OPEN ACCESS

Jurnal Pembangunan Wilayah dan Kota
P-ISSN: 1858-3903 and E-ISSN: 2597-9272
https://ejournal.undip.ac.id/index.php/pwk/index

Vol. 21, No. 4, 2025, 498-515

LAND USE CHANGE AND ENVIRONMENTAL IMPACTS: A BIBLIOMETRIC ANALYSIS

PERUBAHAN PENGGUNAAN LAHAN DAN DAMPAK LINGKUNGAN: ANALISIS BIBLIOMETRIK

Dian Hudawan Santoso[a*], Puryani[b], Tissia Ayu Algary[a], Mochammad Chaeron[b]
[a]Department of Environmental Engineering, Faculty of Technology Mineral and Energy, UPN Veteran Yogyakarta; Kabupaten Sleman, Indonesia
[b]Department of Industrial Engineering, Faculty of Industrial Engineering, UPN Veteran Yogyakarta; Kabupaten Sleman, Indonesia

*Correspondence: dian.hudawan@upnyk.ac.id

Article Info:
- Received: 24 March 2025
- Accepted: 31 December 2025
- Available Online: 31 December 2025

ABSTRACT
Land use change is a critical phenomenon that demands attention, particularly in metropolitan centers and developing cities in Asia and Southeast Asia that are undergoing substantial urbanization. The objective of this study is to examine the repercussions of land use modification on the environment, society, and economy. Additionally, it seeks to assess prevailing research trends in this domain through a bibliometric approach. The research methodology encompasses bibliometric analysis employing the Scopus database, encompassing the collection and filtration of data from 1986 to 2025, yielding 193 pertinent documents. The analysis indicates that publications in this field have exhibited significant an annual growth rate, reflecting a notable increase in scholarly interest in this subject. The study also found that China and the United States are the countries with the highest publication contributions, highlighting the importance of international collaboration in this research. The discussion revealed that land use change contributes to environmental degradation, biodiversity loss, and negative impacts on public health, particularly in developing countries. Moreover, this study identifies the need to expand studies in underrepresented countries and emphasizes the urgency of sustainable policies to address the challenges posed by land use change. The findings of this research are anticipated to offer insights that will inform the development of more effective and sustainable urban management and regional development policies by relevant stakeholders.
Keywords: *Land Use Change, Environmental Impacts, Bibliometric Analysis, Urbanization*

ABSTRAK
Perubahan penggunaan lahan adalah fenomena kritis yang memerlukan perhatian, terutama di pusat-pusat metropolitan dan kota-kota berkembang di Asia dan Asia Tenggara yang mengalami urbanisasi yang substansial. Tujuan dari studi ini adalah untuk meneliti dampak perubahan penggunaan lahan terhadap lingkungan, masyarakat, dan ekonomi. Selain itu, penelitian ini bertujuan untuk menilai tren penelitian yang berlaku di bidang ini melalui pendekatan bibliometrik. Metodologi penelitian mencakup analisis bibliometrik menggunakan basis data Scopus, yang meliputi pengumpulan dan penyaringan data dari tahun 1986 hingga 2025, menghasilkan 193 dokumen yang relevan. Analisis menunjukkan bahwa publikasi di bidang ini telah menunjukkan tingkat pertumbuhan tahunan sebesar 5,12%, mencerminkan peningkatan minat akademis yang signifikan terhadap subjek ini. Studi tersebut juga menemukan bahwa Tiongkok dan Amerika Serikat adalah negara dengan kontribusi publikasi tertinggi, menyoroti pentingnya kolaborasi internasional dalam penelitian ini. Diskusi tersebut mengungkapkan bahwa perubahan penggunaan lahan berkontribusi terhadap kerusakan lingkungan, hilangnya keanekaragaman hayati, dan dampak negatif terhadap kesehatan masyarakat, terutama di negara-negara berkembang. Selain itu, studi ini mengidentifikasi perlunya memperluas penelitian di negara-negara yang kurang terwakili dan menekankan urgensi kebijakan berkelanjutan untuk mengatasi tantangan yang ditimbulkan oleh perubahan penggunaan lahan. Temuan penelitian ini diharapkan dapat memberikan wawasan yang akan menginformasikan pengembangan kebijakan manajemen perkotaan dan pembangunan regional yang lebih efektif dan berkelanjutan oleh pemangku kepentingan yang relevan.
Kata Kunci: *Perubahan Penggunaan Lahan, Dampak Lingkungan, Analisis Bibliometrik, Urbanisasi*

1. INTRODUCTION

Land use change is a critical phenomena that necessitates attention, particularly in major metropolitan centers and developing cities in Asia and Southeast Asia, which have experienced substantial urbanization. Urbanization frequently entails alterations in land use, which may have environmental, social, and economic repercussions for communities (Estoque & Murayama, 2015). Urbanization in Asia is anticipated to persist, exerting considerable effects on ecosystems and the quality of life for residents. Consequently, investigating the effects of land use alterations in suburban urban regions is crucial for the establishment of sustainable policies (Wang et al., 2019).

Several studies have shown a substantial increase in land use change, a trend reinforced by the growing focus on environmental issues and sustainability (Kalfas et al., 2023; Turner et al., 2007). The impacts of land use change (LUC) have emerged as a vital area of research owing to its profound effects on environmental quality, biodiversity, and human health. The acceleration of urbanization and the global growth of agriculture results in repercussions such as habitat loss, ecological disruptions, and changes in climatic patterns. Urbanization is the primary catalyst for land use change, characterized by the conversion of natural landscapes into artificial settings (Santoso et al., 2025). This transition frequently results in a depletion of natural resources and the deterioration of ecosystem services. Kanga et al. (2022) emphasize that urbanization leads to environmental degradation, including the deterioration of air and water quality, alongside substantial loss of natural ecosystems. Dong et al. (2024) observe that intense land use alterations, especially in the swiftly emerging port cities of Southeast Asia, lead to habitat fragmentation, hence exacerbating the danger to biodiversity. The emergence of the urban heat island (UHI) effect is also one of the impacts resulting from changes in land use. This phenomenon has occurred widely across various regions, often exacerbated by ongoing urban expansion, which frequently leads to the loss of green spaces (Hao et al., 2015; Maharjan et al., 2021). Additionally, this land use change encompasses agricultural and natural habitats. Agricultural development, a significant element in land use change, coupled with economic pressures, has resulted in significant habitat destruction and an increased rate of sedimentation in water systems (Noda et al., 2017). Emadodin and Reinsch stated that changes in land use, especially in arid and semi-arid regions, can trigger processes such as drying, thereby altering the local climate and reducing overall biodiversity (Emadodin & Reinsch, 2018).

Land use change and climate change are intricately linked, mutually influencing one another and affecting global socio-ecological systems (Gills et al., 2025; Proswitz et al., 2021). Deforestation and urbanization diminish ecosystem resilience, exacerbating the effects of climate change. Practices of sustainable land use, including reforestation, afforestation, and climate-smart agriculture, can bolster resilience to climate change and promote sustainable development (Kalnay & Cai, 2003; Kiguchi et al., 2021).

