

QUANTIFYING WATER CIRCULATION IN BURABAY NATIONAL PARK: TOWARDS AN EVALUATION OF POTENTIAL SOLUTIONS TO LIMIT LAKE SHALLOWING

V.R.Yapiyev*, M.M.Kabiyeva

NURIS, Nazarbayev University, Astana, Kazakhstan; *vyapiyev@nu.edu.kz

INTRODUCTION.

This study is the preliminary phase of a three-year project. Its goal is to provide basic original hydrological and hydrogeological data to the scientific community about Burabay National Nature Park (BNNP) and its lakes. The major lakes of the Park are Ulken Shabakty, Shortan and Burabay. The area is experiencing a great anthropogenic load due to water uptake from the lakes for supply needs, which causes the water level decline. The hydrological study is necessary and important for the management of BNNP. The objective of the study is to analyze water balance of the lakes from 1991 to 2012 and identify the main hydrologic components, which affect water level.

METHODOLOGY.

Water level data for the period from 1993 through 2012 were used for analysis of the water balance. Some climate and hydrological data were obtained from the Kazakh Hydrometeorological Agency reports [1]. The USGS Thornthwaite monthly water balance model (T-model) driven by graphical user interface was used in the current study to generate the values for evapotranspiration and runoff. The methodology was originally presented by C.W.Thornthwaite [2,3]. Water level records were obtained from Burabay and Schuchinsk meteorological stations to analyze lake level variations in 1991-2012.

RESULTS AND DISCUSSION.

The preliminary analysis shows that the water level of Lake Shortan correlates with water abstraction rates. However since the measured data was very limited and often did not correspond to reality a number of assumptions had to be made. That can certainly negatively affect any model performance.

CONCLUSIONS.

The main challenges are the quality and quantity of the data as well as accuracy in hydrological investigations. Further work implies more thorough analysis of water balance of lakes as well as concentration on the study of subsurface flow, lake-groundwater interactions, development of hydrometric network and numerical modelling.

ACKNOWLEDGMENTS.

We thank Chevron Munaigas Inc. for funding the project. The Chevron Young Researcher Grant allowed us to implement our research ideas and formulate the project work plan.

REFERENCES.

1. Kalelova A.B. (2007). Development of forecasting model of ecological situation in Schuchinsk-Burabay resort area. Kazakh Hydrometeorological Agency "Kazhydromet", Almaty.
2. Thornthwaite C.W., Mather J.R. (1955). The water balance. Publications in Climatology, 8: 1-104.
3. McCabe G.J., Markstrom S.L. (2007). A monthly water balance model driven by a graphical user interface: U.S. Geological Survey Open-File report 2007-1088, 6pp.