



SANREM CRSP

Research Brief

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Assessing the Scientific Knowledge Base for Ecoagriculture

Continued population growth and urban expansion are reducing the availability per capita of land for agricultural purposes. Growing water scarcity is threatening agricultural production and creating challenges for farmers. As the severity of these problems increases, the world continues to demand that agriculture:

- feed the growing global population and reduce hunger;
- generate sustainable incomes and livelihoods;
- contribute to export growth strategies;
- reduce poverty; and
- support economic and social equity.



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The natural forest bordering this tea field in Malaysia provides important biological services for agricultural production in this ecoagriculture landscape, such as clean water, climate regulation, and nutrient cycling.

These demands highlight the need for more productive agricultural production systems; however, there is growing concern that current systems are not sustainable and may be contributing to the degradation of ecosystems that are important to humans and other species. Out of this concern comes a new approach to farming that combines sustainable agriculture with the protection of ecosystems and biodiversity. This approach, called ecoagriculture, promotes sustainable

solutions to global malnutrition and hunger while protecting and enhancing the natural resources used in food production and wildlife conservation.

On the surface, such a theory provides a comprehensive solution to several serious issues; however, many researchers have questioned the scientific validity of ecoagriculture and its feasibility as a sustainable development strategy. In response to these questions, SANREM CRSP commissioned a group of Cornell faculty researchers to prepare a review paper as background for deliberations at the 2004 Ecoagriculture Conference and Practitioners' Fair. The result of their work is "Ecoagriculture: A Review and Assessment of its Scientific Foundations." This research brief summarizes this paper, drawing input from researchers worldwide to examine the scientific basis for the concept and look at its potential for future development.

Establishing a foundation

In analyzing the available research and compiling this assessment, researchers focused on two main questions:

1. Is there a scientific basis for the concept of ecoagriculture?
2. If so, how can the concept be implemented successfully?

Research into the validity of ecoagriculture was done by three groups of experts: the Ecoagriculture Assessment Team (EAT), consisting of four Cornell faculty members and four research assistants; the Ecoagriculture Assessment Advisors (EAA), consisting of nine researchers and practitioners; and the Ecoagriculture Working Group (EWG), consisting of 27 Cornell faculty members and two graduate students.

The findings

The researchers concluded that ecoagriculture does have a solid base in scientific knowledge and understanding, and that it offers a foundation for land-use strategies that deliver agricultural productivity, livelihood support, and biodiversity conservation benefits at farm and landscape levels. The study also identified gaps in knowledge and noted promising opportunities and methods for successfully implementing ecoagriculture systems.

The assessment encouraged more exploration of the ecoagriculture theory, because evidence suggests that it will provide:

- opportunities for more productive, profitable, sustainable, and environmentally friendly agriculture that would rely increasingly on energy and nutrients made available through biological processes;
- alternatives to conventional agricultural practices requiring inversion plowing and continuous flooding of rice paddies;
- possibilities for linking biotechnology with ecoagriculture, emphasizing soil biology and ecology; and
- movement beyond standard labor-intensive methods to more efficient productivity.

While the evidence supported the many positive aspects of ecoagriculture, the experts encouraged researchers to explore its broader impact. To effectively understand and apply ecoagriculture research, researchers must develop methods to:

- evaluate various outcomes, positive and negative, of a comprehensive picture of ecoagriculture strategies, and
- broaden the scope and emphasis of the research by stepping back from micro-level research to see effects that may be realized only on a larger scale.

Integrating biodiversity conservation

In their assessment, the researchers also outlined a strategy for integrating biodiversity conservation into agricultural development. The goal is to help policy makers implement sustainable agriculture and environmental protection practices by:

- creating biodiversity reserves that benefit local farming communities;
- developing habitat networks in non-farmed areas;
- reducing land conversion to agriculture by increasing farm productivity;
- minimizing agricultural pollution;
- modifying management of soil, water, and vegetation resources; and
- modifying farm systems to mimic natural ecosystems.



Rice production is crucial to livelihoods in Indonesia. Here, farmers have had to cultivate rice paddies in the middle of a wild forest. In this area, ecoagriculture approaches to land management will be critical to ensure that food production, biodiversity conservation, and livelihoods are maintained and enhanced.

Research needs and opportunities

For now, more researchers need to become involved in understanding the potential for ecoagriculture to benefit agricultural and environmental systems. There is a need for long-term landscape-scale experiments to provide improved measures and indicators of:

- wild biodiversity that can be easily incorporated into modeling and monitoring approaches to be used for research and policy analysis; and
- biodiversity assessments of the relationship between soil and above-ground biodiversity.

Ecoagriculture knowledge is increasing exponentially as its potential to promote sustainable agriculture and natural resource management is recognized. By analyzing and promoting a better understanding of ecoagriculture,

researchers can advance the field in both knowledge and practice. As more research is done, planners, managers, and policy makers must remain realistic about the limitations of using such new information. Until more is known and understood about practical applications, the ecoagriculture theory may best be used as a framework for improved land use. ■

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For more information, see:

Buck, Louise, Thomas Gavin, David Lee, and Norman Uphoff. 2004. Ecoagriculture: A Review and Assessment of its Scientific Foundations. *Ecoagriculture Discussion Paper* No. 1. Washington DC: Ecoagriculture Partners. http://www.oired.vt.edu/sanremcrsp/menu_information/publications.php