Analysis on the flood vulnerability in the Seoul and Busan metropolitan area, Korea using spatial database

Mung-Jin Lee

Korea, Republic Of (leemj@kei.re.kr)

In the future, temperature rises and precipitation increases are expected from climate change due to global warming. Concentrated heavy rain, typhoons, flooding, and other weather phenomena bring hydrologic variations. In this study, the flood susceptibility of the Seoul and Busan metropolitan area was analyzed and validated using a GIS based on a frequency ratio model and a logistic regression model with training and validation datasets of the flooded area. The flooded area in 2010 was used to train the model, and the flooded area in 2011 was used to validate the model.

Using data is that topographic, geological, and soil data from the study areas were collected, processed, and digitized for use in a GIS. Maps relevant to the specific capacity were assembled in a spatial database. Then, flood susceptibility maps were created. Finally, the flood susceptibility maps were validated using the flooded area in 2011, which was not used for training. To represent the flood susceptible areas, this study used the probability-frequency ratio. The frequency ratio is the probability of occurrence of a certain attribute. Logistic regression allows for investigation of multivariate regression relations between one dependent and several independent variables. Logistic regression has a limit in that the calculation process cannot be traced because it repeats calculations to find the optimized regression equation for determining the possibility that the dependent variable will occur.

In case of Seoul, The frequency ratio and logistic regression model results showed 79.61% and 79.05% accuracy. And the case of Busan, logistic regression model results showed 82.30%. This information and the maps generated from it could be applied to flood prevention and management. In addition, the susceptibility map provides meaningful information for decision-makers regarding priority areas for implementing flood mitigation policies.