Mapping of Sand Deposition Using Spectral Crust Index – A Case Study of Kosi River Region

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***Abstract*— The paper presents an area estimation and mapping of sand deposition around Kosi river due to several floods this river has witnessed over last many decades. Remote sensing technique has been used for this estimation. Difference in the reflectance of different soil types has been used as a tool to mark out the areas with sand deposition.**

***Index Terms*—Remote Sensing, Spectral Crust Index .**

I. INTRODUCTION

The Kosi river in north Bihar has suffered many floods over last many decades. Due to these floods there is a permanent sand deposition around the Kosi river. Mapping these areas with ground survey is very difficult , costly and time consuming. But using Remote Sensing technique it can be done very easily.

Spectral Crust Index is calculated using the normalized difference between the spectral values of the Red and Blue band. This index can be applied to differentiate the soil having sand deposition with other soil types.

II. SPECTRAL CRUST INDEX

Formula of spectral crust index is $CI = 1 - \{ (RED - BLUE) \setminus (RED + BLUE) \}$.

This index can be used on any satellite imagery having Blue (400-500 nm) and Red (500- 600 nm) band. The value of CI ranges from 0 to +2. In this paper we have applied this index on the Landsat 8 imagery (Figure 1) captured on 10th April 2013 of the Kosi River area.

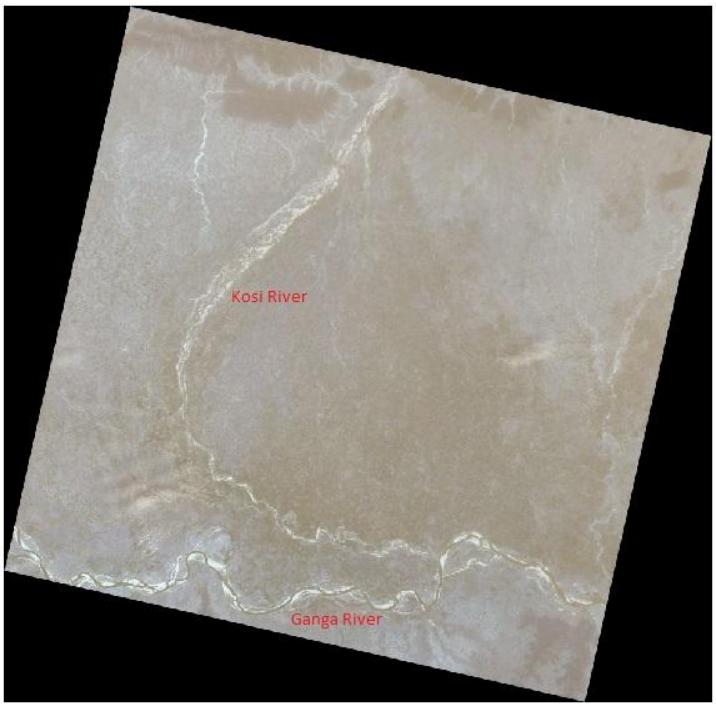

Fig 1. Landsat 8 Imagery of Kosi River Area

III. METHODOLOGY

When we apply Crust Index on the Landsat imagery(Figure 2) , we can easily recognize the soil having sand deposition . Soil having sand deposition will appear dark as compared to the other soil types due the absence of organic matter in it. The CI value will range from 0.96 to 0.98.

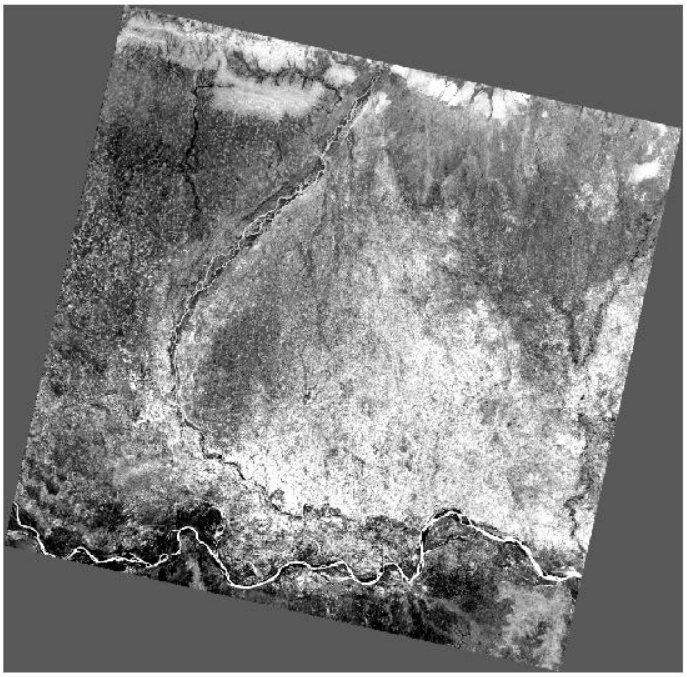

Fig 3. Crust Index image of Kosi River Area

Crust Index image when converted to a binary image (soil with sand =1 & other =0) we can get a more clear map of the soil having sand deposition (Figure 3).