Based on our identification of various studies previously conducted by other researchers, particularly those related to the impact of land use change, not many other researchers have comprehensively investigated the broader research trends on the impact of land use change, especially in Asian countries. Therefore, it is crucial to conduct a systematic bibliometric analysis to fill this significant gap and offer deeper insights into future research trajectories.This study presents the following research questions: RQ1: Will alterations in land use be a prominent subject for scientific inquiry in the future? RQ2: What is the present distribution of research concerning the environmental effects of land use? RQ3: What theoretical and practical knowledge may be extracted to guide future research trajectories? RQ4: What are the determinants and consequences of land use change? By answering these four inquiries, a new contribution will be produced that will fill the present research gap regarding the effects of land use change. Furthermore, it will present insights into the latest research subjects pertinent to this issue and furnish stakeholders with assistance for policy formation concerning urban management and regional development.

2. DATA AND METHODS

This study utilizes bibliometric analysis, a methodological framework designed to assess and delineate research patterns concerning the effects of land use change in metropolitan regions of Asia. Bibliometric analysis is a proficient method for discerning publishing trends, researcher collaboration, and the evolution of research themes over time (Herzog et al., 2022; Romero et al., 2010).

The article search procedure was conducted in steps, comprising an initial keyword search, data collecting, data organization and cleaning, analysis, interpretation, and data visualization (Polat et al., 2023). This study employs Scopus, a leading global bibliographic database, as its data source. A thorough search approach was utilized, integrating important keywords including "land use change," "impact," "environmental impact," "urban," "suburban," "urban fringe," and "Asia" to gather pertinent data.

The data gathering method was conducted meticulously to identify all relevant and high-quality publications. This combination of keywords is expected to provide articles that explore various aspects of land use change and its effects on the environment in urban and suburban areas of Asia. The article search was performed on March 13, 2025, covering the timeframe from 1986 to 2025, yielding an initial total of 451 documents. A filtration mechanism was subsequently adopted, narrowing the scope to papers related to Environmental Science, Earth and Planetary Science, Social Science, and Agricultural and Biological Science. This process resulted in a total compilation of 420 articles. Subsequent filtration involved selecting certain article kinds and conference papers, resulting in a final document count of 388. The preliminary keyword selection, omitting "Eurasia" and "Africa," produced 212 documents. The preliminary search was refined, restricting the results to "Journals," "Books," and "Conference Proceedings," resulting in 202 documents. The ultimate selection was confined to English-language articles, decreasing the total to 193 documents. The filtered SCOPUS literature data was exported in CSV and RIS formats for use in the Bibliometrix and Vosviewer software.

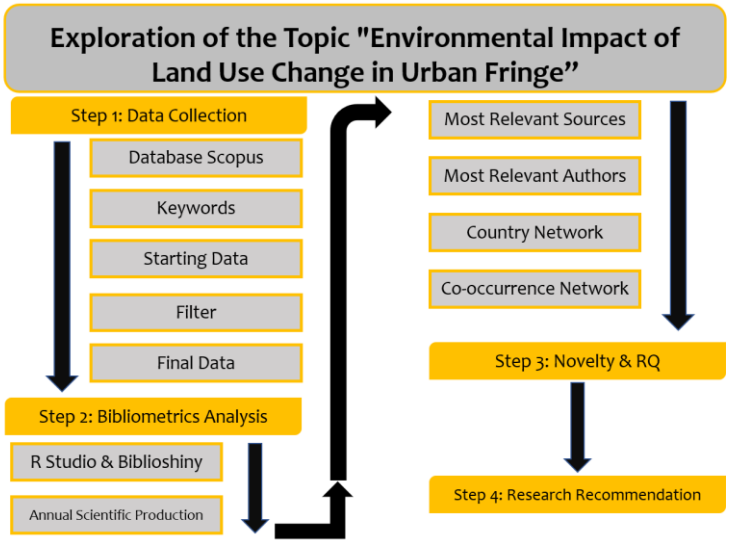


Figure 1. Steps of the Study

This study employed Vosviewer and Bibliometrix software (https://www.bibliometrix.org/home/) for bibliometric analysis, serving as a user interface for the R package. Bibliometrix is a tool that facilitates researchers in doing interactive and visual bibliometric analyses, encompassing citation analysis, author collaboration analysis, and temporal publication trend analysis (Bernatović et al., 2021). Moreover, it enables the creation of comprehensive visualizations of collaboration networks and research advancements concerning the repercussions of land-use change, thus offering an expanded viewpoint on prospective research (Rosas et al., 2011). Figure 1 illustrates the sequence of research steps.

Figure 1 demonstrates a methodical approach to performing bibliometric analysis about land use change and its environmental effects. The first step, termed "Data Collection," involves acquiring relevant literature from several sources to guarantee access to extensive datasets that represent the current state of study in the topic. This essential stage is crucial, since the quality and extent of the obtained data will significantly impact later analysis.

Following data gathering, the next phase is "Bibliometric Analysis," wherein the gathered data is quantitatively assessed to discern trends, patterns, and principal contributors in the literature. This analysis culminates in the third stage, "Topic Uniqueness Trends," which examines the emergence and progression of certain research subjects across time. The fourth step, named "Research Recommendations," consolidates the data to offer insights and proposals for future study trajectories. This systematic approach improves comprehension of the current literature and highlights deficiencies and prospects for more research, therefore facilitating the progression of knowledge in the discipline.

3. RESULT AND DISCUSSION

Table 1 provides a detailed summary of the bibliometric data gathered from 1986 to 2025, concentrating on research pertaining to land use change and its effects. The table reveals that 193 documents were published across 136 sources, encompassing both journals and books. The yearly growth rate of publications was 5.12%, signifying a consistent rise in research output over time. The mean age of the documents was roughly 7.34 years, suggesting that this literature is comparatively contemporary. The average number of citations per document is significantly high at 34.3, reflecting the considerable impact and significance of these research in academic circles. The cumulative number of references cited in these documents is 12,045, highlighting the considerable existing research in this domain.

Table 1. The Bibliometric Data Collected from the Years 1986 To 2025

Description	Results
Sources (Journals, Books, etc)	136
Documents	193
Annual Growth Rate %	5.12
Document Average Age	7.34
Average citations per doc	34.3
References	12,045
Keywords Plus (ID)	1,987
Author's Keywords (DE)	685
Authors	898
Authors of single-authored docs	22
Single-authored docs	22
Co-Authors per Doc	4.88
International co-authorships %	40.41
Article	168
Book chapter	18
Conference paper	7

A total of 1,987 unique keywords have been identified in the author's corpus, with 685 of these keywords belonging to a distinct set of author-specific keywords. The author participation map is marked by a total of 898 authors, with 22 of them contributing to documents written by a single author. The analysis revealed an average of 4.88 co-authors per document, with international collaboration accounting for 40.41% of the total collaboration. The document types encompass a wide array of publication formats, including 168 articles, 18 book chapters, and 7 conference papers, thereby illustrating a diverse array of scholarly output. This comprehensive bibliometric analysis not only underscores growth trends and

collaborative efforts within this domain but also underscores the significance of international collaboration in propelling research on land-use change and its environmental ramifications.

