

Conflation Methodology Applied to Flood Recovery

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Abstract : Current flooding risk modeling focuses on resilience, defined as the probability of recovery from a severe flooding event. However, the long-term damage to property and well-being by nuisance flooding and its long-term effects on communities are not typically included in risk assessments. An approach was developed to address the probability of recovering from a severe flooding event combined with the probability of community performance during a nuisance event. A consolidated model, namely the conflation flooding recovery (&FR) model, evaluates risk-coping mitigation strategies for communities based on the recovery time from catastrophic events, such as hurricanes or extreme surges, and from everyday nuisance flooding events. The &FR model assesses the variation contribution of each independent input and generates a weighted output that favors the distribution with minimum variation. This approach is especially useful if the input distributions have dissimilar variances. The &FR is defined as a single distribution resulting from the product of the individual probability density functions. The resulting conflated distribution resides between the parent distributions, and it infers the recovery time required by a community to return to basic functions, such as power, utilities, transportation, and civil order, after a flooding event. The &FR model is more accurate than averaging individual observations before calculating the mean and variance or averaging the probabilities evaluated at the input values, which assigns the same weighted variation to each input distribution. The main disadvantage of these traditional methods is that the resulting measure of central tendency is exactly equal to the average of the input distribution's means without the additional information provided by each individual distribution variance. When dealing with exponential distributions, such as resilience from severe flooding events and from nuisance flooding events, conflation results are equivalent to the weighted least squares method or best linear unbiased estimation. The combination of severe flooding risk with nuisance flooding improves flood risk management for highly populated coastal communities, such as in South Florida, USA, and provides a method to estimate community flood recovery time more accurately from two different sources, severe flooding events and nuisance flooding events.

Keywords : community resilience, conflation, flood risk, nuisance flooding

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