Impact of Population Growth and Climate Change in Lebanon and Egypt on Water Scarcity, Agricultural Output and Food Security

In the Middle East and North Africa (MENA), indications of a changing climate are clearly evident. Most of the predicted outcomes associated with international climate models are already occurring in the region, compounding existing problems of water scarcity, water pollution, desertification, salinization, and sea-level rise. Climate change experts argue that the impacts of climate change in the MENA region have been intensifying. While the region faces shared environmental threats, individual countries will be impacted differently by climate change through variations in exposure to climate risks.

The proposed research program worked on exploring the impact of population growth on water and agricultural resources while investigating the impact of climate change on these issues over the past decade in both Lebanon and Egypt.

The dynamics of population growth, water availability, and food security are complex and intricate in both countries. Hence, the Columbia University Middle East Research Center (CUMERC) in Amman housing the Institute for Sustainable Development Practice (ISDP), the Desert Development Center (DDC) at the American University in Cairo (AUC), along with the American University of Beirut’s Faculty of Agricultural and Food Sciences and the Climate Change and the Environment in the Arab World Program of the Issam Fares Institute for Public Policy and International Affairs are joining efforts to address these pressing issues. The research program provides an analysis of the impact of climate variability and population growth on water, agriculture and food security.

The project started with a synthesis study, followed by expert consultation workshops, and the development of a total of five case studies. All of these research phases provided information that will be incorporated into a final report that gives recommendations for addressing water scarcity and food security in both Lebanon and Egypt. The recommendations are feasible with a reasonable chance of successful outcomes at the level of local communities of water users and food producers and were identified and selected based on conclusions from scientific research.
and government policy outcomes, expert opinions and advice, and the results of the case studies which give voice to local communities of water users.

In Lebanon two case studies were selected: one in Kfardebian and another in central Bekaa. These two locations were selected because of the different agriculture production and environmental conditions. Several factors led to the exclusion of prime agricultural lands such as the Akkar Region and Southern Lebanon mainly due to the security situation those regions, time and funding constraints.

Several field visits were conducted to interview farmers and complete surveys that address their production; the challenges they face; any signs of changing climate; available water resources accessed especially their availability and their impact on agriculture. Among the farmers interviewed from the central Bekaa, it was determined that agriculture production is distributed into 64% open field, 34.5% greenhouse and 7.6% orchards whereas in Kfardebian; 95% are orchards producers and 2.5% have open field production with no significant greenhouse production. Land holdings were predominantly medium in the central Bekaa ranging from 50 to 100 dunums whereas in Kfardebian holdings were small, typically less than 30 dunums.

Most of the interviewed farmers noticed clear environmental changes that are impacting negatively their production. The farmers in the central Bekaa reported the earlier onset of colder temperatures which is causing them to lose precious production time of several weeks to even a month.

Over 97% of total land area in the central Bekaa is irrigated and in Kfardebian almost all lands are irrigated. Surface irrigation is widely practiced in Kfardebian (60%), whereas drip and sprinkler irrigation are the common practice in Bekaa; 95% of the irrigation of greenhouses and some open field production is drip and for open field production, 43% is sprinkler irrigated. Women constituted the majority of the labor force in the Bekaa (71%) whereas it is the opposite in Kfardebian where 70% of labors are males

As precipitation (rain and snow) varies in intensity and timing, 88% of the Bekaa farmers reported digging additional wells to make up for the changes in availability while 79% changed the time of planting. In Kfardebian, water issues are not pronounced for farmers closest to major spring sources, but the issue becomes more complicated for farmers downstream as they are forced to store water or engage in other measures to prepare for water shortage in late summer. High humidity during spring season is causing the multiplication of fungal pathogens that negatively affect apple production in this high mountainous locality. To adapt, 37% of the farmers opened additional wells and bought water and 57% of them changed planted varieties.
Some 90% of the central Bekaa farmers depend on agriculture as main source of income whereas in Kfardebian, this percentage drops to 70%. In the interviewed Bekaa municipalities 62% of the inhabitants are hooked up to the water supply network, and 53% are hooked up to the sewage network; however, in Kfardebian, 50% of the inhabitants are hooked up to the water supply and sewage networks.

The results obtained in the Lebanese case studies and their analysis will be added to those found in Egypt to produce a comparative overview of the situation in the two. The final report is being finalized and is expected to be produced towards the end of December.

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