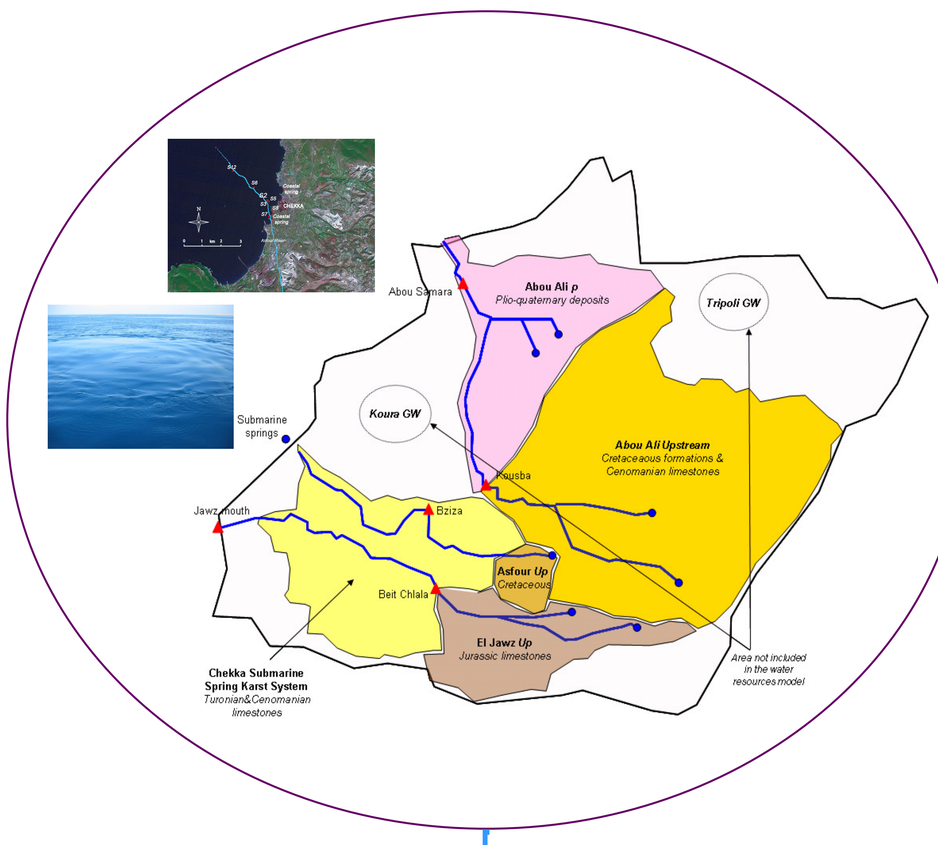
Construction of a Water Management Support System for the Chekka Bay area (Lebanon)

The present work is part of EU project MEDITATE (Mediterranean Development of Innovative Technologies for integrAted waTer management of the 6th Framework program (PL509112)) which aimed at developing a water management support system (WMSS) at the scale of water catchment and integrating alternative water resources such as fresh water from karstic submarine springs or wastewater treatment and reuse.
Water scarcity mitigation is an important challenge in many arid and semi-arid regions in Mediterranean and Middle East countries

