I J C R M

International Journal of Contemporary Research In Multidisciplinary

Review Article

A Review on the Role of Geospatial Technology in Resource Analysis and Regional Planning of Churachandpur District, Manipur

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DOI: https://doi.org/10.5281/zenodo.15304531

Abstract

Geo-spatial technology plays a central role in resource assessment and regional planning, providing sophisticated tools for data analysis, visualization and decision-making. In this study, its application in Churachandpur district, Manipur, is highlighted with a focus on Geographic Information System (GIS), remote sensing and global positioning systems (GPS) for mapping and monitoring of natural resources such as land use, water, vegetation and minerals.

They allow for the exhaustive evaluation of resource distribution and potential and better inform policymakers about environmental dynamics. In facilitating well-informed decisions, they support sustainable management of resources. Geo-spatial tools also aid in regional planning by maximizing infrastructure development strategies, disaster preparedness, and conservation of ecology. The research examines the effectiveness of geo-spatial technology for resource assessment and planning, highlighting the accuracy and dependability of GIS, remote sensing and GPS data. It further develops best practices for the inclusion of geo-spatial data into planning frameworks to enhance sustainable development and durable regional development.

Through the use of spatial data, Churachandpur will be able to effectively tackle environmental issues, encouraging effective resource usage and comprehensive regional planning. The study offers crucial insights into the convergence of geo-spatial technology, resource assessment and planning with a view to informing sustainable development in Churachandpur.

Manuscript Information

- **ISSN No:** 2583-7397
- **Received:** 25-02-2025
- **Accepted:** 22-03-2025
- **Published:** 17-04-2025
- **IJCRM:**4(2); 2025: 204-211

- **Plagiarism Checked:** Yes
- **Peer Review Process:** Yes

How to Cite this Article

Haokip TL, Prasad TK. A Review on the Role of Geospatial Technology in Resource Analysis and Regional Planning of Churachandpur District, Manipur. Int J Contemp Res Multidiscip. 2025;4(2):204-211.

Access this Article Online

www.multiarticlesjournal.com

KEYWORDS: Geo-Spatial, Regional Planning, Resources, Planners, Challenges & Evaluation.

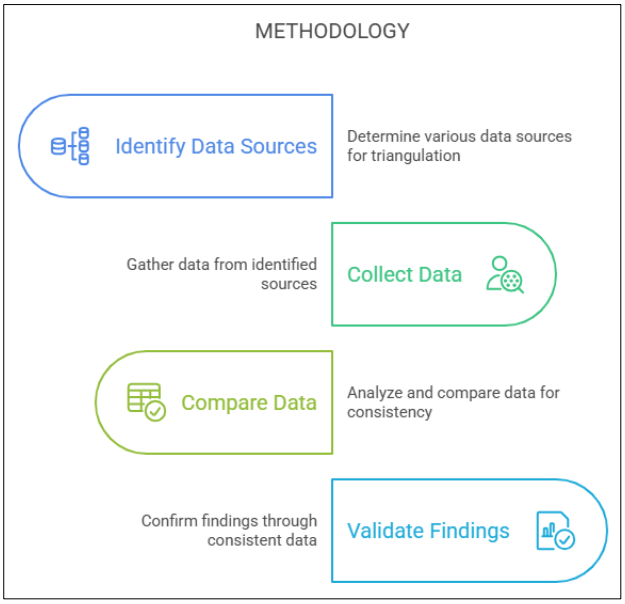
1. INTRODUCTION

The geospatial technology revolution has brought in a revolutionary period in resource assessment and regional planning with an effective set of tools to interpret, analyse and visualise spatial information (Sunny, M. A. U. 2024) [22]. As the world becomes more complex and dynamic, the right evaluation of natural resources and crafting effective regional planning strategies are key to sustainable development (Graymore, M. L., Sipe, N. G., & Rickson, R. E. 2008) [8]. Geospatial technology, which includes Geographic Information System (GIS), remote sensing and Global Positioning System (GPS), is at the leading edge of this revolution, providing unmatched abilities to map and

