



# SMALLHOLDER FARMERS AND ECOSYSTEM-BASED ADAPTATION

To mitigate and adapt to climate change, it is critical that we protect, restore and manage natural ecosystems and the services they provide. A promising approach to build people's resilience to climate impacts is ecosystem-based adaptation (EbA): the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change.

Implementation of EbA at a scale commensurate with its potential requires the identification and integration of EbA strategies into adaptation planning in critical sectors, including agriculture. However, few studies have focused on the adaptation benefits of EbA in agricultural landscapes, especially in the context of smallholder farmers.

Smallholder farmers are extremely important for agricultural production worldwide, representing 85 percent<sup>1</sup> of the world's farms. These farmers are vulnerable to climate change as changes in temperature, rainfall and the frequency of extreme weather events affect crop and animal productivity, food security, income and overall well-being. EbA agricultural practices help smallholder farmers adapt to climate change by diversifying production systems and ensuring continued provision of ecosystem services on which farming depends, such as water and food provision, nutrient regulation, pest control and pollination.

EbA in the agriculture sector was recently defined by a first-of-its-kind study<sup>2</sup> as *agricultural management practices which use or take advantage of biodiversity, ecosystem services or processes to help increase the ability of crops or livestock to adapt to climate change and variability*. This study also provides a framework to facilitate identification of EbA practices for smallholder farmers.

<sup>1</sup> Nagayets, O., 2005. Small farms: current status and key trends. The Future of Small Farms: Proceedings of a Research Workshop, IFPRI, Wye, UK, pp. 355–367.

<sup>2</sup> Vignola, et al. 2015. Ecosystem-based adaptation for smallholder farmers: definitions, opportunities and constraints. Agriculture, Ecosystem and Environment. 211: 126-132. This study was conducted by Conservation International, Ecosystem Services for Poverty Alleviation (ESPA), Tropical Agricultural Research and Higher Education Center (CATIE), the French Agricultural Research Centre for International Development (CIRAD), the German Federal Environment Ministry (BMUB), and Agroforestry with Perennial Crops Scientific Partnership Platform (PCP).

# FRAMEWORK FOR IDENTIFYING EbA AGRICULTURAL PRACTICES

(Based on Vignola et al., 2015)

At least one criterion from each dimension below must be met

Dimension 1: Ecosystem-based	Dimension 2: Adaptation benefits	Dimension 3: Livelihood security
<ul style="list-style-type: none"><li>• Is based on the conservation, restoration and sustainable management of biodiversity (e.g., genetic, species and ecosystem diversity)</li><li>• Is based on the conservation, restoration and sustainable management of ecological functions and processes (e.g., nutrient cycling, soil formation, water infiltration, carbon sequestration)</li></ul>	<ul style="list-style-type: none"><li>• Maintains or improves crop, animal or farm productivity in the face of climate variability and climate change</li><li>• Reduces the biophysical impacts of extreme weather events (e.g., heavy rainfall, extremely high temperatures, strong winds) and high temperatures on crops, animals or farming systems</li><li>• Reduces crop pest and disease hazards due to climate change</li></ul>	<ul style="list-style-type: none"><li>• Increases food security of smallholder households</li><li>• Increases or diversifies income generation of smallholder households</li><li>• Takes advantage of local or traditional knowledge of smallholder farmers</li><li>• Uses local, available and renewable inputs (e.g., using local materials from within the farm or landscape rather than external inputs such as pesticides or inorganic fertilizers)</li><li>• Requires implementation costs and labor affordable to smallholder farmers</li></ul>
Examples that qualify as EbA agricultural practices for smallholder farmers		
<ul style="list-style-type: none"><li>• Shade trees in coffee systems</li><li>• Use of live barriers, crop covers and other soil conservation techniques</li><li>• Use of fallow to restore soil fertility</li><li>• Crop diversification to reduce risk of crop loss due to climate change</li><li>• Conservation of forests and riparian areas to ensure water provision</li></ul>		

## CASCADE project

Conservation International (CI) and Tropical Agricultural Research and Higher Education Center (CATIE) support implementation of EbA agricultural practices for smallholder farmers in Costa Rica, Honduras and Guatemala through the CASCADE project (Central American Subsistence and Coffee farmer Adaptation based on Ecosystems). By identifying and testing EbA strategies used on basic grain and coffee farms, the project assesses the impacts of different management practices on crop productivity and provision of ecosystem services.

## Vital Signs: Providing data access and adaptation tools for smallholder farmers

To implement climate adaptation strategies in agriculture, such as the EbA practices identified above, there is a need for better data to guide decision-making. CI's Vital Signs data system generates near real-time data and diagnostic tools at every scale (household, plot, landscape, nation, globe). This data helps identify interventions that will increase the resilience of agricultural production to climate variability and shocks by building capacity, quantifying synergies, monitoring outcomes, and informing policies and structures for climate-resilient and EbA smallholder agricultural practices.

## POLICY IMPLICATIONS

Many EbA practices are proven to help smallholder farmers adapt to climate change, but current financial, political and technical constraints limit widespread adoption of these practices. Initiatives such as CI's Vital Signs data system and the CASCADE project can provide information to farmers and policymakers, but to overcome implementation challenges at the scale needed, policymakers should integrate EbA approaches for adaptation in the agriculture sector. When applicable, national adaptation plans (NAPs) and regional and local adaptation programs and initiatives targeting smallholder farmers should include EbA.

### For more information:

Overview of CI's EbA work: [conservation.org/eba](https://conservation.org/eba)  
CASCADE project: [conservation.org/cascade](https://conservation.org/cascade)  
Vital Signs: [conservation.org/vitalsigns](https://conservation.org/vitalsigns)

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