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Land Use, Farming Systems and Carbon Sequestration in Ouémé Catchment in Benin

VALENS MULINDABIGWI, MARC J. J. JANSSENS

University of Bonn, Institute of Horticulture, Germany

Abstract

Main goal of this study was to analyse the influence of farming and land use systems on the carbon sequestration and food security in upper Ouémé catchment in Benin. The study was conducted in two representative villages: Dogue and Sérrou respectively for villages with and without land to clear.

Farming systems in the upper Ouémé catchment are mainly shifting cultivation. The crops are sown principally from May to August and the yam comes at the head of crop rotation: tuber (yam) – cereal – cotton or cereal – leguminous – cereal or cotton – cereal – fallow or cashew. Except yam, other food crops are intercropped and the number of intercropped crops increases with land scarcity. Farming systems are also still characterised by the growing of cashew plantations, which can provide a solution to deforestation.

On the assumptions, that the rainy season ends in September instead of mid-October, the quantity of rain and the farming systems remain unchanged, the soil productivity and rainwater use efficiency will decrease respectively to 17 and 23% in Dogué, to 14 and 25% in Sérrou. The seasonal rain variability in Dogué and Sérrou could lead to the peoples' migrations (5.5%), deforestation (2.6%), carbon release (77 t/ha and 3 t/inhabitant CO₂) and increase of agricultural water use (from 1357 to 1756 and from 2562 to 3422 m³/inhabitant-year respectively in Dogué and Sérrou).

Biomass burning and increase of agricultural areas are two principal factors that cause the release of carbon into the atmosphere. The carbon sequestration is higher in forest (70.9–135.0 t/ha) than in other land use system. The difference between the forest system and the agricultural areas (38–103.4 t/ha) represents the carbon emission.

Summary, farmers in upper Ouémé catchment need efficient water use management to achieve their food security, otherwise they are obliged to extend their agricultural areas or to immigrate towards less occupied regions. Consequently the carbon release, which accelerates the climate change, will increase.

Keywords: Benin, biomass, carbon emission, carbon sequestration, farming systems, food security, land use