SOIL EROSION MITIGATION TECHNIQUES IN CLIMATE SMART AGRICULTURE INTERVENTION AREAS IN BURKINA FASO

EXECUTIVE SUMMARY

In Burkina Faso, food security, agricultural development, and rural development are highly interlinked. Approximately 80% of the population lives in rural areas where rain-fed subsistence agriculture is the major source of livelihood. The size of the population is expected to double by 2050 to more than 30 million people based on the 2010 population growth rate of 3.1%. The country is located in the Sudan-Sahelian climate zone and typically experiences a climate characterized by a highly erratic rainfall and frequent droughts. Furthermore, the impacts of climate change such as prolonged droughts and floods compound the weather conditions. Increased agricultural production is a function of vast production areas at the expense of natural vegetation, exposing the soil to erosion and degradation. The unfavorable weather conditions and soil degradation diminishes agricultural production and its ability to meet the growing food needs of an increasing population. This calls for sustainable agricultural production practices that mitigate the negative effects of climate change while protecting the natural resource base for future generations.

The World Food and Agriculture Organization (FAO) recommends the transformation of traditional agricultural systems by adopting the climate smart agriculture (CSA) approach. The approach was introduced at the FAO's conference on agriculture, food security, and climate change held at The Hague in 2010. FAO estimates that the implementation of CSA will contribute to the achievement of development goals as it integrates the three dimensions of sustainable development (economic, social, and environmental) while addressing the challenges of food security and climate change. The CSA approach is based on three main pillars: (1) sustainable growth of agricultural productivity and income; (2) the adaptation and building resilience to climate change; and (3) the reduction of greenhouse gas emissions. The CSA approach is a holistic approach that mobilizes technical, political, and financial resources for sustainable agricultural development and food security in the face of climate change.

The USAID West Africa Water Supply, Sanitation and Hygiene (USAID WA-WASH) Program food security activities aim to increase the agricultural production in the intervention communities by training producers on improved farming practices. The Program supports the CSA approach in 10 rural communities in three regions of Burkina Faso. These communities are: Nana, Yaro, Moko and Oullo in the Boucle du Mouhoun region; Tiogo Mossi and Koukouldi in the Centre-Ouest region; and Tama, Oueglega, Koudiéré, and Vipalogho in the Centre region. The practices include the climate smart farming techniques such as soil and water management conservation, and multiple-use water services. The specific activities include generating and disseminating weather information across the 10 intervention communities and training and advising farmers on soil and water conservation technologies.

The Program conducted a scoping study to gather information on the potential of climate smart agriculture by identifying the cropping systems used by producers, soil erosion mitigation measures and water conservation technologies practiced by farmers. Focus group discussions with the members of the intervention communities gathered information about the cropping systems and the types of crops produced in the area. In the intervention communities, farmers produce sorghum and millet that mature within 120 days. Rarely do producers use fast maturing crops varieties despite the reduced amount of rainfall. Producers in the Centre region practice the Zai technique to conserve soil and water. In the regions of Centre-Ouest and Boucle du Mouhoun, do not practice any soil and water conservation technique, but practice crop rotation to manage soil fertility. The Boucle du Mouhoun region lies in the Sudanian rain belt that receive relatively higher amounts of rainfall as compared to the Centre-Ouest and Centre regions that are located in the dry Sahel-Sudan belt.

According to the country's national meteorological office, the rainy season lasts between 180 to 200 days between the months of May and November in the Sudanian rain belt as compared to 85 to 100 rain days between the months of June

and October in the Sahel-Sudanian belt. The rainfall patterns in the region of Boucle du Mouhoun show that the rainy season is long enough to accommodate the 120 days of growth cycle of the crops varieties cultivated by the communities. However, this is only if the rainfall is evenly distributed during the season, which is often not the case. Crop production in the regions of Centre-Ouest and Centre is relatively adversely affected by the short rainy period as they neither cultivate early maturing crop varieties nor apply water conservation technologies.

Rainwater in the two regions is lost through runoff which depends on the type of soil, the vegetation cover, and the topography of the area. The month of September, which is one month after the high amounts of rainfall in the month of August, is the ideal month to assess vegetation cover in Burkina Faso. From the observations during the study, only a few patches of land are completely covered by vegetation. These areas correspond to forest reservations and protected parks. Besides these patches, most of the study area depicts a land cover ranging from 70% to less than 30 %. This demonstrates the importance of agricultural activities to the local communities on one hand and the risks of soil erosion on the other as producers clear vegetation for cultivation of crops. The soil conditions are generally poor in the intervention communities. The commonly found soil types in the intervention areas are Hydromorphic soils, which change according to the water content and are usually located in low topography. In addition, the Sesquioxydes soils are also present in the intervention area. They are poor in organic matter content and are less developed. These soils are highly exposed to erosion as a result of human activities.

Based on the study findings, the proposed CSA techniques for soil conservation in the different regions depend on the soil types, the topography, and the land cover settings. The techniques include the Zai holes (planting pits), half-moons, stone lines for steep and gently sloping terrain; small dams in the valley bottoms to harvest rain waiter and natural tree regeneration. Stone lines which are small at the most they are three stones wide and two stones high and are used where there are loose stones in the field. They slow down runoff, and enable gradual soil development. The half-moon micro-catchments are small, semicircular earth bunds that hold water flowing down a slope. They help to rehabilitate degraded land and limit run-off. In addition to these techniques, mulching is advised to control wind erosion and to improved soil fertility.

The Program trained 471 producers in the intervention communities on the improved soil and water conservation techniques. According to the CSA evaluation of the 2014 rainy season, 295 producers had adopted at least one of the soil and water conservation techniques. The soil and water conservation techniques used in the CSA approach contributed to increased yields of millet, sorghum, and maize by 60%, 134%, and 170%, respectively as compared to the yields of farms that did not apply the CSa techniques. Further, the Program developed a training manual for soil erosion control techniques, soil fertility, water management, and improved production technologies using the CSA technique. This manual was shared with the stakeholders in the agriculture sector in order to scale up the adoption of the CSA techniques in other regions in the country.

The full report is available (in English) upon request via our website. For more details about our program activities and other reports please visit http://wawash.fiu.edu/

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