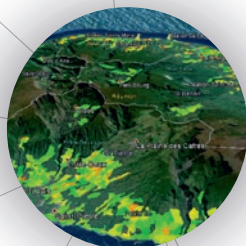
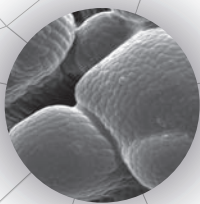


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*Expertise of the scientific community
in the Occitanie area (France)*

COMPLEX SYSTEMS *From biology to landscapes*



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Simulation models for analysing the impact of seed exchange and farmers' practices on agrobiodiversity dynamics

The sustained high genetic diversity of crops has enabled human populations to survive and adapt to adverse climatic conditions over the centuries. This varietal diversity—upheld by seed management practices—now helps farmers cope with global change. Farmers' seed systems facilitate the preservation and circulation of a diverse range of local and research-derived varieties, thus facilitating seed supplies to farms in addition to the national supply. The IMAS project focused on the enhancement and maintenance of agrobiodiversity in developing countries through the identification of new forms of varietal diversity management via the interplay, at different scales, between farmer, commercial and institutional seed systems. The approach was based on

the co-construction of innovative tools (multiagent models) that could incorporate the viewpoints of the different stakeholders, simulate the dynamics of biodiversity management in order to analyse the impacts of future developments, while supporting participatory action research. An iterative approach, with an ongoing dialogue with the actors (farmers and researchers), made it possible to compare their perception of the system—at the considered system scales—and to work on the construction and appropriation of shared representations. The seed system is thus considered as a complex system characterized by the many:

- functions related to seeds: agricultural production, conservation, selection, dissemination
- scales and timeframes: from the plot to the international public policy framework
- stakeholders and standpoints: farmers, government organizations, non-governmental organizations, researchers, etc.

IMAS has been extended via the Dynaversity and CoEx projects in which network analysis methods are implemented to study interactions between farmer seed systems and certified seed chains. The aim is to offer innovative modes of governance that are better adapted to the day-to-day reality of farmers' crop diversity management practices.

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For further information on IMAS (Impact of seed access conditions on genetic resource diversity in agriculture): <http://imas.agropolis.fr/index.html>

CoEx project: <https://umr-agap.cirad.fr/projets-de-recherche/coex>

◀ *A quinoa seed system simulation workshop based on a role-playing game in Chile. IMAS project, December 2011. © D. Bazile*



Ecosystem services and territorial management

The definition of the ecosystem services concept provides a framework for operational analysis of relationships between sociosystems and ecosystems based on the benefits that socioeconomic stakeholders derive from ecosystem functioning. It broadens the issues, and thereby the disciplines involved, in addressing the needs and terms of ecosystem conservation policies, but also other territorial management related areas. In addition to monetary appraisals, which are widely discussed by advocates of the intrinsic value of nature, the recognition of ecosystem services provides a framework for a functional approach to ecosystem analysis at the territorial level, and for multicriteria approaches to account for the many diverse impacts and interactions. The mapping of services and their interactions through the service package concept makes it possible to leverage the landscape concept as a spatial integrator of some services and to guide land-use planning initiatives that underlie

territorial development policies. The identification of services and how they are perceived by stakeholders and populations facilitates joint collective formulation of service conservation or heritage enhancement objectives at the territorial scale. This new reference framework therefore contributes to strengthening territorial governance systems and identifying support needs to strengthen knowledge and recognition of ecological processes, and thereby the social learning necessary to embrace new pro-environmental values. In this regard, ecosystem services are no longer just a benchmark studied by researchers, but also a collective action mediation tool within a consultation and territorial governance framework. The research carried out by CEE-M in this field is focused on both (monetary) assessment methods and the prioritization of services in support of public decision-making at national, regional or local levels.

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