SEMINAIRE AMURE

Vendredi 14 décembre 2012

14h00>15h30

Amphi B - IUEM

Technopôle Plouzané

CENTRE DE DROIT ET D'ECONOMIE DE LA MER

Programme

< Vers une gestion écosystémique des pêcheries côtières de Tasmanie>

Par Martin Marzloff, University of Tasmania, Australia

Title:
Rock lobster - sea urchin - seaweed community dynamics in eastern Tasmania, a modelling tale: thresholds in reef community dynamics and best management interventions against destructive grazing by the long-spined sea urchin

Résumé:
Ecosystems worldwide have demonstrated the potential for dramatic shifts to an alternative persistent state following anthropogenic perturbations or changes in environmental conditions. These shifts are often sudden and challenging to predict and can have disastrous, sometimes irreversible consequences for both ecosystem functioning and structure. In eastern Tasmania, shallow rocky reef communities on exposed coast occur as two alternative persistent states, i.e. either as rich seaweed beds characterised by a dense and productive canopy of macroalgae, or as sea urchin 'barrens' characterised by a poorly productive rocky habitat largely bare of seaweeds as a result of destructive grazing by the long-spined sea urchin. The establishment of widespread sea urchin barrens is the result of the combined effects of climate-driven range extension of the sea urchin, and depletion by fishing of large rock lobsters as their key predator.
These kinds of shifts in ecological dynamics are hard to study empirically, and very difficult to predict. Thus, simulation models of community dynamics can play a crucial role in investigating alternative states in ecological dynamics.

The TRITON model was specifically developed to better understand the dynamics of Tasmanian rocky reef communities and inform management about mitigation of sea urchin destructive grazing. Through model simulations, we (i) estimate thresholds in reef dynamics, and (ii) assess the effects of management measures on ecosystem state. Simulation-based estimates of thresholds for the shift from seaweed bed to sea urchin barrens, and back, provide valuable reference points for management (e.g. in estimating the critical biomass density of large lobsters necessary to prevent the establishment of sea urchin barrens). These thresholds reveal hysteresis in the dynamics and indicate that prevention of barrens

formation constitutes a much more viable and effective management strategy than restoration of seaweed beds once extensive sea urchin barrens have formed. Together with direct control of sea urchins by humans (e.g. harvesting or culling), rebuilding of rock lobster populations (through reduction in fishing, translocation and implementation of a maximum legal catch size) is likely to provide optimal outcomes both in terms of minimising barrens formation and optimising performance of the lobster fishery in eastern Tasmania, where C. rodgersii barrens occur. Because rock lobsters deliver key ecosystem services to reefs in eastern Tasmania, model simulations highlight the necessity for fisheries management to move away from a single species focus and account for the ecological roles of targeted commercial species.

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Contact : Martin.Marzloff@utas.edu.au