Wastewater in Jordan

By

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Wastewater shall not be managed as "waste". It shall be collected and treated to standards that allow its reuse in unrestricted agriculture and other non-domestic purposes, including groundwater recharge.

The Water Strategy of Jordan

Wastewater Management Policy…1

- Wastewater is a perennial water source and shall form an integral part of renewable water resources and the national water budget.

- Treatment of wastewater shall be targeted towards producing an effluent fit for reuse in irrigation in accordance with WHO and FAO guidelines as a minimum. Reuse of treated wastewater in other purposes shall be subject to appropriate specifications.

Wastewater Management Policy…2

- A basin management approach shall be adopted where possible. The use of treated wastewater in irrigation shall be given the highest priority and shall be pursued with care.

- Wastewater from industries with significant pollution should be treated separately to standards allowing its reuse for purposes other than irrigation or to allow its safe disposal.

Wastewater Management Policy…3

- The transfer of advanced wastewater treatment technologies shall be endorsed and encouraged. However, appropriate wastewater treatment technologies shall be selected with due consideration to operation and maintenance costs and energy savings, in addition to their efficiency in attaining and sustaining quality standards.

Wastewater Management Policy…4

- Priority shall be given to agricultural reuse of treated effluent for unrestricted irrigation. Blending of treated wastewater with fresh water shall be made to improve quality where possible. Crops to be irrigated by the treated effluent or blend thereof with freshwater resources shall be selected to suit the irrigation water, soil type and chemistry, and the economics of the reuse operations.

Wastewater Management Policy…5

- Treated effluent quality should be monitored and users be alerted to any emergency causing deterioration of the quality so that they will not use such water unless corrective measures are taken.

- Whenever possible, other end uses of treated effluents; such as recycling, cooling, power generation, etc., shall be considered.

Wastewater Management Policy…6

- Treated effluent shall be priced and sold to end users at a price covering at least the operation and maintenance costs of delivery.
- All crops irrigated with treated or mixed waters shall be analyzed and monitored periodically.
- Observation wells shall be installed near the treatment plants to monitor groundwater quality where necessary, and to mitigate adverse impacts where and when needed.