3.1. Land Use Change will Remain a Significant Focus of Research in The Future

The quantity of publications published from 1986 to 2025 offers a distinct visual representation of research production trends concerning land use change and its effects. The first analysis of the data indicated that scientific productivity was negligible, with a restricted number of publications produced each year until around 2003. This period represents a significant turning point, demonstrated by a notable rise in the volume of published publications, which reached its zenith in the years subsequent to 2010. This growing trend indicates an increasing degree of interest and investment in research within this domain, possibly driven by greater awareness of the environmental consequences linked to urbanization and land use change (Refer to Figure 2).

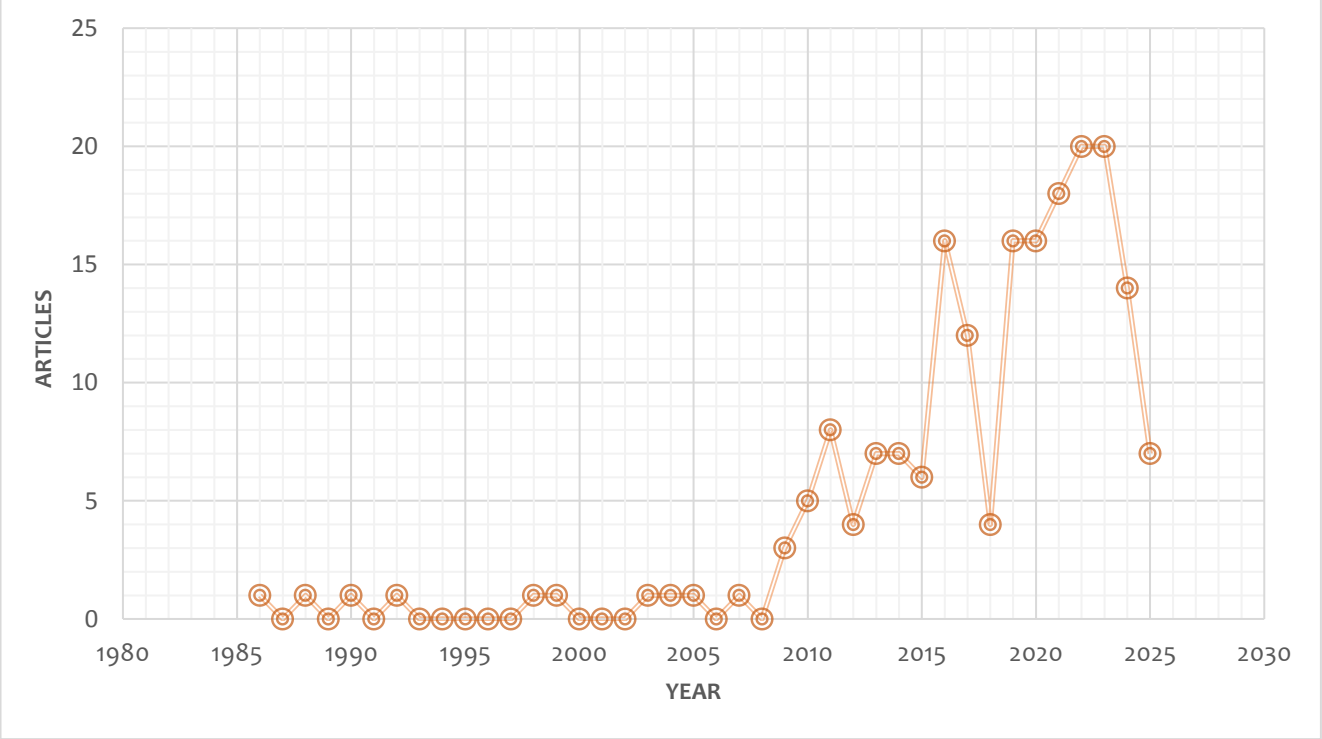


Figure 2. Annual Production of Documents Focused on the Impact of Land Use Change from 1986-2025

Significant document production is anticipated from 2019 to 2025, with an estimated range of 15 to 20 articles. This phenomenon signifies that the challenges emanating from land use change are becoming increasingly intricate, compelling numerous individuals to engage in research endeavors. This phenomenon indicates that topics related to land use change and its impacts will continue to be significant areas of focus for future research.

3.2. Distribution of Research on The Impact of Land Use Change

A comprehensive analysis of the distribution of research on the impacts of land use change in 193 articles was conducted. The analysis was based on the categorization of articles according to various classifications, including country, region, affiliation, source, and author. The study limited the analysis to only the top 10 articles in each classification. A comprehensive understanding of the allocation of research pertinent to the impacts of land use change is imperative for academics and practitioners to formulate future research agendas, particularly in the context of sustainable regional development.

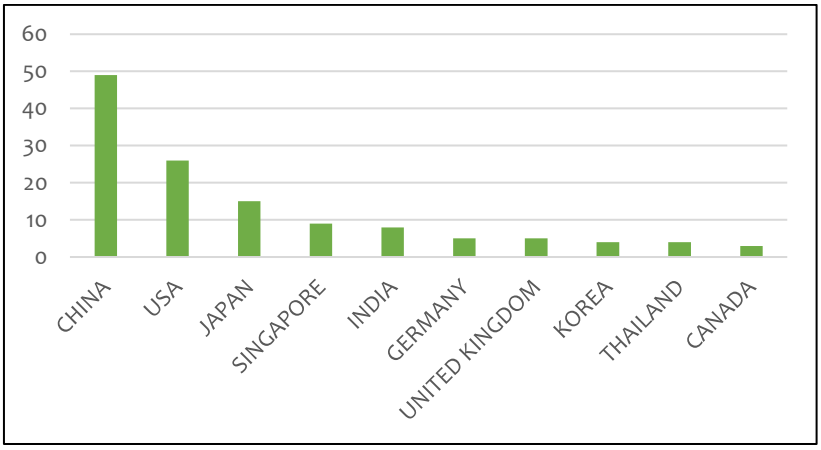


Figure 3. The Author's Country of Origin Regarding the Impact of Land Use Change (Top 10 Countries)

The authors' countries of origin about the impact of land use change, classified by country or region, reveal China's preeminence with 49 manuscripts, succeeded by the United States with 26 manuscripts. Moreover, various other nations have made substantial contributions to this research, including Japan with 15 publications, Singapore with 9 publications, India with 8 publications, Germany with 5 publications, the United Kingdom with 5 publications, South Korea with 4 publications, Thailand with 4 publications, and Canada with 3 publications. The findings demonstrate that the issue of land use change has garnered the attention of numerous countries, encompassing both wealthy nations in the Western hemisphere and emerging countries in the Eastern hemisphere, underscoring the worldwide significance of this subject.

The distribution of research related to the impact of land use change based on authors demonstrates significant variation among them. Liu et al. (2020) are at the forefront of this research, with six documents each. Chen X and Chen Y follow closely with five articles each, while Chen J contributes four articles. The remaining authors—Chen H, Fan P, LI Y, Liu Y, and Ma H—each made notable contributions, with two documents each, as illustrated in Figure 4.

