ANALYSIS OF WATER-LEVEL FLUCTUATIONS IN AYDARKUL-ARNASAY-TUZKAN LAKE SYSTEM AND ITS IMPACTS ON THE SURROUNDING GROUNDWATER LEVEL

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This paper presented the water level fluctuation in Aydarkul-Arnasay-Tuzkan Lake System (AALS) and its impact on the surrounding groundwater level. A positive correlation between the increasing of water surface area as a function of water level and the groundwater level was found. The water level has been fluctuating within 0.1–2.9 m/year and has been causing the increases in water surface area and groundwater level within 71–77 km^2/year and 0.05–0.16 m/year respectively. Regarding to high variability of arid climatic parameters, they gave significantly impact on the quality and the mineralization of both surface and groundwater. The schematic map of dynamical water surface and groundwater flow was drawn to provide better understanding the mechanisms of the fluctuation of water level, the increasing of mineralization and its consequence. It should seriously be considered by the following researchers and stakeholders.

Key Words: *Uzbekistan, AALS, water level, water surface area, groundwater level, salinity.*

1. INTRODUCTION

Aydarkul-Arnasay-Tuzkan Lakes System (AALS) is an artificially man-made ecosystem created within the last 40 years on the former Aydarkul desert salt depression, which currently includes huge areas of floodplains, sandy degraded rangelands, rainfed and insignificant irrigated agricultural lands in the middle stream of Syrdarya River basin (Ladigina *et al.*, Kholmatov *et al.*)[1,2]. Historically these three large tectonically formed lakes were used for different purposes. In the Arnasay Lake due to its geomorphology water is low salinity, which is available for irrigated agriculture. The water of Aydarkul and Tuzkan are high mineralized because of discharge saline wastewater generated from the irrigated field and from collector-drainage system (Evelynn *et al.*)[3].

Since 1967, the AALS has regularly received water from the Syr Darya River as retarding basin through Chardara Dam, which constructed in early 1960s at the Uzbek-Kazakh boundary. The dam is provided with floodgates functions as flood control. In 1969, the increasing of AALS water level was occurred as a result of catastrophic outflow of water from Chardara reservoir. The floodgates were opened to prevent the dam from overflowing. Then, the over surplus of water was drained into the Aydarkul depression. During 1969 about 25 km³ of water was released into the Aydarkul depression (Kitaykin *et al.*)[4].

The analysis of multi-years observation of the water level data indicated that water level in the AALS increased progressively every year (Alanazarova *et al.*)[5]. The increasing of AALS water level was observed within the period from 1993 up to 2007 and within that period the areas had been increased from 3,039 km^2 up to 3,748 km^2 (Alanazarova *et al.*)[6]. During last decades, it has been extending into 300 km in length and between 30 km and 50 km wide. Therefore the AALS becomes the next famous after Aral Sea world's best known (Alanazarova *et al.*)[5,6]. The increasing of water level of AALS induced the flooding of rangelands, allocated for livestock grazing (Gintzburger *et al.* and Kawabata *et al.*)[7,8].