

Overview of beach and wave condition along the Tamil Nadu coast, India

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Abstract: The present study provides overview of beach and wave condition along the Tamil Nadu coast, India. The coastline of Tamil Nadu experiences different seasons in a year namely, South-west monsoon (July, August, September and October), North-east monsoon (November, December, January and February) and non-monsoon (March, April, May and June). Researchers carried out several studies in Tamil Nadu coast and revealed many geomorphological processes. This paper highlights the key geomorphological process along the central Tamil Nadu coast.

Keywords: *Coastline, Cyclone, Geomorphology, Tamil Nadu, India.*

1. INTRODUCTION

The coastline of Tamil Nadu extends for 1,076 km (669 mi) from Pazhaverkadu of Thiruvallur district to Ezhudesam of Kanniyakumari district. It has different coastal segment categorized as Northern part, Central part and Southern part. All are east face side covered by Bay of Bengal. Some part of the coastline in south Kanyakumari surrounded by the Indian Ocean. As seen in the beaches, a series of sand dunes occurred parallel to the coast in the places around Velankkani, Karaikkal, Tharangampadi and Cuddalore [1, 2]. Dunes are located close to the beaches and upto the height of about 5m. The dunes are generally devoid of vegetation. A wide sandy beach of varying width from 50m-200m can be seen in the entire coastal stretch. The beaches are found to have medium to fine sand with numerous dune complex [3 – 6]. The beaches are straight and gentle in slope. The beaches are found to have thick alluvium in the adjuncts.

2. BEACH AND WAVE PROCESSES

The wave climate for the study region is characterized by the Southwest monsoon (June-September), Northeast monsoon (October to January), and non monsoon period (February to

May) [2]. The wave approaching the coast is predominantly from Southeast (135°N) during Southwest monsoon, Northeast (45°N) during Northeast monsoon, and East (90°N) during non-monsoon. The wave period mostly lies between 8s and 10s during the year [7 – 10]. Beach ridges are elongated, narrow mounds of unconsolidated or semi consolidated materials such as gravel, sand, and shells. They are located at the back of an active beach above the mean high tide and storm wave zone, and roughly parallel to the waterline. Nagapattinam, Karaikkal regions have highly exposed beach ridge formation on backshore environment. On the other hand, there is no dune formation reported within the stretch.

The slope of beach is the angle formed by the intersection of plane of a beach with the horizontal plane of the sea water surface. The size of the beach slopes by more or less, fixing the width of the beaches covered by tidal water. Beach width changes over varying timescales make a vital stage for shoreline management, especially, seawall construction, hazard setbacks, available of engineering works, manmade activities, etc. During January to April; the beach profile is found to gradually decrease and attain the maximum level during monsoon season. However, September onwards the beach width slightly increases from its minimum level. It is due to comparatively low wave energy and reversal trend in the direction of sediment transport prevailing during the monsoon [11 – 14]. The annual seasonally profile of the beaches in the study area reveals the presence of net erosion without giving any chance to monsoonal effects as well as tropical cyclone effects [15 – 17].

3. TROPICAL CYCLONES

An analysis of the frequency of cyclones on the East coast of India between 1891 and 1995 shows that there are 449 cyclonic storms, and 189 extreme cyclonic storms occurred in and around east coast stretch, which indicates that a moderate to severe cyclone hits the Tamil Nadu coast every two years. Though the tropical cyclones occur in many parts of the east coast of India, the central Tamil Nadu coast is one of the ideal tropical cyclogenesis zones [9, 10, 14, 20, 21]. Alongside, there is no major earthquake activities present in the Tamil

Received : 26 July 2018; Revised: 30 September 2018; Accepted: 08 October 2018; Published online: 24 December 2018

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Nadu coast line [18, 19]. The cyclone study shows a maximum of damage to the life in Nagapattinam and Karaikkal cyclones. The earlier report has indicated maximum wind speed in the South Nagapattinam during 1952, but the cyclones are not that frequent. From the year 1991, the cyclones are the very high order in that location. After 2010, many cyclones affected the Tamil Nadu coast for example, Thane (2011), Nilam (2012), Madi (2013), Roanu (2016), Kyant (2016), Nada (2016), Vardah (2016), Ockhi (2017) and Gaja (2018). The dataset proved that intense tropical cyclones can be formed in and around the Tamil Nadu coast. Through the evidence, Tamil Nadu coast stands for one of the cyclonic vulnerable zones of North Indian Ocean [20 – 21].

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