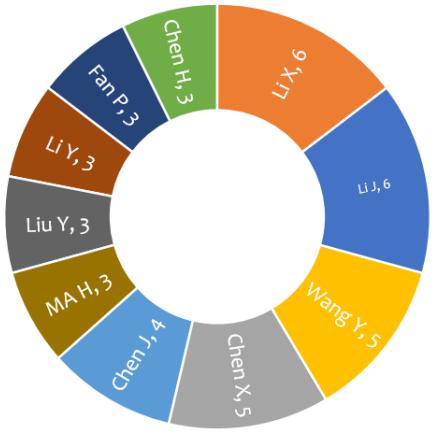


Figure 4. Number of Articles Produced by Authors on Impact on Land Use Change

The analysis of research concerning the effects of land use change indicates that the Journal of Climate and the Science of The Total Environment are the dominant journals, each publishing a total of 6 articles, thereby underscoring their prominence in the relevant research domains. The second position is held by "Remote Sensing," which has produced 5 articles and demonstrates considerable contributions to its domain. Concurrently, journals like "Environmental Research Letters," "Climate Dynamics," and "Landscape and Urban Planning" exhibit moderate representation with four publications apiece, signifying

a substantial engagement in the research dataset. Additionally, there are four journals: "Atmospheric Environment," "Earth Systems and Environment," "Ecological Indicators," and "International Journal of Environmental Research and Public Health," each featuring three publications, reflecting a balanced contribution to the current literature (refer to Figure 5).

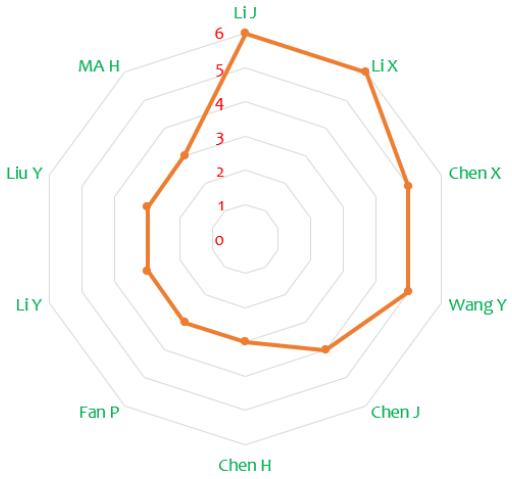
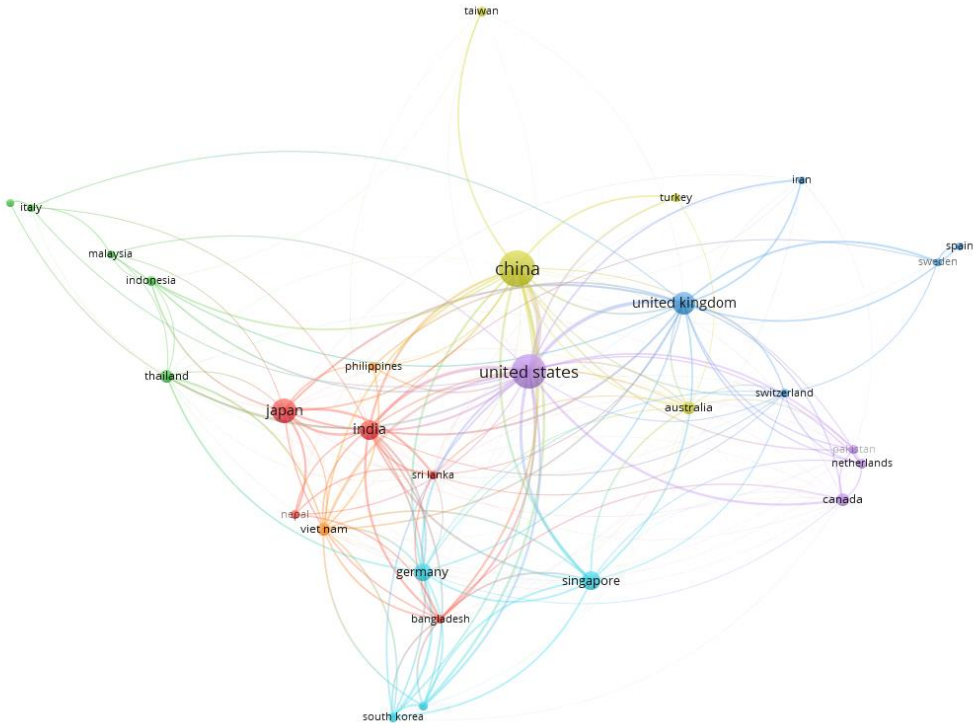


Figure 5. Most Relevant Sources

The researchers also analyze the relationships between countries involved in research on the impacts of land use change using VOSviewer software. This phase is crucial in formulating a systematic prospective research agenda. VOSviewer findings from this analysis show the relationships between countries in researching the topic of land use change impacts (see Figure 6).



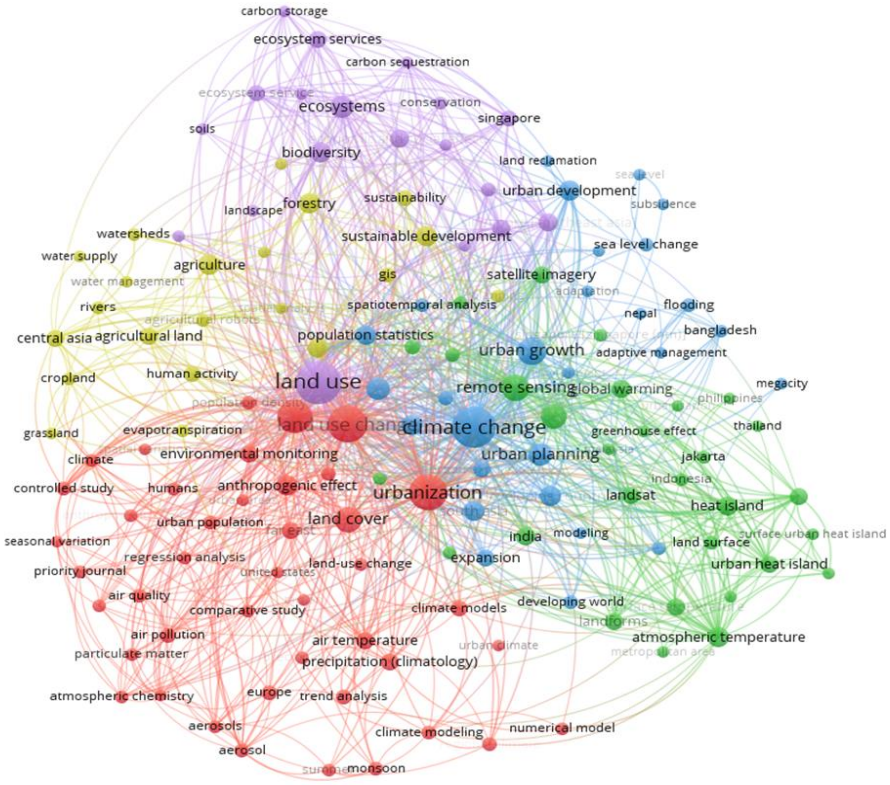
Source: Output Vosviewer Software

Figure 6. Network Country Visualization

This finding further reinforces the idea that air pollution is a concern not only in Western countries, such as the United States, the United Kingdom, and the Netherlands, which are synonymous with large cities, but also in other developing countries, such as Thailand, Indonesia, and Malaysia. Concerns about the negative impacts of current and future land use changes have prompted many researchers and scientists to develop formulations that predict air pollution as a means of adapting.

