University of Milan

Department of Agricultural and Environmental Sciences –
Production, Landscape, Agroenergy

Integrated Information and Communication Tools and Technologies for Managing Natural Resources: the case of WEAP for the Al Assi river basin

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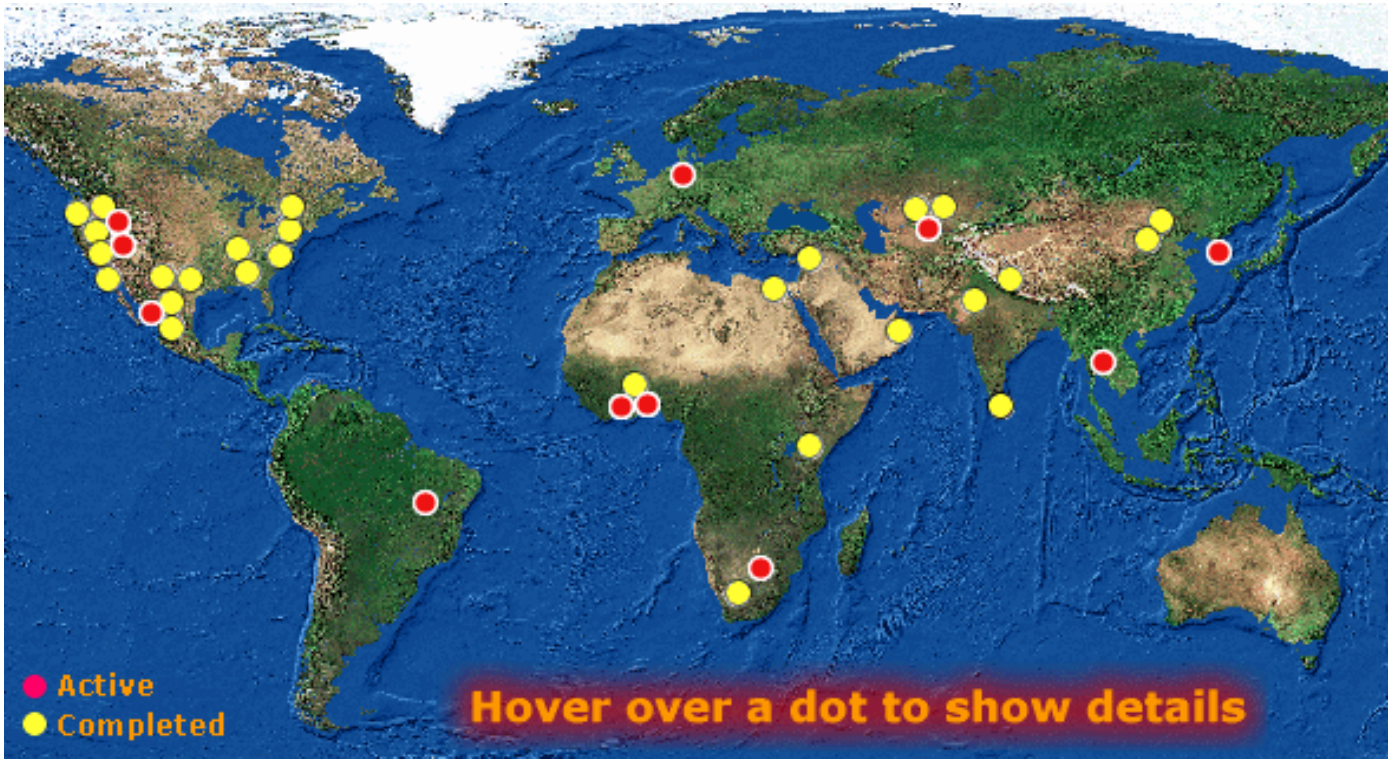
Index

1. The model WEAP: brief introduction
2. The project framework
3. Data Collection and elaboration

The Model WEAP

A generic, object-oriented, programmable, integrated water resources management modelling platform



Why WEAP?