monitor various resources on a spatial level (Gautam, K., Tripathi, K. S., & Pandey, K. 2023) [7]. This introduction seeks to explore the key role of geospatial technology in mitigating the problems inherent in resource depletion, environmental degradation and accelerated urbanization (Rana, M. M. P. 2011) [16]. The combination of spatial data enables an overall grasp of the distribution of resources, land use and environmental conditions, thus enabling informed decision-making processes. While we tread through a period of increased consciousness regarding the limited availability of resources on our planet, it is crucial to unlock the potential of geospatial technology to ensure optimized use of resources and develop durable regional planning strategies to address the needs of ecology as well as society (Carroll, C., Dunk, J. R., & Moilanen, A. 2010) [3]. This investigation highlights the importance of geospatial technology in informing a sustainable and intelligent strategy for managing resources and developing regions. Aside from its mapping function, geospatial technology provides an interactive platform for real-time tracking, facilitating the detection of patterns and trends that are essential in adaptive regional planning. This introduction aims to deconstruct the complex influence of geospatial technology on resource assessment and regional planning, highlighting its contribution to encouraging data-driven decision-making, environmental resilience and sustainable development practices in a world where the spatial dimension is an essential component in addressing global issues.

2. METHODOLOGY

The methodology for the study "Geospatial Technology for Resource Evaluation and Regional Planning: A Study of Churachandpur District, Manipur" is carefully designed to ensure a robust and comprehensive investigation.



1. Research Design

- Employ a mixed-methods approach, combining quantitative and qualitative research methods to capture both spatial data and contextual insights.

2. Data Collection

- Utilize primary data sources such as field surveys, interviews and focus group discussions to gather qualitative information on local perspectives, challenges and resource utilization practices.
- Acquire secondary data from relevant government agencies, research institutions and other reliable sources to supplement the primary data.

3. Geospatial Technology Application

- Implement Geographic Information System (GIS), remote sensing and Global Positioning System (GPS) technologies for mapping and monitoring natural resources.
- Utilize satellite imagery and aerial surveys for comprehensive land cover and land-use assessments.
- Integrate GPS data for precise location mapping during field surveys.

4. Spatial Analysis

- Conduct spatial analysis using GIS to identify patterns, trends and correlations in resource distribution, land use, and environmental changes.
- Employ statistical analysis to quantify relationships between socio-economic factors and resource utilization.

5. Town Planning Strategies

- Develop town planning strategies by analysing spatial data on land use, infrastructure, and population density.
- Utilize GIS tools to optimize land use, identify suitable locations for amenities, and address transportation infrastructure deficiencies.

6. Disaster Preparedness Assessment

- Assess natural disaster risks using geospatial technology to identify vulnerable areas and formulate disaster preparedness strategies.
- Integrate historical data with real-time monitoring for a comprehensive approach to disaster risk assessment.

7. Ethical Considerations

- Ensure ethical considerations in data collection, respecting the privacy and consent of participants.
- Adhere to ethical standards when handling and storing geospatial data.

8. Validation and Reliability

- Validate findings through triangulation of data from various sources to enhance the reliability of results.
- Use established geospatial validation techniques to assess the accuracy of spatial data.

This methodology combines traditional research methods with advanced geospatial technologies to provide a holistic understanding of resource evaluation, regional planning, and town planning strategies in Churachandpur District. Adjustments may be made based on the specific nuances and challenges encountered during the research process.

Background of the study

Manipur's Churachandpur District is an epitome of complex interplay of diverse resources and the compelling need for realistic regional planning in an emerging socio-economic scenario. Bountifully provided with the diversity of ecosystems ranging from forests to agricultural land and home to different ethnic groups, the area lacks optimal resource distribution, environmental, and socio-economic development prospects. Geospatial technology application to the task offers a promising solution to overcoming these issues.

The background of this study discusses the unique aspects of Churachandpur District, pointing to the need for geospatial technology in its comprehensive analysis of resources. Not only is the district rich with diversified natural resources but is also confronted by land-use conflict, water scarcity and the need for disaster-resistant infrastructure. Appreciation for such complexities warrants an advanced way of handling these and geospatial technology, encompassing GIS, remote sensing and GPS, shows up as the cutting-edge mode of collecting, analysing and portraying spatial information. This research sets out to examine the particular deployment of geospatial technology within Churachandpur District, highlighting the capacity of this technology to assist in informing regional planning approaches. Through a case study in this unique geographic region, the work endeavours to provide relevant findings that may be applied universally to other analogous regions experiencing parallel issues, adding to the enhanced understanding of geospatial technology's function within resource assessment and regional planning.

