

Securing the Future for Bhutan's Small-Scale Farming Communities With Climate-Smart Agriculture

CLIMATE CHANGE HAS WIDE-RANGING EFFECTS

on farming communities throughout the world, as unpredictable weather patterns cause irregular rainfall and destabilize longstanding agricultural practices. In the Eastern Himalayan region, climate change is compromising food ecosystems and escalating conflict between humans and wildlife. Within this region, in Bhutan's Pemagatshel District, nearly half of residents are small-scale farmers who depend on agriculture for their livelihoods and are highly vulnerable to the effects of climate change.¹

However, new research shows that adopting climate-smart agriculture could mitigate the negative effects of climate change by improving food production and food security, helping secure the future of these communities.

Examining small-scale farming practices reveals focus areas for strengthening farmer resilience and potential responses to climate change. While maize is the primary crop in Pemagatshel District and throughout eastern Bhutan, farmers also grow potatoes, soybeans, cereals, peanuts, other vegetables and legumes, spices, and fruit trees. Around 60 percent of small-scale farmers are women, and most are illiterate.² Local impacts of climate change include an increase in pests and agricultural diseases, damage to crops from wildlife, irrigation challenges, and damage from wind and hailstorms.



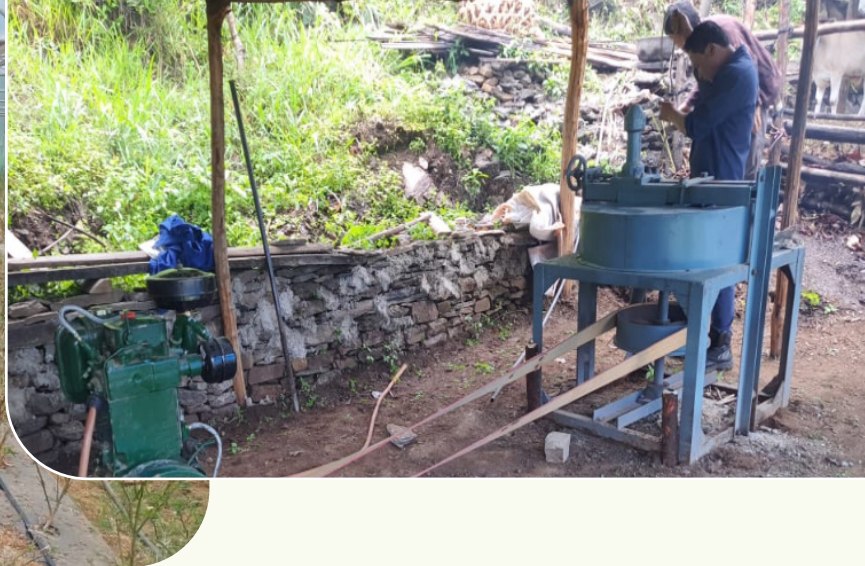
Climate-smart practices include farming on slopes and natural terraces to reduce soil erosion.

What Is Climate-Smart Agriculture?

Climate-smart agriculture is an approach to farming that guides agricultural systems towards green and climate-resilient practices around three objectives: to sustainably increase productivity and incomes; to adapt and build resilience to climate change; and to reduce, where possible, greenhouse gas emissions.

Practices include growing crops that are more resistant to temperature and precipitation extremes; growing trees alongside crops or livestock to create shade and windbreaks and improve nutrient cycling; and cover cropping, or growing crops to enhance soil health and water quality between cash-crop plantings.

Source: Food and Agriculture Organization of the United Nations, "Climate-Smart Agriculture," <https://www.fao.org/climate-smart-agriculture/en/>



A water tank with drip irrigation in Chimung Gewog (left) and a corn flake machine in Yurung Gewog (right) were installed in a farm as part of the research project.

Supporting Local Farmers With Information and Practices

In Pemagatshel District, researchers from the Royal University of Bhutan and the University of Montana conducted a resource mapping exercise and key informant interviews to better understand the risks of climate change to small-scale farmers in the region and potential uses of climate-smart agriculture to mitigate these risks. This research included:

- General farming resource needs and challenges.
- Gaps in local knowledge on the impacts of climate change and threats to farmer livelihoods.
- Specific climate-induced challenges.
- Other agricultural threats and opportunities in the region, such as water availability, labour, farm inputs like seeds and supplies, and equipment.
- Farmers' attitudes towards adopting climate-smart agriculture.

Since most of these farmers had not received training on climate-smart agriculture, researchers prioritized farmer training. Researchers trained farmers in three gewogs, or village groups, on targeted climate-smart agriculture technologies and practices in order to enhance their resilience, boost their incomes, and improve their livelihoods in the face of a changing climate.