Water Systems Planning

- Small Reservoirs Project, Ghana/Brazil
- California Water Plan, California, USA
- Guadiana River, Spain

Transboundary Water Policy

- Okavango River, Angola/Namibia/Botswana
- Lower Rio Grande, USA/Mexico
- Mekong River, Thailand/Cambodia/Vietnam/Laos
- Jordan River

Climate Change Studies

- Sacramento and San Joaquin River Basins, California, USA
- Massachusetts Water Resources Authority, Massachusetts, USA
- Yemen Second National Communication
- Mali Second National Communication

Ecological Flows

- Connecticut Department of Environmental Protection, Connecticut, USA
- Town of Scituate, Massachusetts, USA

Data requirements

Schematics, maps of the river basin to model

- a vector (e.g. ArcView Shape files: *.shp)
- raster format (e.g. ArcView GRID) for easy uploading into WEAP.

Demand data

•Municipal, domestic, industrial, irrigation, livestock, etc. in term of total withdrawals from surface and groundwater categorized at the level of detail desired for the model

- Drivers (i.e. population, irrigated area, etc.)
- Water use rates (e.g., per capita urban or rural water use)
- etc

Hydrology

•River and tributaries head flows in termo of time series data or monthly inflows

•River flow monitoring data (e.g., streamgauge)

•Land use/land cover data, soil type and climatic data

Data requirements

Groundwater

Information on storage capacity, maximum withdrawal per month and recharge volume

Reservoirs

Hydropower and Wastewater treatment facilities

Losses in the system (pipes, etc.)

Major point sources for pollutants (e.g., industries) and water quality data

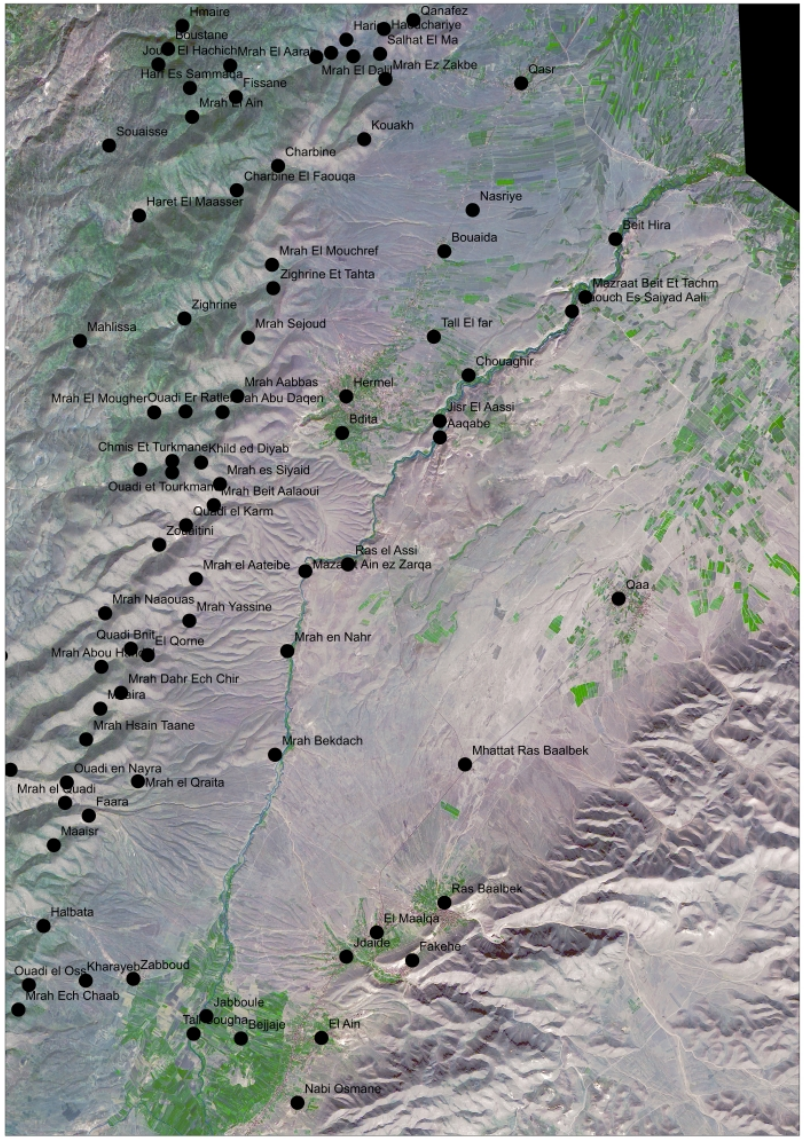
The project

Italian Development Cooperation Office
New technologies (ICT) for a sustainable and integrated management of natural resources in Lebanon (AID 9145)

