

# Active Student Research

**NICKOLAS KENYERES**

## Ecological Baseline & Satellite Data Infrastructure

Before you can measure whether a lake is recovering, you need to know where it started. Nickolas built the technical foundation for tracking environmental change around Lake Malawi — using satellite data to map how land cover and water conditions have shifted year by year from 2017 to 2024. By developing tools that can extract and analyse this kind of data at scale, his work creates the baseline against which future restoration efforts can be measured. The code is open-source and designed so that future students and researchers can build directly on it — including students at Malawian universities who will continue this work on the ground.

**KAVYA VELMURUGAN**

## AI Adoption & Decision Support Modelling

Getting the right tools into the right hands is harder than it sounds — especially in communities where resources are limited, conditions are unpredictable and trust in outside recommendations has to be earned. Kavya’s project models how AI-supported decision tools actually get adopted in smallholder farming communities in the Lake Malawi region — looking at what happens when recommendations interact with real-world variables like soil quality, household income uncertainty and climate variability. Her goal is to identify not just what advice works, but what forms of support — including peer learning — make that advice stick. This directly informs how the Living Lab designs its AI platform so it gets used rather than ignored.

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## Reinforcement Learning for Land-Use Optimization

One of the hardest questions in ecological restoration is: given limited land, what should be farmed, what should be conserved and where? Ying tackles this using reinforcement learning — a branch of AI that learns optimal decisions through trial and error — to model land-use allocation across a 25km zone around Lake Malawi. The model weighs crop yield against water costs, training an AI agent to find the configuration that maximizes both economic and ecological value simultaneously. This is precisely the kind of tool that supports the Living Lab’s core premise — that prosperity and protection do not have to be in conflict and that the right analytical framework can show you exactly where they reinforce each other.