

10 WATER RESOURCES

10.1 GOALS

Lying in the semi arid-sub humid eastern Mediterranean zone sensitive to climate change, Lebanon is witnessing a higher frequency of droughts and episodic torrential rain signifying its apparent trend towards more aridity. Water mismanagement is leading to increase wastage and, coupled with increasing demand, is making securing the needed water a problem.

The study tries to investigate the impacts of climate change on the water budget, and vulnerability of representative hydro-systems and the community. It identifies adaptation measures for proper management through a variety of technical, administrative and policy options.

10.2 SCOPE

The exposure units used to reflect the vulnerability of the water sector are surface water, ground water and the drought affected community. These are exposed in both coastal and inner Lebanon through a time frame defined by on-going trends, as well as the years 2015, 2050 and 2080 as benchmarks for climate change.

10.3 METHODS AND UNCERTAINTIES

Different approaches are followed including analogues to learn from past or similar conditions; field surveys where data are missing or where new techniques are applied; expert judgment is sought in many instances because reliable and documented data in Lebanon are not easily available; modeling is also used as some data are predictive in nature, and future projections are a must in a theme as uncertain as climate change inherently is. Indeed, there are uncertainties in all the above methods because data in Lebanon and the scope of scientific research are quite lacking. This is why evaluations are done for the predictive capabilities of the mentioned methods. Thus, sensitivity analysis, scientific feasibility and data needs are employed for valuation and a summary matrix gives the overall picture of appropriateness of the methodology. This leads to establish a set of useful data on precipitation trends, evapo-transpiration as an indicator of desertification, stressed community, depletion of water sources, soil moisture, water quality, water supply-demand (balance), green-cover and soil removal, and an idea about management.

10.4 VULNERABILITY AND IMPACT ASSESSMENT

This is where first the climate change scenario is introduced and then impacts are analyzed. To be meaningful, the expected future has to be compared to the present. Thus, existing conditions and plans in terms of water supply and demand (total and sectoral) are

shown as a baseline to the year 2015 (where some studies believe the demand will double), and projected further to 2050 and 2080. It clearly shows a water deficit building up anywhere between 140 MCM to 800 MCM annually. Then, with climate change impact reflected by less expected precipitation, it only means that the above deficit could become worse, i.e. possibly between 250- maybe more than 800 MCM annually (Fig. 18). This is further linked to the possible effects of sea level, as seawater intrusion will impact the quality of coastal fresh water. Yet, indications are given that if certain measures are taken starting now, the above negative picture could be reduced.

10.5 ADAPTATION MEASURES

These are identified at three levels as the impacts are expected to affect the whole social structure: the strategic, the population and the individual levels. A total of 34 options are given falling under 4 opportunities: prevention, sharing, changing, and control technology. The options are further recommended, after being screened with respect to their priorities, into 3 phases: the immediate within the year 2001, the medium term within 2005, and the long term within the year 2010 (see attached list).