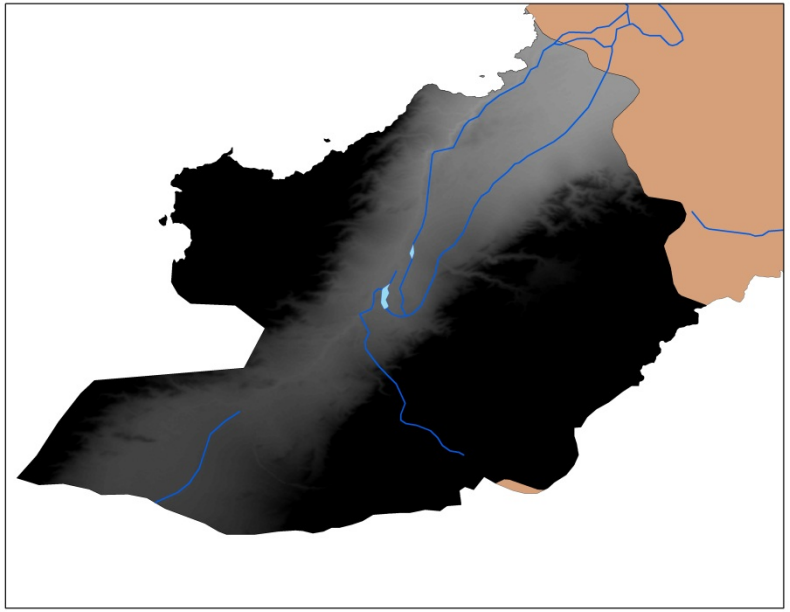
General Objectives:
Scientific and technical assistance on ICT

Specific Objectives:
- Data collection, integration and mining
- Set up of a general framework to «feed» WEAP

