

A Flexible Bayesian State-Space Modelling for Population Dynamics of Wildlife and Livestock Populations

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Abstract : We aim to model dynamics of wildlife or pastoral livestock population for understanding of their population change and hence for wildlife conservation and promoting human welfare. The study is motivated by an age-sex structured population counts in different regions of Serengeti-Mara during the period 1989-2003. Developing reliable and realistic models for population dynamics of large herbivore population can be a very complex and challenging exercise. However, the Bayesian statistical domain offers some flexible computational methods that enable the development and efficient implementation of complex population dynamics models. In this work, we have used a novel Bayesian state-space model to analyse the dynamics of topi and hartebeest populations in the Serengeti-Mara Ecosystem of East Africa. The state-space model involves survival probabilities of the animals which further depend on various factors like monthly rainfall, size of habitat, etc. that cause recent declines in numbers of the herbivore populations and potentially threaten their future population viability in the ecosystem. Our study shows that seasonal rainfall is the most important factors shaping the population size of animals and indicates the age-class which most severely affected by any change in weather conditions.

Keywords : bayesian state-space model, Markov Chain Monte Carlo, population dynamics, conservation

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