

Implementation of Oil Spill Mapping Based on GIS and Remote Sensing Techniques

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Abstract: Oil spill has turned out to be major problems in nations particularly that have oceans or seas like Iraq, Malaysia and others. This circumstance creates harm to earth and also, contaminate the water. To minimize the effect of harm and to secure life in water, plants and soil so close to this affected zone definitely a study and examination has to be made. The causes and variables that prompt the calamity of oil slick should be contemplated or researched. Global information system and remote sensing can be utilized to dissect this issue. The point of review is to apply Geographical Information System (GIS) and remote sensing methods to decide the area and to guide oil slick territory utilizing Radarsat information.

Key words: Oil spill, GIS, radar, remote sensing, slick territory, examination

INTRODUCTION

Oil spills adrift dirty the marine condition to a shifting degree amid extensive oil tanker mischance, particularly when they happen near the drift. Then again, oil discharge from boats when cleaning tanks, may turn out to be a much more terrible contamination. When considering how frequently such spills occur amid normal ship operation (Ibrahim and Seeni, 1999). The impacts of the contamination can be limited if the spills can be recognized early. Space borne radar remote detecting might be utilized to help recognize oil slicks. It has been reported that space borne radar remote detecting has certain abilities to identify oil slicks as a result of

substantial territory scope and all climate perception by utilizing separating and grouping procedures, the oil slick/smooth regions can be upgraded to enhance their discovery. Mishaps including ocean tankers have been one of the contributing components to oil slicks (Andrew, 1995; Kang, 2008). The event of mishaps and consequently the spills are never expected-nobody knows when and where it will occur. The earnestness of a spill might be influenced by various components: the sort and amount of oil spilled where oil is spilled, climate conditions, encompassing situations and so on. This is the reason counteractive action and readiness is critical (Fig.1).

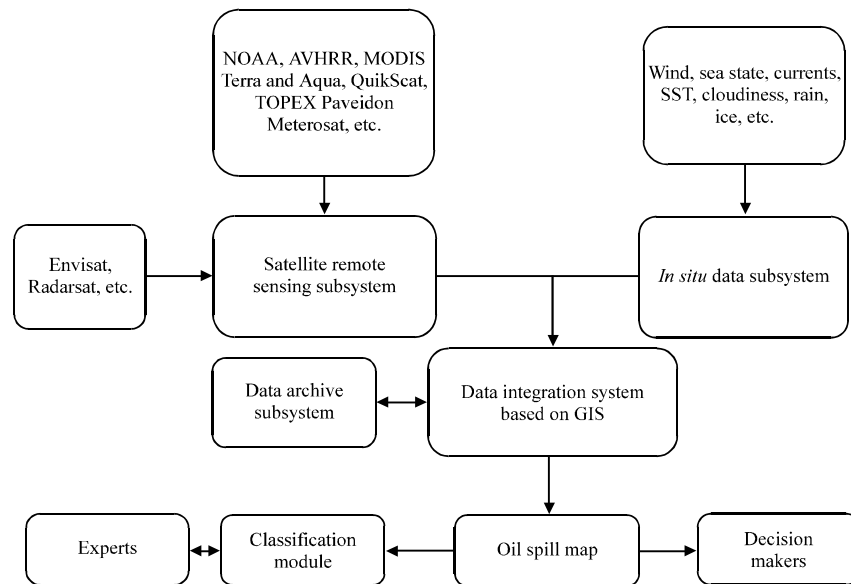


Fig. 1: Oil spill monitoring system view

Existing system: Oil slick has turned out to be basic in a few nations, particularly for nations that have oceans or seas like Iraq, Malaysia and others. The circumstance is brought on harm the earth and dirtied the water. To decrease condition harm and ensure life in water, plants and soil close to hazardous situation. Study and investigation ought to be done keeping up the integrity of the specifications. A general system view is depicted in Fig. 1. As seen such a system could be composed of the data integration subsystem based on a GIS and three subsystems responsible for: acquisition and processing SAR and other remote sensing data and images, collection in situ measurements and contextual information and backup and archiving of information. Amongst data of remote sensing satellites necessary for verification are data on the Sea Surface Temperature (SST), chlorophyll concentration and algae blooms provided by the visible/infrared sensors are essentially necessary. Wind and wave fields and rain rates over the ocean can be retrieved from data of microwave scatterometers, altimeters and radiometers. Collected remote sensing and in situ data and measurements can be further used as an input to oil spill drift models.

MATERIALS AND METHODS

Validation of methodology approach: Oil pollution of the Sakhalin coastal zone comes mainly from two sources, i.e., oil production and shipping (including fishing) activity. Spills produced by these activities can be found in any part of the coastal zone, especially, along the east coast and episodically along the west seashore. Large oil slicks were detected in the waters of Aniva bay and Terpeniya Bay, their sources are considered to be various, some of them having linear forms left by passing ships.

Discussions about wellsprings of oil spill that incorporate boats contamination, mishap of oil tanker and seaward boring and furthermore infected ocean winged animals and marine species, mangrove trees and fisheries assets can be found in the primary phase of writing survey. In second stage, remote detecting systems are talked about for example, Geo referencing, separating and testing of a few channels like Lee channel, Kuan, Enhanced Lee, Frost and Enhanced Frost. Distinctive window sizes are utilized for sifting. In the wake of sifting, the procedure of division and order are completed utilizing ecognition and ENVI programming project to decide the oil slick from the crude information of Tanjung Piai, Johor in the third stage, GIS systems will be used like outline and create GIS database (Ormsby *et al.*, 2004). In the fourth stage, spatial examination will be completed and the outcome could be acquired. At last, the finish of this review will be drawn up.