Statement of the problem

The Churachandpur District of Manipur is beset with complex problems involving resource planning, environmental management, and regional growth. The current socio-economic environment is typified by an active interaction among varied ecosystems like forests and cultivated lands in a mosaic of ethnic diversity. Despite this, the area is plagued by critical concerns like competing use of land, water shortage and the imperative for adaptive infrastructure. The problem statement for the study concerns with the deficiencies of existing resource appraisal and regional planning strategies in Churachandpur. There is a lack of an extensive knowledge of the distribution and usage of resources that worsens such problems, deterring sustainable development initiatives. This study aims to fulfil this void by examining how geospatial technology can be used as a revolutionizing solution that provides a thoughtful approach for better-informed decision-making in resource management and planning at the local level in the particular case of Churachandpur District, Manipur.

Within the town of Churachandpur, the growing population and urbanization further highlight the need for efficient town planning. Unplanned development of infrastructure, poor public facilities and natural resource constraints have resulted due to the absence of a planning system. It is crucial that there be effective town planning in order to manage these problems effectively and ensure sustainable growth, maximization of land use and an enhanced standard of living. Geospatial technology has the potential to be a game-changer in enabling accurate planning interventions, providing a data-centric solution to tackle the unique requirements of Churachandpur town's changing urban fabric.

Research questions

1. How can geospatial technology be applied to map and monitor natural resources in Churachandpur District and address key environmental challenges for effective regional planning?
2. How does land-use conflict arise in Churachandpur and how can geospatial technology help in resolving or mitigating these issues?
3. What are the limitations of current regional planning in Churachandpur, and how can geospatial technology support more adaptive, resilient strategies, including identifying optimal locations for public amenities and services?
4. How can geospatial technology improve land use and zoning in Churachandpur town for sustainable urban development and support infrastructure planning to meet future needs?
5. How do ethnic and cultural factors affect land use and resource management in Churachandpur and how can geospatial technology incorporate these aspects into regional planning?

3. OBJECTIVES

1. To examine a detailed analysis on the biophysical setting of the study area from a geographical standpoint.
2. To assess and investigate natural and anthropogenic interfaces of Land use/land cover change in the study area and to examine their manifold implications of regional development and planning
3. To examine the change in land use affected by construction of dams, industrial areas and other built-up areas and to examine the impact of shifting cultivation on physical as well as cultural setting of the region.
4. To examine the trend and dimensions of urban growth in the region and to monitor the sprawl of built-up area and urban areas for future planning
5. To develop a responsible society that is conscious of socio-economic as well as environmental concerns in regards to town planning and placing of infrastructure zoning for a region’s long-term growth.

Significance of the study

The research on "Geospatial Technology for Resource Assessment and Regional Planning: A Case Study of Churachandpur District, Manipur" is of very great importance

with its ability to tackle very pressing issues in this region. Churachandpur District, which is made up of various ecosystems and has a vibrant cultural mosaic, suffers from complicated challenges including scarcity of resources, degradation of the environment and strategic town and regional planning requirements. Geospatial technology is crucial in this case study for spatial analysis and data collection. Through the application of GIS, remote sensing and GPS, the study seeks to enhance the precision of resource estimation and present an integrated perspective of natural resources, land use and environmental change in the district. The applicability of this research ranges from national to regional planning, i.e., town planning for Churachandpur town. Poor infrastructure and urbanization have aggravated the problems. Geospatial technology can assist in the development of effective town planning policies through efficient use of land, improved transport and improved disaster response. This study will direct the planning of Churachandpur District and offer policy guidelines for corresponding global challenges. By illustrating geospatial technology's application in resource estimation and regional planning, it provides additional momentum to debate on sustainable development and urbanization. It also potentially may inform policy-making and trigger effective regional development processes. This study may redefine town planning in Churachandpur in solving urbanization problems. With the support of geospatial technology, it will aim to maximize land use, bridge infrastructural gaps and improve the urban environment. The research outcomes will provide the direction for sustainable town planning in the interest of urban resilience in Churachandpur and serve as a model elsewhere to replicate.

