

Modeling Deforestation Using Logistic Regression And Artificial Neural Network in Golestan Province, Iran

Kamyab H.R.¹ and Salman Mahiny A.^{2*}

1. Department Of Natural Resources Engineering-Environment,
Tarbiat Modares University, Iran

2. *College Of Environment, Gorgan University, Iran
Kamyab_Hamid@Yahoo.Com

Abstract

A major force of environmental change is the change of natural land-cover due to human uses of land. Obald and Hobbs described two basic types of spatially explicit land use change models Logistic regression (LR) and artificial neural network (ANN) methods. These have been used to model the deforestation in the Golestan province between the years 1987-2001. Seven variables including slope, distance to roads, elevation, distance to rivers, vegetation density, distance to urban area and distance to forest edge were used in the modeling methods. Relative operating characteristic (ROC) was used to assess the success of the modeling methods. ROC value for LR and ANN was 0.931 and 0.663 respectively showed the success of the modeling methods. The results show that prediction of exact locations in LR was better than LTM. Also, the relative effect of the seven predictor variables have been evaluated through ROC by using seven reduced-variable models and the full model. Using this method, we found that removal of the variable of vegetation density has the highest effect on ROC value as compared to other variables. Furthermore, elevation removal improved models prediction ability has been carried out. Thus, spatial patterns of deforestation distribution were created by these models. Based on the probability map, we can answer the question such as “Where would deforestation occur if we knew the amount of deforestation?” In addition, the study area is covered by 17.4% in 1987 forest. Forest distribution patterns maps were produced and showed that forest area would be decreased down to 15% and 10% in both models.

Keywords: *Deforestation, Logistic Regression, Land Transformation Model, ROC, Golestan Province*