Use of Side Scan Sonar in identification of submerged objects in the shallow sea area

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Abstract

North east coast is playing a significant role in economy of the country via fishery. Beach seine fishery has been initiated in this area after 30 years of civil war. Under water war remnants buried in the bottom of the north east shallow sea acts as a major impediment in improving of beach seine fishery in the area. Generally, unidentified buried objects are discovered with the help of divers and underwater cameras. However, this technique is ineffective, due to absurd searching in the sea bottom, time consuming and high cost. So survey becomes unsuccessful, most of the time. In this study, Side Scan Sonar (SSS) survey technique which has been developed using medical ultrasound technology was used to detect the specific objects that affect the beach seine fishery, their exact location and distribution on the seafloor. North east coast of Mullaithivu area in Northern Province was selected as the study area for four waypoints (W-9°18'32.42"N/80°47'14.59"E, X-9°19'16.10"N/80°48'2.97"E,Y-9°18'10.05"N / 80°49'15.06"E, Z-9°17'30.00"N/80°48'30.00"E) using the Integrated Global Positioning System (inbuilt GPS or DGPS Garmin Colorado 300 handheld GPS). Survey was carried out by towing vessel along predetermined survey lines just above the bottom of the seafloor depending upon the water depth. Data was collected using Imaginex Model 872 "YellowFin" side scan sonar combination with data acquisition using "YellowFin version 2.0.1.4" software. Image processing techniques of "sonarWiz" 5 and "ArcGIS" software was used to detect and classify buried objects in side-scan sonar images. According to the results, three objects were identified in three different locations. Object 01was at 09˚ 17.97244' N/080˚ 48.66892'E with 85 m length and 21 m width, while object 02 was at 09˚ 18.71599' N/080˚ 48.02634'E with 55 m length and 15 m width at the widest point. Location of object 03 was at 09˚ 18.87650' N/080˚ 47.48114'E with 120 m length and 25 m width at its widest point. Highest coverage (with greatest length and width), was recorded for object three (3000 m) which was distributed over a larger area of sea bed. Distance from coastal area to object one, two and three are reported as 400 m, 575 m and 200 m respectively. Third object is in close proximity to beach environment compared to other two. Average depth of the studied area was recorded as 10 -12 m. Sharp edges and curvy features of first and second objects indicated that these two objects are ship wrecks. Images show vast amounts of ship debris around these identified ship wrecks. Since these two artificial objects were identified within boundary of coastal area, there is a high potential to damage coastal fishing gears, especially beach seines by entangling and will waste time and money in repairing the damaged nets. Third object exhibits blunt edges with smooth curvatures and can be a natural structure such as a bed rock or a sand bar. The identified objects can be marked as the objects that directly influence on commercial beach seine industry. Side Scan Sonar can be recommended as a modern technique useful in detection of underwater objects with their precise location.

Keywords: Side scan sonar, shipwrecks, sea floor, beach seine nets