



THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF WATER AND IRRIGATION

Jordan Country Water Report

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H.M King Abdullah the Second, 7 November 1999

**Our Water Situation is a challenging one
and it cannot be ignored.**

**We have to strike the balance
between the needs for drinking,
industrial and irrigation water.
However the issue of drinking water
remains the most important one.**

Components of the Water Crisis in Jordan

High Population Growth

Limited Renewable Water Resources

Increasing Cost of Supply Expansion

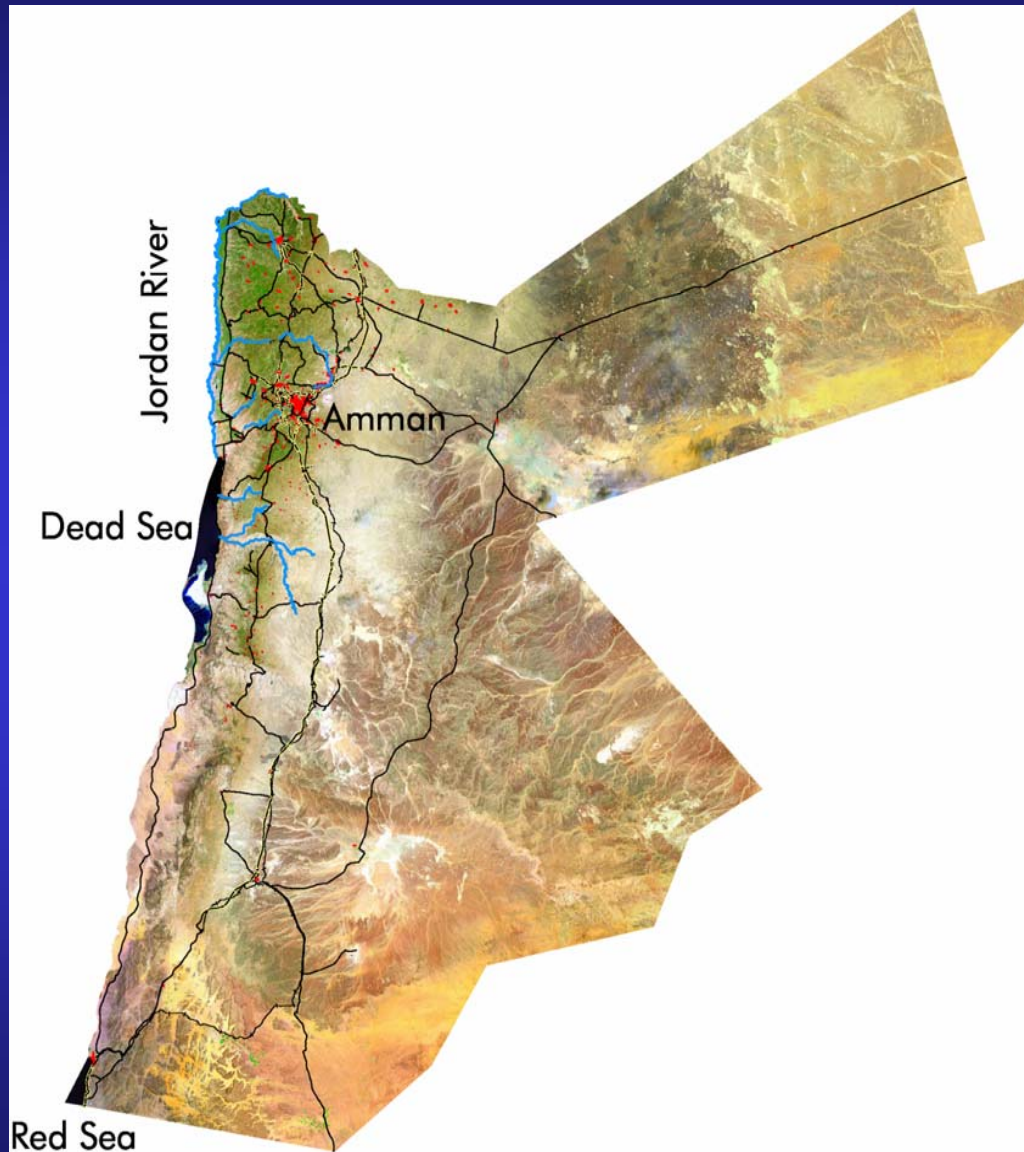
Efficiency of Service Delivery

Cost Recovery & Affordability

Prevailing Water Sector Management Constraints

- Per capita availability of natural water resources is very limited due to water scarcity and high population growth (3600 M³/Cap/Year in 1946, 145 M³ in 2004)
- Highly Competing Sectoral demands on scarce water resources
- Demand centers are distant from water sources
- Groundwater over-abstractions
- Limited financial capacities

Population Issues



- High population growth rate @ 3%
- Population increase > natural growth rates (refugees)
- Population is concentrated in Hilly areas away from water resources