Description of current water resources of the area

Description of current water demand of the area



2005

WEAP

2030

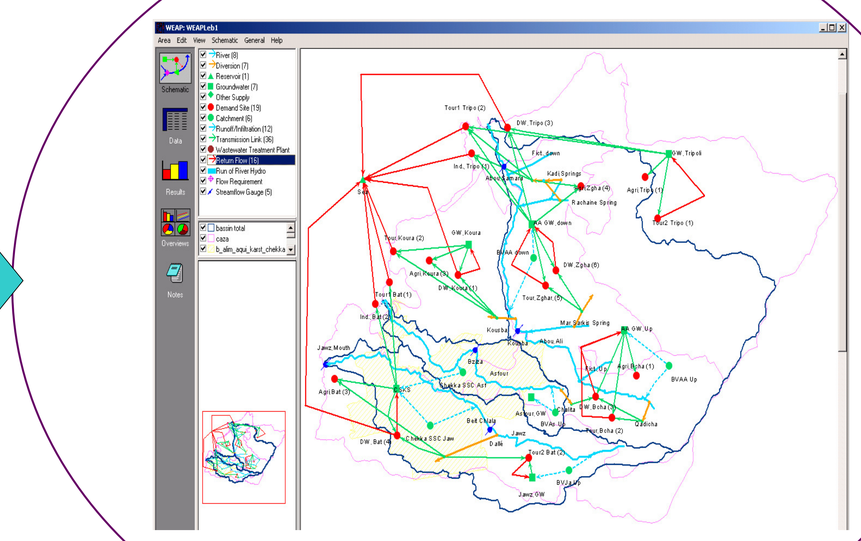


Figure 1 : Definition of five groundwater reservoirs in the Lebanese case study

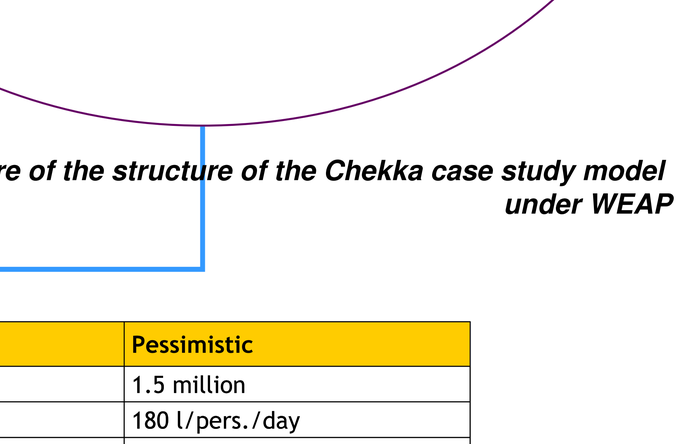
Figure 2 : Screen capture of the structure of the Chekka case study model under WEAP

Definitions of scenarios of evolution

	BAU	Optimistic	Pessimistic
Population	1.35 million	1.35 million	1.5 million
Mean DW consumption	180 l/pers./day	180 l/pers./day	180 l/pers./day
Losses in distribution network	45 %	30 %	55 %
Cultivated surfaces	Idem 2005	Idem 2005	decrease of 30 %
Modern irrigation	25 %	50 %	0 %
Mean Irrigation efficiency	62.5 %	77.5 %	55 %
Tourism filling up rate	70 %	70 %	20%
Water saving measures	20 % households with rainfall storage tanks	-20 % households with rainfall storage tanks - 50 % households with sanitary saving devices - Pricing policy (10 % of DW saved)	None
New resources		- 30 % of wastewater reused - Exploitation of Chekka submarine springs	

RESULTS

The lack of accurate time series data (climatic and hydrometric) and the incomplete knowledge of the regional hydrogeology (especially aquifer geometries and extends) have led to simplify the model and decrease its possibility of prediction. Nevertheless, after calibration, the model could be run to evaluate the water resources and the water demand of the area for a reference year (2005).



Business As Usual			Optimistic		Pessimistic	
Drinking water	165.9	53.40%	90.4	47.50%	202.5	60%
Agriculture	93.6	30.10%	75.5	39.50%	74.5	22%
Industry	50.5	16.30%	39.7	20.80%	60.8	18%
Tourism	0.5	0.20%	0.4	0.20%	0.2	
TOTAL	310.5 MCM		206 MCM		338 MCM	

Regarding the water budget estimation, or the water demand calculation, the results given by the WEAP model are neither new nor different from those already brought by the work undertook in MEDITATE project concerning hydrogeological study and socio-economy analysis.
Thanks to the WEAP Lebanon model, risk of seasonal shortage and failure to satisfy some demand nodes, pressure points on resources and long-term over-exploitation of aquifers are highlighted.

Whatever the scenario, with a water supply requirement ranging from 206 to 338 10^6 m^3 in 2030 and a annual water resource estimated around 700 millions m^3, there is obviously no water problem at the study area scale and at the annual scale.

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