STATISTICAL ANALYSIS OF LONG-TERM SPRING YIELD IN A SEMI-ARID WATERSHED
A CASE STUDY FROM PALESTINE

Mohammad N. Almasri[1], Anan Jayyousi[2], and Ammar Jarrar[1]

1. ABSTRACT
Arid and semi-arid regions are generally characterized by water scarcity and low per capita water allocation. This situation is further exacerbated when such areas are agriculturally dominated with high-density residential areas. Faria watershed, located in the northeastern part of the West Bank, Palestine, is one of these semi-arid watersheds where recently, the prolonged drought periods in the watershed and the high population growth rate have negatively affected the existing obtainable surface water and groundwater resources. Springs are a major water resource in the watershed where more than 50% of the water needs of the Palestinians in the study area is furnished by these springs. Most of the springs of Faria watershed are located in the upper and middle parts of the watershed. There are 11 fresh water springs in the watershed which can be divided into three groups: Faria, Bathan, and Miska in addition to other two springs that are entirely utilized by the City of Nablus. Discharge data for the springs show high spring discharge variability. Annual discharge from these springs varies from less than 4 to almost 42 MCM with an approximate average amount of 13.5 MCM. Due to the fact that the available water resources in Faria watershed have sustainable-yield limits that cannot be surpassed and owing to the fact that water demand is increasing to fulfill the agricultural and residential requirements, reliability assessment of water availability in Faria watershed is of great importance in order to optimally manage the local water resources. This situation has compelled the motivation for conducting a statistical analysis of long-term spring yields in the watershed. This analysis is essential to better understand the behavioral trends in spring yields in the area, to comprehend the uncertainty associated with spring yields and the influential explanatory parameters, and to enable the development of optimal water allocation policies and management option measures under drought conditions such that the economic revenue is maximized. This paper employs the fundamental statistical parameters and concepts to analyze the long-term spring yields in Faria watershed in or-

der to evaluate the seasonality and variability of the yields. Thereafter, the relationship between spring yield and explanatory parameters such as precipitation is investigated. Such relationship can be utilized in the development of best management practices that can be adopted to manage the scarce water resources in the watershed.

Keywords. Springs; statistical analysis; semi-arid watersheds; management

1-Water and Environmental Studies Institute, An-Najah National University, Nablus, Palestine, mnmasri@najah.edu, jarraram@najah.edu
2-Department of Civil Engineering, College of Engineering, An-Najah National University, Nablus, Palestine, anan@najah.edu