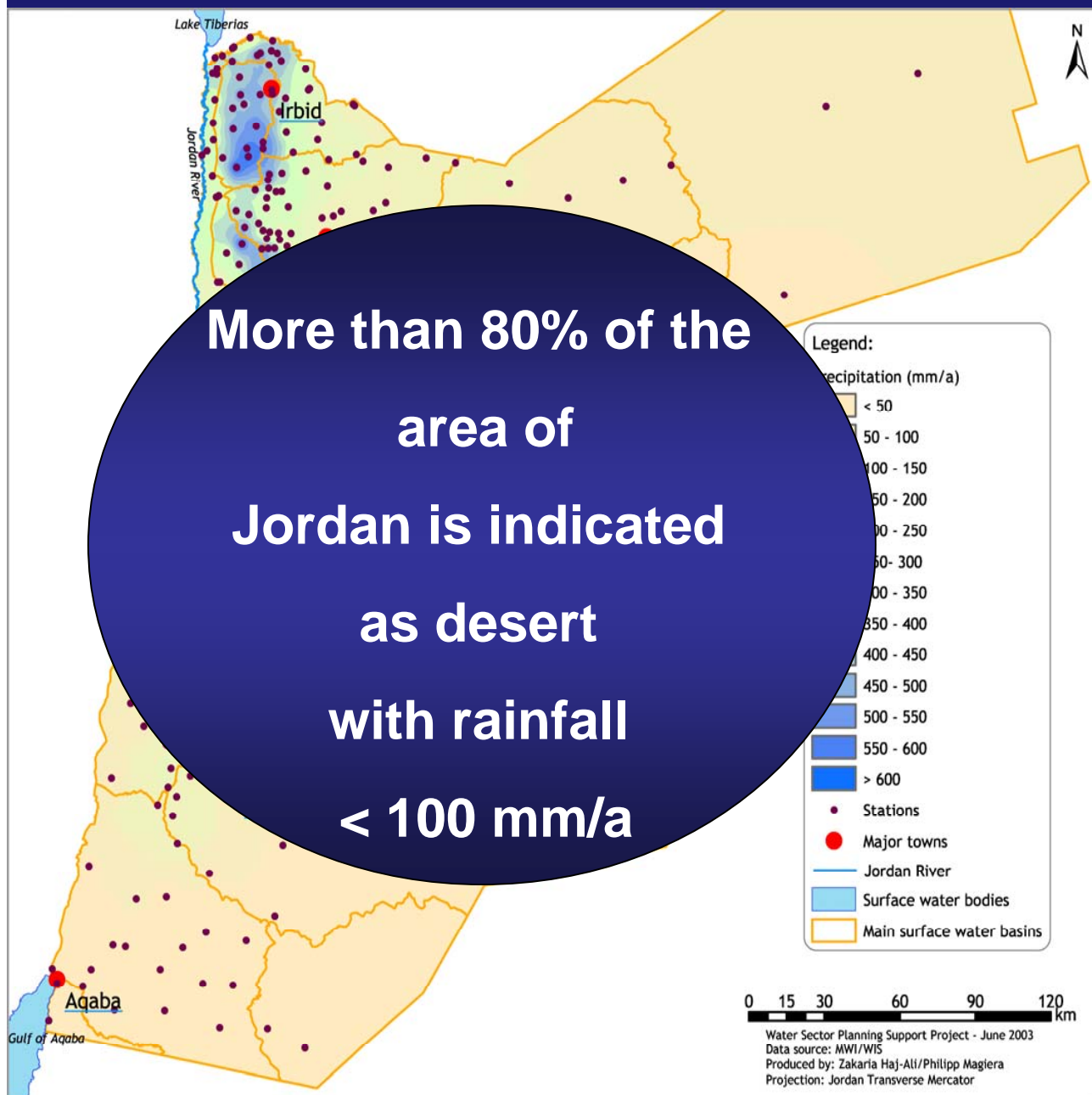
The above negatively impacted planning efforts to provide the population with water and WW

Water Resources:

Seasonal rainfall is the main source of water in the kingdom:

- It is highly variable
- It only occurs in the mountainous range in the north-west.
- Its annual variability affects rain fed agriculture, ranges, livestock, groundwater recharge and surface water storage.

Mean Annual rainfall, mm 1963-2002



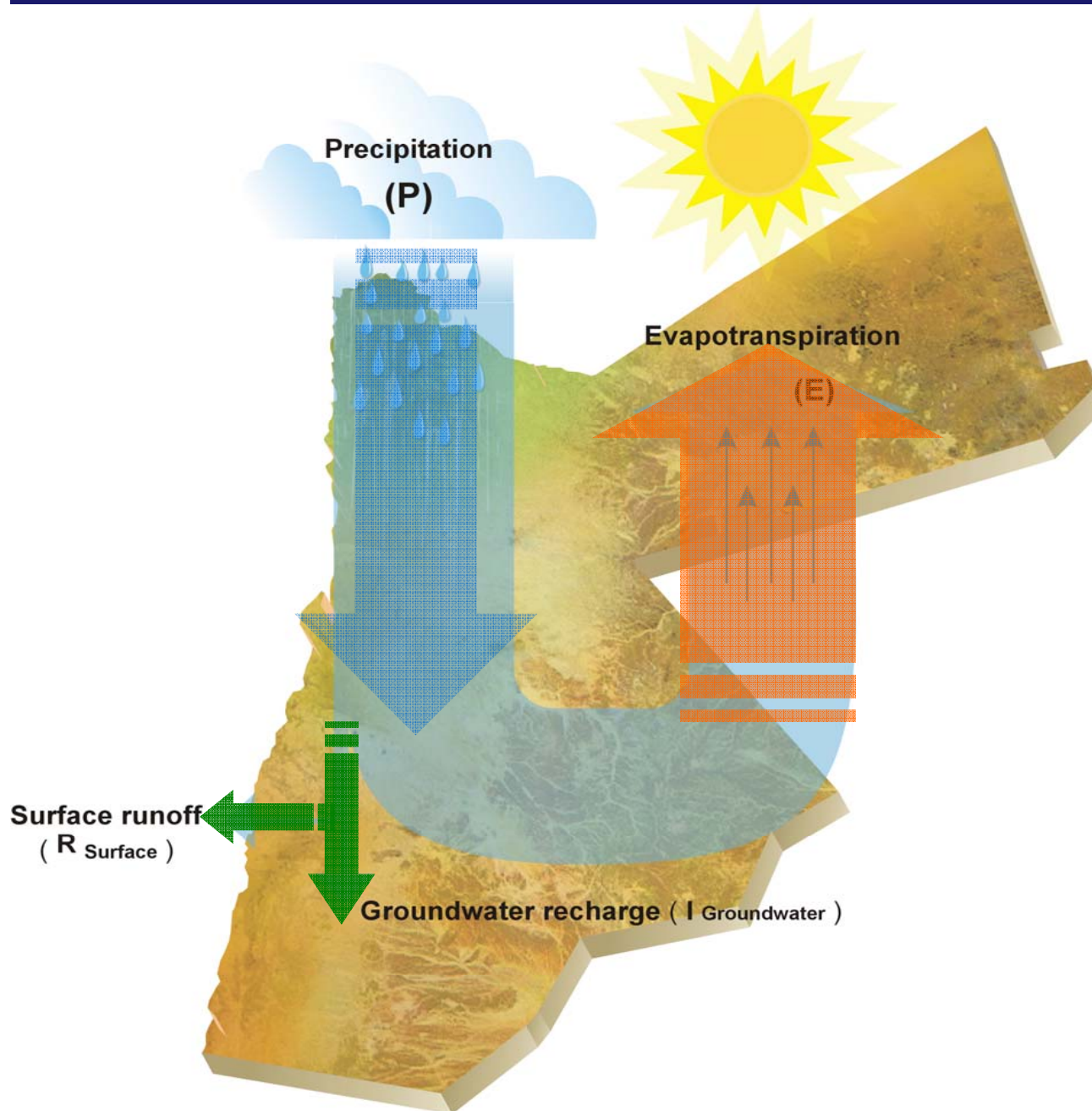
The following main climatic zones can be distinguished:

