

# Water uses and wastewater management in Lebanon

**Darine Geara-Matta, Catherine Lorgeoux, Antoine Samrani,  
Ghassan Chebbo and Régis Moilleron**

- Introduction
- Water demand
- Wastewater management
- Conclusion and perspectives

# Introduction

Year	Population
1932	793,000
2006	3,900,000
2025	4,600,000

Comprehensive  
population census

Estimation

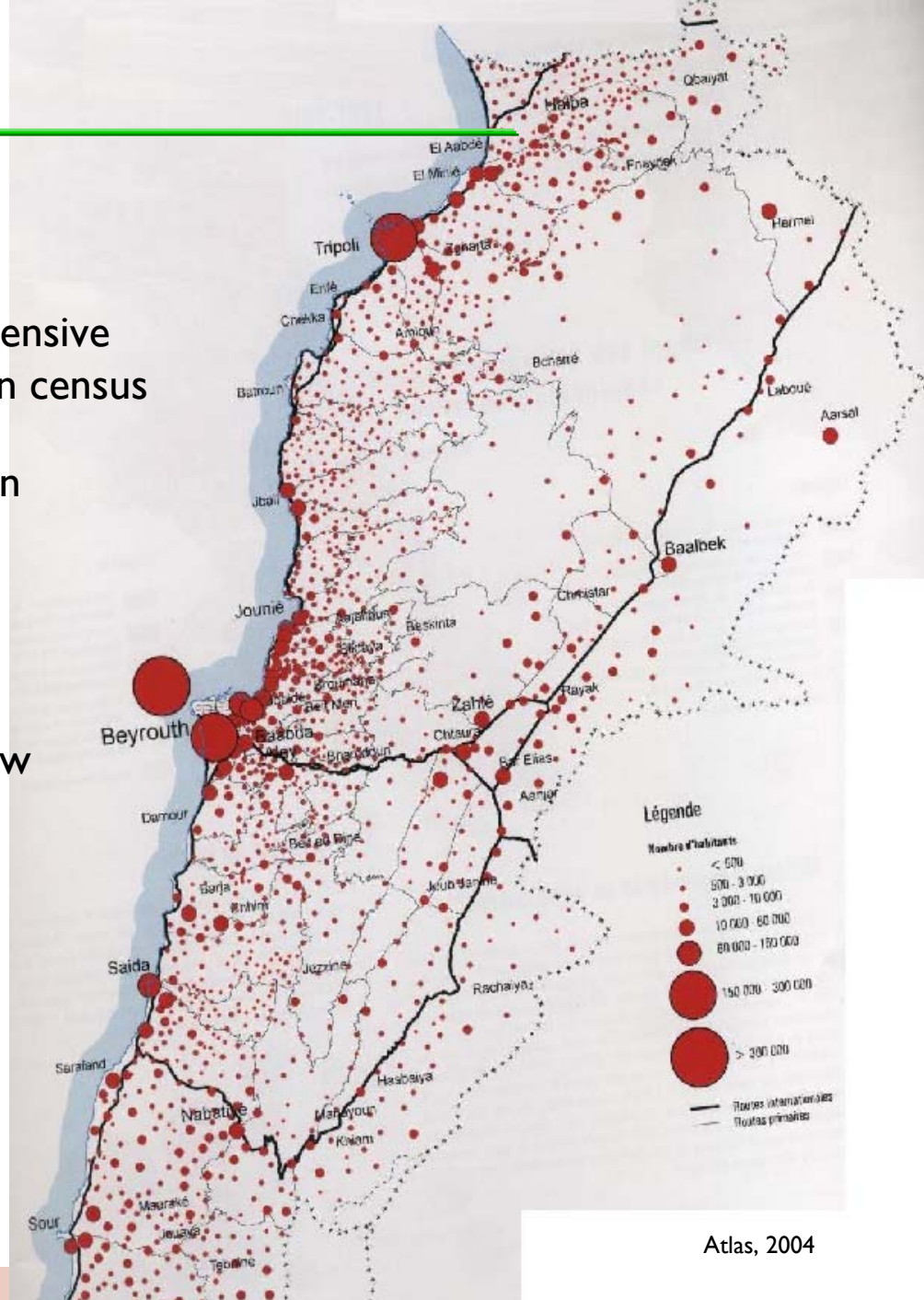
**60%** of the population lives in the narrow coastal strip, i.e. **8%** area of Lebanon

