

## **PREFACE**

This research looks at land suitability for agricultural and tea production and shows how combining heritage cartographic data with current data can assist solve assessment difficulties. Land evaluation approaches have proven to be effective in promoting rational land resource management and long-term growth in various industries. In West Bengal's Darjeeling district, a Geographical Information System (GIS) and Remote Sensing (RS) were utilized to locate appropriate areas for producing agriculture. The standard FAO land appraisal framework was used, with data such as terrain and soil readily available. Several themed maps were created using satellite data to aid in identifying locations with the requisite potentials. Using the ESRI ArcGIS software, a GIS-based suitability study was performed, and the input datasets were categorized to assign categories that could be combined in a single model. To compare the outcomes of each technique, a weighted overlay method was used in combination with the Analytic Hierarchy Process (AHP). Assessing the constraints for sustainable land use planning necessitates a land suitability assessment. To assess land suitability for cultivation, we used eleven site-specific factors as criteria layers that include rainfall, soil pH, soil moisture, geology, slope, aspect, drainage, distance to roads, and land use land cover and applied a weighted multi-criteria evaluation (MCE) technique in a geographic information system (GIS) environment. All the parameters' weights were determined using an analytical hierarchy method. A site suitability map was created using weighted overlay analysis to integrate numerous factors. Precision farming techniques, which allow for continuous crop management and better yield production, might be one way to distinguish these regions in the future. The study demonstrated the efficacy of an integrated GIS and MCE strategy for land suitability assessments.