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Smart-Valleys' effects on inland valleys ecosystem services: Farmer insights in West Africa's Sudano-Guinean zones

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Abstract

Smart-Valleys (Smart-IV) development of inland valleys (IVs) for agricultural purposes, known as a participatory approach to the exploration, design, and construction of water control channels following the flow of water in IV, and the bunds valleys development approach (Bund-IV), known as the direct construction of water conservation ponds in the IVs, are expanding rapidly in Benin. Nonetheless, the impact of these development approaches compared to Undeveloped-IV on the conservation of IVs ecosystem services (ES) remains understudied, despite its potential to inform policy decisions and balanced IV management. This study, using a mixed (quantitative and qualitative) sociocultural evaluation approach, assesses the perceptions of 298 smallholder farmers on the ES provided by 41 IVs management approaches (14 Smart IVs, 14 Bund-IV, 17 Undeveloped-IV) and the associated threats. The results show that provisioning and regulating ES are more important for the Smart-IV approach (RII = 0.89, RII = 0.89, RII = 0.77 respectively) than the Bund-IV (RII = 0.78, RII = 0.66, RII = 0.67 respectively) and Undeveloped-IV (RII = 0.57, RII = 0.57, RII = 0.64 respectively). The Undeveloped-IV is more associated with cultural services (PCA results). High chemical pesticide use (CF= 0.13) and hydrological constraints (CF = 0.12) were reported as the major threats to the ES. Gender, level of education, and annual income were determinants of farmers' ES perception. IV management should have an integrated, participatory management plan that considers the conservation of all ES. Improving the commitment and capacity building of women would ensure the understanding and adoption of sustainable practices.

Keywords: Developed valleys, ecological functions, lowlands, subsistence growers, West Africa.

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