



Computing the Water Budget Components for Lakes by Using Meteorological Data

Rawya Kansoh^a, Mohamed Abd-El-Mooty^a, Rania Abd-El-Baky^{b*}

^a Professor, Faculty of Engineering Alexandria University, Alexandria, Egypt.

^b Assistant Lecturer, King Mariout Academy for Engineering & Technology, Alexandria, Egypt.

Received 27 February 2020; Accepted 08 June 2020

Abstract

Lake Mariout located between the longitudes of 29° 49' and 29° 56'E and latitudes of 31° 04' and 31° 08'N in Egypt. It is situated on the southern side of Alexandria City, Egypt. The land surrounding the lake is occupied by agriculture field, population zones and fish farms. This makes the lake to serve as a sink to drain different kinds of drainage waters from surrounding catchment areas of Alexandria City. The water of Lake Mariout is pumped to the Mediterranean Sea through El-Max pump station. The water budget was computed by measuring or estimating all of the lake's water gains and losses. Applying the hydrology budget balance for lakes takes the interaction between the inflow and the outflow water from lakes into account. It is very useful for conservation and better management of water resources. All water budget components of the lake are estimated. Groundwater amount is the most difficult component to be measured or estimated in the water budget equation. Most of the previous studies assumed that the residual of water budget to be the groundwater flow to the lake. The results show that the lake Mariout receives approximately 8.95 m³/d from the main drains which represents the major part of the inflow water to lake. The discharge of El-max pump station is also one of the largest components of the outflow water (102 m³/s), while the water loss by evaporation represents 3.2% of the outflow water from the lake. Moreover, the water gain by rainfall 0.38% of the inflow water. The Groundwater flow to/out the lake was estimated as a residual of the water budget equation. It represents 1.2% of the total inputs for the lake water budget. The result shows that the lake is under severe environmental pressure. One of that is the groundwater comes from catchments areas which may be affect the configuration and operating system management of El-Max pump station by the time running.

Keywords: Evaporation; Groundwater; Lake Mariout; Out/Inflow Water; Water Budget.

1. Introduction

The estimation and evaluation of all water budget components are extremely important for regional management and development of water resources, mitigating hazardous flow events and optimizing surface water and groundwater resources. Recently, many researchers are interested in investigations of water budget, because of the dependence of human life on aquatic life. Therefore, many efforts aiming to understand the interactions between inflow water and outflow water and their ecological implications for lakes. All water budget components were computed for lake Qarun, Egypt except ground-water component. He estimated the Ground-water component as a residual of the water budget [1]. The Water budget components and the vertical conductance were determined for Lowry (sand hill) lake in central of Florida, USA. The out/inflow water components were determined based on measurements but the leakage value was determined as a residual in water budget equation [2].

* Corresponding author: rania.abdelbaky@yahoo.com

 <http://dx.doi.org/10.28991/cej-2020-03091545>



© 2020 by the authors. Licensee C.E.J, Tehran, Iran. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).