

Title

ASSESSMENT OF THE VULNERABILITY OF SENEGALESE FARMING HOUSEHOLDS TO CLIMATE CHANGE: INTEGRATED ASSESSMENT APPROACH AND MAPPING OF INDICATORS USING GEOGRAPHIC INFORMATION SYSTEMS (GIS).

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Abstract

Due to their heavy dependence on rain-fed agriculture, sub-Saharan African countries are largely exposed to climate change. Sahelian countries, and particularly those in West Africa, are among the most affected by the recurrent effects of climate change, particularly long periods of drought. Climate change could exacerbate the vulnerability of agricultural households; whose livelihoods mainly depend on income from agricultural production. The theoretical literature is unanimous in considering that climate change increases the vulnerability of rural households (Barrett et al., 2007; IPCC, 2007; Agossou et al., 2012). However, there is a lack of knowledge on certain questions such as “Who is vulnerable?” », “What is the degree of vulnerability? », “What is the capacity to adapt? », “How is vulnerability distributed geographically? This misinformation from political decision-makers about the level of vulnerability of people and their priority needs poses a problem for the effectiveness of public investments. This research attempts to answer these questions to shed light on how agricultural households are affected by climatic events such as drought and floods. It maps a set of indicators and generates a vulnerability index, which could facilitate the intervention of political decision-makers on climate change issues. A sample of 668 agricultural households distributed in 33 communes and two different agro-ecological zones was studied using an integrated and spatial approach combining socio-economic indicators and institutional factors of households, biophysical variables linked to temperature, precipitation and climatic events (drought, floods), and other variables linked to accessibility to infrastructure and basic social services (roads, education, health, etc.), and environmental characteristics such as soil type, the slope and the vegetation. These cited indicators are grouped according to three sub-components of vulnerability, namely exposure, sensitivity and adaptive capacity of households, then a composite vulnerability indicator is calculated according to the definition of the Intergovernmental Panel on climate change (IPCC) and the methodology developed by Zébisch et al. (2021). The results of the

research indicate that out of 33 municipalities studied, two (2) are in a very high level of vulnerability of around 0.61 to 0.70, six (6) are in a state of high vulnerability of 0.53 and 0.60 and six (6) others are in a moderate situation (0.46 to 0.52). These localities are highly exposed to climate change, including changes in temperature, precipitation, and events such as floods and droughts. They are also sensitive given their altitude, less conducive to the development of rice growing, and especially their fragility linked to a relatively dominant age group. Indeed, in these slightly more remote areas, the adaptation capacity of households remains low; Households are far from roads and health infrastructure and have limited access to agricultural credit, extension services and agricultural insurance and are therefore characterized by relatively low income levels. To this end, strengthening social capital through the development of extension services such as agricultural advice; strengthening human capital through education and training; the development of institutional capital through the development of basic social infrastructure, transport and credit institutions; as well as economic capital through the promotion of agricultural insurance, are fundamental policy measures to reduce the vulnerability of agricultural households and thus improve their resilience. The policy implications that emerge from this research provide an idea of the order of priority of adaptation policies in the different localities considered. The originality of this research is that it is being developed in a context where countries need to produce solid scientific knowledge to justify their exposure to climate change so that the adaptation options that will be proposed can meet the requirements of the mechanisms of international financing as established by the guidelines of the Least Developed Countries (LDC) Expert Group which stipulates that the financing process for national adaptation plans (NAPs) must be based on sound scientific knowledge (LDC-2012).

Keywords: Climate change, Vulnerability, Index method, Rice farmers, Senegal.