The ecology of crime dynamics in the presence of criminal refuge.

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The role of mathematical models in modelling crime has been done by many researchers. This paper considers a four-state model in which the police population controls the spread of crime. We formulate and analyze a mathematical model of the spread of crime in the presence of police, rehabilitation, and recidivism. The model is shown to have positive solutions that are bounded. The model equilibria, the criminal free and criminal persistent equilibrium, are determined and analysed. A new threshold, the 'criminogenic potential', R0, is established as the threshold quantity that determines the dynamics of crime. It is determined that if $R0 < 1$, the criminal-free equilibrium is locally asymptotically stable. The model has multiple criminal persistent equilibria and exhibits a backward bifurcation. Numerical simulations are done to determine the impact of various parameters on the long-term dynamics of crime. The implications of the results are discussed in the context of crime control.

Ecology of crime; Criminogenic potential threshold; Crime dynamics; Refuge; Modelling; Simulations

References

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