Scope of the Study: The study is on geospatial technology for resource estimation and regional planning in the case of Churachandpur District, Manipur. Natural resource mapping, environmental study, town planning strategies, and disaster preparedness will be examined. Geographic Information System (GIS), remote sensing and Global Positioning System (GPS) data will be utilized for sustainable resource management and regional growth.

Limitations of the study

1. Data Availability: The study may face limitations related to the availability and accessibility of certain spatial data, which could impact the accuracy and comprehensiveness of the geospatial analysis.
2. Technological Constraints: Challenges related to the technical expertise and infrastructure required for implementing geospatial technology could influence the scope of the study.
3. Temporal Constraints: The dynamic nature of environmental and socio-economic factors may pose challenges in capturing real-time changes, potentially limiting the study's ability to provide an up-to-the-minute assessment.
4. Generalization: While the findings will be valuable for Churachandpur District, generalizing the results to other regions requires caution, as contextual differences may exist.
5. Budgetary Constraints: The financial constraints associated with acquiring and maintaining geospatial technology tools and software may impact the extent of data collection and analysis.

4. RESULTS AND DISCUSSION

Agriculture Planning for Regional Development

Agricultural planning is a key driver of regional development, underpinning economic growth, food security and environmental sustainability. By coordinating agricultural plans with regional factors like soil, climate and water, planning promotes productivity while protecting natural resources. Diversified farming decreases reliance on a single crop, reducing risks and creating jobs. Coordination among government, stakeholders and investment in infrastructure are key to effective regional plans.

Frank (2016) [6] discussed rural planning and production, consumption and environmental protection tensions. He highlighted the need for multifunctional agricultural policies balancing economic development with ecological concern using North American case studies.

Kiminami (2017) [14] proposed frameworks that combine marketing and planning to redefine rural Asia's image, spearheading changes to reposition agriculture as a sustainable economic pillar.

Singh, T. B. (2021) [20] researched Manipur, reporting issues like water scarcity, inadequate infrastructure, and market accessibility limitations. The study reported science-based technology, better communication and participatory methods to improve agriculture and combat poverty.

Guite & Sharma (2023) [9] analysed economic transformation in Manipur's Thadou-Kuki societies in which there has been a shift from Jhum cultivation to the cultivation of cash crops as indicators of agriculture diversification and hill economic restructuring.

Urban Planning for Regional Development

Urban planning plays a central role in regional growth, influencing the physical, social and economic status of cities. Successful planning encourages sustainable development, improved quality of life and satisfaction of community demands. This includes the development of efficient infrastructure like transport systems linking cities. Mixed land-use zoning and planning minimizes environmental effects and encourages active neighbourhood communities.

Environmental sustainability is concerned with green spaces, sustainable urban planning and waste management to enhance urban quality of life and minimize ecological footprints. Public-private partnerships and public participation ensure that urban development remains inclusive and resilient.

Ioannis Pissourios (2014) [10] recommends that a combination of top-down and bottom-up planning methods results in better spatial planning outcomes. He stresses the need for placing planning standards into practice in a balanced fashion. The

research points out that participatory planning could be enhanced where institutional settings provide channels for both expert and community contributions. This mixed method strengthens the stakeholder involvement and accountability. Finally, it leads to more adaptive and context-driven regional development policy.

Nazmiye Balta-Ozkan *et al*. (2015) highlight the need for regional-level thinking when moving towards a low-carbon energy future. Their research stresses the need for coordination between national energy policies and local governance. It suggests that a multi-scalar policy response can be beneficial in promoting sustainable energy programs. The convergence of regional strengths and contextual elements is viewed as crucial to success. This connection enhances both energy resilience and policy cohesion.

T. Yigitcanlar & S. Teriman (2015) [23] believe that comprehensive urban planning frameworks must be adopted in order to encourage global sustainability. They note an evolutionary shift towards smarter, resilient cities in the paradigms of urban planning. The study emphasizes the imperative of long-term, integrated planning for the sustainable management of urban growth. Incremental reforms are viewed as vital to attaining widespread sustainable development objectives.

