



Adaptation and recovery after the 2015 Nepal earthquakes: a smallholder household perspective

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A year after a series of earthquakes struck Nepal in Spring 2015, collapsed buildings and rubble still littered villages across Dolakha, a largely rural and mountainous region in central Nepal.

Many schools remained unrepaired and health posts struggled to continue operations in damaged buildings with constrained access to equipment and resources. Damage to infrastructure in Dolakha was the most visible indicator of the 7.8 magnitude earthquake that struck near the district's capital, Charikot, on May 12, 2015.



However, the earthquake destroyed more than homes and buildings. Rural communities in Dolakha and throughout Nepal are largely agrarian and many residents practice subsistence agricultural. Given the critical role of agricultural systems in rural lives and livelihoods of many earthquake victims, we traveled to remote villages across Dolakha to study how the earthquakes impacted mountain farming communities.

Mountain agriculture in Nepal uses a terraced system to help control water and soil moisture. Farmers grow many traditional crops including maize, wheat, rice and millet as well as crops to sell like potatoes, cardamom and kiwi. Livestock are very important for field labor and adding nutrients to the soil, as are local forests where women gather fuelwood and fodder for animals.



We used a suite of qualitative and quantitative tools including a survey, numerous interviews, focus groups, and participatory group interviews to assess earthquake damages.

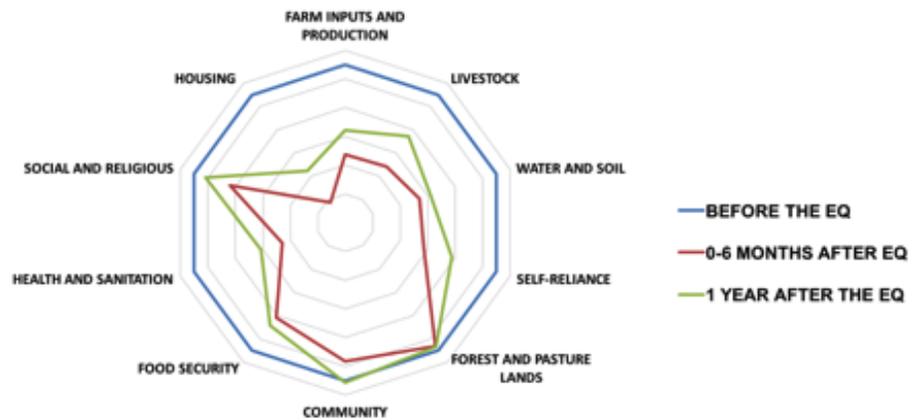
The physical impacts of the earthquake to the landscape created huge cracks in some farmer's fields and heavily compacted soils in others. It severed the bamboo pipes that carry irrigation water, destroyed carefully dug canals, and buried traditional seeds stocks and farm livestock in the rubble. The earthquake also compromised the structural integrity of hillsides. Because many of the terraces are cut into steep slopes, some over 30 degrees, the looming threat of landslides still hovers over some farmer's fields and homes.



In the months after the earthquake, households have to surmount many obstacles. Families are still living in tin cottages, that many describe as uncomfortable, and unsafe. They need income to rebuild not only their houses, but also farms.

In many ways, the earthquake hit subsistence farming the hardest and in response, more farmers are turning to cash crops. They need immediate income to rebuild houses and send children back to school. Cash crops also help farmers adapt to new post-disaster farming

realities. Crops like kiwi and cardamom require less water than traditional crops like rice and millet, and can be planted on marginal or non-terraced land. These cash crops also require less labor, reducing stress on already labor-constrained households and those rebuilding their livestock assets. However, implementing new farming technology and practices almost always requires access to capital, training, or assistance. For many of Dolakha's poorest farmers, cash crop adoption may be out of their financial reach. This could lead to an increase in localized inequality, widening the gap between castes and classes.



'Spider diagram' of earthquake impacts on social-ecological system variables (all 10 adaptation and recovery assessment indicators from table 1). Scores for individual metrics are averaged across total respondents (n=79). The outer edge represents the (self-assessed) pre-earthquake baseline. The closer to the center an indicator falls, the more it declined relative to the pre-earthquake baseline; the closer it is to the outer edge, the more it recovered.

Although transformations surrounding subsistence ways of life were already undergoing change, the earthquake has accelerated these shifts, particularly towards cash crops cultivation. Looking ahead, it will be critical to understand the indirect yet pervasive effects of disasters and shocks on traditional farming communities. Government policies will in turn

require adaptive flexibility and diversified assistance programs to support agricultural landscapes in transition across class and caste.

With the generous help of American Alpine Club's Research Grants, we were able to collect data to inform two conference presentations - the Social Science Baha in Kathmandu 2016 and the Association of American Geographers 2017 - and two peer reviewed publications - one in review with *Environmental Research Letters* and one pending for the *Journal of Peasant Studies*.



About the researchers

We are doctoral students in Geography - Katie Epstein at Montana State University and Jessica DiCarlo at University of Colorado, Boulder. We are both avid outdoorswomen who research issues of landscape change in mountain communities, and seek adventures whenever possible. You can follow our research at mountaingeographies.com