

2. WasteWater Status and Trends

2.1 WasteWater Production

Municipal : estimated to be 310 million m³/year

Industrial : estimated to be 61 million m³/year

2.2 Wastewater Treatment

Sewage effluent from communities, towns and cities throughout Lebanon are routinely discharged into rivers and into the Mediterranean Sea. In most cases, these effluents are not treated or controlled, and where treatment exists it is rudimentary (MOE, 2005).

The National Emergency Reconstruction Program (NERP) proposed the construction of twelve WWTPs along the coast. The proposed plants were to be built in: Abdeh, Tripoli, Chekka, Batroun, Jbeil, Kesrouan, Dora (North Beirut), Ghadir (South Beirut), Chouf (coastal area), Saida, Sour, with the possibility of constructing a WWTP between Saida and Sour (Table-1). With the execution of these coastal wastewater plants, more than 65% of the wastewater problem in Lebanon will be solved by the year 2020.

In addition to the coastal plants, twenty major inland WWTP are proposed. The plants will be located near major cities, such as Zahleh, Baalbeck, Nabatiah, and other areas where protecting water sources from pollution is considered a priority, such as the Litani River (Table 1). With the construction of these twenty WWTP, Lebanon will achieve around 80% wastewater treatment by the year 2020. The remaining areas that house 20% of the population will require around 100 small WWTPs. (MEDAWARE, 2003)

Till now 3 major wastewater treatments plants are actually functioning in Lebanon, 2 are coastal and one is an Inland WWTPs:(CDR, 2011)

- **Saida** (Coastal): Water volume **(Design Capacity)** 55,000 m³/day – Preliminary Treatment – Sea Outfall – Generated water not re-used.
- **Ghadir** (Coastal): Water volume **(Design Capacity)** 50,000 m³/day – Preliminary Treatment – Sea Outfall – Generated water not re-used.

- **Iaat/Baalbeck (Inland):** Water volume (**Design Capacity**) 12,000 m³/day – Secondary Treatment (Conventional Treatment Process/Activated Sludge + Disinfection by Chlorination) – Generated water re-used for Agriculture.

Table-1 The Planned WWTP in Lebanon

Treatment Plant	Stage of constructon	Level of Treatment	Volume Generated (m3/day)
Abdeh	Financed		
Tripoli	Executed	Secondary	
Cheka	Under execution	Secondary	
Batroun	Under execution	Secondary	
Jbeil	Under execution	Secondary	
Kesserwan	Financed		
Dora	Financed		
Ghadir	Functioning	Primary	50,000 m3/day
Chouf	Executed		
Saida	Functioning	Primary	55,000 m3/day
Sour	Contracts awarded	Secondary	
Nabi Younes Jiheh	Executed	Secondary	
Zahleh	Under execution		
Baalbak	Functionning	Secondary	12, 000 m3/day
Nabatieh	Executed		
Jeb Jennine	Under execution		
Yohmor	Contracts awarded		
Zawtar	Contracts awarded		
Kfarsir	Contracts awarded		

Other than the wastewater treatment plants proposed by the NERP, many NGO's have implemented small WWTPS in different regions in Lebanon. Many of these were financed by the USAID. Such WWTPS are found in regions like Bekaa, Denyye, akkar, Baaabda, Chouf, Marjeyoun, Hasbaya.

It is also to be mentioned that many private companies have their own WWTPs where the generated water is used for landscape irrigation. However, it is difficult to collect data from these stations.

2.3 WasteWater use

Untreated:

Most of wastewater collected through sewer networks flow to the sea. Wastewater generated from building not connected to a sewer network flow into septic tanks or into the rivers (Mnaimneh, 2005) .

Many farmers use the untreated wastewater in a informal manner for irrigation. However there are no accurate data regarding the amount of wastewater used for irrigation. According to FAO this amount could be around 2 million m³/year.

Treated :

The only wastewater treatment plant generating water for irrigation, is Baalbak WWTP where 12000 m³/day are generated.

3. Policy aspects and National strategy

3.1 Policy

Existing laws and regulations for environmental protection in Lebanon date as back as 1925. Protection against pollution was first addressed by decree No. 8735 of October 1974 that prohibited digging of wells for the disposal of raw sewage, banned infiltration from septic tanks, and the use of sewage for the irrigation of vegetables and some fruit trees. (Karaa *et al.*)

However in most Lebanese regions this law is not respected. Recently this year, the Minister of Agriculture issued a decree, prohibiting the use of wastewater in irrigation.

In March 2001 Decision No. 8/1 reviewed the previously issued wastewater standards to cover the discharge of wastewater to the sea, to surface water and to sewerage system. However standards for the reuse of treated effluents have not been addressed. (Karaa *et al.*)

The first guidelines for the use of treated wastewater for irrigation were implemented by FAO in 2010. Table 2

Table 2- Guidelines for the reuse of treated wastewater in irrigation

Parameter	Category of treated wastewater		
	I Irrigation of vegetable eaten raw is <u>not</u> allowed	II	III
BOD ₅	25	100	100
COD	125	250	250
TSS	60	200	200
pH	6 – 9	6 – 9	6 – 9
Cl ₂ residual	0.5-2	0.5	0.5
N-NO ₃	30	30	30
Faecal Coliforms (in 100ml)	<200	<1000	None required
Helminth ova (in 1 litre)	<1	<1	<1

- **Category I : (Irrigation of vegetable eaten raw is not allowed)**

1. Fruit trees and crops that are eaten cooked
2. Parks, public gardens, lawns, golf courses and other areas with direct public exposure
3. In case of stabilisation ponds, the TSS limit value is 200 mg/l.

Water treatment expected to meet the criteria: Secondary treatment + filtration + disinfection

- **Category II**

1. Fruit trees

2. Lawns, wooded areas, and other areas with limited public access, road sides outside urban areas
3. Landscape impoundments: ponds, water bodies and ornamental streams, where public contact with water is not allowed.

Water treatment expected to meet the criteria: Secondary treatment + filtration + disinfection or Secondary treatment + either storage or well-designed series of maturation ponds or infiltration percolation

- **Category III**

1. Irrigation of cereals and oleaginous seeds, fiber, & seed crops
2. Crops for canning industry, industrial crops
3. Fruit trees (except sprinkler-irrigated)
4. Plant nurseries, ornamental nurseries, wooden areas, green areas with no access to the public

Water treatment expected to meet the criteria: Secondary treatment + a few days' storage or Oxidation pond systems.

3.3 Research and monitoring programs :

Many researches are conducted at research centers and universities on the wastewater reuse for agriculture and its impacts. One of these studies is the use of treated wastewater on *Pinus Pinea* and *Castanea* (Mnaimneh, 2005).

5. Organizational Roles and Responsibilities

Governmental Organization Name :

- Ministry of Energy and Water (MoEW)
- Ministry of Environment (MoE)
- Ministry of Agriculture (MoA)
- Ministry of Interior and Municipalities (MoIM)
- Ministry of Public Works (MoPW)

- Council of Ministers (CoM)
- Council for Development and Reconstruction (CDR)
- Autonomus Water (5 regional Offices)
- Litani River Authority (LRA)
- Mouhafazat
- Municipalities

International Funding organizations:

- USAID, Japenes Bank for International Cooperation (JBIC), European Investment Bank (EIB), International Development Bank (IDB), World Bank

NGOs

- YMCA, PM, Mercy Corps and CHF