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Climate Change in Agro-Forestry Systems: Farmers Perception and Adaptation Strategies Efficiency in the Northern Shea-Parks, Benin, West-Africa

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Abstract

Shea trees (*Vitellaria paradoxa*) grow throughout West-Africa. This vegetative formation has been used for centuries by African farmers to plant crops and benefit from the land caring properties of the Shea trees. In this system, farmer perception refers to climate events, climate related damages on Shea trees and farming systems. Therefore, climate change perception is split into perceived (1) climate change events; (2) environment damages including damages on Shea trees and farming systems. Likert-type three points scale; unequal weighting and linear aggregation methods computed the corresponding indexes. The study was conducted in the Shea-parks of the northern part of Benin. The quantification of perception intensity gives the indexes: climate change events 1.32(±0.23) out of 1.47 and environment damages 3.34 (±0.58) out of 4.12. These results indicate that farmers know that their livelihoods are at stake. Moreover, the sense of threat is greater for perceived environment damages through bad quality of Shea-nuts, Shea trees delay maturation; and smaller size of tubers, ears or capsules, modification of crops vegetative cycle, etc. Understanding the risk they encounter, 69.91 % of the surveyed farmers adapt using re-sowing (69.91 %), re-ploughing (57.36 %), prayers (21.43 %), traditional rituals (39.39 %), off-farm activities diversification (45.24 %) and reforestation (35.50 %). The adaptation strategies identified, was regressed on the Total Productivity Factors (TPF) index to capture their effects on agroforestry systems economic efficiency. The system is economically efficient with a TPF index 1.53 (±1.27) on average. The index is significantly affected by re-sowing, re-ploughing, traditional rituals and off-farm activities diversification. Among these strategies, only increases in the re-ploughing frequency and off-farm activities diversification have a positive effect, respectively, on Shea-parks economic efficiency. Moreover, the Logit model reveals that only Shea trees density affected negatively both strategies; and farmer gender affects negatively off-farm activities diversification. Therefore male household head, having more than 20 Shea trees per hectare is likely not to apply these two adaptation strategies. Indeed, Shea nuts trade net revenue 18287.87 (±16869.45) Fcfa per month in harvest times, may compensate farmers that do not practice re-ploughing and off-farm activities diversification as climate change adaptation strategies.

Keywords: Adaptation strategies, climate change, economic efficiency, perceptions, Shea-parks

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