



The Effect of Caspian Sea Water Level Changes on Nowshahr Harbor Sedimentation

[Ulrich Reza . Kamalian رضا کمالیان]

[Hasan . Safari حسن صفری]

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1-Abstract

The mean water level at Caspian Sea has been changed dramatically during the last century. It has been decreased continuously for about 50 years down to -3.2m and then increased for 20 years up to +2.5m. The effect of water level changes on Nowshahr harbor sedimentation (South of Caspian Sea) has been studied. The trend of shoreline changes, sediment dredging and yearly hydrographies has been considered. One-line and 2D simulations have been used in order to predict sedimentation at the harbor entrance. The effect of sea level changes on sediment bypassing and sediment storage at the upstream shore has been calculated. The wave and flow pattern around the harbor has been simulated in different conditions in order to check the possibility of sediment movement from the downstream shoreline into the harbor entrance. The results show that sea level rise has reduced sedimentation problems considerably during 1977 to 1995.

2-Introduction

Harbor sedimentation is an important problem to be addressed, especially within the access channel. Noushahr harbor (from 1939) had no sedimentation problem until 1988. Then dredging became necessary at the harbor entrance. The dredging rate was about 100'000 to 120'000 m³/year for several years. However, it has been increased to about 200'000 m³/y in the last three years [1]. Several factors have been studied in order to describe the specific trend of sedimentation along Nowshahr Harbor lifetime. Among them are the sea level change, modifications in the harbor layout, and the effect of road construction along Chaloos river near the harbor.

There are no or seldom studies which address specifically the effect of Caspian Sea level changes on sedimentation behaviours at the harbors, including Nowshahr. The sea level has been decreased continuously from 1930 to 1977 by more than 3 meters. Then it has been increased continuously to 1995 by 2.5 meters. It is not possible to describe the trend of harbor entrance siltation and the annual dredging reports without taking the effect of sea level change into account [1].

There are several studies addressing the effect of sea level rise on the shoreline migration in general. Bruun (1962) studied the effect of sea level rise on the shoreline erosion [2]. He proposed a simple relationship based on adaption of the surf zone profile just by cross shore sediment transport (Fig.1). Schwartz (1967) named that relationship Bruun Rule [3]. Brune (1983, 1985, 1988) reviewed

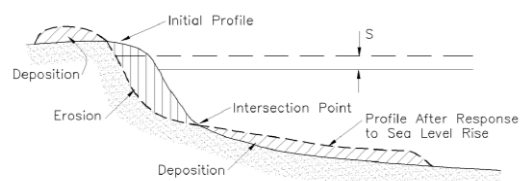


Fig.1. The concept of Bruun Rule