

COREIDS

PREDICTING COMMUNITY RESILIENCE TO INVASIONS
FROM DIVERSITY AND NETWORK STRUCTURE.

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Understanding properties of food webs*, such as their topology or stability, and the rules underlying food web structure, has been a key issue in ecology for now more than half a century. Because obtaining data on food webs has long been a hard task in itself, this research field has progressed slowly, and its dynamical aspects have seldom been empirically considered. However, technical advances, like next generation sequencing or the possibility of retrieving past ecosystems in sediment cores, have paved the way for massive data and the analysis of time series on food webs, while new models allow better predictions about food web dynamics.

Making use of such existing data sets, this working group will aim at assessing the effects of biological invasions on food web topology, the fluxes of energy and nutrients throughout the network, and its ultimate effects on biodiversity. The working group will provide an integrative view on this topic, simultaneously tackling empirical, theoretical and applied aspects of biological invasions in food webs. Obvious applications will arise both from the numerous transports of invasive species and from the reshuffling of natural communities that is expected under global change scenarios. The working group comprises theoreticians and empiricists, biological invasion specialists as well as food web and host-parasite network experts, and will benefit from existing experience in the field of ecoinformatics and massive data management in ecology.

** A food web is the set of "who-eats-whom" links through which energy and matter circulate within an ecosystem.*



TOTAL This project is co-financed by TOTAL



The FRB was launched in 2008 at the initiative of the ministry of research and the ministry for the environment of France, and was founded by 8 public research institutions (BRGM, CIRAD, CNRS, IFREMER, INRA, IRD, IRSTEA, MNHN). The FRB is a science-society platform and it supports and promotes scientific projects and expertise on biodiversity.



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APPROACH, BENEFITS AND ANTICIPATED RESULTS

Databases

The COREIDS working group will bring together existing databases on food webs and create a meta-database. The group will also gather other data on regions sensitive to invasions in a general database. Linking these two databases, the group will be able to make recommendations on the study of food webs *in natura*, notably on the evaluation of the fragility of food webs and on the relative risk of losing certain ecosystem services linked to those food webs.

Methods

The working group will produce statistical methods aimed at studying large food web databases, such as those expected due to the development of next-generation sequencing and more generally, when such data includes temporal depth. These methods will be described in scientific publications and made publicly available through a dedicated R package which will include all necessary tools to use harness the information contained in existing databases.

Publications

One of these publications will be a conceptual synthesis on invasions in food webs. Another publication will be a meta-analysis of the effects of invasions on empirical food webs, with a comparison of networks that have been, or not, recently invaded. Other papers will deal with the effects of invasive species on the topology of food webs, ecosystem functioning, and the micro-evolution of resident species in response to invasion.

The CESAB is a centre for the synthesis and analysis of biodiversity created and developed by the FRB to foster knowledge on biodiversity through data and theoretical synthesis activities. CESAB provides researchers with the means to conduct these activities in a dedicated place over sustained periods of time.