However

Population



Water  
demand



Atlas, 2004

## National water resources

Water resources of Lebanon derived mainly from **rainwater** and **snow** smelting

**Resources**

**9,700 Mm<sup>3</sup>** (1982)

**8,600 Mm<sup>3</sup>** (1994)

**8,600 Mm<sup>3</sup>** (2001)

(data from different studies)

approximately

50% evapotranspiration  
10% groundwater oozing  
8% neighbouring countries

Only **32%** available

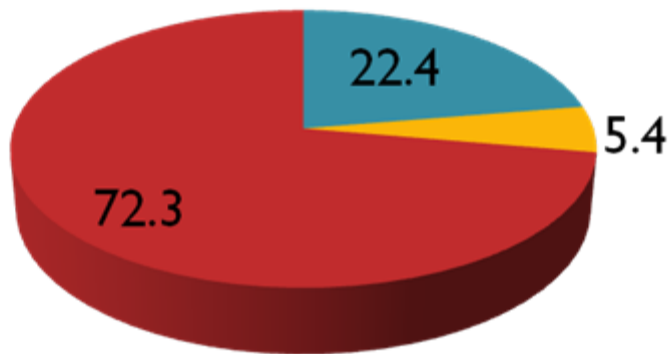
**available**

**3,375 Mm<sup>3</sup>** (1982)

**2,280 Mm<sup>3</sup>** (1994)

**2,600 Mm<sup>3</sup>** (2001)

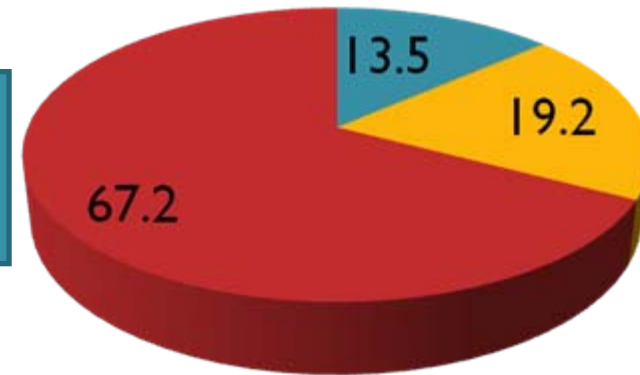
# Water demand



1,211  
Mm<sup>3</sup>/year

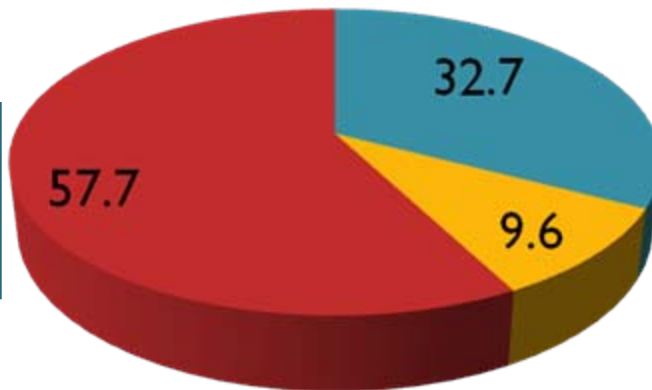
2,290  
Mm<sup>3</sup>/year

2010



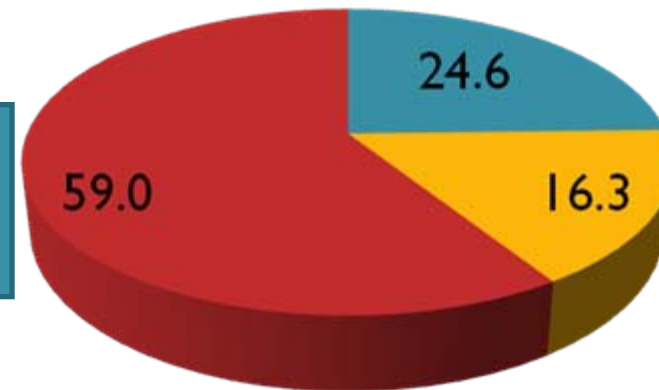
2,600  
Mm<sup>3</sup>/year

2020



3,200  
Mm<sup>3</sup>/year

2030



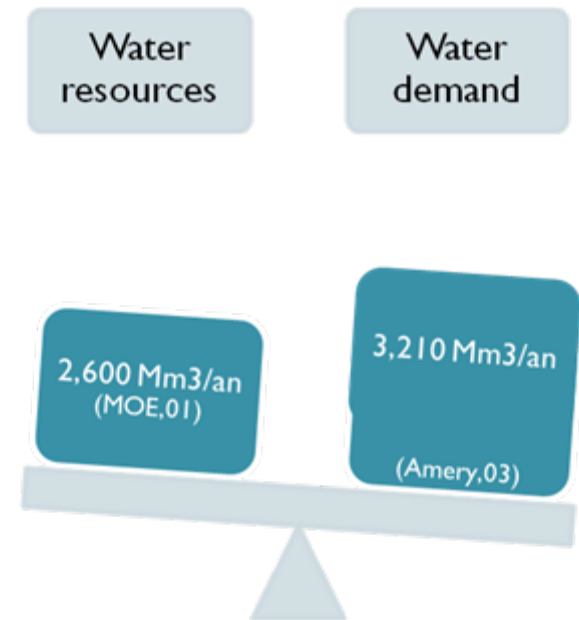


