

0119 - CCAFS & FCDO Agroecology and Climate Change Rapid Evidence Review

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Exhibitor



CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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Summary

A [new scientific review](#) of over 10,000 studies finds substantial evidence that agroecological practices – like farm diversification, agroforestry and organic agriculture – can significantly contribute to climate change adaptation and mitigation in agriculture in low- and middle-income countries (LMICs).

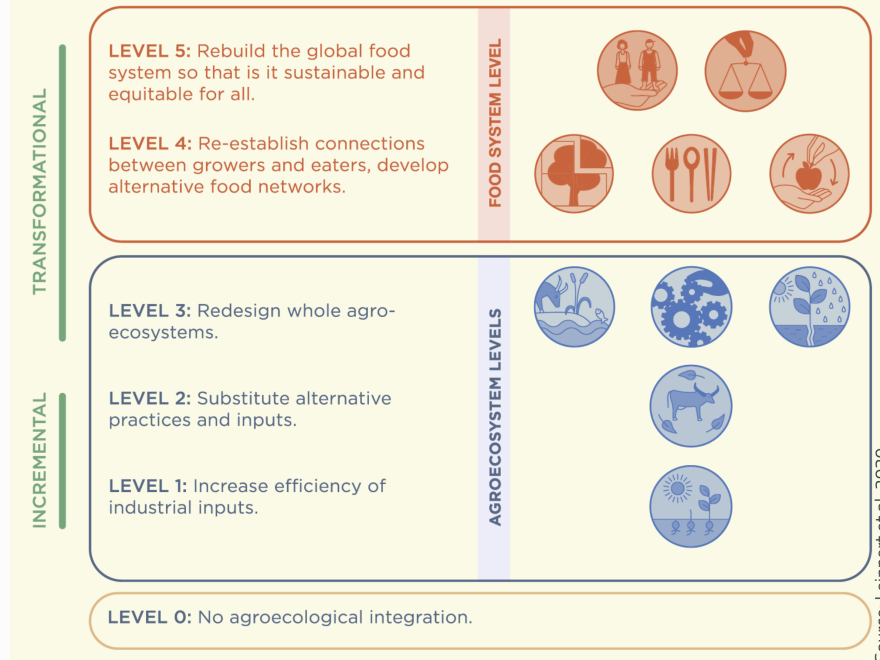
Here, we present the new report on the impacts of agroecology on climate change adaptation and mitigation. We used the [FAO 10 Elements of Agroecology](#) and [Glissman's transition levels](#) as a framework for defining agroecology.

The study found that agroecology can play a major role in climate change adaptation and mitigation. So, what does the available evidence tell us? And how can it inform decisions?

Key messages from the review of over 10,000 studies

- Climate change adaptation can be associated with agroecology practices. However, there are many data gaps.
- Evidence for agroecology's impacts on climate change mitigation is modest, except for enhanced carbon sequestration in soil and biomass. Livestock is a major gap.
- Farmer co-creation and sharing of knowledge consistently supported farmers' capacity to adapt to local conditions, improving both adaptation and mitigation.
- Experience in scaling up agroecology involved interventions, enabling conditions and barriers similar to conventional agriculture, although gave more emphasis to farmer co-creation of knowledge and local solutions.
- Few studies compared agroecology performance against alternatives and cost-effectiveness in LMICs and the tropics.
- To avoid contention about what is defined as agroecology, the authors recommend an outcome-based approach to assessing performance that integrates agroecological principles and climate change adaptation and mitigation indicators.

Agroecological transition levels as they relate to the FAO 10 Elements of Agroecology



Presentation

What the evidence tells us

Climate change adaptation

- **Farm diversification** had the strongest body of evidence for impacts on climate change adaptation, which included positive impacts of diversification on crop yield, pollination, pest control, nutrient cycling, water regulation and soil fertility.
- Substantial evidence exists for climate change adaptation associated with practices and systems aligned with [principles of agroecology](#). However, **more analysis is needed** to understand agroecology's resilience to extreme weather conditions.
- Some agroecological practices, like agroforestry, have positive impacts on biodiversity, water regulation, soil carbon, nitrogen and fertility and buffering temperature extremes. Others, like organic agriculture, improve regulating (pest, water, nutrient) and supporting services.

Climate change mitigation

The evidence on agroecology's impact on mitigation is modest, except for enhancing carbon sequestration in soil and biomass.

Where there is **strong evidence**:

- Tropical agroforestry had the strongest body of evidence for impacts on mitigation, which had associated sequestration of carbon in biomass and soil.

Where there is **weak evidence**:

- As the GHG footprint of outcomes depends on where system boundaries are drawn, more multi-scalar analyses are needed to capture flows of inputs and impacts beyond the farm scale, especially in LMICs where there is almost a complete lack of data on GHG emissions from tropical agriculture.

Where there is **moderate evidence**:

- There is a [moderate](#) and [growing](#) body of evidence for organic agriculture increasing soil carbon sequestration.
- Evidence of nitrous oxide mitigation was modest for tropical agriculture overall, and data on methane generation or mitigation was also limited.
- Evidence from the global North suggests that reliance on organic nutrient sources and organic farming will likely avoid increased nitrous oxide emissions compared to use of synthetic nitrogen fertilizer.

