How small scale farmers cope with two different timings of heavy rainfall events in Southern Zambia

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Abstract

In the semi-arid tropics where small farmers depend heavily on rain-fed agricultural systems, variability in precipitation has a dramatic impact on crop production and livelihoods. The frequency of unexpected heavy rainfall or flood events has increased in many areas of Africa, including Southern Zambia. Unexpected heavy rainfall events occurred in 2007/08 and 2009/10 forcing small-scale farmers to adopt various coping behaviors. This study investigated the coping strategies adopted during heavy rainfall events in 2007/08 and 2009/10 in Southern Zambia.

We examined three sites located along a topographic gradient in the Southern Province of Zambia where annual rainfall is approximately 640 mm and is concentrated from November to April. The three sites were located in lower terrace, mid-escarpment and upper terrace topographic regimes. Rain-fed maize was the predominant crop and was cultivated during the rainy season. To understand farmers’ coping strategies, we developed a crop allocation map using a hand-held GPS in the rainy and dry seasons from 2007/2008 to 2009/10. We also interviewed farmers to determine their coping behavior after rainfall events.

The heavy rainfall event of 2007/08 occurred at the end of December, whereas the 2009/10 event occurred at the end of February. Because the dissemination of Maize is undertaken at the beginning of the rainy season, the two heavy rainfall events damaged the crops at different growth stages. In 2007/08, lodging and flow of young maize occurred in sites A and C, and a land slip occurred in site B. In 2009/10, lodging occurred in sites A and C, and a land slip occurred in site B, with an additional decay of the ears of pre-harvest maize. The proportion of the field area damaged by heavy rain was 6% in 2007/08 and 20% in 2009/10.

Cotton was cultivated as a cash crop more often in site A than at the other sites, but the sale of vegetables was low. The sale of timber and stones for house building was undertaken at site B but not at the other sites. Poultry sales were higher in site C than in the other sites. Therefore coping behaviors differed, because the available natural resources varied among sites.

Farmers used agricultural strategies such as crop switching or crop replanting to change land-use patterns in 2007/08; however, most land was abandoned in 2009/10. Farmers buffered the shock by developing cash acquisition activity after damage occurred. Sales of
domestic animals dominated; however, there was an increase in the dependence on timber sales in site B.

We concluded that: (1) the exact damage varied according to the different topographic and ecological conditions of the site, (2) the degree of damage varied according to the timing of extremely heavy rainfall, because of the different growth stages of the crops and ecological conditions, and (3) the coping behavior adopted varied, because the available natural resources differed among sites. Therefore, it is necessary to select the type of assistance offered carefully and in accordance with the local characteristics and timing of a disaster.

Keywords: coping behavior, unexpected heavy rainfall, semi, arid tropics, Zambia