# Water demand

- From 2000 (tomorrow !), Lebanon is going to face a water crisis since water demand will be higher than water resources

By 2030 Water demand will be x1.4 available water resources

→ ***Change habits on water consumption...  
Water and Wastewater  
Management***



## Government plans

To date, little information is available in terms of wastewater management

Wastewater treatment study is conducted by CDR and MoEW

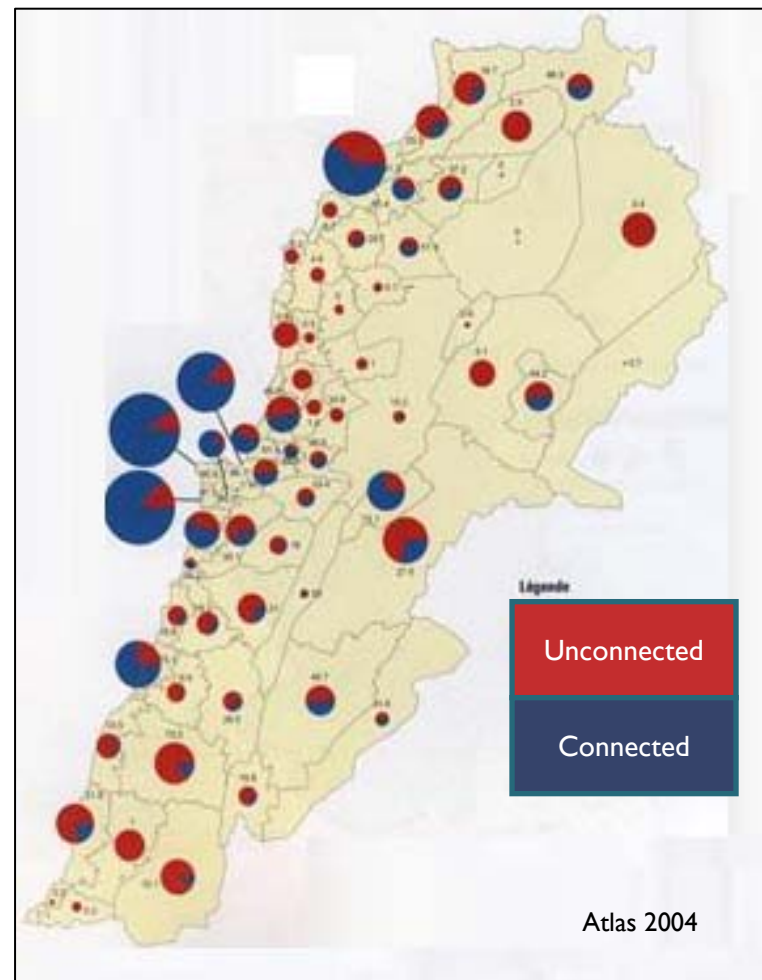
- Determination of sewer networks necessary for the collection of domestic wastewater, in a way that relies as much as possible on gravity transportation
- Determination of the characteristics of the coastal WWTPs sea outfalls
- Construction of WWTPs and determination of adequate treatment technology

## Collection networks

Less than 60% of the nearly half-a-million buildings in Lebanon are connected to a sewer network

Beyrouth (98.3%)  
Beyrouth suburbs (89.3%)  
North (53.5%), South (42.1%)  
Bekaa (41.1%),  
Mount of Lebanon (33.9%).