Wu, F. (2015) [25] explores China's strategic deployment of spatial planning tools such as urban clusters and mega-regions. The research uncovers how these instruments are at the heart of coping with rapid urbanization and regional inequalities. Wu writes about the conflicts between state-directed planning and market-driven urbanization. The book also explores the difficulties of coordination across administrative boundaries. Overall, the research sheds light on the changing nature of Chinese urban policy and governance.

Kempenaar *et al*. (2016) [13] consider the work of regional design to influence Dutch practices of spatial planning. They write about the extent to which the processes of design add up procedurally and politically to strategies in long-term planning. Regional design, they conclude, creates communication among stakeholders as well as reaching consensus concerning the spatial future. It accentuates the visionary as well as symbolic role of design in the rhetoric of plans. Their findings are that design, in regional development, is neither only aesthetical nor essentially political.

Ratcliffe, J., Stubbs, M., & Keeping, M. (2021) [17] discuss the relationship between urban planning and real estate development. Their work demonstrates how planning choices determine land use patterns and investment patterns. They contend that urban planning is a regulatory and facilitative instrument that determines market behaviour. The research indicates that spatial planning influences property values, land availability, and development feasibility. This interactive relationship is fundamental in explaining urban change and economic growth.

In the end, literature indicates that urban planning is central in regional development. It integrates spatial, economic, environmental and governance dimensions towards sustainable development, equity, and resilience. Planning has to be visionary and contextually responsive to steer change in the face of global challenges.

Application of Geo-Spatial techniques in Regional Planning

Geospatial techniques including Geographic Information Systems (GIS), Remote Sensing (RS) and Global Positioning Systems (GPS) have become essential tools for regional planning. These technologies enable spatial analysis, land use assessment, infrastructure development, environmental monitoring and disaster management. Integration of these technologies in planning process ensures data driven decision making and more sustainable and equitable development outcomes.

GIS allows planners to analyse spatial data and model various scenarios to optimise land use. It supports overlay analysis of topography, land cover and socio economic data to identify suitable locations for development activities. Remote sensing through satellite imagery provides dynamic monitoring of landscape changes essential for deforestation, urban sprawl and natural hazards. GPS enhances the precision of spatial data collection and is useful for mapping infrastructure, transport routes and critical public services.

In resource management geospatial tools are used to assess soil quality, water availability and vegetation cover. These applications support sustainable agriculture, land conservation and effective zoning. Geospatial techniques also promote community participation through participatory GIS which enhances transparency and inclusivity in the planning process. As technology grows these tools are becoming more and more important in shaping regional development strategies.

Bhatta (2009) [2] used GIS and remote sensing to study urban growth in Kolkata. His work presented a methodology to detect urban sprawl, monitor changes over time and evaluate the impact on natural resources. This helped policymakers to understand spatial dynamics and formulate urban strategies.

Youssef (2010) applied remote sensing, GIS and Analytic Hierarchy Process (AHP) in urban land suitability analysis. The study developed a multi criteria approach to identify areas for future development. It showed how layered data and expert input can lead to objective urban planning.

Rawat, J. S., Biswas, V., & Kumar, M. (2013) [18] conducted a study on land use and land cover changes in Uttarakhand using remote sensing. They showed how geospatial analysis can track shifts in vegetation and human settlement, thereby informing sustainable development policies. Their work is valuable in ecologically sensitive regions.

Sinha (2015) analysed urban sprawl using advanced GIS techniques and remote sensing in Indian cities. His study provided a comprehensive view of how cities expand over time, often encroaching on green spaces and farmland. This helped in identifying areas where planning controls are urgently required.

Kaur (2018) [12] examined the use of geospatial technologies in disaster risk reduction, especially in multi-hazard mapping. Her work emphasized the importance of spatial analysis in identifying vulnerable zones and planning emergency responses.

This has significant relevance for disaster-prone areas across South Asia.

