

## 別紙 4

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## 主 論 文 の 要 旨

論文題目: An assessment of the impacts of land use and socioeconomic changes on flooding risks in Nigeria

(ナイジェリアにおける土地利用と社会経済的変化が洪水リスクに与える影響の評価)

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## 論 文 内 容 の 要 旨

Land use modifications, socio-economic shifts, and rapid urbanisation have affected Nigeria's increase in environmental problems in the last few years. With the expectations that Nigeria will continue to experience changes to the socio-economic landscape, the need to examine how these variations may impact the frequency and intensity of natural hazard such as flooding is now paramount. Flood is one of the most catastrophic natural disasters, posing a serious and immediate threat to the society and the environment. Several methods have been developed to assess flood-prone areas, but they do not adequately account for socioeconomic changes. However, with the increasing frequency of floods and related disasters, it is necessary to examine the relationship between land use and socioeconomic changes and flood damage. This research attempts to identify how land use drivers influence land use changes and their respective impacts on flooding risks; it further simulates future land use changes under multiple scenarios until 2040. The study also estimates the areas at risk of flooding by utilising machine learning and land use modelling and finally highlights how the choice of socio-economic development impacting land use changes can affect the exposure of people, land cover and infrastructure to existing risks.

The results show that demographic, economic and accessibility factors were among Nigeria's main drivers of land use change. From the land use simulations, in the first scenario, maintaining current developmental trends, agricultural land would expand to about 58 per cent, and forest would be depleted to 20 per cent. However, the two other scenarios that focus on improving existing land use policies and other socio-economic indicators witnessed a reduction in agricultural expansion by 52 per cent and 44 per cent, while forest areas improved to 22 per cent and 23 per cent, respectively. The study also used machine learning techniques to predict areas at risk of flooding. The results show that the highest flood risk is primarily among urban residents, with about 72% of the urban population exposed to high flood risk. Finally, the study provides insight into how varying socio-economic changes can affect land use patterns and leading to variations in flood risk exposure. Finally, the study can also aid in creating effective countermeasures for long-term flood catastrophe prevention in Nigeria and the rest of the developing world.

**Keywords:** Land use changes, Flooding, Flood risk assessment, Socio-economic changes, Nigeria