

Analyzing Sediments Assessment and Distribution Using Bathymetric Survey: A Comprehensive Study of the Abu Abdullah Canal, Southern Iraq

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Abstract

The Abu Abdullah canal, an essential part of the Garmat River, serves as the feeder to the water injection station for the Basrah Oil Company's southern region's oil fields, playing a significant strategic. This study thoroughly investigates the sedimentation rate and distribution processes within this critical canal. The canal was built in the 1980s, with a depth of 3 meters planned. In 2017, RSK Company, in partnership with the Basrah Oil Company, started a comprehensive bathymetric survey of the canal to investigate its depth characteristics. The survey yielded intriguing results, revealing notable variations in depth along the canal's course. Depths ranged from 0.4 m at the canal's edges to an average of 1.6 m in the middle, indicating a significant decrease of 1.4 m in the middle region and 2.6 m at the edges. The collapse of the canal banks, induced by the proximity of Buffalo breeders' residences near the canal, is the primary source of this depth variation. Incidental entry and traversal of Buffaloes lead to gradual structural degradation of the banks, exerting a substantial influence on sediment distribution within the canal. Moreover, Buffalo standing in the middle of the canal induces compression on the channel bottom, altering the sediment transport dynamics. The study's outcomes are critical for sustainable canal management and environmental conservation. Understanding the complicated interaction between human activities and natural processes for shaping canal morphology is vital for developing effective strategies aimed at safeguarding canal banks and preserving their ecological functions. This research significantly advances the understanding of canal sediment dynamics, presenting practical applications in hydraulic engineering and environmental management.

Keywords: Sedimentation, bathymetric survey, Garmat Ali waterway, sediments transported.

Introduction

Abu-Abdullah Canal is one of the strategic projects in oil production, which works to transfer water to the water injection station for oil fields, which is branched from the Garmat Ali waterway. This canal suffers from sediment accumulation, which leads to a decrease in its efficiency. Sedimentation is the process by which sediment or particles are deposited on the bottom of a body of water. Sediments are generally described as solid particles transported by a fluid (Orji and Dike, 1991).

Sediments come from various sources, such as eroded soil, rock, or organic matter. Sediments can form naturally through erosion, weathering, and natural processes (Tucker, 2001). In the cases briefly mentioned above, the accumulation of sediment should be monitored regularly using appropriate methods. Based on the results of these studies, protective and corrective actions should be taken as necessary. One of the monitoring methods used in this regard is precise bathymetry. By performing bathymetry at regular intervals, changes in channel

bed topography can be monitored, and sediment transport and accumulation rates can be calculated by depth measuring devices. Sediments are rocky crumbs transported, suspended, or deposited by flowing water (Hayter and Gailani, 2014). All constituents of the parent rock material (silts and clays, sand, and mud) are usually found in the sediment and transported by water from the place of origin to the place of deposition. In watercourses, sediment is the alluvial material carried in suspension or as a bed load. Sedimentation is settling and depositing by the gravity of suspended matter in water (Cech, 2010).

In channel beds, soil particle accumulation can decrease the losses of the maximum bed depth and water use potential and shorten channel lifetime by causing changes in the channel bed topography. Other negative results of channel sedimentation are the reduction of flood attenuation, changes in water quality, and damage to pumping machines' valves and the channels (Maloi et al., 2016). Sedimentation leads to many issues, such as the operation and maintenance of engineering infrastructures, the