Our team partnered with The University of Rwanda to investigate the effects of rainfall patterns on food security in Rwanda's Southern Province. By analyzing historical data from the Kaduha-Gitwe Corridor, we examined Standardized Precipitation Index (SPI) patterns – a measure of drought and wetness severity. Leveraging this analysis, we developed predictive tools to forecast droughts and potential food shortages, with a particular focus on Cassava, a vital crop that provides 25% of Rwanda's dietary energy.

By applying forecasting techniques to precipitation data, the team identified varying drought risks across the region, particularly worsening drought conditions in the Cyanika, Kitabi, and Kigoma stations. These insights were paired with a model predicting cassava production. These insights were integrated into a predictive model for cassava production, which linked rainfall patterns to caloric availability. The model enhanced its accuracy by incorporating factors such as land use, population dynamics, and yield measurements to estimate daily calories per person more effectively

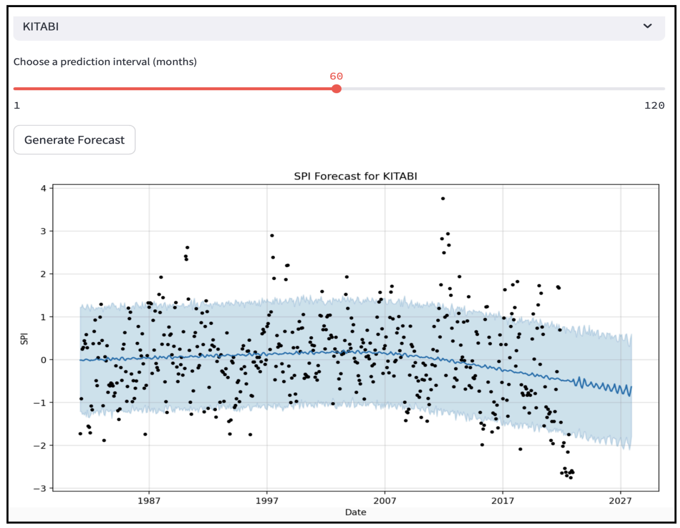

Figure 1. *Generated forecast of SPI over 60 month interval*

Key outputs included an interactive dashboard showing drought forecasts that visualize inclines and declines in SPI over a chosen month interval (Figure 1), as well as a cassava production model that estimates the range in which caloric availability is expected to fall, with 20% uncertainty, for a chosen SPI value (Figure 2).

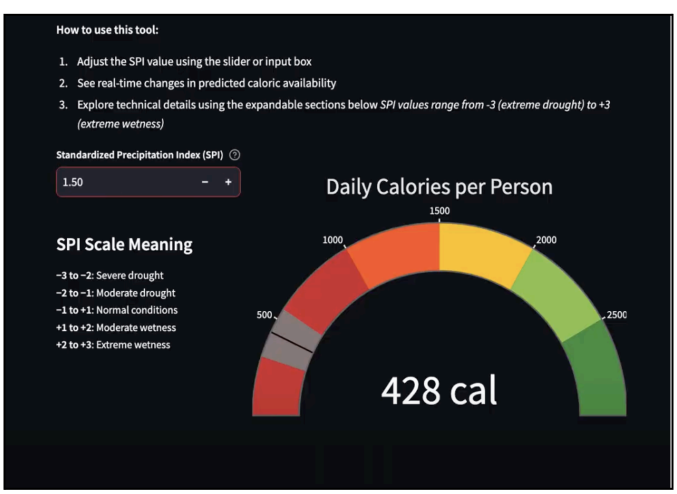

Figure 2. *Cassava model showing caloric availability*

While the current model explains 56% of cassava production variability, future work could improve accuracy by incorporating satellite rainfall data and expanding coverage to all provinces. This approach demonstrates how localized climate analysis can support food security in agriculture-dependent economies.