- The Jordan Rift Valley: 50-350 mm/a (5.7%)
- The Highlands: 400-600 mm/a (2.9%)
- The Desert: < 100 mm/a (91.4%)

Total Rainfall Amounts

- Wet Year: 11 Billion Cubic Meters
- Average Year: 8.3 Billion Cubic Meters
- Dry Years: 5.8 Billion Cubic Meters

Water Balance - Jordan



- 92% Evaporates
- Only 8% is available in the form of flood flow & groundwater

Water Resources:

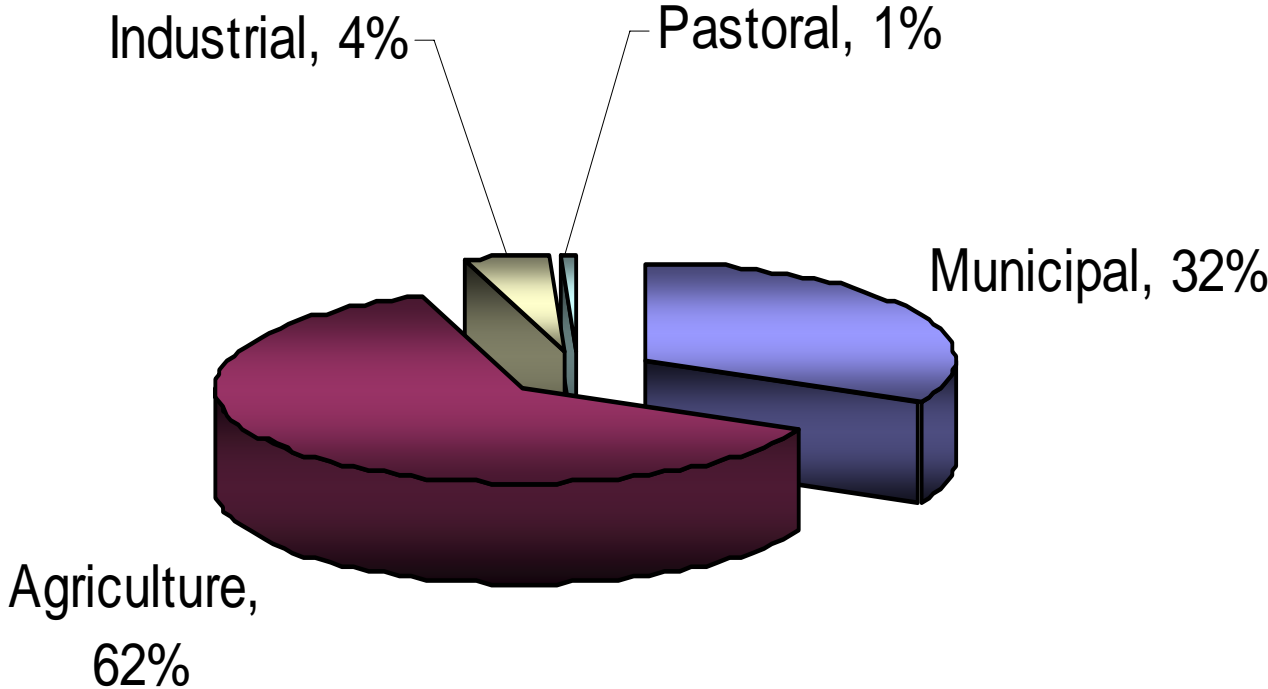
- The average annual renewable fresh water resources: (780) MCM
 - 275 MCM is GW
 - 505 MCM is usable SW
 - Other sources of water are Nonconventional water resources:
 - Nonrenewable water = 140 MCM
 - Treated WW = 94 MCM in 2004
 - 207 MCM in 2020
 - Almost 100% will be reused
- About 91 % of treated effluent in Jordan is currently reused in agriculture. .

