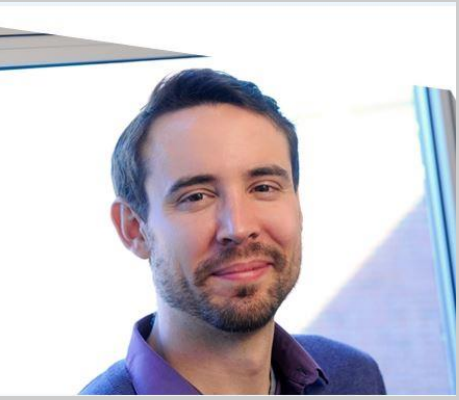
NC STATE UNIVERSITY

Comparative Medicine Institute

Zachary S. Brown



Assistant Professor, Agriculture and Resource Economics, Genetic Engineering & Society (GES) Center (cluster faculty)

Ph.D., Environmental & Resource Economics, Duke University, 2011

B.A., Economics-Mathematics, Lawrence University, 2005

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Adaptive Management of Uncertainty in Bioeconomic Models of Evolution

Research emphasis:

Dr. Brown's research focuses on bioeconomics with an emphasis on analyzing the social and economic implications of evolutionary dynamics. He uses dynamic economic optimization techniques (optimal control and dynamic programming) applied to biomathematical models of resistance evolution and gene drive spread. Given significant uncertainty about the biological parameters involved in the underlying biomathematical models, Dr. Brown has a particular interest in assessing the 'value of information' and adaptive management of reduced parameter (and model) uncertainty.

Application:

- Optimal control of insecticide resistance, e.g. in malaria vectors, agricultural insect pests.
- Estimating the value of information from reduced parameter uncertainty in the evolutionary models of insecticide resistance
- Adaptive management of resistance to Bt toxins with uncertain evolutionary fitness costs of resistance
- Economic analysis of biomathematical models of malaria transmission

Collaboration potential:

- Adaptive management of resistance (e.g. pesticide resistance, antibiotic and drug resistance)
- Economic optimization and control of biomathematical models (e.g. gene drives, Wolbachia)

Selected publications:

Z. S. Brown, R. A. Kramer, D. Ocan, C. Oryema. Household perceptions and subjective valuations of indoor residual spraying programs to control malaria in northern Uganda. [final stages of revision at Infectious Diseases of Poverty].

D. Kim, Z. S. Brown, et al. (2016). The value of information in decision-analytic modeling for malaria control in East Africa. Risk Analysis [manuscript in press].

Z. S. Brown, K. Dickinson, and R. A. Kramer (2013). Insecticide resistance and malaria vector control: The importance of fitness cost mechanisms in determining economically optimal control trajectories. Journal of Economic Entomology, 106(1): 366-374.

Z.S. Brown. Estimating Pigovian subsidies for household participation in mosquito control programs to prevent malaria [working paper].