Climate Change and the Hydrologic Cycle

By Ali Fakih

In the last five years, climate changes have been considerate as a controversial topic. This being said, there is evidence that the global climate is changing. Is this change part of the ecological system evolvement or is it a permanent change that will get worse by time; the coming generations will know for sure the answer. How does climate change affect the hydrologic cycle?

Future climate change has mainly been linked to global warming. Global warming is the rise in temperature of the earth's atmosphere mainly due to extensive greenhouse gas emissions. To maintain the global water balance, evaporation from oceans worldwide must be balanced by precipitation in the oceans plus runoff from the continent. As Global warming is leading to a higher sea-surface temperature which creates a larger vapor-pressure difference between the sea surface and the adjacent atmosphere and is leading to additional ice cap melting, precipitation and salinity of ocean are directly affected. This is affecting the ecological balance.

These hydrologic changes will affect the performance of the existing infrastructure and will lead to more natural disaster (floods, droughts, etc). Another challenge will be the outdated historical runoff data that this climate change will generate. Widespread increases in heavy precipitation events have been observed in some places where total precipitation has decreased. At the same time the length, frequency and intensity of heat waves have widely increased. In addition, more precipitation now occurs as rain rather than snow in northern regions. All these changes are consistent with a warmer atmosphere with a greater water-holding capacity.

Climate change may affect groundwater levels as recharge volumes vary and evaporation increases. Researches observe an increase in water availability in moist tropics and high latitudes area and decrease in water availability and increase in drought in mid-latitudes and semi-arid latitude area and it has been estimated that hundreds of millions of people were exposed to water stress. Raising awareness and researching the dynamics and processes associated with water related climate change are key aspects of finding solutions to this evolving issue.

References:

Water In Changing World, The United Nations World Water Development Report 3, UNESCO Publishing , Paris, France, 2009.

Holway, J. and K. Jacobs, Chapter 3 in Water Resources Sustainability, L.W. Mays, Editor-in-Chief, McGraw-Hill, 2007