AN APPROACH TO IMPROVE ELEVATION MODEL ACCURACY AND ITS APPLICATION IN FLOOD AFFECTED TEA PLANTATIONS OF BRAHMAPUTRA FLOODPLAIN

Prangya Paramita Gupta

Tea Research Association (TRA),
Tocklai Experimental Station, Jorhat, Assam-785 008, paramita2680@gmail.com

Abstract: Tea is a major source of revenue and foreign exchange for India and Assam produces more than 50% of the tea produced in India. Tea is mainly grown in the floodplains of the River Brahmaputra where change in slope is low. Tea has a wide range of climatic adaptability; however some optimum weather conditions, specifically rainfall and temperature, are required for its production. With the changing climate the distribution of rainfall has become erratic in this region. Too much of rainfall is concentrating within a short period of time, resulting in severe flood and waterlogging conditions which are detrimental for tea production. It is a recurring problem in Assam creating social and economic vulnerability. Keeping in mind the scale and frequency of flood events in this part of the globe, flood management measures need more attention. Flood models are widely used as an effective tool in flood management. One of the fundamental requirements of the flood models is the surface topography which is generally represented as Digital Elevation Model (DEM). Remote sensing is widely used to map the topography by generating DEMs. Now, the term DEM is very much generalized and often misused. Automatically derived elevation models from remotely sensed data represent both the ground surface as well as the objects on the earth's surface at scale of the resolution of the image resulting in a Digital Surface Model (DSM). Bare earth surface models, known as Digital Terrain Model (DTM), are also used in flood models by removing the surface artifacts from the DSM either manually or semi-automatically using commercial off-the-shelf tools. In flood condition some of the surface artifacts e.g. forest are permeable to water allowing a smooth passage of runoff whereas some are impermeable e.g. buildings and tend to obstruct the flow. Thus a DSM or a DTM will either overestimate or underestimate actual surface topography respectively in a flood situation. Therefore, instead of using a DSM or a DTM it may be more logical to use a pseudo-DTM by removing the permeable artifacts from a DSM while keeping the impermeable ones. The present study has been carried out in River Waal floodplain in The Netherlands where average elevation was 12 above msl and has topographic similarity with the floodplain of River Brahmaputra. A methodology has been developed to create a pseudo-DTM whose first step is the identification of the artifacts which are required to be removed and retained. A pixel based feature identification technique has been adopted using coloured digital aerial photographs. Both colour and texture parameters were used separately as well as in combination for classification to find out an optimum solution. Gray Level Co-occurrence Matrices (GLCM) of various sizes was used for the texture based image classification. The study reveals that a combination of colour and texture classifies the image more accurately than if they are used separately. The present study is relevant in flood modeling in the flood affected tea growing regions of the River Brahmaputra floodplain.

Keyword : *Tea, flood, image classification, pseudo-DTM, Climate Change.*