

## PREFACE

This thesis is being submitted as requirement for a Master's degree in Geoinformatics. The research conducted for this thesis took place from 1<sup>st</sup> Dec, 2023 to 3<sup>rd</sup> June, 2024. The project was done in collaboration with Esri India Technologies Private Limited and includes references to other academics' works in addition to the author's original work.

The northeastern Indian state of Nagaland has moderate coal deposits, estimated to be 316.41 million tonnes. Several districts, including Mokokchung, Wokha, Dimapur, Longleng, Mon, and Peren, are home to these reserves. In the last ten years, Mokokchung district's forested hill slopes of the Changki Valley have seen a significant amount of coal mining activity, mainly in the form of rat-hole and open-pit mining.

Significant environmental deterioration has resulted from these intense mining activities. Overburden mine spoils amounting to 250 tonnes are carelessly deposited every year along the edge of the surrounding woodlands. The forest landscape has undergone significant changes as a result of this, including a significant drop in vegetation cover. Satellite imagery shows that considerable mining work has continued unabatedly despite a ban being imposed in 2019 for prohibiting further mining in the area.

The objective of this study is to create an interactive online application that allows temporal analysis and detects coal mining sites using a deep learning methodology. The purpose of this application is to give policy-makers a thorough and user-friendly tool to assist in making informed decisions on coal mining activities and the negative environmental effects they have on Changki Valley.

Through the use of this dashboard, policymakers should be able to evaluate the environmental effects of mining operations, gain a better understanding of the scope of the industry, and put more effective plans in place for environmental protection and sustainable resource management in the area. This study emphasises how crucial it is to implement sustainable mining techniques and strictly enforce mining laws in order to lessen the negative impacts on Nagaland's ecosystems and forests.