Wastewater Management Policy…7

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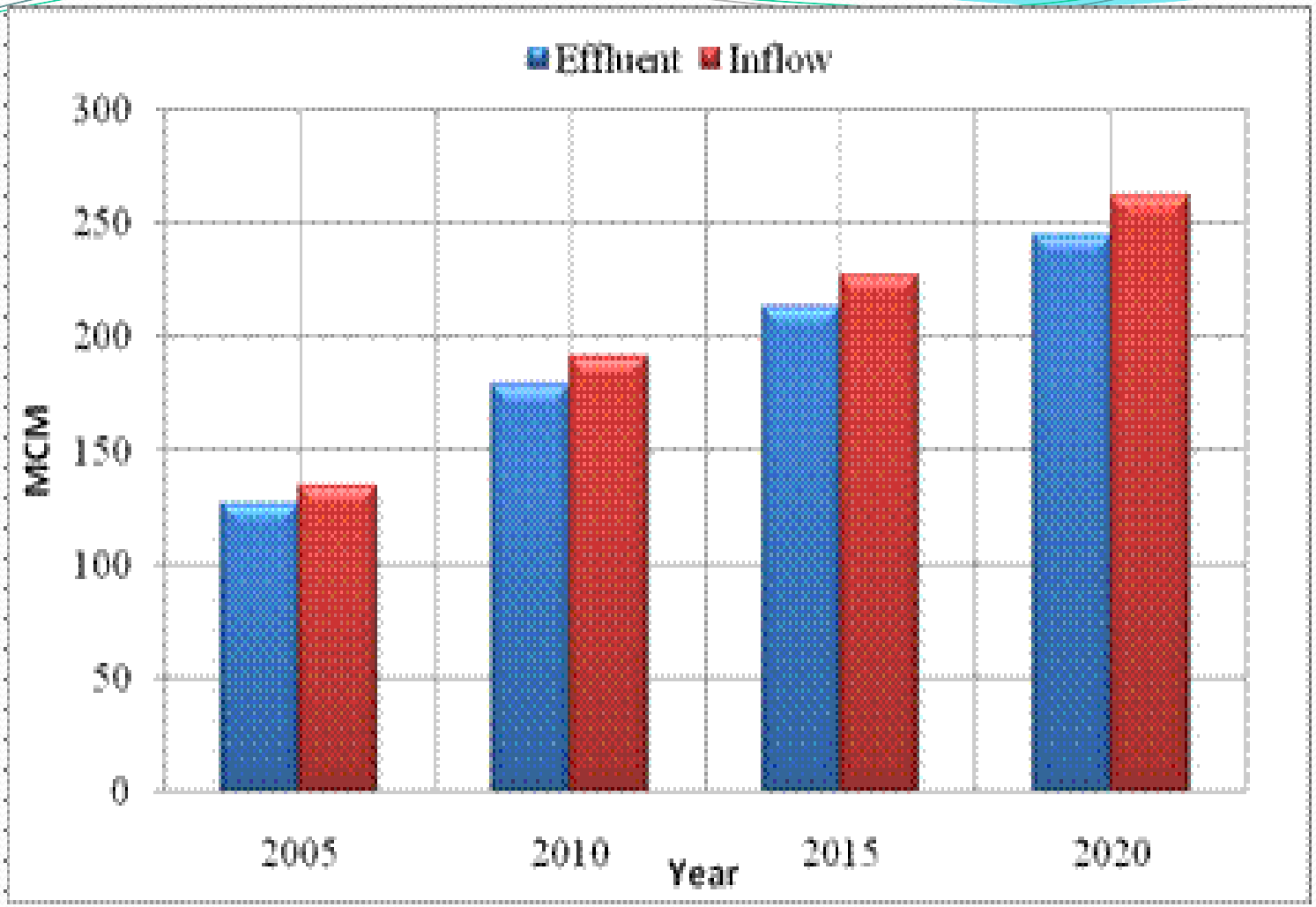
Wastewater treatment

- About 65 % of the total population of Jordan have access to wastewater collection and treatment systems(2007)

- There are 22 WWTPs in Jordan, which discharged about 98 MCM of treated wastewater (2007) .