3.3. Theoretical and practical implications for future research

This research was performed on 193 publications obtained from the Scopus collection. VOSviewer was employed to demonstrate that the findings of this study could possess theoretical and practical ramifications for forthcoming research on the effects of land use change. The outcomes of the metadata analysis conducted with VOSviewer will assist academics and practitioners in comprehending the assumptions and conclusions pertaining to the effects of land use change. The bibliometric analysis conducted with VOSviewer reveals extensively investigated variables and those that remain underexplored, so establishing a basis for future research endeavors. From a stakeholder perspective, the outcomes of the literature analysis conducted with VOSviewer will assist stakeholders in devising suitable sustainable regional development policies in the future.



Source: Output Vosviewer Software

Figure 7. Co-occurrence Framework and Representation of Key Terms

The keywords with the highest overall link strength are Land Use (680), Climate Change (556), Urban Area (481), Urbanization (474), Land Use Change (428), Urban Growth (279), Remote Sensing (273), Land Cover (212), Ecosystem (205), and Atmospheric Temperature (188). The top ten most prevalent keywords are displayed in Table 2 and Figure 7**.**

Table 2. Number of Keyword Strength Links in Research on the Impact of Land Use Change

Rank	Keyword	Total Link strength
1	Land Use	680
2	Climate Change	556
3	Urban Area	481
4	Urbanization	474
5	Land Use Change	428
6	Urban Growth	279
7	Remote Sensing	273
8	Land Cover	212
9	Ecosystem	205
10	Atmospheric Temperature	188

A review of current literature reveals significant shortcomings in prior research, as the majority of studies have been conducted in large countries or regions, such as the United States and China (see Figures 3 and 6). Consequently, future research endeavors should be undertaken in developing countries or regions that have received minimal scholarly attention, such as Malaysia, Indonesia, and Thailand. The number of comprehensive studies on land use change and its effects in developing countries remains limited (Figueroa et al., 2023; Igarashi et al., 2019). A significant body of extant research has a tendency to concentrate on particular regions, thus overlooking the broader context and the specific local variations that may be present across countries. Consequently, a more profound comprehension of the factors that precipitate and the ramifications of land use change in developing countries is imperative to facilitate effective decision-making in sustainable resource management and urban planning.

3.4. The Factors of Land Use Changes

Land use change in nations that are both industrialized and developing is affected by a multitude of interconnected causes. In developed countries, economic factors are key, with a notable trend of agricultural land abandonment during the 1950s, particularly in Europe and the United States. This mostly results from socio-economic issues, including elevated opportunity costs of agriculture and a diminishing agricultural workforce. Moreover, urbanization and infrastructure development significantly influence land use change, since economic activity and urban growth modify land functions, especially in rural and peri-urban regions, through a process termed artificialization. Developed nations have enacted diverse environmental laws to regulate land use change, emphasizing the mitigation of adverse environmental effects and the promotion of sustainable land management practices.

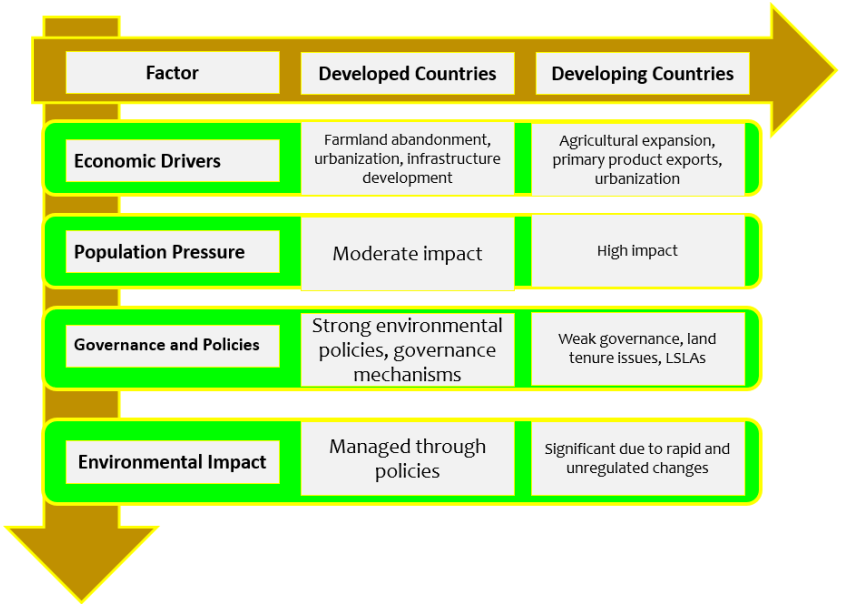


Figure 8. Factors Causing Land Use Change

Concurrently, in developing countries, economic development is a significant factor, with agricultural expansion being an essential process for increasing production to support economic development. This process typically entails the conversion of forests, wetlands, and other natural habitats into agricultural land. Exports of primary products, which predominate in terms of export earnings, also propel alterations in land use, thereby augmenting agricultural activities and other resources. The mounting pressure resulting from rapid population growth has led to increased demand for critical resources such as food, water, and housing. This has precipitated substantial alterations in land use, characterized by the expansion of agricultural areas and the development of urban regions (see Figure 8 and Figure 9).

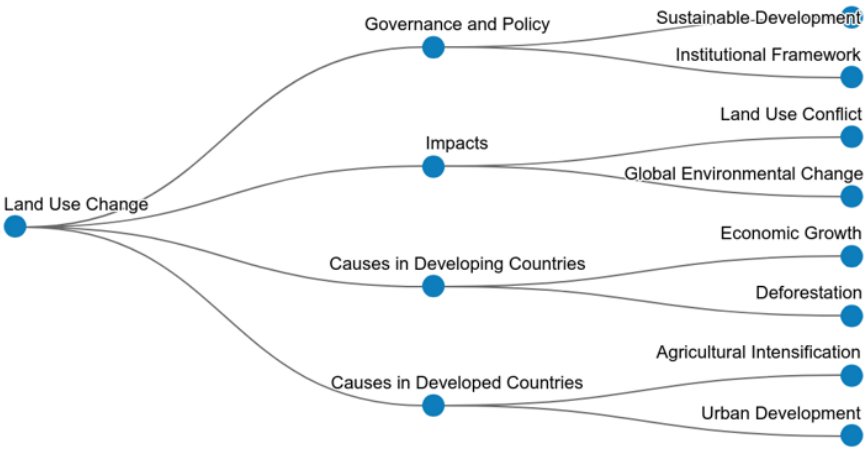


Figure 9. Formulation of the Impacts of Land Use Change

Urbanization in emerging nations has led to the transformation of agricultural and natural land into residential and commercial zones. Institutional and governance issues are essential components, especially in areas like Tanzania, Vietnam, and Borneo, where political decisions about land rights and development significantly influence land use change. In some cases, insufficient governance can exacerbate land disputes and prolong unsustainable practices over time. Moreover, extensive land acquisitions by governments and

investors for agricultural production, biofuels, and other commodities lead to both direct and indirect modifications in land use, encompassing population displacement and changes to local customs.

