Effects of Coastal River Dynamics on Shoreline Sedimentological Characteristics and Movement (Case Study: Western Makoran Coastal Plain, Iran)

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Extended Abstract

Introduction

More than half the world's population lives in coastal regions (Bird, 2008). The shorelines are unstable zone that comprises marine and terrestrial domains very sensitive to a variety of geological process; Waves and tides play a most important role in the coastal dynamics, and their mutual interaction accounts for redistribution of the sediment budget causing accumulation or erosion (Dabrio, 2000). The coastal ocean, where land, air and sea meet, is a region of very high physical energy and biological diversity that is heavily exploited by man (Murthy et al., 2002). Tidal flats are low-lying areas where alternately covered by water and exposed to the air each day (Gore, 2010). Analysis of forms and coastal conditions provides a valuable key for coastal management. Many studies have been conducted on the impact of waves on beach (Bagnold, 1939; Ross, 1955; Hayashi and Hattori, 1958). In a related research on western Mokran coastal plain, Shayan et Al. (2014) found that in terms of forming processes and according to the coastline curves and rivers' hydrodynamics, coastal sand masses were located by coastal waves. The aim of this study is to identify the effects of fluvial flows on sedimentological characteristics of shoreline in the western part of Mokran coastal plain, Iran.

The study area is located at 25^{o} 31'- 27^{o} 09'N, 56^{o} 54'-59^{o} 19'E, in western part of coastal plain of Mokran, south Iran in the north coast of Oman Sea and west to Strait of Hormoz. In general, the study area could be assumed a dry land with very low rain of windy, sand storm, torrent shower, thunder-storm, higher humidity and hazy down (Akbarian et al., 2006). From geological aspect, this area is affected by general construction of the Mokran (Makoran) region and mainly composed of shale, marl and sandstone layers.

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Materials and Method

The data of this research are including spatial distributions of tidal zones, velocities and directions of wind, fetch length, the morphologic and sedimentological characteristics including granulometeric and morphoscopic indicators. Geologic and topographic maps, satellite images, GPS, binocular microscope and computer software including ArcGIS and Gradistat also were used as the research tools. For sediment measurement studies, 8 samples were taken from shoreline. The samples were analyzed using ASTM standard sieves and Gradistat software from granulometery aspect. Morphoscopic indicators were investigated by 40X binocular microscope. After that, by using wind data, WRPlot View software and Molitor equations, wave characteristics were studied and the wave roses were plotted also.

Results and Discussion

It can be concluded that the processes of marine sediment transportation are in force across the range of this coastal zone. Waves and tides deliver sediment to the intertidal zone, so that wind is able to transport it landwards from the intertidal to the supratidal area (French, 2001).

Particle size windows (PSWs) are interpreted as reflecting different modes of sediment transport and deposition (Clarke et al., 2014). A beach can be composed of a wide variety of materials of many sizes and shapes (Dean and dalrymple, 2004). Based on sedimentological characteristics, tidal deposits are comprised of fine-grain to very fine sandy materials. In general, these grains are angular to sub-round and their surface textures are bright. The samples don't have clay hunks but have small fragments of marine shells.

Waves are crucial in stirring up sand in the nearshore; variations in direction of wave approach, combined with irregularities in sea floor topography results in refraction or bending of wave crests and this initiates variations in energy levels received along a shoreline (kidd, 2001). On south coast, west and southwest waves are predominant from October till the end of June; In July, the percentage of southeast waves is considerably increased except of West Jask Cape. This situation continues till the end of September. Thus, the sediments brought by rivers, are drifted in different directions by waves along with coastline sharp curvatures.

Conclusion

The results of this present study show that coastal area sands were transported by the sea processes as a final stage. But morphometric indicators represent high impact of fluvial processes on coastal deposits. It can be concluded that sources of the analyzed sediments is adjacent to mouth of the rivers in the region; the transportation ability of sea processes is less than performance need to eliminate fluvial effects on coastal deposits and sediments.

Keywords: coastal geomorphology, sedimentological processes, shoreline, West Mokran plain.