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Challenges in Developing a Sustainable Dredging Strategy

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Abstract

Sustainability issues are of growing concern in the world, as the effects of human activities on the planet become more visible. The environmental impact of dredging activities has been a point of discussion for a long period. Over recent years more emphasis is put on sustainability by different stakeholders in answer to the climate change effects like pollution, shortage of resources , stress on ecosystems and as a result an imbalance in the total system. It is our task to combine sustainability requirements with the ever increasing demands on dredging applications. To date, dredging equipment has been designed from an economical point of view. The social balance is more or less easily attained depending on the situation. This paper will evaluate the challenges to develop a sustainable dredging design philosophy with ecological requirements, without compromising economy.

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Keywords: dredging; sustainability; climate change; challenges

1. Introduction

Dredging is an activity that is required to be carried out to remove the unnecessary deposits from water pathways. But even though the activity aids regularity in marine traffic, it is not without its disadvantages. Dredging possess a huge threat to the marine environment and is required to be carried out quite carefully aided only with the help of the right dredgers and dredges.

Significant effects of dredging on the marine environment include effects of the dredging process and disposal process. The dredging site undergoes biological, physical and chemical impacts. Dredged material may cause suspended solids during dredging as a result of substratum disturbance and during transport to the surface, overflow from barges or leakage from pipelines during transport between dredged and disposal sites. Dredging may affect the physical environment by changing the bathymetry, current velocity and wave conditions [1]. Light attenuation by suspended sediments affects the amount of light available to sea grass plants and several marine organisms. Turbidity should not only be expressed in terms of a reduction of light but also by investigation of suspended solid concentrations [2]. The turbidness of the soil under the water also changes because of this alteration in the underwater soil composition. This poses problems by way of creation of newer and harmful organisms, transferring of unwanted organisms to other parts in the water-body leading to a wider spread of contamination and organic processes by way of release of extra and unwanted nutrients. The turbidness also causes the already existing contaminations to spread further into the water-body which also affects the marine environment adversely.

Since dredging loosens up the soil, those substances which were previously held fast to the contaminated deposit will find their way into the water and the un-dredged soil. If these substances are harmful organisms then they

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will cause a substantial degradation to the environment even after dredging the area. To ensure that the process of dredging is carried out without any debilitating effects, it is important to use the right dredgers. As an example, the trailing suction hopper dredgers that suction out the deposits are considered to be a major cause for turbidness in the dredged water-part. It has been recommended that those dredgers which present a chance for pollution and extensive contamination be avoided and replaced with other safer methodologies.

In this paper, the environmental impacts of dredging and major challenges for sustainable dredging at Jamuna river of Bangladesh are presented as a case study.

2. Case Study

Bangladesh government has undertaken a mega project named "Capital Dredging of River System of Bangladesh". One of the major Location of dredging is Jamuna River from upstream of Sirajganj Hard Point (through Bangabandhu Bridge) to near Dhaleswari Offtake [Fig.1]: to divert the flow from the west channel into a mid-channel to reduce the risk of failure of Sirajganj Hard Point and to guide the flow along the middle of the existing char through the Bangabandhu Bridge to near Dhaleswari Offtake[3].

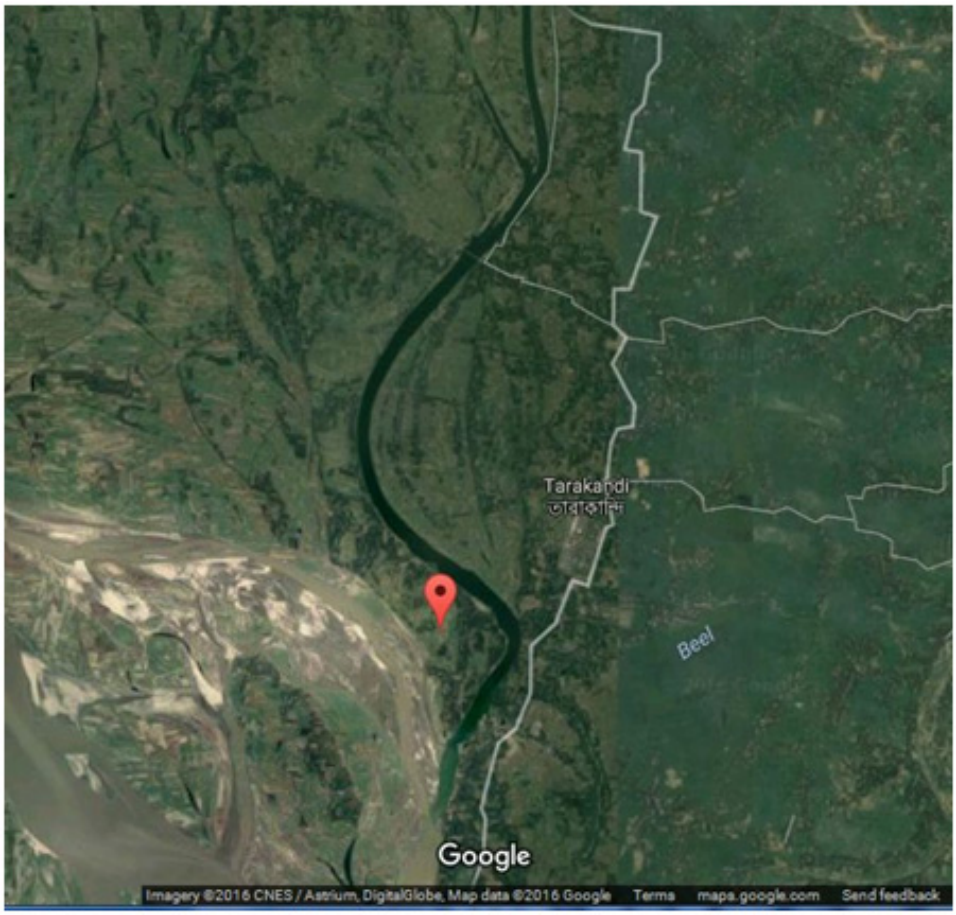

Fig. 1: Map for the site showing the proposed dredging zone of Jamuna river

It will reduce the risk of riverbed scour along the Sirajganj hard point and also reduce the erosion of right guide bundh of Bangabandhu Bridge [4]. 192.42 kilometres of river have been already dredged. It includes test dredging