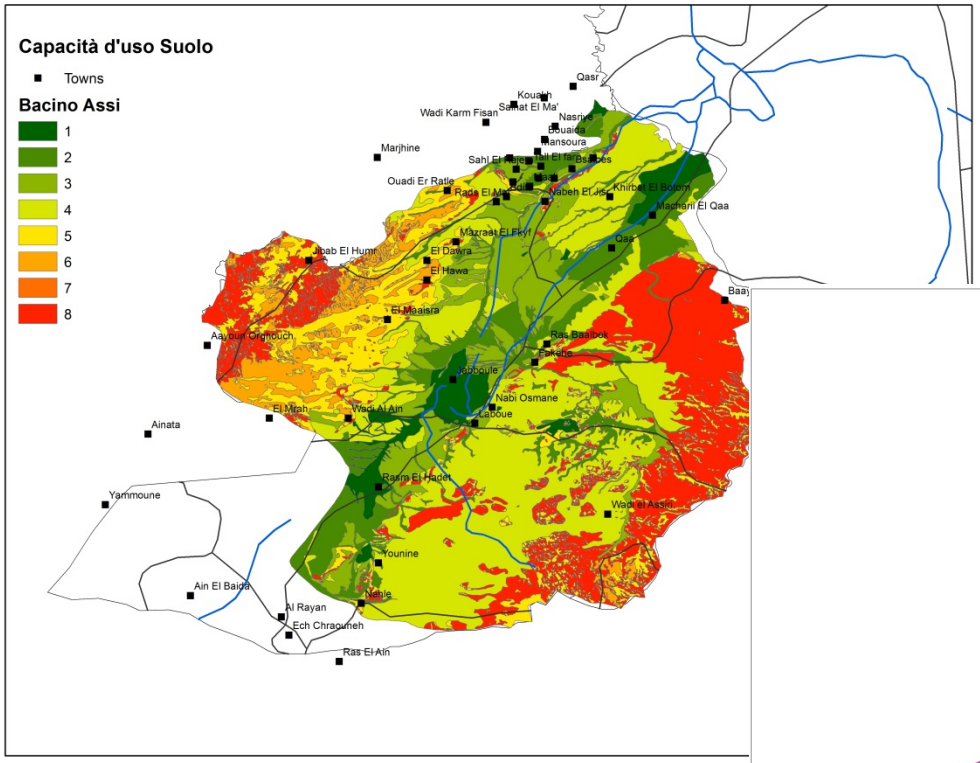
The Study Area: Al Assi River Basin

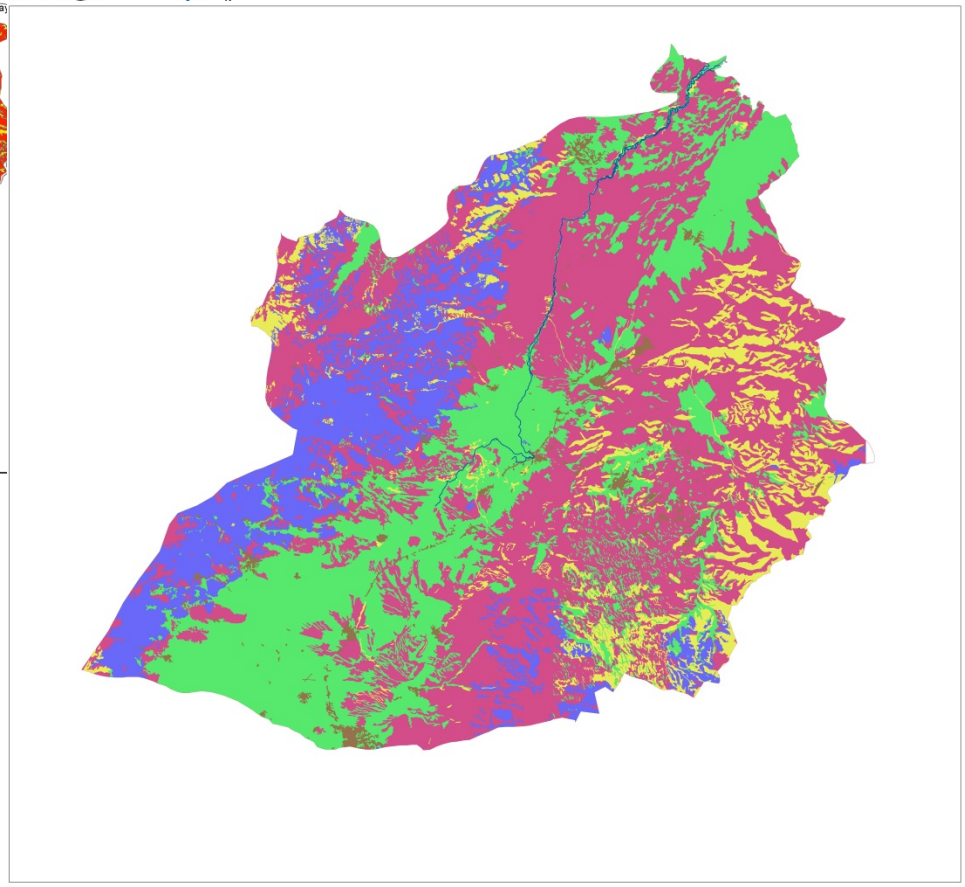


Satellite Imageries and DEM

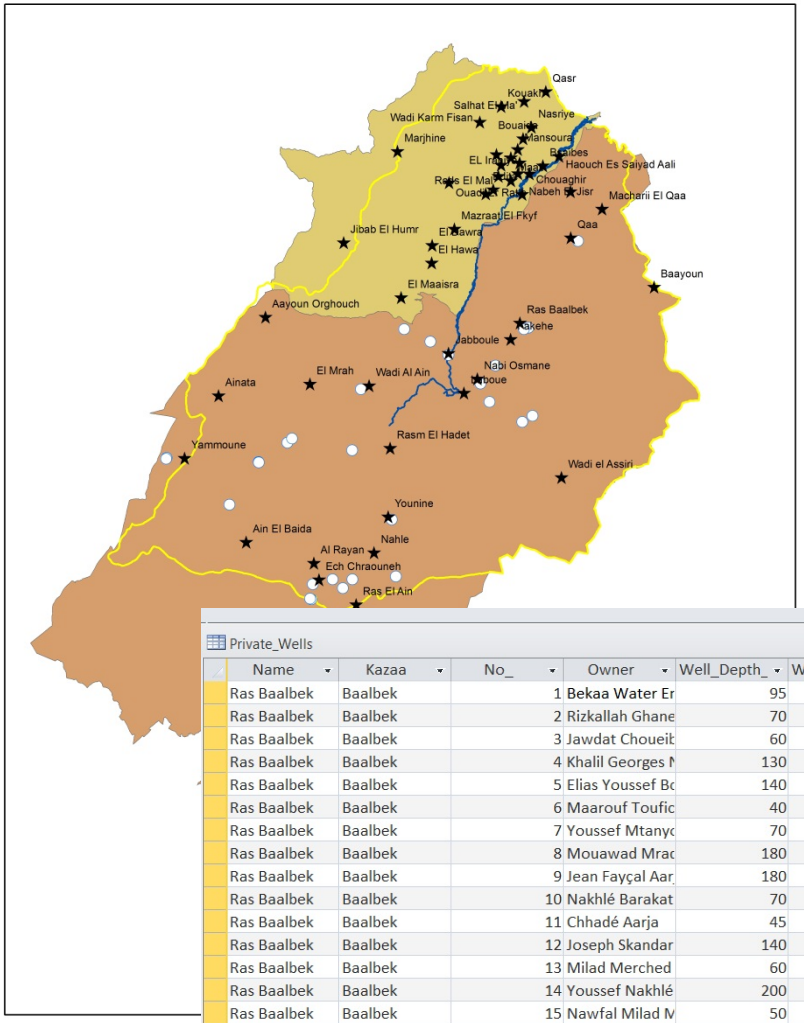


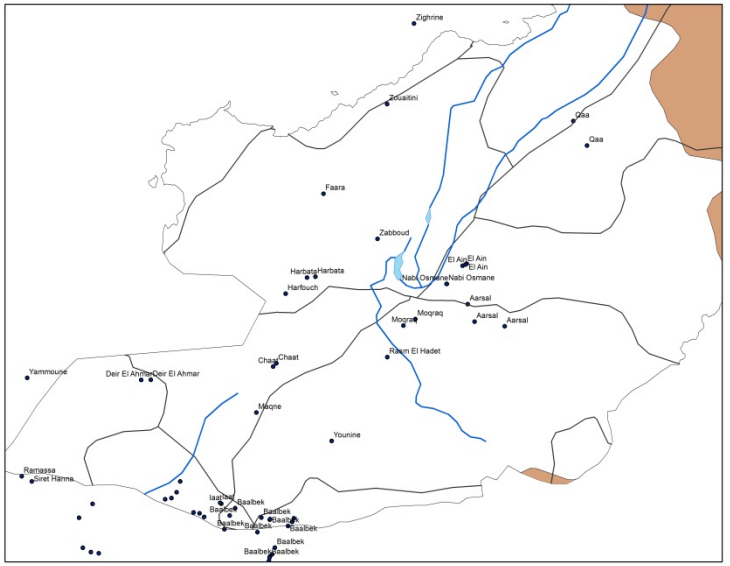
Demand: agriculture





Demand: withdrawal

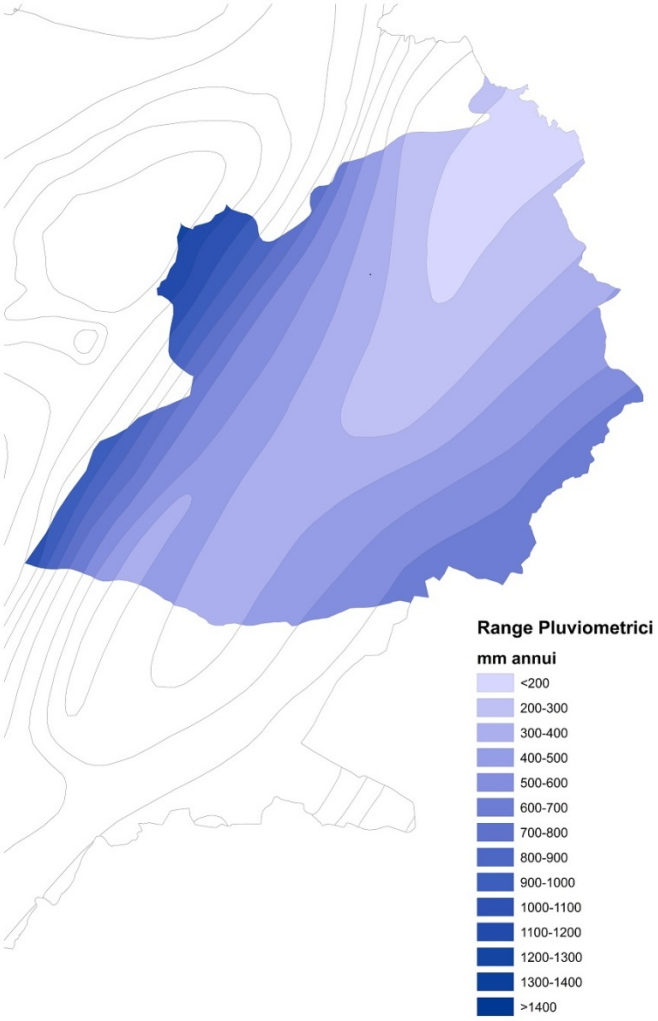




Private_Wells

Name	Kazaa	No_	Owner	Well_Depth_	Water_Level	Usage_	Diameter_pi	pumping_m3	Operating_h	pumping_m3	operating_d	pumping_m3
Ras Baalbek	Baalbek	1	Bekaa Water Er	95	60	Domestic	5	80	18	1440	310	446400
Ras Baalbek	Baalbek	2	Rizkallah Ghane	70	25	Agricultural + D	1,5	12	5	60	200	12000
Ras Baalbek	Baalbek	3	Jawdat Choueit	60	35	Agricultural + D	2	15	4	60	100	6000
