is used ~~to its~~ in all areas where it is possible water savings of about 15-20% could be reached. This system is now being gradually but very fast implemented in Jordan.

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— Domestic uses:

Major savings can be achieved by upgrading and developing (repairing) the water networks.

The water network losses in the greater Amman area were calculated to be around 50% of the pumped water (Humphreys and sons 1983). For the whole country it is losses are estimated to be about 40%.

No savings can be realled by reducing the pro capita present use, because this is at the lowest value for hygienic standards.

Worldwide network losses up to 12% are tolareted. Realing this fijure in Jordan would mean savings up to of 30-40 million cubic metres of water per year. This water is gained (collected), purified and pumped but it does not reach the users and is lost without being utilized.