Disaster Vulnerability Analysis and Regional Planning

Disaster vulnerability analysis is a key part of regional planning as it provides an approach to strategize on risks posed by both natural and man-made threats. Planners are able to evaluate the range of vulnerabilities which communities face from environmental to infrastructure and social as well as economic and formulate plans to ensure resilience and disaster impacts mitigation. The analysis starts with understanding the region's hazard vulnerability to disasters like earthquakes, floods, or even industrial accidents. Adding to that consideration of population, density, poverty level, governance and environmental degradation adds layers to understanding the risks associated with a disaster.

Geospatial technologies such as GIS and remote sensing have a crucial role in mapping vital creepy infrastructure, hazard risk zones and vulnerable populations. These technologies improve the planners' capacity to design specific regional based effective mitigation strategies crafted to the specific region as well as the region's identity.

Mitigation plans are bound to fail if the social aspects like access to health, education, and other basic services by the marginalized is not considered. With such information policies focusing on community preparedness programs, active land use planning can be enacted alongside structural resilience for rapid and effective sustainable responsive systems.

Nunik Hasriyanti (2019) [19] assessed disaster coping capacity in Indonesia's Mempawah Hilir Subdistrict. By focusing on local vulnerabilities and strengths, the study offers scalable planning models for vulnerable communities.

Mateos, R. M., López-Vinielles, J., Poyiadji, E., Tsagkas, D., Sheehy, M., Hadjicharalambous, K., & Herrera, G. 2020) [15] evaluated landslide hazard integration in European urban planning. Her work emphasized the role of geological risk assessments in zoning and infrastructure policy to prevent long-term disaster impacts.

Agrawal, N., Gupta, L., Dixit, J., & Dash, S. K. 2021) [1] examined seismic risks in Northeast India. By linking seismic hazard exposure with societal vulnerability, the study calls for tailored mitigation strategies in geologically active zones.

Orru, K., Hansson, S., Klaos, M., Nero, K., Torpan, S., & Siimsen, I. 2022) [24] proposed a dynamic social vulnerability framework based on future disaster scenarios. Their model is forward-looking, useful for long-term urban resilience planning and emergency management policies.

Tools and Techniques for Resource Evaluation and Regional Planning

Tools and techniques for regional planning encompass a diverse array of methodologies that enable effective decision-making and sustainable development. One fundamental tool in regional planning is Geographic Information System (GIS), a powerful technology that allows planners to analyse and visualize spatial data. GIS integrates various layers of information, such as land use, demographics, and infrastructure, providing a comprehensive understanding of the region's dynamics.

Remote sensing is another crucial technique, involving the use of satellite imagery and aerial photography to monitor and assess the landscape. This technology aids in identifying changes in land cover, assessing environmental conditions, and understanding patterns of urbanization or natural resource utilization.

Global Positioning System (GPS) technology plays a pivotal role in accurately mapping locations, facilitating precise data collection and spatial analysis. GPS is particularly useful for infrastructure planning, transportation management, and disaster response.

Stakeholder engagement is a vital technique that involves collaboration with communities, local governments and various interest groups. Gathering input from diverse perspectives ensures that regional plans align with the needs and aspirations of the population. Scenario planning is a technique that involves developing and evaluating different future scenarios to anticipate potential outcomes and uncertainties. Integrated land-use planning, environmental impact assessment and resilience planning are also employed to create comprehensive and sustainable strategies.

Paul Collier & Anke Hoeffler (2005) [4] investigated the role of natural resources in governance and conflict. Their econometric models demonstrated how resource wealth, when poorly managed, can exacerbate instability, underscoring the need for accountable planning institutions.

Rudolf de Groot (2006) [5] introduced function-analysis and ecological valuation in land-use conflict resolution. Using spatial and stakeholder-based tools, his approach offered a framework to balance ecological sustainability and economic demands in multifunctional landscapes.

Stratigea, A., Papadopoulou, C. A., & Panagiotopoulou, M. (2015) proposed a smart-city framework integrating ICT into participatory planning. Her model emphasized data-driven urban management and e-governance, shifting the focus from technology deployment to application in sustainable development goals.

Personal interest and motivation:

My interest in this study comes from a strong personal connection to Churachandpur District, Manipur, and a deep concern for the environmental and developmental issues the region faces. Growing up in a place known for its rich cultural diversity, I've seen how closely communities are tied to their natural environment. These experiences sparked my passion for sustainable development and responsible resource management.

