

Water availability, demand and supply model for the Rio Cobre basin of Jamaica - under different climate scenarios. Impact of drought on water resources

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Jamaica, the third largest island of the Caribbean is significantly affected by variability in the climate pattern which has impacted the island's water resources in the past few years. The water resources of the island (surface and groundwater) were severely affected in the years 2010, 2013-2015 following less than normal rainfall and passage of the El Nino circulation in 2015, leading to severe droughts in the eastern and southern sections of the island (parishes of St Catherine, Kingston and St Andrew, the two heavily populated parishes of the island). Additionally the groundwater resources of these parishes have also been affected by contamination from sewage and salt water intrusion which has led to closure of some of the operational wells, thus leading to additional water stresses for the parishes. Water levels in the two primary reservoirs for the capital city Kingston fell to <30% of its maximum capacity thus leading to severe water lock offs which affected all sectors in the city. This thus necessitated the need for research into finding newer sources of water to combat the issues of recurrent drought due to variability of the weather patterns as well as climate model projections which show a trend of increase in temperature and decrease in daily rainfall for the Caribbean.

The water resources of the island are divided into surface and groundwater resources of which groundwater attributes to >75% of the resources. These are mainly confined in the limestone aquifer which accounts for majority of the aquifer system of the island. The impact of drought in 2010 and 2013, 2015 impacted heavily the Kingston metropolitan area whereby leading to investigations on exploring water resources of adjoining parishes /basins and suggesting possible measures to extract water from other hydrological basins. At present the Kingston basin receives water from the Hope, Yallahs and Rio Cobre river of which the Hope and Yallahs were severely impacted by drought. This thus leaves the Rio Cobre basin of St Catherine which can look into supplying water to offset the deficit of Kingston. The present work involves a detailed analysis of the Rio Cobre basin, its present available resources, demand and supply through a Water Evaluation and Planning model (WEAP). The model will incorporate rainfall, groundwater abstraction rates, intake from river, sectorial demands , supply for the past 25 yrs along with rate of change in population. The model will also work on future water demand using climate model results primarily from the PRECIS SRES scenarios and further extend to the RCP 1.5 and 2 deg C change in temperature scenarios. Such results will aid in better water management and allocation thus finding possible adaptation strategies for drought.