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## Analysis of Causes and Effects of Coastal Erosion and Environmental Degradation in Southern Coastal Belt of Sri Lanka Special Reference to Unawatuna Coastal Area

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### Abstract

Sri Lanka is an island with a coastline approximately 1600 km in length and it is the boundary between the land and the sea to protect the land mass of the country. Today coastal erosion and environmental degradation are accelerating along many coastal areas of the country due to the natural and anthropogenic activities. The prime objectives of this study are to identify the natural and anthropogenic activities to coastal erosion, problems associated with the instability of coastline, analysis of the intensity of erosion and identify possible management strategies against coastal erosion in southern coastal belt of Sri Lanka specially in the Unawatuna coastal area. Quick bird satellite images from Google Earth used to assess the behaviour of the coastline and to identify the land use patterns around the study area. Randomly selected 100 residents were subjected to collect primary data through questionnaire survey to assess the livelihood activities against coastal erosion. Chi square, used as statistical analysis tools while image processing, digitizing, geometrical calculations in GIS and Remote Sensing used as descriptive analysis tools to achieve the prime objectives of this study. The study found that both natural and anthropogenic factors are subjected to coastal erosion in the area. Natural sea waves became more destructive and its incentive increased due to the artificial rock dam (water break) constructed in the area. At present tourism and related human activities have been a stimulus for the coastal erosion. Erosion along the beach in 2007 was at natural level, and it represented 19408.87 m long. In 2011, erosion gradually increased and the length of beach represented as 10081.99 m, and in 2013, sand was pumped into the coast along the beach, thus expanding up to 13389.38 m. The sand pumped into the shore to stop the erosion deposited on coral reefs, and had made bad effects on the bottom dwellers of the sea. Also erosion has made a breakdown of tourist industry indirectly and the economy of the country. Removing the rock dam along the belt was a major suggestion, and several minor strategies are possible to be implemented to minimize this problem.

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## 1. Introduction

Coastal areas are very important for human beings, as they witness culture and economic exchanges between different nations. Most of the big cities, having famous harbors around the world are situated at coastal areas. About one third of the human populations are living in and around the seashore areas. Due to abundant natural resources, urbanization and population rapidly increase on coastal areas. Various developmental projects are installed in the shore line areas, placing great pressure on it, leading to diverse coastal hazards like sea erosion, sea water intrusion, coral bleaching, shoreline change; etc. Coastal landforms are highly dynamic in nature [1]. Coast line simply defines as the outline of a coast, when seen from the sea, or the land adjacent to it [2].

Coastal erosion is a natural process, and it is a major problem for developed shorelines everywhere in the world, today. The land ward displacement of the shoreline caused by the forces of waves and currents is termed as Coastal Erosion. The Coastal areas have become more prone and vulnerable to natural and human made hazards, which lead to Coastal Erosion [3]. Coastal Erosion mainly occurs when wind, waves and long shore currents move sand from shore and deposit it somewhere else [3]. Coastal landforms are highly dynamic in nature; however, urbanization and population rapidly increase on these areas due to the abundant natural resources. Human activities related with this negatively impact the shoreline, and coastal erosion can become a serious problem, today.

Sri Lanka is one of the countries with a number of world heritage sites, and it is an island with a coastline approximately 1600 km in length and it is the boundary between the land and sea to protect the land mass of the country. The coastal environment of the country is very attractive and it consists of rich bio diversity and different kinds of natural resources. Hence, the land area on coastal belt has high environmental value as well as high economic and social demands. According to the archeological sources of the country, coastal areas have been very popular among the foreigners since colonial period. Mirissa, Weligama, Beruwala, Bentota, Nilavelee, Trincomalee, Tangalle, Polhena, Koggala, Unawatuna, Hikkaduwa, Arugambe are the most attractive coastal lands in the country, especially the south and south – western coastal areas in the country have very beautiful environment, and it leads to increase the tourists' interaction in these areas. It is one of the reasons that Sri Lanka is identified as one of the eco tourists' destinations in the world.

Coastal area is the densely populated with more than 65 per cent of the total country's population, and developed area in the country and contains the capital city of Colombo and several large cities. The total population in the coastal belt is projected to be 8.4 million in 2010 [4]. When the population increases in an area, the infrastructural facilities and related resources simultaneously increase to fulfill the demands of the particular people. It leads to damage the particular environment and related resources to some extent, especially the south west coastal line and southern coastal areas have high concentration of population, and it will enhance the coastal erosion of particular area as well. Hence, it is necessary to identify the factors and impacts of coastal erosion and environmental degradation in Sri Lanka to minimize the impact on it.

Tourism is one of the main sectors which contribute towards economy of the country. Tourism is a major activity in the coastal area. Tourism infrastructure, major commercial ports, fisheries, harbours and anchorage are also located in the coastal area. The main highway and railway are also located close to the coast [4]. The natural resources and environment of any areas leads to increase the tourist attractions in the country. Unawatuna is one of the attractive coastal areas, situated in the south-western coastal area of Sri Lanka, and it is one of the main tourism destination in the country due to a number of reasons. The beauty of the beach, the richness of bio diversity, the location of related tourism sites, the development of lot of infrastructural facilities etc lead to the increase of tourists' attraction in the area. The area has great historical value, and most of the archeological sources mentioned that Unawatuna coastal area was highly famous among the Europeans in the colonial period with their arrival to Sri Lanka. Unawatuna

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