Production, Supply & Demand

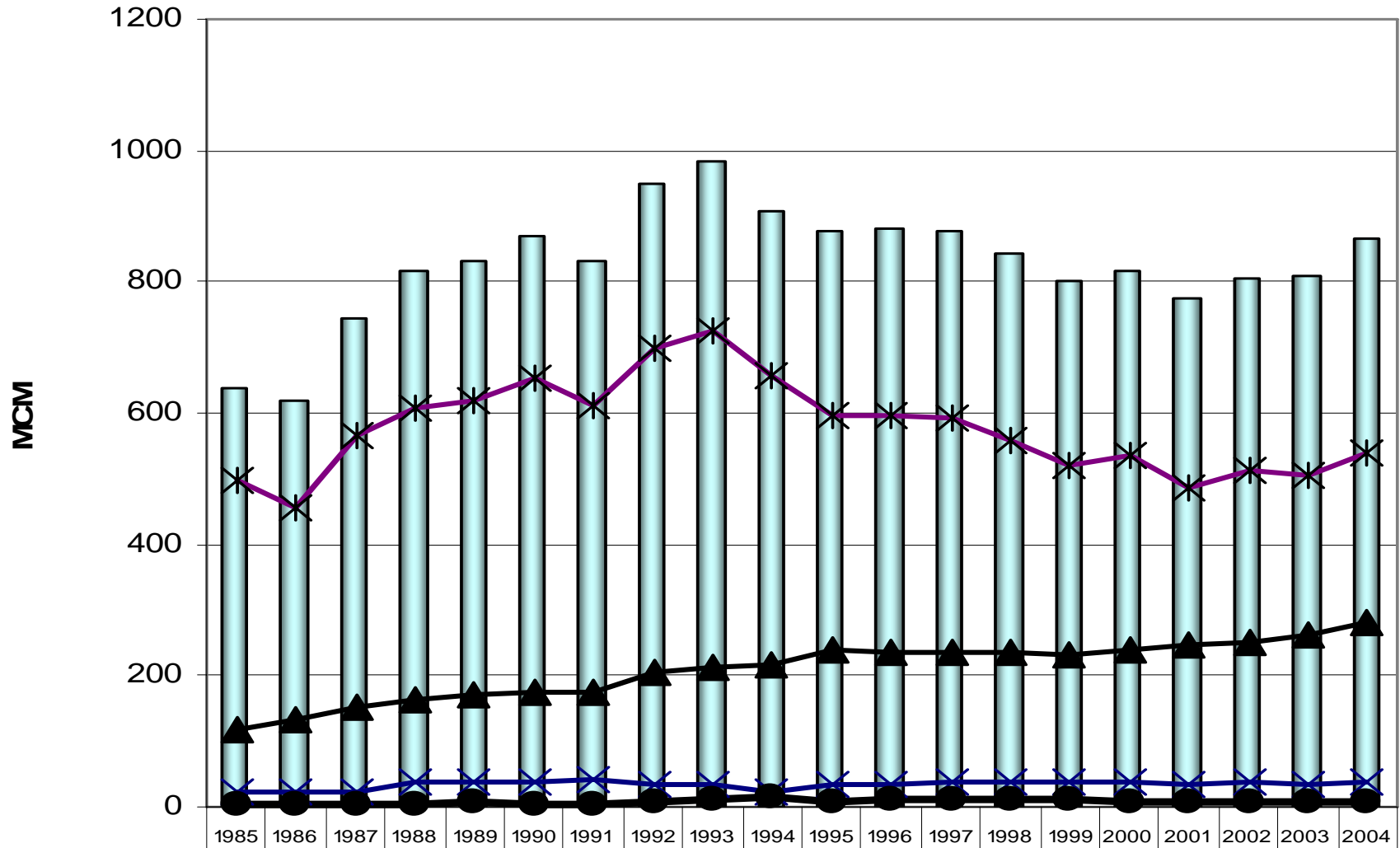
Water Uses:

- The total water use for 2004 was (866) MCM, of which (780) MCM are from traditional water resources and desalinated water @ Abu Zeighan (5.3 MCM).
- The rest from treated wastewater (TWW) estimated at 86 MCM = 10% of total uses)
 - TWW currently provides 16% of water used by agriculture (2004)

% Uses By sector (Year 2004)