Ras Baalbek	Baalbek	4	Khalil Georges M	130	70	Agricultural + D	2	18	4	72	50	3600
Ras Baalbek	Baalbek	5	Elias Youssef Bo	140	60	Agricultural + D	1,5	10	5	50	80	4000
Ras Baalbek	Baalbek	6	Maarouf Toufic	40	25	Agricultural + D	2	20	6	120	140	16800
Ras Baalbek	Baalbek	7	Youssef Mtanyo	70	45	Domestic	1,5	8	4	32	100	32000
Ras Baalbek	Baalbek	8	Mouawad Mrad	180	78	Agricultural + D	2	18	4	72	50	3600
Ras Baalbek	Baalbek	9	Jean Fayçal Aar	180	95	Agricultural + D	1,5	10	7	70	60	4200
Ras Baalbek	Baalbek	10	Nakhlé Barakat	70	30	Agricultural + D	1,5	10	5	50	120	6000
Ras Baalbek	Baalbek	11	Chhadé Aarja	45	20	Domestic	1,5	12	6	72	180	12960
Ras Baalbek	Baalbek	12	Joseph Skandar	140	76	Agricultural + D	1	4	10	40	60	2400
Ras Baalbek	Baalbek	13	Milad Merched	60	40	Domestic	1	6	4	24	100	2400
Ras Baalbek	Baalbek	14	Youssef Nakhlé	200	95	Agricultural + D	2,5	30	6	180	60	10800
Ras Baalbek	Baalbek	15	Nawfal Milad M	50	42	Agricultural + D	1,5	12	6	72	180	12960
Ras Baalbek	Baalbek	16	Ghaleb Chafic M	70	50	Agricultural	1,5	12	5	60	60	3600
Ras Baalbek	Baalbek	17	Kamil Elias Sem	120	60	Agricultural + D	1	5	6	30	50	1500
Ras Baalbek	Baalbek	18	Maurice Mousa	70	45	Domestic	2	8	4	32	150	4800
Ras Baalbek	Baalbek	19	Amin Zhouri Na	149	87	Agricultural + D	2,5	40	5	200	40	8000
Ras Baalbek	Baalbek	20	Raymond Fawzi	50	29	Agricultural + D	1,5	8	6	48	200	9600
Ras Baalbek	Baalbek	21	Sleiman Elias Se	180	70	Agricultural + D	2,5	28	6	168	140	23520
Ras Baalbek	Baalbek	22	Eliane Sakr Gha	70	45	Domestic	1,5	8	6	48	200	9600

