# Exploring the Future of Terceira's Native Forest: Predictive Modeling of Arthropod Community Composition with Recurrent Neural Networks

Understanding and predicting changes in species community composition is a fundamental aspect of ecological research, as it provides insights into the dynamics and responses of ecosystems to various environmental factors. We present a novel approach involving artificial intelligence algorithms, specifically a recurrent neural network (RNN), to forecast the arthropod community composition within the native forest of Terceira in the Azores Archipelago.

The dataset used for training our RNN model consisted of arthropod species abundance records obtained during a Long Term Ecological Monitoring project using SLAM traps over the past 10 years. By leveraging the temporal patterns inherent in the dataset, the RNN was able to capture complex dynamics and generate accurate forecasts for the next sampling period.

Our results demonstrate the effectiveness of the RNN model in predicting arthropod community composition, showcasing its potential as a valuable tool for ecologists and conservationists in monitoring and managing biodiversity. The forecasted compositions provided a comprehensive understanding of the expected changes in species abundance, allowing for early detection of potential shifts in community structure and the identification of critical conservation areas.

Moreover, our work highlights the importance of long-term monitoring data and their integration with advanced machine learning techniques to generate reliable predictions. By incorporating these forecasting capabilities into ecological studies, we can enhance our understanding of ecosystem functioning and improve conservation strategies, ultimately contributing to the preservation and sustainable management of terrestrial biodiversity.

**Keywords:**

Ecological modeling, Species abundance, Long-term monitoring, Terrestrial biodiversity, Azores Archipelago