Training was delivered through peer-to-peer, hands-on learning activities that included information on farming techniques such as tree pruning, organic manure production, seed saving, and composting, as well as a wide range of guidance on sustainable agricultural practices. The training emphasized the importance of farm design, including the critical practice of interchanging crops to benefit soil health and support sustained productivity of farm plots. In addition, farmers were given farm equipment and other essential agricultural inputs, such as seeds, to implement their learnings.

Challenges to Bhutan's Small-Scale Farmers Worsened by Climate Change



PESTS AND DISEASES



CONFLICTS WITH WILDLIFE



LACK OF WATER FOR DRINKING AND IRRIGATION



LABOUR SHORTAGES



POST-HARVEST LOSSES

Key Research Findings Reveal Promising Opportunities

Farmers can better withstand the impacts of climate change by adopting climate-smart agriculture technologies and practices.

Climate-smart agriculture support for farmers in Pemagatshel District should be appropriate for local small-scale farming crops and livestock. Because the region is semiarid and gets little rain, technologies and farmer capacity development activities should center on dryland farming. Crops must be drought resistant, and technologies should help conserve moisture.³

In other parts of Bhutan with more rainfall, traditional or heritage cereal crops that are drought tolerant, nutritionally dense, and require little management are being replaced due to the growing preference for rice, which is easily available and relatively cheap. However, reviving production of heritage cereal crops and legumes, such as amaranths, buckwheat, lentils, millet, and soybeans, could provide a promising climate-smart shift in practice, if backed with production and marketing support.

Most small-scale farmers rely on agricultural extension agents for their farming information, so strengthening these agents' capacities in climate-smart agriculture approaches is also crucial. Given the escalating threat of climate change to agriculture



Examples of traditional cereal grains in Chongshing Gewog: foxtail (left) and little millet (right).

in the area, supporting policy change and investing in programs to provide climate-smart agriculture infrastructure and capacity strengthening to build the resilience of local farmers is more important than ever.

Local farmers are willing to adopt climate-smart agriculture approaches to ensure long-term food security.

Data showed that small-scale farmers in the district were overwhelmingly willing to adopt climate-smart agriculture approaches, with 93 percent expressing a desire to adopt seed-saving practices and nearly 90 percent saying they would use farmyard manure as fertilizer. Other important climate-smart practices that farmers expressed a desire to adopt included mixed cropping and crop rotation, improving crop varieties, mulching, and integrated livestock rearing.

Climate-smart agriculture can especially benefit women, who comprise most farmers in the Eastern Himalayan region.

Small-scale farming in rural areas is largely headed by women farmers, since men often leave the farm for other work. Because most of these women are also illiterate, future agricultural capacity development programs must prioritize their needs for greater impact. Farming tools, equipment, and machines, as well as training materials and resources, need to be user-friendly for illiterate audiences and designed or adapted to meet the preferences and priorities of women farmers. Examples of such equipment include mini power tillers and mini threshers. For this project, the research team procured a specialized milling machine.

The Important Role of Extension Agents

Extension agents are government-appointed civil servants who are agriculture diploma holders or university graduates placed in all 205 gewogs in Bhutan. They are the first point of contact for farmers and work directly with them to form an important bridge between grassroots and central agricultural agencies. Each of the gewogs has one extension agent in agriculture and one in livestock. Extension agents are expected to be well equipped with knowledge and skills to competently address the needs of farmers. They are responsible for the implementation of improved technology and farming practices to develop agriculture and food production in the gewog.

Recommended Actions to Protect Bhutan's Small-Scale Farmers From Climate Change

Bhutanese policymakers in the Ministry of Agriculture and Livestock, as well as at the district and gewog level, should invest in programs that provide climate-smart agriculture training and supplies to farmers.

Climate change is a reality, and small-scale farmers in remote areas are disproportionately affected. They need training, capacity strengthening, and climate-smart agricultural supplies and technologies, such as drought-tolerant seeds, green manure, bio-pesticides, crop rotation, and water-harvesting techniques, to improve food production and food security in rural areas and develop resilience in the face of climate change.

Policymakers in the Ministry of Agriculture and Livestock, as well as at the district and gewog level, should promote traditional cereal crops as a climate-smart choice.

Traditional or heritage cereal crops are drought tolerant, nutritionally dense, and easy for farmers to manage. Efforts to reestablish the farming practices needed to sustain a shift to these crops, such as providing subsidies and establishing local markets, are a wise investment in the future.

Climate-smart agriculture programs should include user-friendly equipment and low-literacy training adapted for women, who represent most farmers in rural areas. Such equipment could include small and lightweight power tillers, mowers, and other semi-automated tools.



References

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