Recharge: rainfall

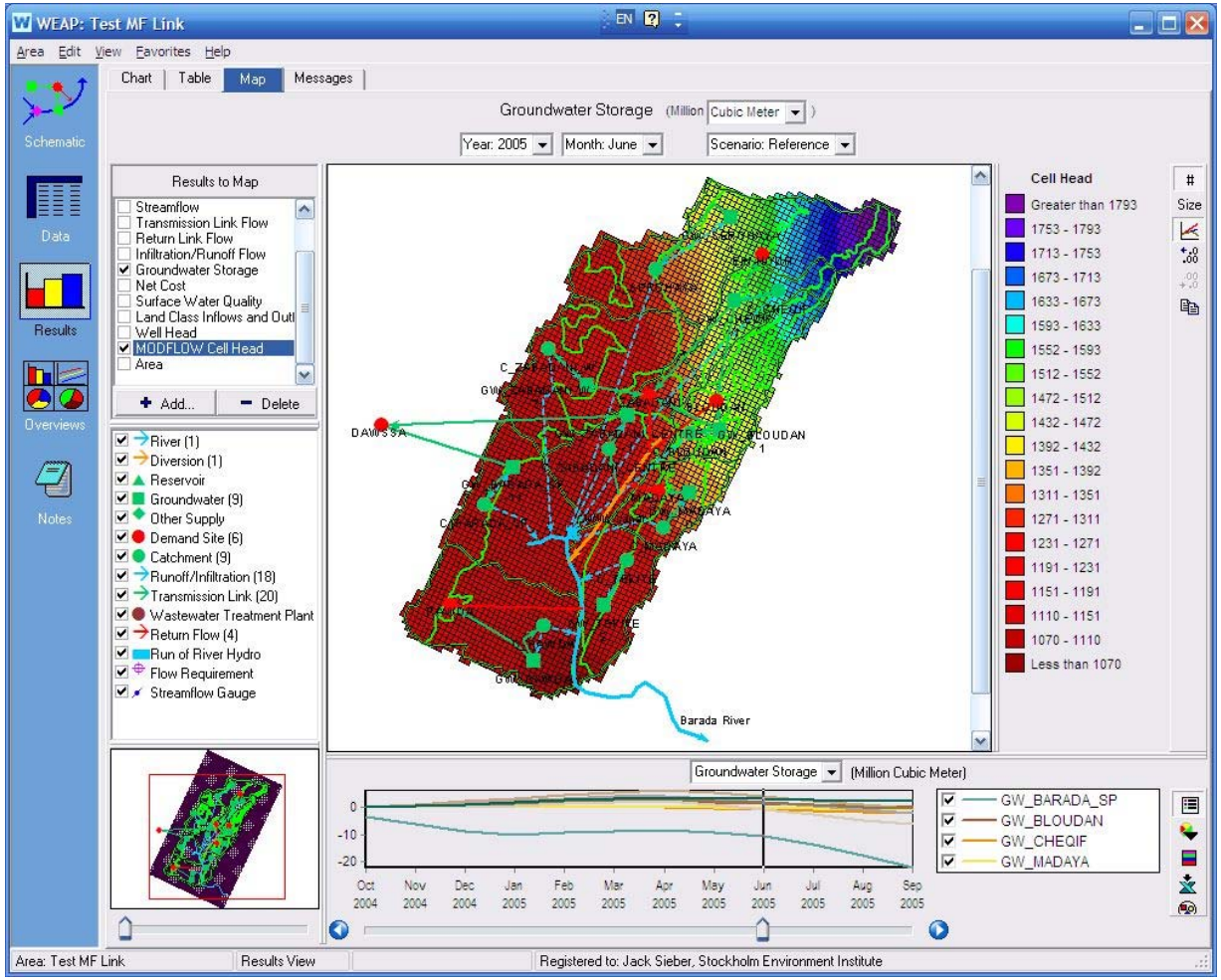


Installation of 3 agrometerological stations in Al Assi Basin

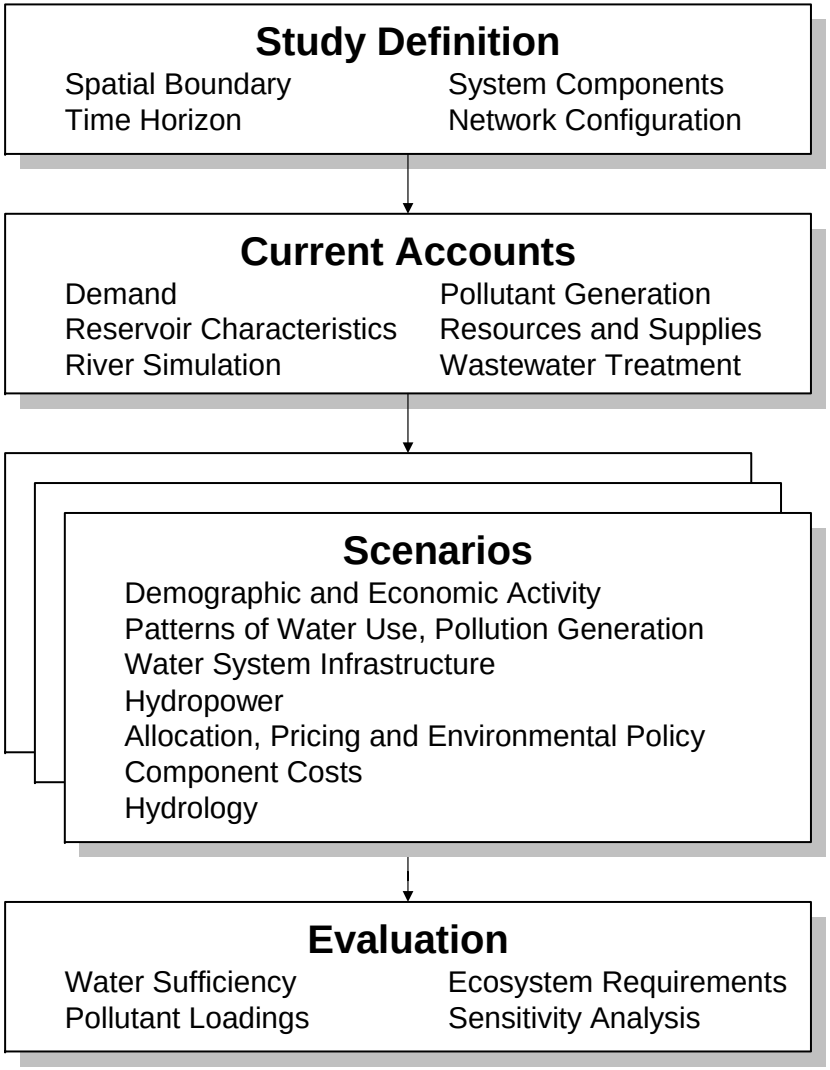
Collection of ancillary meteorological data

Comparison with previous rainfall map (no scientific validation because only 3 years)

Recharge: groundwater study



Final Remarks



WEAP is a simple tools, but require accuracy in building the correct framework for data collection and management

ICT tools can provide support to build up a network to collect data, but validation is always based on experience

WEAP chart flow, SEI 2008


THANK YOU
A SPECIAL THANKS TO MEW