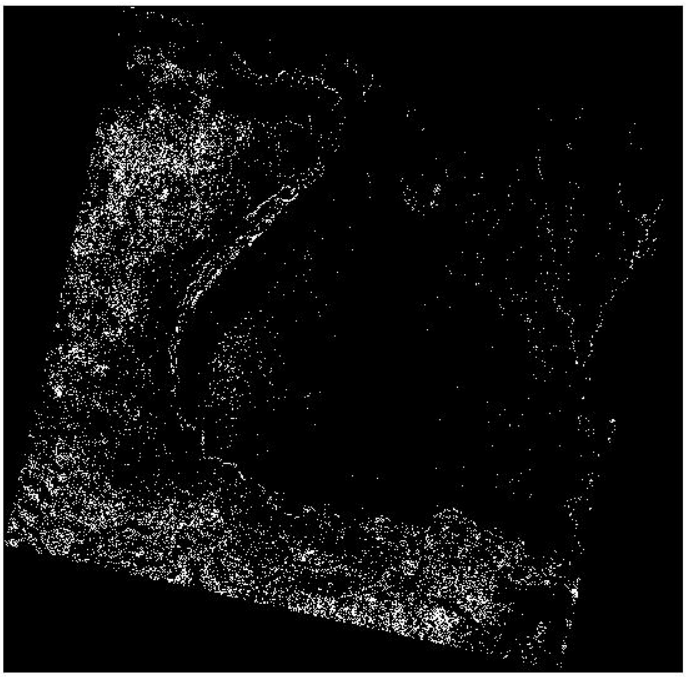

Fig 3. Binary Image of Kosi River Area after using Crust Index.(Soil with sand is in white)

IV. CRUST INDEX MODEL

Here Landsat 8 image was taken as an input raster. The two functions were created where (RED – BLUE) and (RED + BLUE) operation was performed in each of the two functions. The output of these functions were stored in two temporary raster. Then again a function was created to perform { 1- (RED-BLUE) \ (RED + BLUE) } operation. The final output was the Crust Index image.

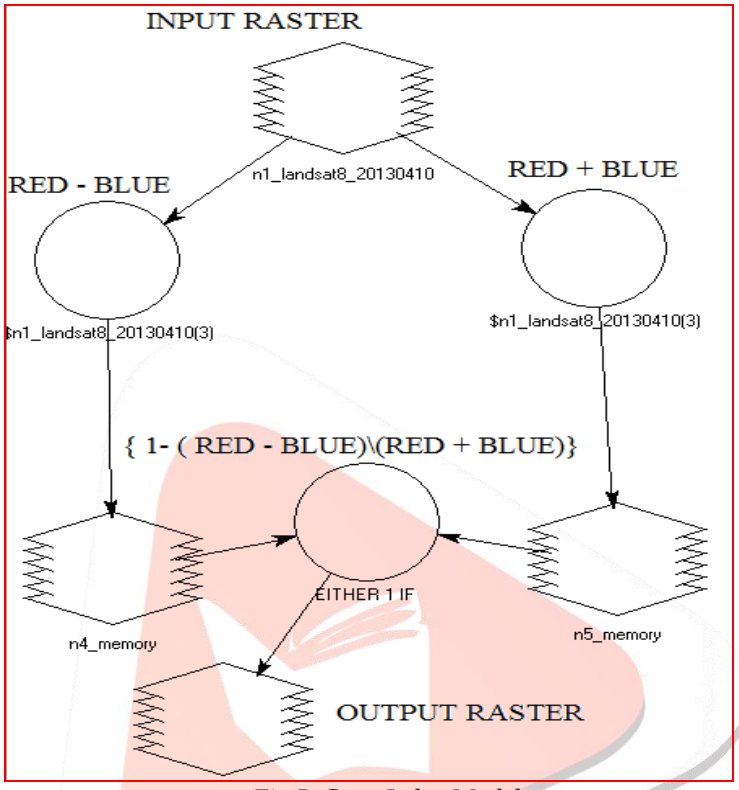

Fig 5. Crust Index Model

V . CONCLUSION

After using Crust Index on Landsat Imagery we saw that we can easily map out area having sand deposition. This technique can be easily used on post flood evaluation.

VI . ACKNOWLEDGMENT

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