

## Competition and cooperation in natural resources exploitation: An evolutionary game approach

G.I. Bischi - F. Lamantia - L. Sbragia

Speaker Lamantia

e-mail: lamantia@unical.it

Università della Calabria

O.A.A.P. Department

ITALY

KeyWords: Bioeconomic Models, Oligopoly Games, Resource Exploitation, Replicator Dynamics

### ABSTRACT

We propose a dynamic model to describe the commercial exploitation, by a population of strategically interacting agents, of a common property renewable resource. The population of players is assumed to be divided into two groups: cooperators, that decide their harvesting policy by maximizing the overall profit of their group, and defectors, that just maximize their own profit. An evolutionary mechanism, based on the replicator dynamics, is introduced to describe the time changes in the proportions of defectors and cooperators within the population. This leads us to the qualitative study of a two dimensional nonlinear dynamical system that describes the time evolution of the resource stock and the population share between cooperators and defectors. The long run evolution of this dynamical system is analyzed by analytical and numerical methods, and the role of some economic and ecologic parameters is investigated.