Cesspools and septic tanks  
directly into rivers and streams and  
underground





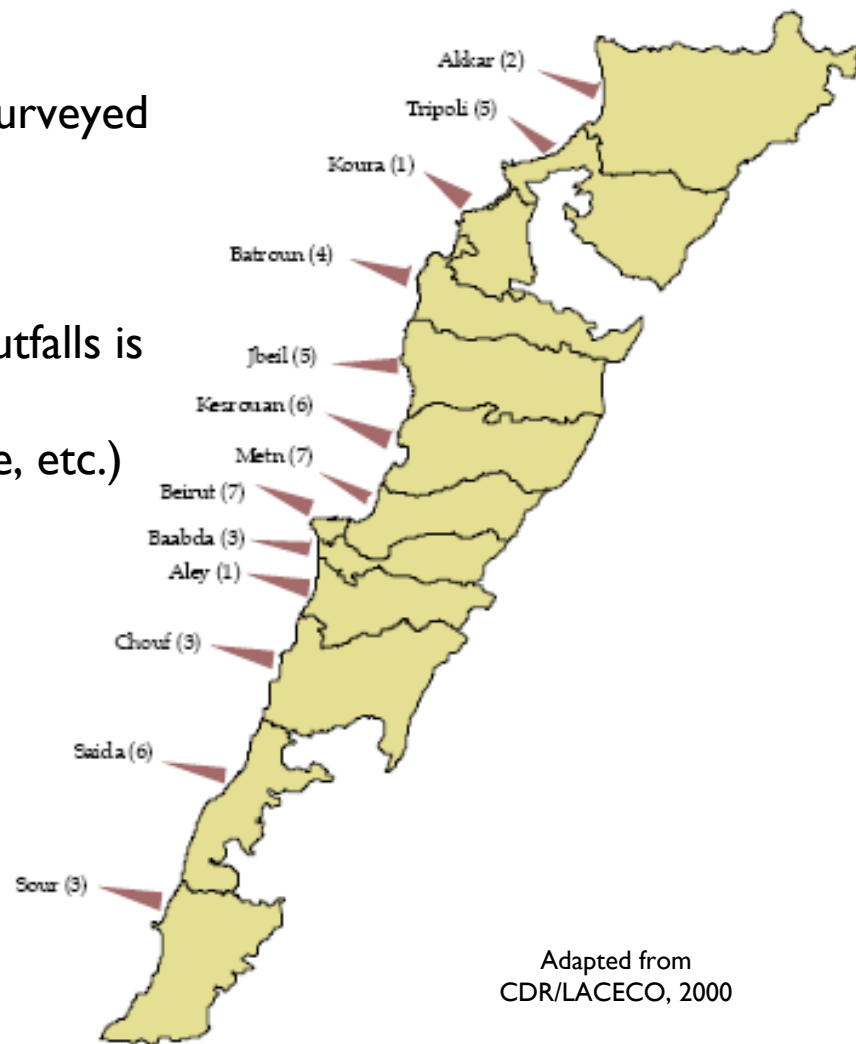
## Wastewater disposal

Number of sea outfalls (53) has been surveyed

**but**

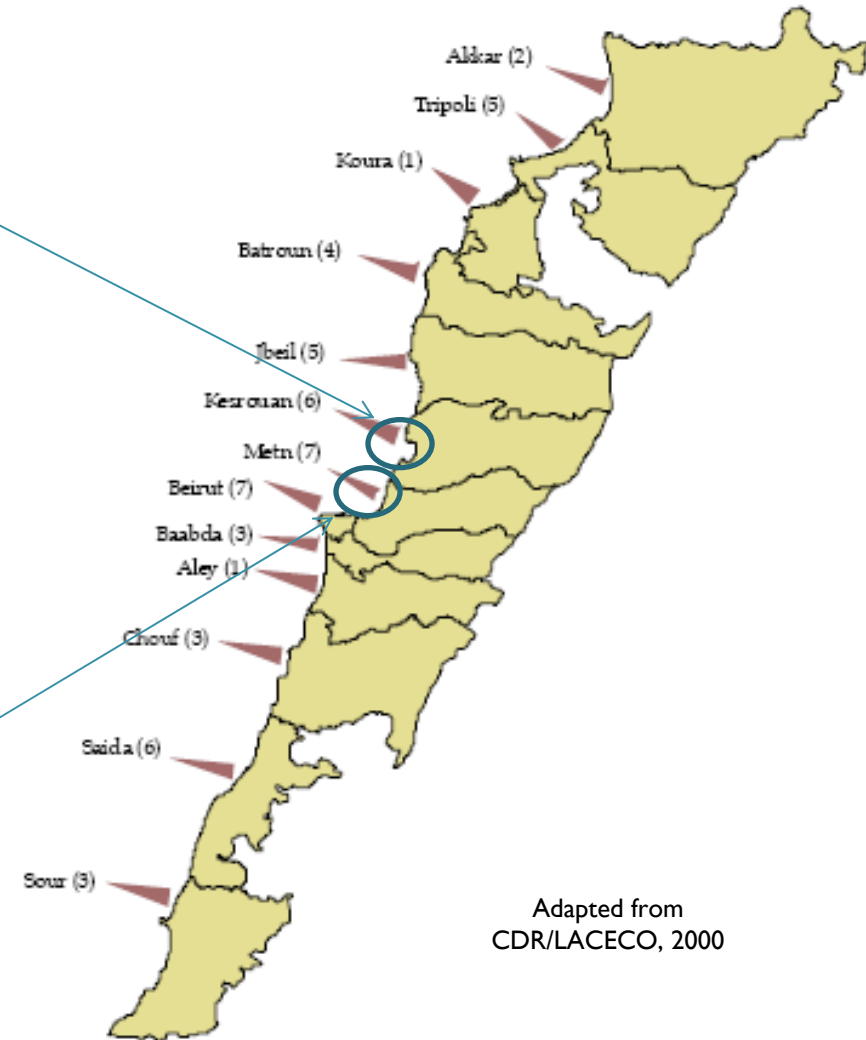
no information on the state of these outfalls is available  
(i.e., length, dimensions, loading volume, etc.)

**=> Impact on Mediterranean Sea**



Adapted from  
CDR/LACECO, 2000

# Wastewater management



Adapted from  
CDR/LACECO, 2000

## WWTP planned project

- 12 Coastal WWTPs: Abdeh, Tripoli, Chekka, Batroun, Jbeil, Kesrouan, Dora , Ghadir, Chouf, Saida, Tyre
- 20 Inland WWTPs: Zahle, Baalbek and Nabatiyah (Litani River protection)

➡ **80 % raw wastewater would be treated (horizon 2020)**



# To date: WWTP Ghadir

- 800,000 inhabitants.
- Southern suburbs of Beirut and its surroundings + septic tank septage and leachate from the Naameh landfill (areas not connected )
- Capacity max  $2.6 \text{ m}^3/\text{s}$   
min  $1.1 \text{ m}^3/\text{s}$ .
- Effluents discharged at 2.6 km from coastal area
- Preliminary treatment



# To date: WWTP Ghadir

	Effluent	Std
BOD mg/L	257	25
COD mg/L	559	125

**No primary treatment nor  
secondary treatment !!!!**





# To date: Community-based WWTPs

- Functional (2002)
- Flow 0.003 m<sup>3</sup>/s
- Effluent reuse in agriculture

Delays in wastewater works and communities and treatment (USAID) —→ municipalities wastewater collection

Some of these community-based projects coincide with the plans of the national program, (Qobayat)

Effluent quality does not comply with the national standards for discharge into surface or sea water

undesirable!!!

Problem faced:

Low construction quality  
Lack of sufficient budgets



HASBAYA

# Conclusion

- Water sector → Lack of infrastructure
- Little information on the wastewater quality in Lebanon is available  
→ Academic researches not necessary representative on a national scale

- Screening of wastewater of sewage collectors located along the Lebanese coast should be monitored
- Establish a database, not yet existing, on the wastewater quality in Lebanon
- Assess the efficiency of planned wastewater treatment plants.

## Current situation of planned projects

Secondary wastewater treatment plant in Lebanon

Under Execution	Under Preparation	No funding secured
12	17	3



Networks: fond already available for construction of water and wastewater in Baalbeck and surrounding areas

THANK YOU  
FOR YOUR  
ATTENTION