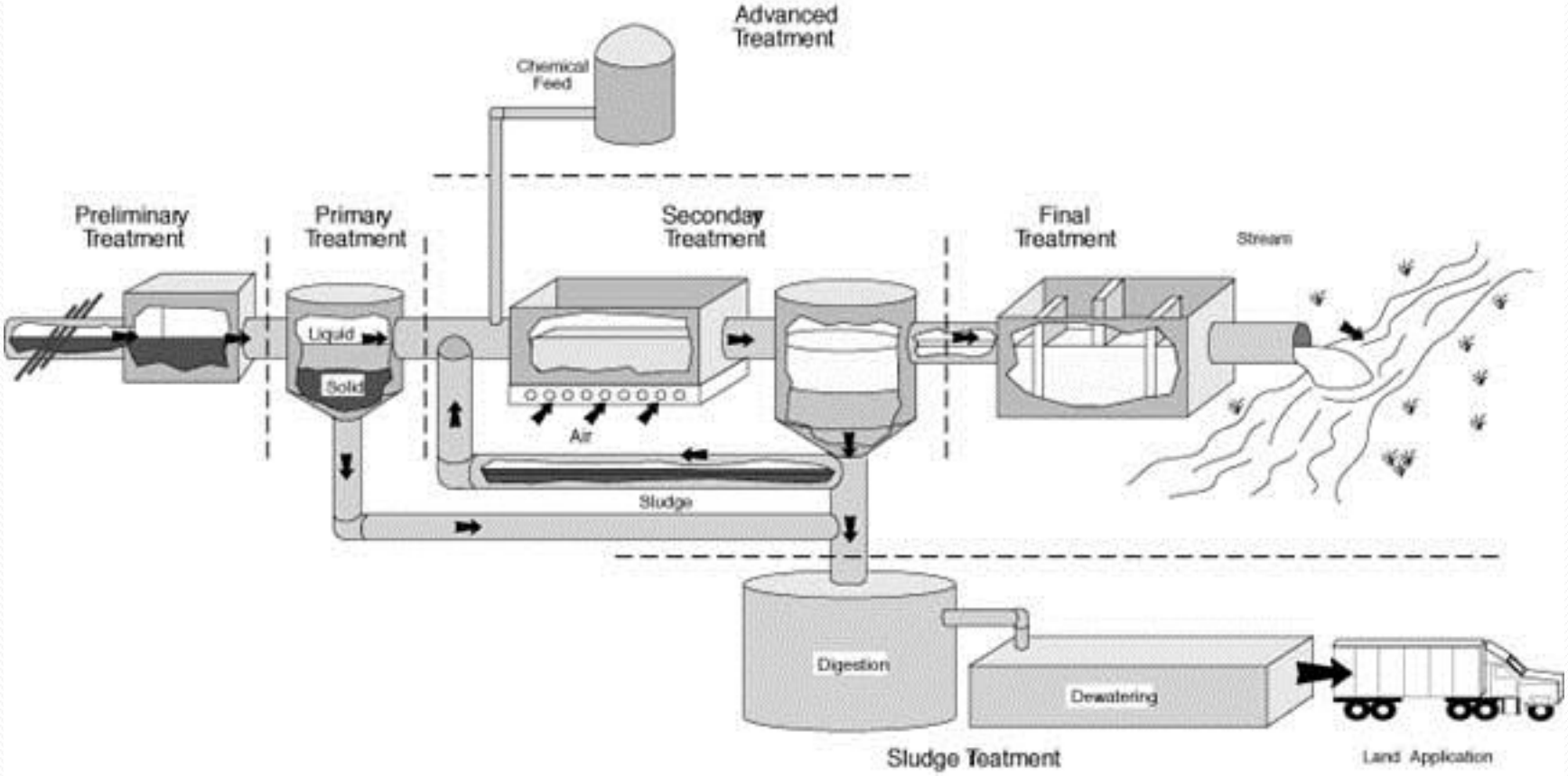


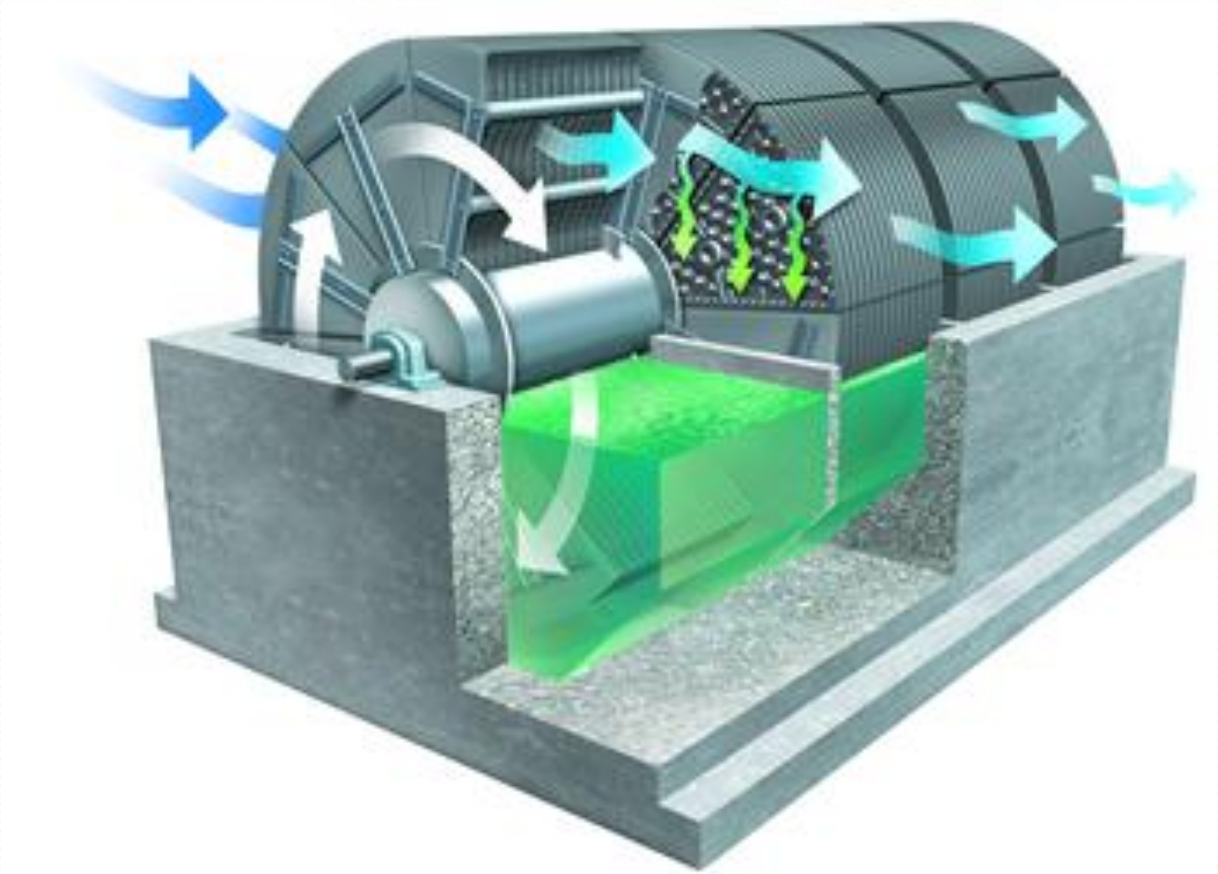
Total influent and effluent from treatment plant (MWI)

Characteristics of the Jordanian untreated wastewater

Parameter	Value[1]	Typical Concentration[2] (mg/L)		
		Low Strength	Medium Strength	High Strength
BOD5	809.1 ± 221	110	190	350
COD	1555.8 ± 515	250	430	800
TSS	726 ± 229	120	210	400
TDS	580 ± 143.3	270	500	860

Wasterwater Treatment Systems





Characteristics of wastewater treatment plants and their operation conditions for year 2005

WWTP	Treatment Method	Year of Operation	Design Capacity m^3/day	Operating Capacity m^3/day Year 2005	Design Value BOD mg/L	Influent BOD mg/l Year 2005
As-Samra	WSP	1985	68,000	221,509*	526	655**
Aqaba	WSP	1987	9,000	7,041	900	353
Mafraq	WSP	1988	1,800	1,958*	825	546
Madaba	AS	1989	7,600	4,660	950	1465**
Ma'an	WSP	1989	1,600	2,352*	970	700
Irbid	AS&TF	1987	11,900	6,696	800	965**
Jerash	AS	1983	3,500	3,593*	1090	1310**
Salt	AS	1981	7,700	4,570	1090	797
Baqa'	TF	1988	14,900	10,615	800	911**
Karak	TF	1988	785	1,679*	1080	593
Tafila	TF	1988	1,600	1,116	1050	819
Wadi Arab	AS	1999	22,000	8,316	995	724

Reuse of water

- Treated wastewater is now being considered as new source of water.
- Using wastewater for agriculture production will help in alleviating food shortages and reduce the gap between supply and demand.
- 93% of treated wastewater from treatment plants are reused as a source of water in the year 2007.