Geo referencing: Geo referencing is the way toward scaling, turning and making an interpretation of the picture to coordinate a specific size and position. The term dereference is comparable recognizable to GIS clients, yet, broad CAD clients may have never observed the word, despite the fact that the capacity is extremely valuable for their research.

Sub scene image: After Geo reference must take sub scene picture from the entire picture to spare time and memory in light of the fact that the picture preparing like sifting need much time and much memory estimate in PC.

Speckles separating: All SAR symbolisms including Radarsat are constantly stood up to with salt and pepper appearance because of the nearness of dots. Spots ascribe to the rationality way of radar backscatters utilized as a part of the picture arrangement, extremely influence visual investigation of the symbolism (Rolf, 2000; Marghany, 2001). In actuality the evacuation of dots enhance visual investigation as well as particularly improve oil slick components if treated with suitable channels.

Division image: The objective of division is to improve and additionally change the portrayal of a picture into something that is more important and less demanding to break down. Picture division is regularly used to find items and limits in pictures. The effect of picture division is an arrangement of sections that on the whole cover the whole picture or an arrangement of form removed from the picture.

Advanced image classification: The mechanized gathering of all or chose arrive cover highlights into outline classifications and can be actualized to order the aggregate scene content into a predetermined number of significant classes. Order methodologies can likewise be executed to recognize at least one particular classes of landscape (for example, water bodies, range, oil slick and carbon copy and land territory. Unsupervised computerized classification is the last stride after the division to demonstrate the oil slicks area from that point lookalikes and the encompassing ocean.

RESULTS AND DISCUSSION

The presented and discussed approach shows feasible to co SAR imagery and GIS. Oil spill maps clearly indicate those marine areas which are exposed to oil pollution. It is expected this information to be very useful

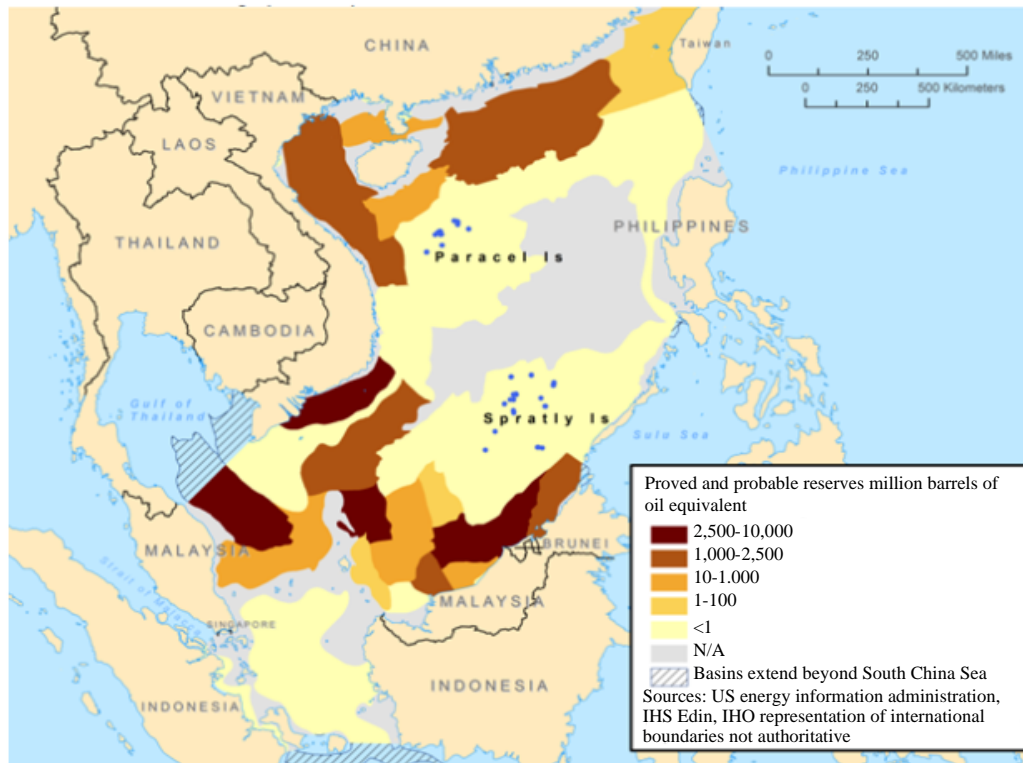


Fig. 2: Oil spill distribution map for the Gulf of Thailand based on processing and analysis of the ERS and envisat SAR images

both for decision makers of pollution authorities and experts of environmental agencies. Oil spill distribution map is a valuable remote sensing product and is of commercial value.

Figure 2 shows spatial distribution map of oil spills in the GOT, created with help of GIS where major oil spill and risk areas are clearly seen. The oil spills in the GOT were basically detected in the navigation areas, along main ship routes and at the mouths of the large rivers such as Chao-Praya, Tha Chin, Mae Klong and Bang Pakong in the Bangkok Bight. The oil pollution in the central area of the GOT is due to oil discharges from ships. The most polluted waters (large concentration of oil spills) were revealed in the Southern part of the GOT at the border of territorial waters between Thailand and Malaysia. Comparison of our results with results obtained is showed an efficiency of the given approach for mapping of oil spills in this basin.

CONCLUSION

From this study, beginning results have been acquired in the wake of preparing the Radarsat information utilizing the remote sensing strategies to identify the oil spill. Research will be kept utilizing the GIS to build up the database of oil spill of the review

region. This review shows that the remote sensing and GIS systems can be utilized for location of oil slick.

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