

ABSTRACT

Most coastal rural communities in Ghana are particularly vulnerable to sea level rise because of poverty, remoteness and isolation from central planning agencies. Understanding future sea-level rise (SLR) risk levels and community adaptation behavior is critical in implementing climate change adaptation strategies. This study assessed the risk level of sea rise and adaptation behavior within three coastal rural communities in Ghana namely, Sawoma, Anlo Beach and Glefe-wiaboman. The study employed an innovative mixed-methods approach that combines spatial data (UAV and satellite imagery), questionnaire surveys, Focus Group Discussion (FGD) and expert knowledge. Data obtained from both primary and secondary were analysed to generate scores for each component of risk based on the IPPCC AR5 climate risk concept which was then aggregated to obtain risk level scores for each study community. The study utilized a multistage sampling technique to select household respondents and purposive sampling for participants for the Focus Group Discussion (FDG). Descriptive and inferential statistics were used to quantitatively describe and summarize the data collected. The Sea Level Affecting Marshes Model (SLAMM) was employed to simulate the effects of various sea level rise scenarios on rural coastal communities. Multinomial logistic regression was then employed to identify the factors that predict residents' intention to relocate. Results from the study indicated that cumulative impacts resulting from both erosion/accretion and inundation, on average of about $1.67 \pm 0.72 \text{ km}^2$ of rural coastal community land will likely be impacted for up to 1.4 m SLR scenario for Sawoma ($0.11 \pm 0.03 \text{ km}^2$), Anlo Beach ($0.38 \pm 0.12 \text{ km}^2$) and Glefe-wiaboman ($0.18 \pm 0.56 \text{ km}^2$). Socio-ecological vulnerability levels were high in areas where there were human settlements and critical ecosystems. The levels varied between 0.43 and 0.60, with Anlo Beach recording the highest score of 0.60, as anticipated due to its highest ecological vulnerability score. Sawoma and Glefe-wiaboman reported vulnerability scores of 0.43 and 0.49, respectively. In terms of risk to SLR, Glefe-wiaboman community will likely be at high-risk (0.75 – 1) whilst Anlo beach and Sawoma likely be at medium (0.25 – 0.49) and low-risk (0 – 0.24) levels respectively. The high SLR risk level in Glefe-wiaboman is exacerbated by its low-lying topography, high population density and beach sand mining. Also, the study revealed that cognitive and compositional factors ($p\text{-value} < 0.05$) are more important than contextual factors for predicting the relocation intention of coastal rural communities in Ghana. Thus, the study advocated for intensive education on the effects of future sea-level rise impacts on communities and the benefits of relocating vulnerable coastal rural communities.

Keywords: Ghana, Sea Level Rise, Adaptation Behaviour, Coastal Rural Area, Relocation, Perceived Risk