**FloodGuardEdge project Recommendations**

**Data Collection**

Since data collection is the cornerstone of the FloodGuardEdge project, particularly given Nigeria's challenges with data scarcity and accessibility. To develop an effective flood prediction system, a strategy combining local and global data sources is essential.

Locally, agencies such as the Nigerian Meteorological Agency (NiMet) and the Nigeria Hydrological Services Agency (NIHSA) provide critical data, including rainfall measurements, temperature records, and historical flood events. These can be accessed through their official websites (nimet.gov.ng and nihsa.gov.ng) or via direct requests (e.g., emailing info@nimet.gov.ng), though delays and incomplete records often complicate reliance on these sources alone.

To address this, global datasets offer a vital complement: CHIRPS provides historical rainfall data (1981–present) downloadable from data.chc.ucsb.edu, whilst SRTM offers high-resolution elevation data via earthexplorer.usgs.gov. Additional global sources like MODIS and Copernicus (Sentinel-1/2) supply land cover and flood extent insights, and OpenStreetMap provides infrastructure details (e.g., roads and waterways) from download.geofabrik.de. Socioeconomic data from UN/World Bank repositories (e.g., data.humdata.org) and real-time updates from Twitter/News APIs (developer.x.com and newsapi.org) further enrich the dataset.

**Model Development**

The model development strategy for FloodGuardEdge employs an ensemble approach, integrating classical machine learning and deep learning techniques to deliver accurate and practical flood predictions. Models such as Random Forest, XGBoost, and LightGBM are my recommendations for their ability to handle structured, noisy data efficiently, which is crucial for Nigeria’s varied terrains and limited computational resources. These models excel in flood susceptibility tasks and have been validated in similar regional studies.

**Existing or Similar Models**

A review of existing flood prediction systems and studies highlights opportunities for FloodGuardEdge to stand out. Globally, Google's Flood Hub provides 7-day forecasts across over 80 countries, including Nigeria, using AI on public datasets to reach millions via web and mobile platforms. However, its dependence on global data may lack local precision, and its online-only access limits rural utility.

In Nigeria, Climatrix AI positions itself as the country’s first AI-driven climate platform, claiming 98% accuracy for 3-day warnings, yet its data sources, deployment scope, and accessibility remain unclear, raising questions about its practical reach.

Academic efforts also inform the landscape: a Springer study (2018–2024) used geospatial methods for downstream Nigeria, an MDPI study (1985–2020) applied Random Forest and ANN for susceptibility mapping, a Frontiers study introduced NeuralFlood for AI modelling, and a ScienceDirect study (1998–2023) combined SVM, XGBoost, and ANN for hazard zoning in the Niger River basin. These studies offer valuable insights but lack operational deployment. FloodGuardEdge can bridge these gaps by emphasising local data integration for accuracy, offline capabilities for accessibility, and a deployable system that builds on research, distinguishing it from both global tools and academic works.

**Possible Novelty of FloodGuardEdge**

FloodGuardEdge distinguishes itself through innovative features that address unmet needs in flood prediction. The comprehensive approach, merging data collection, advanced modelling, app development (Streamlit and FastAPI), and research, I think will creates a holistic solution that delivers both practical utility and innovation.

**THE BIG QUESTION IS ON**

**HOW TO GET THESE LOCAL DATASETS**