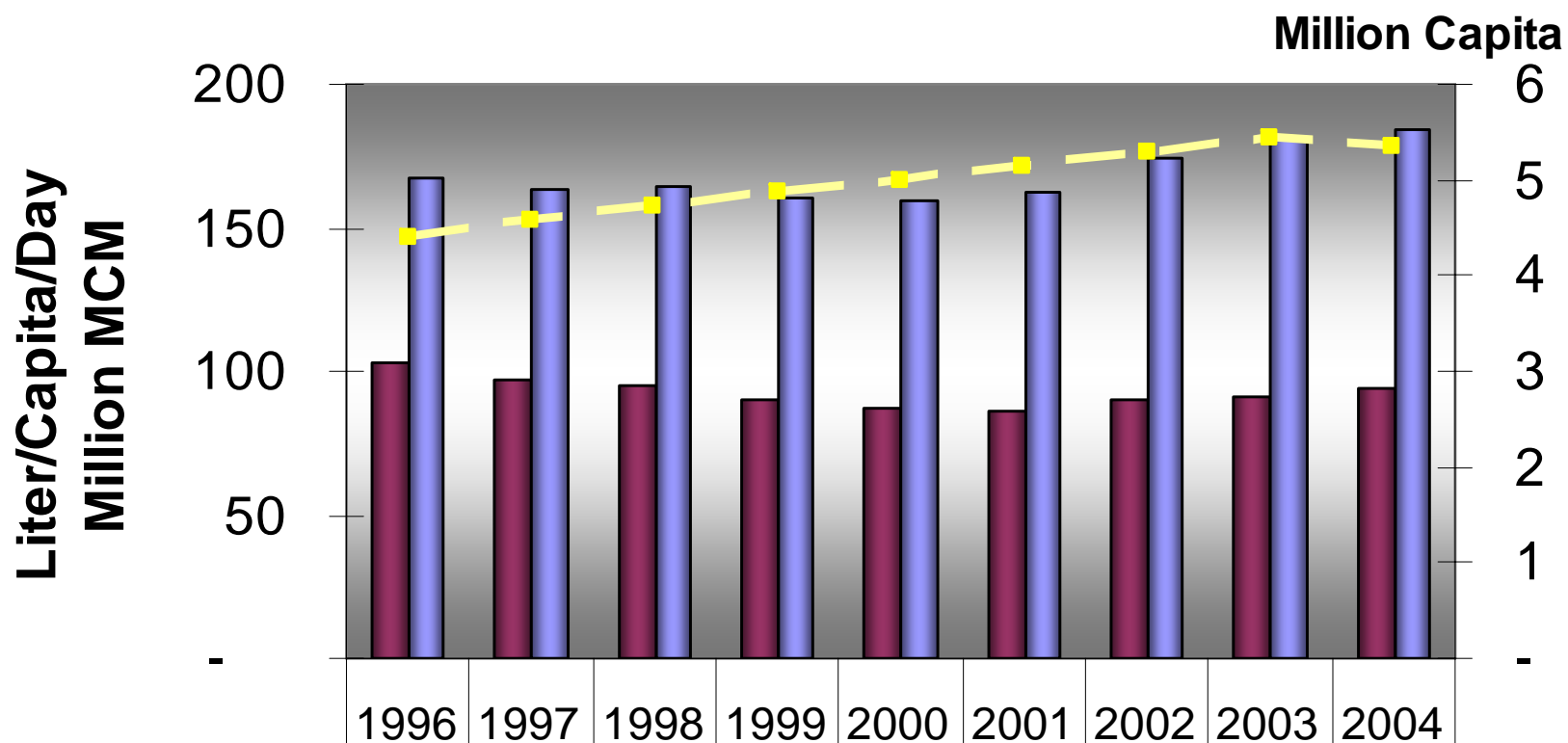





Water Uses in Jordan 1985-2004



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total	639	619	744	817	830	870	833	951	984	909	878	882	876	843	802	817	774	804	810	866
Municipal	116	135	150	165	170	176	173	207	214	216	240	236	236	236	232	239	246	249	262	281
Industrial	22	23	24	39	36	37	42	35	33	24	33	36	37	38	38	37	33	37	36	38
Irrigation	497	456	565	608	618	652	613	700	726	655	596	598	592	557	521	534	488	511	506	541
Livestock	4	5	5	5	6	5	5	9	10	13	9	12	11	12	11	7	8	7	7	7

Municipal Water Consumption In Jordan 1996-2004



 Municipal Consumption(L/C/D)	103	97	95	90	87	86	90	91	94
 Municipal Consumption (MCM)	167	163	164	161	159	163	174	181	184
 Population	4.4	4.6	4.7	4.9	5.0	5.1	5.3	5.4	5.4

Water Availability & Reuse In Some MENA Countries

Key Parameters	Unit	Jordan	Tunisia	Israel	Oman	Saudi Arabia	UAE	Egypt
Total Water Resources produced annually	MCM/yr	866	2,658	2,050	1,360	17,320	2,300	68,300
Annual Total Water resources per Capita	m ³ /cap/yr	145	285	325	491	736	783	969
	l/cap/day	397	781	890	1,345	2,016	2,145	2,655
Drinking Water	l/cap/day	94	164	338	135	222	686	372
Agricultural water withdrawal	MCM/yr	541	2,100	1,280	1,230	15,420	1,570	59,000
Agricultural Water Use as part of total (%)	%	62%	79%	62%	90%	89%	68%	86%
Treated Wastewater Reused	MCM/yr	72	60	251	26	217	108	200
Treated Wastewater Volume	MCM/yr	79	200	296	29	650	500	650
Percentage of Treated Wastewater Reused	%	91%	30%	85%	90%	33%	22%	31%

Source FAO AQUASTAT & Jordan NWMP 2004

Production, Supply & Demand

Water Demand:

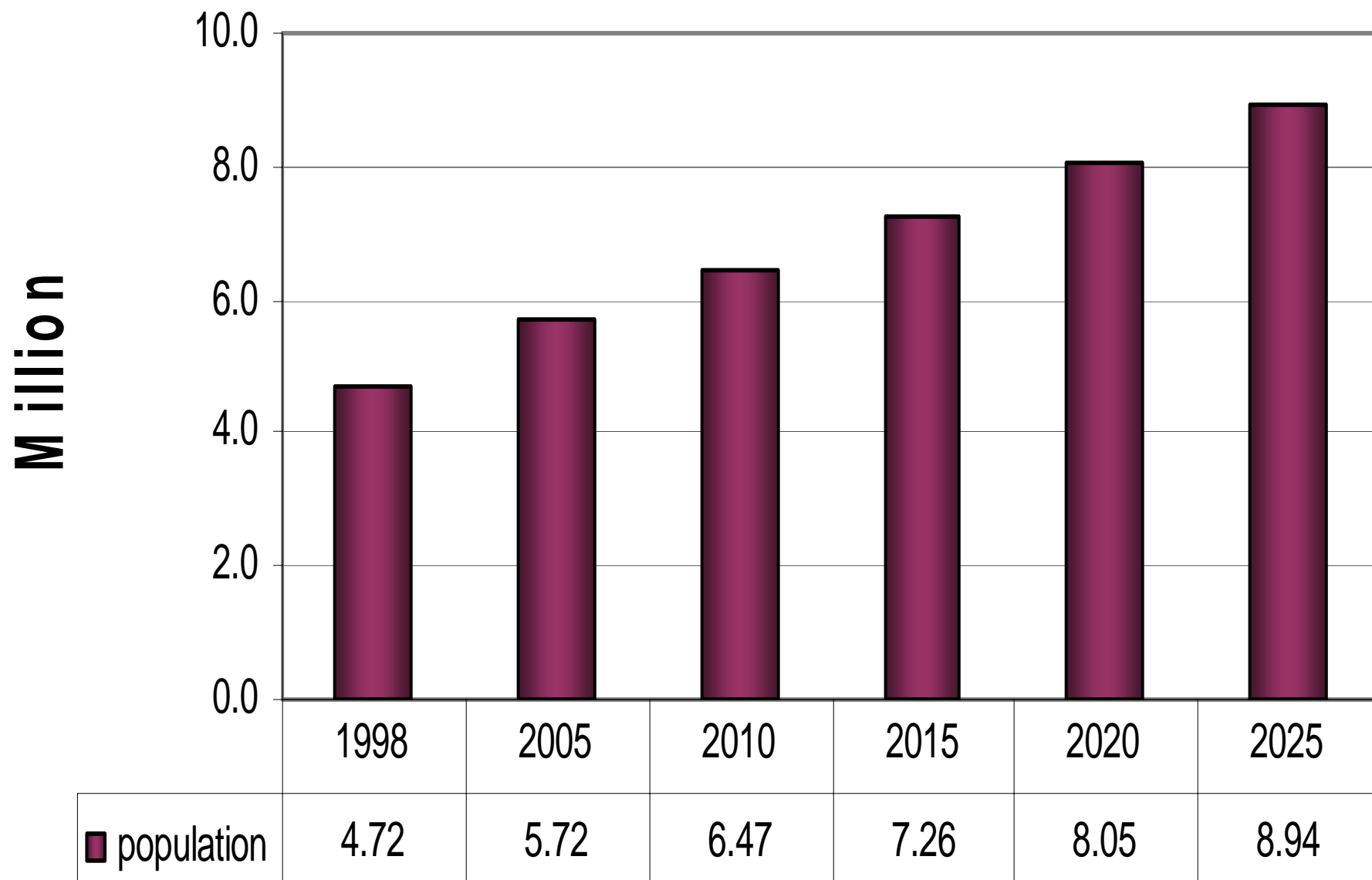
Water demand in 2004 = 1297 MCM

Water Supply = 866 MCM

Deficit = 431 MCM

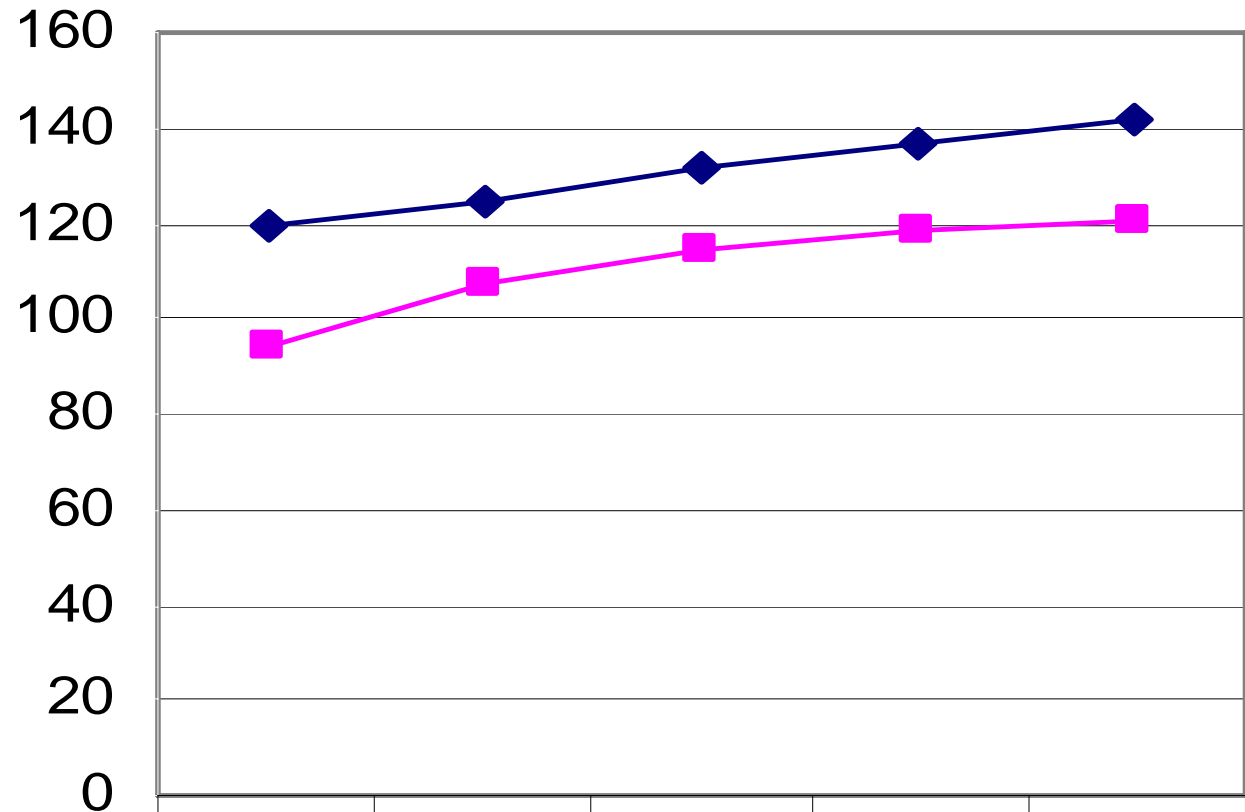
- Demand 2005 = 1525 MCM
- Demand will reach 1615 MCM by year 2020