Adaptive capacity

- Evidence suggests that agroecology provides more climate change adaptation and mitigation than conventional agriculture by emphasizing **locally relevant solutions**, participatory processes and co-creation of knowledge.
- Specifically, **co-creation and sharing of knowledge** supported farmers' capacity to adapt to local conditions.
- Multiple lines of evidence show that engaging with local knowledge through **participatory and educational approaches** are effective at adapting technologies to local contexts, thereby delivering improved adaptation and mitigation.

Yields

- Evidence for **trade-offs exists between yields and climate change adaptation and mitigation**, but it was not systematically reported.
- There are win-win outcomes for yields and climate change mitigation associated with crop diversity and organic nutrient management, but not necessarily for organic farming or agroforestry.

Data gaps

- There is a **clear need for high-quality, long-term, research** on farms and at landscape scales that compare agroecology against alternatives like conventional or climate-smart agriculture.
- A large data gap was found for agricultural GHG emissions and mitigation, with **almost no evidence from the global South**. There were also evidence gaps for agroecology approaches involving livestock integration, landscape-scale redesign and for multi-scalar analysis.

- A **major concern is to what extent scaling up agroecology may restrict farmers' options** and becomes a poverty trap by maintaining the status quo by not providing access to possible growth through industrial and corporate models.
- There is a lack of data or scenarios showing the impacts of agroecological transitions on economic development.

Donor investments

Improve investment in agroecology for climate change will require long-term funding modalities, outcome target setting that includes environmental services and climate benefits, and systemic change and incentives to build farmer capacities (Fig 1). Rather than treating climate change adaptation and mitigation as co-benefits, global food systems must be **actively managed for climate change benefits**.

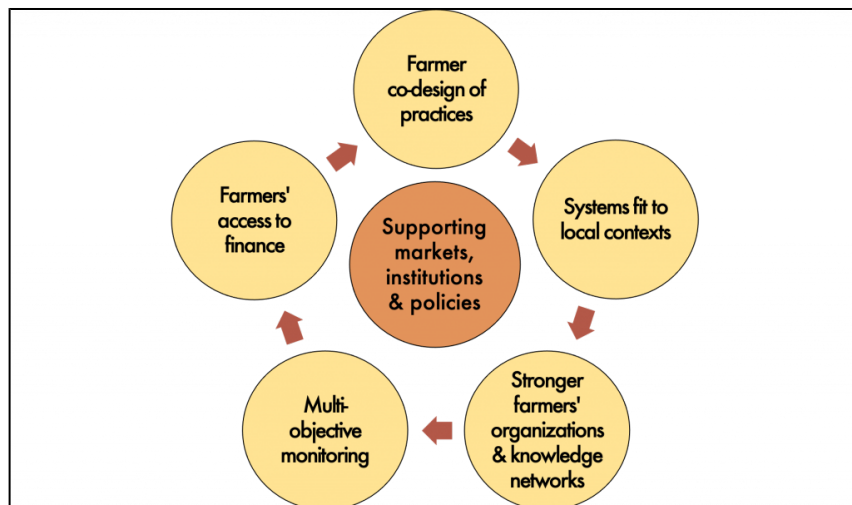
>Figure 1. Key elements of exiting agricultural development programs to increase support for agroecology and climate change outcomes.

What actions are needed?

Tackling climate change has always required broad cooperation and diverse approaches. Implementing agroecology across organizations with different political visions for development will require transcending the many labels for sustainable agriculture and climate change (e.g., climate-smart agriculture, regenerative agriculture), including agroecology. The point is to spend less time debating what agroecology is, and more time on how it can be used to improve agricultural mitigation and adaptation to climate change.

Recommendations from the review

- An outcome-based approach is needed to understand the performance of integrating agroecological principles and climate change adaptation and mitigation indicators.
- Direct agricultural development investments to agricultural diversification, local adaptation, and pathways to scaling both.
- Increase investment for research on agroecology's resilience to extreme weather events and climate change mitigation outcomes.
- Invest in research to analyze approaches aligned with agroecology relative to other agriculture development approaches, across all scales and regions, for outcomes in multiple dimensions and their trade-offs, including cost-effectiveness.



Originally published on April 22 on the CCAFS website: [Agroecology: A key piece to climate adaptation & mitigation?](#)

Images

Preview of the Agroecology and climate change rapid evidence review: Performance of agroecological approaches in low- to middle-income countries

Download the full review here

Videos

More

Review Authors

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Meet the team

During the indicated periods, one of the team members is available for a video chat.

Stand No	Time zone	+/-UTC	Date	Start local time (hh:mm)	Duration (hh:mm)	Attendant	Video chat link
0119							https://meet.jit.si/4p1000_stand_0119
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Handouts

Agroecology and climate change rapid evidence review

Further resources

- Leippert et al. 2020. [The potential of agroecology to build climate-resilient livelihoods and food systems](#). FAO.
- Gliessman. 2016. [Transforming food systems with agroecology](#)
- FAO. [The 10 Elements of Agroecology: Guiding the transition to sustainable food and agricultural systems](#)
- Event (8-9 July 2021): [Scientific Group of the UN Food Systems Summit 2021](#)
- Report: [Agroecology and Climate Change: A case study of the CCAFS Research Program](#)
- Blog: [The future of agriculture? Integrating agroecology and climate-smart agriculture](#)