3.5. The Impact of Land Use Changes

Land use change in developed and developing countries exerts a substantial influence on the environment, the economy, and public health. In developing countries, rapid urbanization frequently exerts deleterious effects, including deforestation, pollution, and biodiversity loss. For instance, a study conducted in Bangladesh revealed that the conversion of land for agricultural and residential purposes has resulted in substantial ecological degradation (Islam et al., 2020). Furthermore, changes in land use have been demonstrated to contribute to health risks, including an increase in asthma cases attributable to air pollution resulting from urbanization. Conversely, developed countries are also subject to the repercussions of land use change, albeit in distinct circumstances. In countries like Japan, despite the strict regulations on land use, challenges persist with regard to informal development and its impacts on mental health and quality of life. Urbanization in developed countries is frequently linked to infrastructure expansion, a phenomenon that has the potential to enhance quality of life while concurrently generating adverse ramifications for environmental sustainability and local climate change (Xu et al., 2019). A summary of the impacts resulting from land use change is presented in Table 3.

Table 3. Impacts of Land Use Changes

Impact Category	Impact & Phenomenon	Brief Description	Authors
Environment (Developing Countries)	Deforestation	Loss of natural habitat	(Andrade et al., 2024; Ceddia & Zepharovich, 2017)
Environment (Developing Countries)	Air and water pollution	Pollution from urban activities degrades air and water quality	(Alcántara-Ayala & Goudie, 2010; Cappelaere et al., 2021)
Environment (Developing Countries)	Damage to wetland areas (loss of wetlands)	Land reclamation causes loss of vital wetland ecosystems	(Bojer et al., 2025; McKeon et al., 2022; Pena-Regueiro et al., 2020)
Environment (Developing Countries)	Decline in biodiversity	Changes in land use reduce biodiversity	(Carpenter et al., 2025; Harsh, 2025; Marselle et al., 2021)
Environment (Developing Countries)	Increased disease risk due to pollution	Urban pollution increases health risks	(Ntajal et al., 2022; Zambrano & González-Salazar, 2025)
Environment (Developed Countries)	Urban Heat Island (UHI)	Increased temperatures due to reduced vegetation	(Nath & Deka, 2025; Rony et al., 2025; Senyel Kurkcuoglu et al., 2025; Shayiti & Kasimu, 2025; Tomar & Kulkarni, 2025)
Environment (Developed Countries)	Infrastructure expansion	Urbanization improves life quality but pressures the environment	(Madhok, 2025; Meineche et al., 2024; Pourhashemi et al., 2025; Priono & Ellisa, 2025)
Health (Developed Countries)	Impact on mental health and child development	Regulations needed to balance urbanization and health effects	(Huth et al., 2018; Kılavuz et al., 2025; Salim et al., 2024)
Social & Economic	Social and economic inequality	Loss of access to basic services affects communities	(Mali et al., 2025; Ramírez-Cando et al., 2025; Sun & Robinson, 2018)

Impact Category	Impact & Phenomenon	Brief Description	Authors
Social & Economic	Land issues (poverty)	Changes in land use cause poverty problems.	(Jhala et al., 2025; Lazaro et al., 2025; Z. Wu et al., 2025b)
Social & Economic	Short-term community-based management & integrated policy	Sustainable management needed to reduce inequalities & environmental impact	(Painter et al., 2020; Sperry & Bender, 2020)
Migration & Demography	Migration from rural to urban	Impact on infrastructure	(Barrico & Castro, 2016; Huang et al., 2024; Iamtrakul et al., 2023)
Coastal & Marine Environment (Southeast Asia)	Pollution from intensive agriculture & heavy metal mining	Agricultural and anthropogenic activities degrade coastal ecosystems	(Myangan et al., 2017; Wu et al., 2025a)

On the other hand, developed countries also experience the impacts of land use change, though often in different contexts. In countries like Japan, despite strict regulations on land use, there remain challenges with informal development and its impacts on mental health and quality of life. Urbanization in developed countries is often associated with infrastructure expansion, which can improve quality of life but also lead to negative impacts on environmental sustainability and local climate change.

A notable consequence of land use change is the elevation of temperature resulting from the urban heat island (UHI) effect. Studies demonstrate that quickly expanding urban areas, like Kathmandu, Dehradun, and Dhaka, encounter substantial temperature elevations, with urban heat island (UHI) intensity adversely affecting public health (Maharjan et al., 2021; Mishra & Arya, 2024). The rise in temperature is frequently associated with the reduction of vegetation cover, which serves as a natural cooling effect (Hassan et al., 2015).

Alterations in land use within developing countries profoundly affect coastal ecosystems, especially through land reclamation for infrastructure like ports and industrial areas, resulting in the deterioration of wetlands, which are essential for sustaining ecosystem stability and alleviating climate change (Xiong et al., 2025) This deterioration leads to the loss of wetlands' ecological functions, including carbon sequestration, coastal erosion mitigation, and flood protection; hence, it heightens environmental susceptibility to human-induced disturbances. Intensive land expansion in the Pearl River Delta of China has resulted in diminished water quality, eutrophication, and a reduction in biodiversity, adversely affecting endemic species and aquatic food webs (Wang et al., 2019). This effect not only harms natural habitats but also disturbs biogeochemical equilibrium, hastening sedimentation and enduring pollution.

Geographic disparities intensify the effects of land use change, especially in Southeast Asia, where intensive agricultural methods—characterised by the overuse of chemical fertilisers and ineffective irrigation—result in water pollution, land degradation, and public health hazards, including the contamination of drinking water sources (Phanmala et al., 2023). In metropolitan regions, heavy metal concentrations in water bodies from runoff of anthropogenic landscapes significantly associate with a deterioration in aquatic ecosystem quality, leading to eutrophication, loss of biodiversity, and habitat degradation (Yuan et al., 2025) This phenomenon illustrates how alterations in land use expedite environmental deterioration, as human contaminants disseminate across regional hydrology, jeopardising ecosystem production and vital services, including clean water provision and fisheries.

Land use change significantly affects social and demographic aspects, as urbanisation prompts substantial migration from rural regions to urban centres, leading to overpopulation, infrastructure strains, and challenges in delivering essential services like housing, transportation, and healthcare (Hao et al., 2015; Martín-Antón et al., 2020). The conversion of land exacerbates socioeconomic disparities, particularly

affecting low-income populations who suffer significant consequences such as diminished access to arable land, natural resources, and traditional livelihoods, thereby intensifying cycles of poverty and injustice (Long et al., 2007; Nyairo et al., 2022; Xie et al., 2005). In poor nations, factors such as poverty, corruption, and administrative inefficiency intensify these effects, obstructing mitigation efforts and amplifying the vulnerability of marginalised populations, including smallholder farmers and indigenous people (Vadrevu & Ohara, 2020).