Population Growth; 1998-2020



Growth In Municipal Consumption L/C/D; 2004-2020

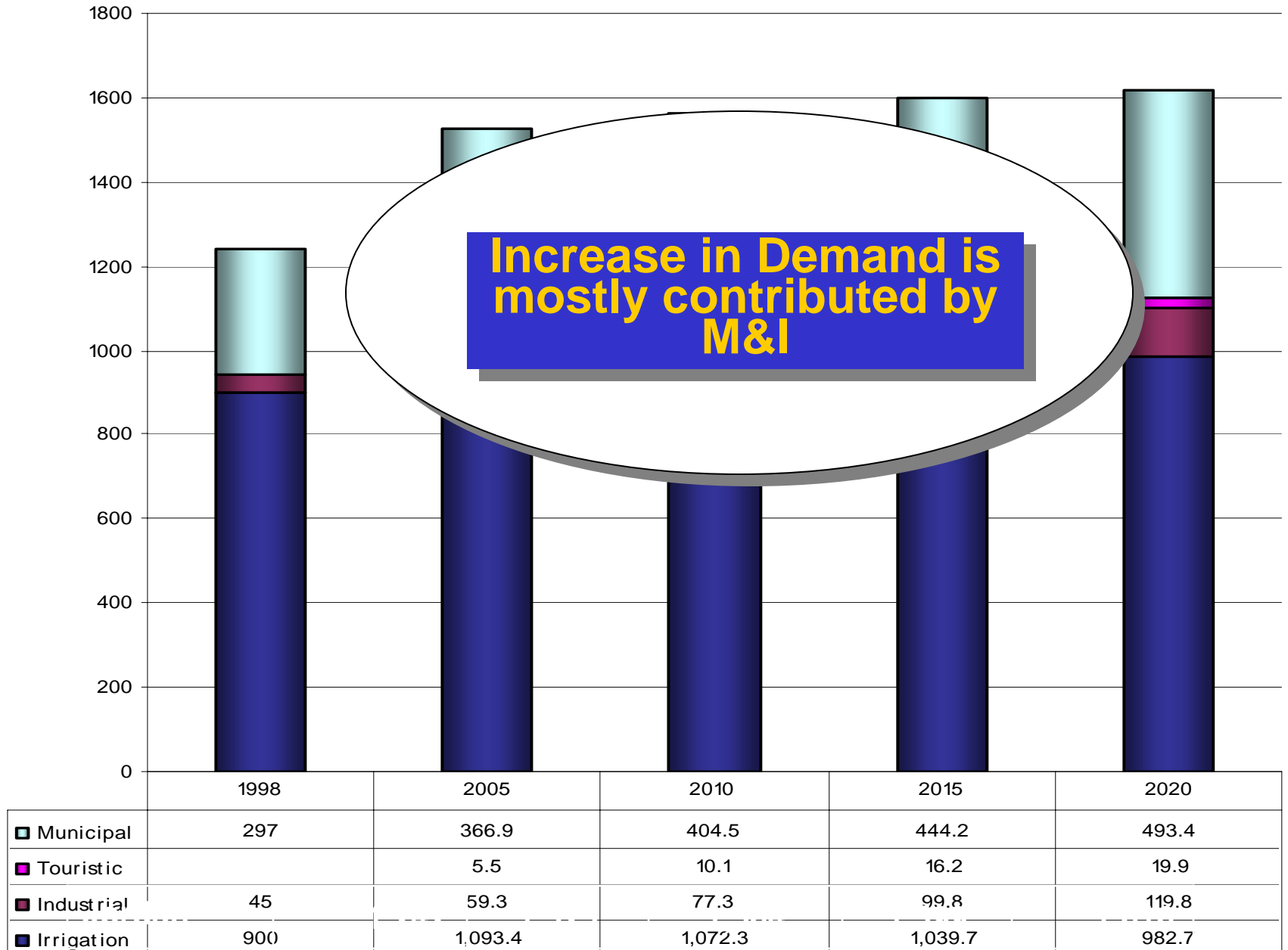
Liters/Capita/Day



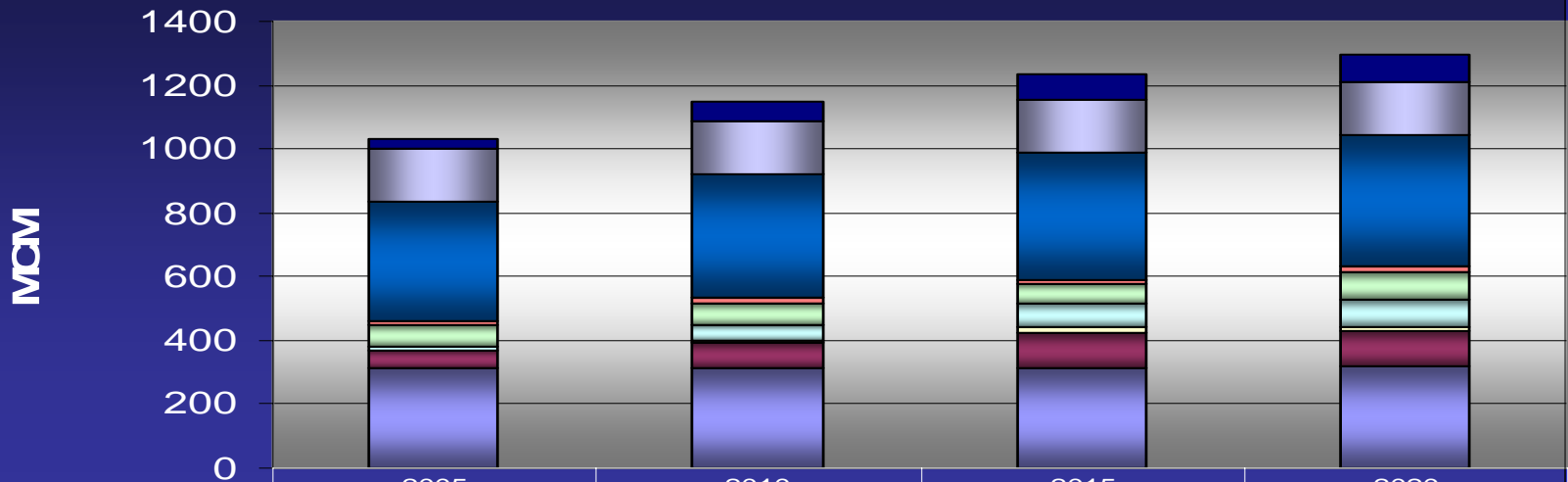
	2004	2005	2010	2015	2020
◆ Net Demand	119.73	124.51	131.71	136.94	141.51
■ Net Allocation	94	107.57	114.46	118.42	120.79

