



Historical Morphodynamics Assessment in Bridge Areas using Remote Sensing and GIS Techniques

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Abstract

Currently the Ministry of Construction is responsible for planning and construction of bridges across the country but remote sensing and satellite data are not widely used in the Ministry's routine process. Although the inspection and monitoring are carried out by the conventional methods, the remote sensing and GIS techniques are available as an alternative way with time and cost saving. From this study, the channel migration in the locations of Ayeyarwady bridges will be analyzed and mapped by identifying temporal changes of channels. Google Earth Engine is used as the primary application in this study and surface water extraction from historical Landsat satellite imagery is done by GEE. River centerline processing and erosion-deposition area identifications are carried out by GIS technique. Study period of each bridge is between 1987 and 2017. Bo Myat Tun Bridge and Ayeyarwady Bridge (Pakokku) are topped in the list with highest migration and erosion-deposition rate according to the study. The goal of this study is to assist the bridge inspections and channel monitoring works by means of remote sensing and GIS techniques which are currently undertaking by Ministry of Construction with conventional techniques.

Keywords: Remote Sensing; GIS; Channel Migration; Change Detection; River Morphology.

1. Introduction

Rivers and streams are self-regulatory in that they adjust their forms in response to environmental changes which may occur naturally or sometimes may be results of human activities. Climatic events like heavy rain and volcanic activities are natural factors while other activities like river training, damming, diversion, sand and gravel mining, channelization, bank protection, and bridge and highway construction can be considered as human activities. Both activities distort the natural quasi-equilibrium of a channel. In order to restore or maintain the balance between its ability to transport and the load provided, one or more of the following characteristics may necessary to adjust such as its slope, roughness, bed material size, cross-sectional shape, or meandering pattern [1, 2].

River morphology is a scientific field dealing with changes in the shape of rivers, mainly due to sedimentation and erosion processes. The morphology of rivers is also a complex issue, which can be subdivided into several areas including overland flow and channel flow, drainage systems and channel networks, discharge and basin area, stream erosion-deposition and transportation [3]. The focus of this study is monitoring the changes of the channels in bridge areas.

River monitoring can be recognized as a key issue for river management and training. Recent developments in remote sensing technologies opened up unprecedented capabilities to perform high quality monitoring program for a wide range

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