



## Visualizing change, cultivating resilience: An augmented reality driven approach to climate adaptation planning in Brazilian agriculture

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The escalating challenge of climate change, notably the changes in rainfall patterns, poses a significant threat to agricultural practices in Brazil, particularly in regions like Novo Progresso, Para, notorious for extensive deforestation and the annual "Day of Fire". We introduce an innovative mobile Augmented Reality (AR) application designed to aid farmers and local communities in adapting to these shifting rainfall patterns.

Our AR climate service application, developed for smartphones running the iOS and Android platforms using Unity 3D and ARKit/ARCore libraries, offers an interactive visualization of the study area. Users can view a detailed map, including administrative boundaries, protected zones, and geographical features, to explore various land uses and simulate potential changes in rainfall and crop yield. By selecting a specific plot of land within the app, users gain the capability to tailor the land's usage parameters, including the type of crops cultivated (if any) and the agricultural management strategies employed. Combining their input of local knowledge with climatic and agricultural models, the tool is able to provide them with projections of the rainfall change for the selected plot as well as the anticipated effect on crop yields. Stakeholders can experiment with different crops and management strategies and observe simulated outcomes on crop yields under different climate scenarios. Additionally, the tool supports multi-user simulations to enable effective community planning. This interactive approach is aimed at improving local decision-making regarding land use, highlighting the potential consequences of various agricultural strategies.

The content and features of the AR tool are grounded in interviews conducted in Para, Brazil, with a focus on incorporating local insights regarding crops, soil types, and existing management strategies. The initial phase of this project included pre-interviews which revealed a general lack of urgency among farmers regarding climate change. Our application aims to visually demonstrate the significance of climate change, linking the farmers' perceived changes in rainfall with larger

environmental trends.

The first iteration of the application was presented to a diverse group of stakeholders in the town of Santa Julia, including farmers, local government officials, and agricultural experts. Their engagement with the tool was followed by semi-structured interviews to gather feedback on usability and effectiveness. The response was highly encouraging, with stakeholders unanimously supporting further development and recognizing the application's potential in visualizing and combating the impacts of climate change.

Our presentation will discuss the iterative development process of the AR application, insights from stakeholder pre-surveys and testing sessions, and plans for further development. Emphasis will be placed on the tool's role in facilitating community-scale decision-making in a region marked by complex power dynamics and environmental challenges. Through this climate service tool, we aim to bridge the gap between scientific research and practical, community-led climate adaptation strategies.