

CONTRIBUTION OF MULTIFUNCTIONAL AGROFORESTRY MANAGEMENT SYSTEMS TO THE CLIMATE CHANGE ADAPTATION CAPACITY OF AGROECOSYSTEMS



photo : David Rivest (Université Laval)

Program
ECOBIOCC

PROJECT STARTING DATE
AND LENGTH
December 2010 • 2½ years

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CONTEXT

Multifunctional agroforestry systems are likely to be more resistant than traditional agricultural systems to the expected changes in future regional climate. Such systems help counteract the harmful impacts of wind, reduce thermal amplitude, augment water infiltration into the soil, encourage predator and pollinating insects, and increase biodiversity. Multifunctional agroforestry systems are not well known in Quebec, but they may offer interesting potential for responding to expected climate change impacts.

OBJECTIVES

The goal of this project is to determine the potential contribution of multifunctional agroforestry systems to the adaptive capacity of agroecosystems to climate change. In particular, the project will consist of assessing the impact of such systems on the production of ecosystem services that minimize the negative consequences of climate change, with particular attention paid to the effect of the anticipated largest climate fluctuations.

APPROACH

Relevant agroforestry options in the operational context of agricultural enterprises will be selected. To maximize the scope of the project results, contrasting agroforestry land uses (eg. fast - versus slow - growing trees) will be compared. The choice of these land use options will be influenced by the climate change scenarios for the 2050 time horizon. The project will assess the role and impact, within the context of climate change, of the establishment of multifunctional agroforestry systems on biodiversity, hydrology, microclimate, tree and crop productivity, and the production economics. This will involve — depending on the variable — an exhaustive review of the literature concerning climate change impacts, collection of field data, and the development of various models.

EXPECTED RESULTS

This study will provide different results depending on the land-use options selected:

- An inventory and quantification of the ecological services delivered by the chosen multifunctional agroforestry systems;
- Integration of the results into models that will link the selected systems and their impacts on the different variables of biodiversity, microclimate and hydrology as well as economic aspects such as the yield of forested and agricultural sections;
- A calculation of the monetary benefits associated with different land-use types;
- Recommendations of agroforestry models for agricultural lands in Quebec.

Various activities will lead to the widespread dissemination of project results (eg., fact sheets, seminars, reports, etc.).

LEAD SCIENTIST

- Alain Olivier
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OTHER PARTICIPANTS

- Agriculture and Agri-food Canada (AAC)
- Institut de recherche en biologie végétale (IRBV)
- Institut national de la recherche scientifique, Centre Eau Terre Environnement (INRS-ÉTÉ)
- Ministère des Ressources naturelles et de la Faune (MRNF)
- Université du Québec à Montréal

IMPACT

The project will produce an assessment of the productivity and ecological services of agroforestry systems under various land-use options for agricultural land. It should give policy makers the tools to guide the implementation of comprehensive strategies required in both agriculture and forestry to improve the strength of agroecosystems and minimize the negative impacts of climate change on these agroecosystems. Project results will also be of interest to those involved in land-use planning, farmers, those involved in the development of private forests, watershed management organizations, and professionals in the agricultural and forestry sectors.

FUNDING