The effects of land use change create a complicated relationship among environmental degradation, population shifts, and social inequity, necessitating a comprehensive strategy to mitigate the conflicts between economic development and sustainability (Martín et al., 2024; Phanmala et al., 2023). In the absence of solutions like evidence-based land zoning and ecological restoration, this trend may exacerbate global crises, including climate change and societal instability, as evidenced in areas such as the Pearl River Delta (Rudiarto et al., 2018; Wang et al., 2019). A subsequent study ought to emphasise predictive modelling to delineate spatial-temporal effects, thereby facilitating the development of long-term resilience-focused strategies (Yuan et al., 2025).

The study has revealed various novel discoveries as previously stated. This study is acknowledged to have shortcomings, including reliance on data exclusively from Scopus. Several alternative databases exist that may have been employed to achieve a more comprehensive and precise dataset, so aligning the results more closely with reality. This bibliometric study on the impact of land use change elucidates that, within the framework of urban management and regional development, it is essential to evaluate many factors that can induce land use change and adverse environmental consequences. In the future, studies on land use change will be increasingly examined due to the continuous progression of global growth. Investigating this subject is also advised in developing nations as a component of initiatives that mitigate the effects of land use changes.

4. CONCLUSION

Particularly in urban areas and developing cities in Asia and Southeast Asia, this study has underlined the need of knowing land use change and its effects on the environment, society, and economy. These areas' fast urbanization has brought about notable changes in land use, which might have major effects on people's quality of life and the surroundings. By means of bibliometric analysis, this paper effectively revealed trends, patterns, and advancements in research concerning land use change from 1986 to 2025. The data reveals that publications on land use change have shown notable increase. This shows growing awareness and scholarly focus on problems concerning the effects of urbanization and land use change on the surroundings. This study also emphasizes the predominance of nations like China and the United States in publication contributions, therefore emphasizing that this global problem calls for worldwide cooperation to be solved. Regarding environmental effects, this study discovered that changes in land use sometimes result in loss of biodiversity, degradation of ecosystems, and worsening of air and water quality. Rapid urbanization in emerging nations sometimes comes with the loss of natural land and habitats, which compromises public health. For instance, rising respiratory disorders including asthma have been connected to more air pollution brought on by urbanization. Conversely, industrialized nations also deal with comparable issues, albeit in different settings, notably the effect on mental health and quality of life resulting from unanticipated infrastructure expansion. Particularly in nations underrepresented in the literature, our study also revealed knowledge gaps on the elements affecting land use change. Thus, more study in these domains is crucial to comprehend the local dynamics influencing land use and its effects. Future studies should take into account the numerous social, political, and economic settings in every nation in order to generate more sensible and long-lasting laws. Furthermore underlined in this paper is the need of a more integrated approach to land use management embracing all stakeholders, including the government, the society, and the business sector. Reforestation, climate-smart agriculture, and preservation of natural ecosystems among sustainable policies should be carried out to improve resistance

to climate change and the adverse effects of land use modification. All things considered, this study significantly advances knowledge of land use change and its effects and provides insightful analysis for legislators and scholars to create better plans to meet the problems presented by urbanization and land use change. The results of this study should inspire more in-depth research in this sector as well as help to shape policies supporting sustainable growth and future better management of natural resources. This will help to stimulate greater conversation in this regard.

5. ACKNOWLEDGMENTS

All authors have contributed to the final manuscript. The authors would like to express our gratitude to LPPM UPN Veteran Yogyakarta for funding this research with research grant number: 121/UN62.21/DT.07.00/2024.

6. REFERENCES

Alcántara-Ayala, I., & Goudie, A. S. (Eds.). (2010). *Geomorphological Hazards and Disaster Prevention* (1st ed.). Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511807527.

Andrade, A. C., Falcão, L. A. D., Borges, M. A. Z., Leite, M. E., & Espírito Santo, M. M. D. (2024). Are Land Use and Cover Changes and Socioeconomic Factors Associated with the Occurrence of Dengue Fever? A Case Study in Minas Gerais State, Brazil. *Resources*, *13*(3), 38. DOI: https://doi.org/10.3390/resources13030038.

Barrico, L., & Castro, P. (2016). Urban Biodiversity and Cities' Sustainable Development. In P. Castro, U. M. Azeiteiro, P. Bacelar-Nicolau, W. Leal Filho, & A. M. Azul (Eds.), *Biodiversity and Education for Sustainable Development* (pp. 29–42). Springer International Publishing. DOI: https://doi.org/10.1007/978-3-319-32318-3_3.

Bernatović, I., Gomezel, A. S., & Černe, M. (2021). Mapping the Knowledge-Hiding Field and Its Future Prospects: A Bibliometric Co-Citation, Co-Word, and Coupling Analysis. *Knowledge Management Research & Practice*, *20*(3), 394–409. DOI: https://doi.org/10.1080/14778238.2021.1945963.

Bojer, A. K., Abshare, M. W., Mesfin, F., & Al-Quraishi, A. M. F. (2025). Assessing climate and land use impacts on surface water yield using remote sensing and machine learning. *Scientific Reports*, *15*(1), 18477. DOI: https://doi.org/10.1038/s41598-025-03493-8.

Cappelaere, L., Le Cour Grandmaison, J., Martin, N., & Lambert, W. (2021). Amino Acid Supplementation to Reduce Environmental Impacts of Broiler and Pig Production: A Review. *Frontiers in Veterinary Science*, *8*, 689259. DOI: https://doi.org/10.3389/fvets.2021.689259.

Carpenter, I., Kuemmerle, T., Romero-Muñoz, A., Aguiar, S., Gasparri, I., Lathuillière, M. J., Nanni, S., Ribero, V., & Baumann, M. (2025). Attributing deforestation-driven biodiversity decline in the Gran Chaco to agricultural commodity supply chains. *Global Environmental Change*, *92*, 103011. DOI: https://doi.org/10.1016/j.gloenvcha.2025.103011.

Ceddia, M. G., & Zepharovich, E. (2017). Jevons paradox and the loss of natural habitat in the Argentinean Chaco: The impact of the indigenous communities' land titling and the Forest Law in the province of Salta. *Land Use Policy*, *69*, 608–617. DOI: https://doi.org/10.1016/j.landusepol.2017.09.044.

Dong, J., Li, Z., Gao, S., & Zhang, L. (2024). A bibliometric analysis of Oropouche virus. *Frontiers in Microbiology*, *15*, 1457773. DOI: https://doi.org/10.3389/fmicb.2024.1457773.

Emadodin, I., & Reinsch, T. (2018). Assessing the impact of land use change on aridification in semiarid land. *Land Degradation and Development*, *29*(10), 3423–3431. DOI: https://doi.org/10.1002/ldr.3108.

Estoque, R. C., & Murayama, Y. (2015). Intensity and spatial pattern of urban land changes in the megacities of Southeast Asia. *Land Use Policy*, *48*, 213–222. DOI: https://doi.org/10.1016/j.landusepol.2015.05.017.

Figueroa, H., Grady, C. J., Maria Beatriz de Souza Cortez, Beach, J., Stewart, A., Soltis, P. S., & Smith, S. A. (2023). *Land Use Changes Result in Increased Phylogenetic Clustering and Preferential Loss of Species-Rich Sites for Michigan Floral Assemblages.* DOI: https://doi.org/10.21203/rs.3.rs-2967584/v1.

