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Agroecological transformation for sustainable food systems

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Building resilience through ecosystem services

Transition to biodiversified agroecosystems

From process analysis to multiscale codesign with stakeholders

Functional plant biodiversity could be a way to enhance the agroecological transition of agroecosystems in tropical regions. A group of researchers studied the effectiveness of mobilizing and managing this biodiversity at different sites encompassing a broad range of conditions and types of systems*. **The holistic approach developed has led to the identification and hierarchical ranking of the main mechanisms linking biodiversity and ecosystem services.** The recycling function was thereby identified as predominant with regard to complex agroforestry systems on relatively poor soils in Cameroon, whereas pest control prevailed on rich Andosols in Central America. The plot spatial organization and biodiversity were found

to be key levers for maximizing services. The quality of these services also depended on the long-term effects when plant biodiversity was introduced in rotations (e.g. weed control). **A generic analysis framework was drawn up to systemically unravel the direct or indirect impacts of plant biodiversity on agrosystem functioning and ultimately on ecosystem service provision.**

At the village community level, farmers should be supported in implementing specific design/adaptation mechanisms to modify their systems in favor of biodiversification. Participatory experimental approaches have been developed—sometimes using facilitation tools (foresight analysis, serious games)—to

enhance learning and joint knowledge production, and ultimately to give farmers more freedom in these adaptive approaches. At the regional level, stakeholders having an influence on the conditions required for implementing these changes have been involved in co-innovation platforms. The aim is to give farmers more say and to ensure that all institutional actors are aware of their potential role in the transition process. Economic (for their market links) and political (for their policymaking weight) stakeholders are crucial in facilitating farmers' adoption of biodiversified agroecological systems.

* STRADIV project, System approach for the transition to bio-diversified agroecosystems: www.agropolis-fondation.fr/STRADIV

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For further information

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▲ Rotational rainfed rice cropping systems under legume cover (*Stylosanthes guianensis*) in Madagascar.

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The challenge of codesigning technically sound and polyefficient agroecosystems

Agroecosystem design (AED) currently has to take up the **triple challenge of diversification, climate change mitigation and adaptation, and food security**⁽¹⁾, while accounting for: (i) the multiple processes supporting ecosystem services (ES) at different scales—from field to landscape; and (ii) the diverse range of people involved—from farmers to regional stakeholders⁽²⁾. Such complexification calls for key paradigm changes in the way the R&D sector has been working so far.

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