Point and pixel inclusive machine learning models for exploring gully erosion susceptibility

Swades Pal, Sandipta Debanshi & **Satyajit Paul**

Pages 16188-16211 | Received 30 Jan 2022, Accepted 21 Jul 2022, Published online: 02 Aug 2022

Cite this article https://doi.org/10.1080/10106049.2022.2106315 Check for updates

Abstract

Sample point based spatial model derived from Machine Learning (ML) algorithms often generalizes the spatial pattern of an event. The present study has tried to highlight how far it is acceptable and can it replace with pixel based modeling? The present study has presented a comparative view of pixel and sample point based modeling of gully erosion susceptibility of the upper Mayurakshi basin to assess the predictabilities. Random forest (RF), Support Vector Machine (SVM), and (ADB) have been applied for developing pixel and point based models in Python and WEKA software environments respectively. The models show that 14–25% area located mainly in the upper parts of the study unit is very highly susceptible to gully erosion. Based on the accuracy and performance level using area under curve (AUC) of Receiver operating curve, sensitivity, precision, F1 score, MCC, pixel based ensemble models are superior to point based modeling. The point-based models often have an inferior agreement with training and testing data. So, pixel based models could not be replaced with point based models. RF is found as the best representative model. The study, therefore, recommends using pixel based modeling for this or a similar purpose. Since the models have figured out the gully erosion susceptible areas, it would be a useful tool for related planning processes.