

# The Stockholm Seminars

- focusing on the dynamics and stewardship of social-ecological systems

## Ecosystems modelled from the outside

**Dr. Benjamin Planque**

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**Tuesday 19 March, 14.00-15.00**

**Linné Hall, the Royal Swedish Academy of Sciences, Lilla Frescativägen 4**

It is often thought that modeling the dynamics of marine ecosystems requires a high level of details to portray the many underlying processes in a realistic way. Because ecosystems are complex, adaptive, and non-linear, ecosystem models are highly sensitive to approximations and simplifications. This results in a race for complexity in which additional processes are constantly added to existing models in order to better reproduce the complex dynamics observed in the real world.

An alternative approach is to acknowledge the complexity, adaptability and non-linearity of ecosystems without trying to explicitly model the complex processes generating them.

Rather than modelling from the 'inside', i.e. by representing the intricate processes within the ecosystem, one can model from the 'outside' by focusing on the constraints that limit the system dynamics. In this approach, complex processes and their interactions are simulated with stochastic (i.e. random) processes whilst the system dynamics is constrained by simple rules.

In this Stockholm seminar Benjamin Planque will show an application of this approach, using a stochastic dynamic food web model (SDF) for the Barents Sea. This simple model displays many features of more complex foodweb models, including apparent regime shifts. The SDF can serve as a reference to study the resilience of marine ecosystems.

### **About Benjamin Planque**

Benjamin Planque holds a PhD from the University Pierre et Marie Curie (Paris, France, 1996). He did his PhD thesis on the spatial and temporal fluctuations of crustacean populations in the North Atlantic. His research has focused on zooplankton, ichthyoplankton and fish spatial and temporal variations in relation to environmental fluctuations and fishing.

He currently holds a research position at the Institute of Marine Research in Tromsø (Norway) where he works on the ecology of redfishes and coordinates the BarEcoRe project on the resilience of the Barents Sea ecosystem.