Plant	Treated wastewater (MCM)	Quantity of water reused (MCM)	Plant	Treated wastewater (MCM)	Quantity of water reused (MCM)
Al-akedar	1.152	1.152	Ramtha	1.23	1.23
As-Samra	58.775	58.775	Ma'an	0.862	0.862
Irbid	2.235	0	Madaba	1.228	1.228
Aqaba	4.921	4.921	Kufranja	1.058	1.058
Salt	1.421	1.421	Wadi Al-Sir	0.892	0.892
Jerash	1.179	1.179	Fuheis	0.577	0.577
Mafraq	0.636	0.636	Wadi Arab	3.516	0
Baqa'a	3.8	3.8	Wadi Hassan	0.388	0.388
Karak	0.549	0.549	Wadi Musa	0.631	0.631
Abu-Nuseir	0.808	0.808	Tel al-mantah	0.098	0
Tafila	0.333	0.125	Al-lagoon	0.232	0
			Total	86.52	80.231

Quantities of treated wastewater and reuse water during 2006(MWI Annual report 2006).

Parameter	Cooked vegetables A	Fruit & forestry trees, crops & industrial products B	Irrigation of fodder crops C	Irrigation of cut flower	Discharge to streams, wadis & reservoirs	Ground water recharge
BOD_5 (1)	30	200	300	15	60	15
COD	100	500	500	50	150	50
DO	>2	-	-	>2	>1	>2
TDS	1500	1500	1500	1500	1500	1500
TSS	50	200	300	15	60	50
PH	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0
Turbidity	10	-	-	5	-	2
NO_3^-N	30	45	70	45	-	30
Total-N	45	70	100	70	70	45
E.coli	100	1000	-	< 1.1	1000	< 2.2
Intestinal Helminthes eggs	≤ 1	≤ 1	≤ 1	≤ 1	≤ 0.1	≤ 1

Jordanian standard JS 893/ 2006 for treated domestic wastewater (MWI website)

Cost of treated wastewater and tariff of reclaimed water

- The cost of treating 1m^3 of wastewater although varying from one area to another depending on the type of treatment employed.

- The average tariff of reclaimed water for irrigation purposes is 10 Fils/m^3 and 50 Fils/m^3 for industrial reuses including power generating and cooling .

Plant	Cost Fils/m^3	Support Fils/m^3	Plant	Cost Fils/m^3	Support Fils/m^3
Al-akedar	33.3	23.3	Ramtha	206.4	196.4
As-Samra	3.9	-	Ma'an	61.4	51.4
Irbid	102.1	92.1	Madaba	156.8	146.8
Aqaba(natural)	24.6	14.6	Kufranja	112.2	102.2
Aqaba(tertiary)	218.7	208.7	Wadi Al-Sir	34.7	24.7
Salt	152.7	142.7	Fuheis	180.4	170.4
Jerash	90.9	80.9	Wadi Arab	100.6	90.6
Mafraq	63.8	53.8	Wadi Hassan	573.8	563.8
Baqa'a	110.5	100.5	Wadi Musa	95.9	85.9
Karak	139.9	129.9	Tall al-mantah	679.8	669.8
Abu-Nuseir	132.1	122.1	Al-lagoon	98.4	88.4
Tafila	223.5	213.5			

The cost of treating 1 m^3 of wastewater and the support that the government pay (Source: MWI Annual report 2007).

Uses of reclaimed water in Jordan

Irrigation

- Treated wastewater is used for agricultural irrigation directly and indirectly.
- Direct reuse of reclaimed wastewater in Jordan is limited to the site and surroundings of the existing treatment plants.
- Indirect reuse, the treated effluent is discharged into surface water or groundwater aquifers.
- Recently treated wastewater is more than 15 % of irrigation water .

Groundwater Recharge

- Water scarcity and the high demand on water for irrigation as well as the location of plants do not allow for planned recharge projects in Jordan.

- Only one direct recharge project exists in Jordan at Aqaba where 1.91 MCM per year is infiltrating to aquifer through a recharge pond.

Industrial use

- The main use of reclaimed water in industries is for cooling purposes.

- Cooling could be performed in

  - Closed circuits

  - Open circuits.