UNIVERSIDADE
DE ÉVORA

Centro de Investigação em Matemática e Aplicações
Departamento de Matemática

Seminário CIMA/DMat

Quarta-feira, 6 abril 2016
CLAV, Anf. 1 às 11h00

Optimal sustainable harvesting policies in random environments*

Nuno M. Brites
Centro de Investigação em Matemática e Aplicações (CIMA)

Apoio:

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

UID/MAT/04674/2013

Resumo

To describe the growth of a harvested population when the environment is subjected to random fluctuations one can use Stochastic Differential Equation models. We consider logistic and Gompertz models for the average natural growth to which we subtract a harvesting yield term based on a constant or variable fishing effort.
There is previous work on the optimal design of the harvesting policy with the purpose of maximizing the expected accumulated profit (discounted by a depreciation rate) over a finite time horizon. The harvesting efforts of these optimal policies vary with the randomly varying population size and such policies can, under certain conditions, even be of bang-bang type. This type of policies are not applicable to harvesting since they need to constantly evaluate population size and are not compatible with very frequent randomly determined changes in harvesting effort.
Our approach, based on sustainable and applicable fishing policies, leads to sustainability of the population and to a stationary distribution of the population size and do not require evaluation of population size. We determine the constant harvesting effort policy that optimizes the expected sustainable profit per unit time and check what we lose profitwise by using this policy instead of the optimal inapplicable policy with variable effort.

* Joint work with Carlos A. Braumann.

Acknowledgements
The authors belong to the Centro de Investigação em Matemática e Aplicações, a research centre supported by FCT (Fundação para a Ciência e a Tecnologia, Portugal). The first author holds a PhD grant from FCT (ref. SFRH/BD/85096/2012).