"Optimal Monitoring Strategy to Detect Rule-breaking: A Power and Simulation Approach Parameterised with Field Data from Gola Rainforest National Park, Sierra Leone"

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Protected area designation aims to protect forests from illegal activities such as hunting. However, the effectiveness of protection and how this changes over time in response to protection measures is difficult to assess, including the design of monitoring programmes able to detect changes. We present new data on rule-breaking prevalence in Gola Rainforest National Park, Sierra Leone, and use these data in spatially explicit simulations to assess the survey effort and design required to detect change and assess the effect of rule-breaker behaviour to these designs. Despite being a protected area, rule-breaking (in the form of signs of hunting) occurred in almost 70% of 1 km survey squares but repeating this baseline survey of 53 survey squares would be insufficient to detect change. A much larger survey effort of 200-400 survey squares would be required to detect a 25% change in rule-breaking. Simulations highlight the extent to which rule-breaker behaviour, particularly hunter range size, influenced the likelihood of detecting change and importance of understanding this for survey design. A dedicated monitoring programme able to detect changes in the level of rule-breaking required an unrealistic level of resources, and we recommend combining monitoring with ranger patrol activities to reduce overall costs and employing questionnaire-based methods. (Text from authors' abstract)

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