

Impact of Reservoir Construction on Flood Characteristics of the Rivers of Kazakhstan during Spring Season

Dinara Arystambekova¹⁾ and Saken Davletgaliev²⁾*

¹⁾ Al-Farabi Kazakh National University, Almaty, Kazakhstan.

* Corresponding Author. E-Mail: d_arystambekova@mail.ru

²⁾ Al-Farabi Kazakh National University, Almaty, Kazakhstan.

ABSTRACT

This paper investigates the influence of human activities on the runoff depth of the spring flood of the rivers Zhayyk, Ilel and Tobyl in Kazakhstan. Statistical characteristics of the runoff depth of the spring flood of these rivers before and after the construction of the reservoirs, as well as for the long-term period of supervision, are analyzed based on actual and restored data. Values of the runoff depth of the spring flood of various frequencies were calculated. Series of observations on homogeneity conducted by graphical and analytical procedures were checked. Total integrated curves of the runoff depth of flood during the spring season were developed. Series of observations of the runoff depth of the spring flood were analyzed for homogeneity by means of Student and Fischer's criteria. The analysis revealed that as a result of reservoir construction, the spring flow is not complying with the hypothesis of homogeneity.

KEYWORDS: River flood, Runoff depth of spring flood, Spring season, Reservoirs, Homogeneity assessment, Kazakhstan.

INTRODUCTION

Water resource issues and problems in developing countries present special challenges, as the development of these countries significantly depends on the utilization of water resources. Due to global warming phenomenon, it is expected that fresh water availability will decrease. This is why it is necessary to analyze the status of water resources and manage the use of water by means of reservoir construction, which will enable to meet the increasing demand for water and consequently attain a large economic efficiency (Basilashvili, 2016). On the other hand, water reservoirs (dam construction) have adverse environmental impacts that affect the

natural hydrological system of rivers.

With global environmental changes and increase in human activities, streamflows of rivers gradually decreased (Milly et al., 2005). The analysis of streamflow variations and their potential impacts on ecosystems is of scientific and practical importance to help deepen the understanding of the streamflow regime and provide a basis for rational utilization of water resources by following the principles of integrated water resource management (Birsan et al., 2014).

Literature review revealed that different researchers have followed different approaches in analyzing water flow in rivers as a result of human interventions, like dam construction. For example, many investigations