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Predicting a roadkill hotspots based on spatial distribution of Korean water deer (Hydropotes inermis argyropus) using Maxent model in South Korea Expressway : In Case of Cheongju-Sangju Expressway

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Road construction has direct and indirect effects on ecosystems. Especially wildlife-vehicle conflicts (roadkills) caused by roads are a considerable threat for population of many species. This study aims to identify the effects of topographic characteristics and spatial distribution of Korean water deer (Hydropotes inermis).
Korean water deer is indigenous and native species in Korea that listed LC (least concern) by IUCN redlist categories. Korean water deer population is growing every year occupying for most of roadkills (>70%) in Korean express highway.
In order to predict a distribution of the Korean water deer, we selected factors that most affected water deer's habitat. Major habitats of waterdeer are known as agricultural area, forest area and water. Based on this result, eight factors were selected (land cover map, vegetation map, age class of forest, diameter class of tree, population, slope of study site, elevation of study site, distance of river), and made a thematic map by using GIS program (ESRI, Arc GIS 10.3.1 ver.). To analyze the affected factors of waterdeer distribution, GPS data and thematic map of study area were entered into Maxent model (Maxent 3.3.3.k.). Results of analysis were verified by the AUC (Area Unit Curve) of ROC (Receiver Operating Characteristic). The ROC curve used the sensitivity and specificity as a reference for determining the prediction efficiency of the model and AUC area of ROC curve was higher prediction efficiency closer to '1.' Selecting factors that affected the distribution of waterdeer were land cover map, diameter class of tree and elevation of study site. The value of AUC was 0.623. To predict the water deer's roadkills hot spot on Cheongju-Sangju Expressway, the thematic map was prepared based on GPS data of roadkill spots. As a result, the topographic factors that affected waterdeer roadkill were land cover map, actual vegetation map and age class of forest and the value of AUC was 0.854.
Through this study, we could identify the site and hot spots that water deer frequently expected to use based on quantitative data on the spatial and topographic factors. Therefore, we can suggest ways to minimize roadkills by selecting the hot spots and by suggesting construction of eco-corridors. This study will significantly enhance human-wildlife conflicts by identifying key habitat areas for wild mammals.