Water Demands 1998-2020

MCM



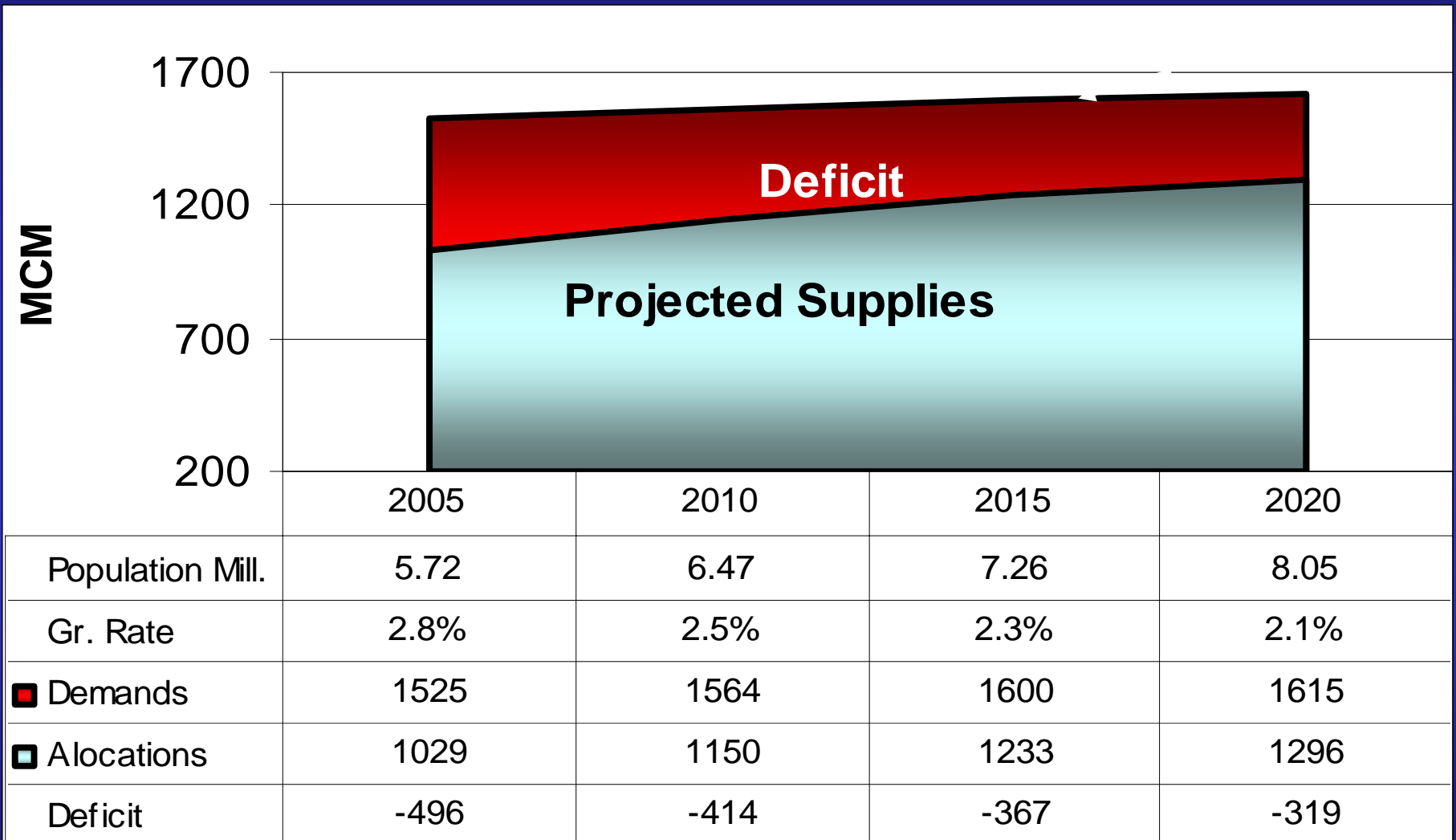
Projected Supply (2005-2020)



	2005	2010	2015	2020
Wastew ater-local reuse	30	60	77	87
Yarmouk	166	167	167	167
Surface w ater	374	390	401	412
Lajjoun fossil w ater	14	14	14	14
Disi	65	68	60	89
Desalination brackish w ater	13	52	73	86
Desalination Aqaba	0	8	18	14
Peace Water	55	80	110	110
Renew able GW	312	311	313	317

Total	1029	1150	1233	1296
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Projected Demands & Allocations (2005-2020)



Dynamic costs for selected projects

DISI Conveyor to Amman	570 fils/m ³
Aqaba desalination	500 fils/m ³
Zai-Daboug conveyor	300 fils/m ³
Network rehabilitation	25 – 250 fils/m ³
Wastewater treatment	183 fils/m ³

The Way Forward

IN THE SHORT TERM

- Implementation of agreements for the sale of recycled Water for industries.
- Increase water tariff to ensure recovery of O&M Costs
- Increase the existing irrigation Water Tariffs
- Encourage Irrigation Advisory Services
- Continued development of centralised Water Information System including the use of advanced technologies.
 - Ensure Compatibility of data and information systems.

The Way Forward

IN THE LONG TERM

- Full development of SW & GW (Economic feasibility, social and environmental considerations)
- Continuous Development of marginal water.
- Gradual reduction of mining of renewable GW (By 2020)
- Continue Development of HR & Public Awareness
- Achieve Highest Possible efficiency (Conveyance, distribution, application and use, including Water & WW systems performance)
- WW management to achieve public health standards
- Improve Industrial waste water monitoring
- Periodical review of institutional arrangements & restructuring
To match changing needs
- Regular update of legislation whenever necessary

The Way Forward

IN THE LONG TERM

- Enhance Stake Holders' participation
- Expansion of Private Sector Role (incl. Irrigated Agriculture), as appropriate.
- Recovery of O&M cost to become a standard practice.
- Capital cost recovery to be linked to per capita share of GDP & cost of living.
- Improve R&D in resource management & economics.

Thank You
For
Your Attention