

Energy, specifically energy services affects social, economic, and environmental aspects of development such as livelihoods, agricultural productivity, health, education, and gender-related issues. Kilifi district in the Coast region of Kenya has very high poverty prevalence (70%). There is dependence on solid biomass for energy and traditional energy end-use technologies. Hence, appropriate energy services for microenterprise development are lacking. This increases the poverty situation and environmental degradation. A household survey, focus group discussions and interviews were used to assess the relative importance of rural micro-enterprises current energy choices, the influence of agro-ecological factors on current energy choices and the environmental impacts of current energy use. The study also determined sustainable energy alternatives for the agro ecological of Kilifi district. The study findings show currently, traditional use of biomass and human energy mainly from women are the main sources of energy for micro-enterprise activities. These findings also show that, agro ecological factors influence both the type and quality of energy sources and microenterprise. Despite this link it appears that, there is no model which uses ecological concepts and principles to assist in designing, developing, and managing sustainable rural renewable energy systems. Rural microenterprise existing energy use impact on the ecological stability and ecosystem services in Kilifi district and beyond which threatens current and future livelihoods. This also undermines human development and well being especially among women. Energy alternatives exists across all agro ecological zones in the district that can offer energy services for microenterprise development and environmental protection a but are not being fully utilised. According to this study the district can have between 80.0 billion and 80.1 billion kWh per year of electricity if 10% of its current bioenergy potential is converted to electricity. The study recommends further research on agro ecological approach to sustainable rural communities' renewable energy systems. Development of a Predictive Ecosystem Mapping (PEM) model for Kilifi district so as to improve natural capital (increased soil water retention hence high water table and increased agro-biodiversity).