Geospatial technology, with its ability to map, monitor and plan with precision, offers exciting possibilities for understanding and addressing the complex challenges in the region. Through this research, I hope to offer meaningful insights that can guide better policies, support local communities and help strike a balance between protecting the environment and fostering socio-economic growth. Churachandpur's unique landscape and social fabric make it an ideal setting for such a study and I see it as a

potential model for how geospatial tools can support sustainable regional planning in similar areas around the world.

I'm also deeply interested in looking ahead not just solving today's problems, but imagining what Churachandpur could look like 50 years from now. I believe geospatial technology can help us build towns and cities that are not only equipped to handle present-day challenges but are also flexible and resilient enough to meet the needs of future generations. This long-term vision of sustainable, inclusive and environmentally conscious urban planning is what truly drives me in this research journey.

Research gap

The literature review reveals several research gaps in the study of geospatial technology for resource evaluation and regional planning, especially in the context of Churachandpur District, Manipur. The identified gaps include:

1. **Integrating Urban Sustainability and Creative City Planning:** There is a need for in-depth research on how economic development, urban sustainability and creative city planning can be effectively integrated and tailored to the unique context of Churachandpur.
2. **Influence of Settlement Systems on Regional Development:** A research gap exists in understanding how settlement patterns in developing countries, particularly in Churachandpur, impact regional development and spatial organization.
3. **Urbanisation and Agricultural Interactions:** Limited studies address how urban and rural planning can be integrated to support sustainable agriculture in Churachandpur, despite growing pressure on agricultural land from urban expansion.
4. **Challenges in Applying GIS in Developing Areas:** There is insufficient research on the specific challenges of using GIS in Churachandpur, including issues like poor data availability, inadequate land use records, and weak institutional frameworks.
5. **Combining Top-Down and Bottom-Up Planning:** There is a lack of exploration into how top-down and bottom-up planning approaches can be effectively integrated in Churachandpur, which still lacks formal town planning strategies and targeted government or academic initiatives.

5. CONCLUSION

The extensive literature review underscores the diverse and complex challenges in urban and regional planning, agricultural development and geospatial technology application across various global contexts. Notably, the studies identified research gaps, emphasizing the need for context-specific investigations and practical solutions. In urban planning, the integration of sustainability and creative city planning in Churachandpur requires focused attention. Regional development in the district necessitates a deeper understanding of settlement systems' impacts and a longitudinal evaluation of regional design effectiveness. Geospatial technology applications face challenges that demand tailored solutions, especially in Churachandpur, where specific considerations like data availability are crucial. Additionally, tourism planning, urban dynamics, environmental impact assessments, multi-hazard scenarios and the evaluation of open-source geospatial technology present avenues for further exploration. The review underscores the importance of addressing these research gaps to enhance the effectiveness of planning strategies and promote sustainable development across diverse regions. Future research should strive for comprehensive and context-specific approaches to bridge these identified gaps and contribute to the advancement of planning disciplines.

In addressing the identified research gaps, future studies could benefit from interdisciplinary collaboration, integrating perspectives from urban planning, geography, and environmental science. Emphasizing case studies in Churachandpur and other diverse regions will enhance the applicability of findings. Furthermore, fostering international cooperation on geospatial technology challenges can facilitate shared solutions. Lastly, a nuanced approach to agricultural development research in Asia, considering regional variations, would contribute to more effective and tailored strategies for sustainable growth.

6. CONFLICT OF INTEREST

I, declare that I have no conflict of interest. However, it is important to note that this article is based on the authors' personal experiences and opinions and may not reflect the views of all individuals or organizations.

7. FUNDING

No grants, fellowships or other forms of financial assistance were received in support of this work.

8. AUTHORS CONTRIBUTION:

T. L. Haokip: Conceptualization, Methodology, Software, Validation, Formal Analysis, Investigation, Data Curation, Writing Original Draft Preparation, Visualization.

Dr. T. K. Prasad: Supervision, writing review and editing.

9. ACKNOWLEDGEMENT

I, wish to express my sincere gratitude to the Department of Geography, Kannur University, for providing internet source. The contributions have been invaluable in enabling the analysis and interpretation.

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