Gills, R., Padua, S., Ramachandran, C., Thomas, S., Rajesh, K. M., Harshitha, R., Varghese, E., Vivekanandan, E., Ratheesh, K. R., & George, G. (2025). Climate change, adaptation pathways, and mitigation measures in coastal Karnataka: Socio-ecological perspectives from marine fishing communities. *Proceedings of the Indian National Science Academy*, 91, 1278-1297. DOI: https://doi.org/10.1007/s43538-025-00582-0.

Hao, L., Sun, G., Liu, Y., Wan, J., Qin, M., Qian, H., Liu, C., Zheng, J., John, R., Fan, P., & Chen, J. (2015). Urbanization dramatically altered the water balances of a paddy field-dominated basin in southern China. *Hydrology and Earth System Sciences*, *19*(7), 3319–3331. DOI: https://doi.org/10.5194/hess-19-3319-2015.

Harsh, S. (2025). Impact of climate warming and landscape change on monarch butterfly. *Journal of Insect Conservation*, *29*(11). DOI: https://doi.org/10.1007/s10841-024-00644-6.

Hassan, Md. S., Mahmud-ul-Islam, S., & Rahman, M. T. (2015). Integration of Remote Sensing and GIS to Assess Vulnerability of Environmental Degradation in North-Western Bangladesh. *Journal of Geographic Information System*, *07*(05), 494–505. DOI: https://doi.org/10.4236/jgis.2015.75040.

Herzog, P. S., Ai, J., & Ashton, J. W. (2022). Applying Bibliometric Techniques: Studying Interdisciplinarity in Higher Education Curriculum. *Computation*, *10*(2), 26. DOI: https://doi.org/10.3390/computation10020026.

Huang, W., Shrestha, A., Xie, Y., Yan, J., Wang, J., Guo, F., Cao, Y., & Wang, G. (2024). Assessing Four Decades of Land Use and Land Cover Change: Policy Impacts and Environmental Dynamics in the Min River Basin, Fujian, China. *Land*, *14*(1), 11. DOI: https://doi.org/10.3390/land14010011.

Huth, N. I., Cocks, B., Dalgliesh, N., Poulton, P. L., Marinoni, O., & Garcia, J. N. (2018). Farmers' perceptions of coexistence between agriculture and a large scale coal seam gas development. *Agriculture and Human Values*, *35*(1), 99–115. DOI: https://doi.org/10.1007/s10460-017-9801-0.

Iamtrakul, P., Chayphong, S., Raungratanaamporn, I.-S., & Chollacoop, N. (2023). Energy-Related CO2 Emissions and Urbanization in Peri-Urban, Pathum Thani Province, Thailand. In H. Gaber (Ed.), *Proceedings of the 5th International Conference on Clean Energy and Electrical Systems*, 1058, 265–276). Springer Nature Singapore. DOI: https://doi.org/10.1007/978-981-99-3888-9_19.

Igarashi, K., Kuraji, K., Tanaka, N., & Aranyabhaga, N. (2019). Prediction of the Impact of Climate Change and Land Use Change on Flood Discharge in the Song Khwae District, Nan Province, Thailand. *Journal of Climate Change*, *5*(1), 1–8. DOI: https://doi.org/10.3233/jcc190001.

Islam, M. M., Pal, S., Hossain, M. M., Mozumder, M. M. H., & Schneider, P. (2020). Coastal Ecosystem Services, Social Equity, and Blue Growth: A Case Study from South-Eastern Bangladesh. *Journal of Marine Science and Engineering*, *8*(10), 815. DOI: https://doi.org/10.3390/jmse8100815.

Jhala, Y. V., Mungi, N. A., Gopal, R., & Qureshi, Q. (2025). Tiger recovery amid people and poverty. *Science*, *387*(6733), 505–510. DOI: https://doi.org/10.1126/science.adk4827.

Kalfas, D., Kalogiannidis, S., Chatzitheodoridis, F., & Toska, E. (2023). Urbanization and Land Use Planning for Achieving the Sustainable Development Goals (SDGs): A Case Study of Greece. *Urban Science*, *7*(2), 43. DOI: https://doi.org/10.3390/urbansci7020043.

Kalnay, E., & Cai, M. (2003). Impact of urbanization and land-use change on climate. *Nature*, *423*(6939), 528–531. DOI: https://doi.org/10.1038/nature01675.

Kanga, S., Singh, S. K., Meraj, G., Kumar, A., Parveen, R., Kranjčić, N., & Đurin, B. (2022). Assessment of the Impact of Urbanization on Geoenvironmental Settings Using Geospatial Techniques: A Study of Panchkula District, Haryana. *Geographies*, *2*(1), 1–10. DOI: https://doi.org/10.3390/geographies2010001.

Kiguchi, M., Takata, K., Hanasaki, N., Archevarahuprok, B., Champathong, A., Ikoma, E., Jaikaeo, C., Kaewrueng, S., Kanae, S., Kazama, S., Kuraji, K., Matsumoto, K., Nakamura, S., Nguyen-Le, D., Noda, K., Piamsa-Nga, N., Raksapatcharawong, M., Rangsiwanichpong, P., Ritphring, S., … Oki, T. (2021). A review of climate-change impact and adaptation studies for the water sector in Thailand. *Environmental Research Letters*, *16*(2). DOI: https://doi.org/10.1088/1748-9326/abce80.

Kılavuz, M., Ağralı, C., & Kanbay, Y. (2025). As the planet warms, women pay the price: The climate change and reproductive health crisis. *Journal of the Egyptian Public Health Association*, *100*(1), 14. DOI: https://doi.org/10.1186/s42506-025-00196-w.

Lazaro, L. L. B., Usuriaga-Najera, O. C., Neto, A. H., Grimoni, J. A. B., & Jacobi, P. R. (2025). Climate commitments and energy transition pledges in Latin America: Where is the region headed? *Energy for Sustainable Development*, *88*, 101779. DOI: https://doi.org/10.1016/j.esd.2025.101779.

Liu, J., Ding, J., Li, L., Li, X., Zhang, Z., Ran, S., Ge, X., Zhang, J., & Wang, J. (2020). Characteristics of aerosol optical depth over land types in central Asia. *Science of the Total Environment*, *727*, 138676. DOI: https://doi.org/10.1016/j.scitotenv.2020.138676.

Long, H., Tang, G., Li, X., & Heilig, G. K. (2007). Socio-economic driving forces of land-use change in Kunshan, the Yangtze River Delta economic area of China. *Journal of Environmental Management*, *83*(3), 351–364. DOI: https://doi.org/10.1016/j.jenvman.2006.04.003.

Madhok, R. (2025). Infrastructure, Institutions, and the Conservation of Biodiversity in India. *Journal of the Association of Environmental and Resource Economists*, *12*(6), 1705–1745. DOI: https://doi.org/10.1086/735284.

Maharjan, M., Aryal, A., Man Shakya, B., Talchabhadel, R., Thapa, B. R., & Kumar, S. (2021). Evaluation of Urban Heat Island (UHI) Using Satellite Images in Densely Populated Cities of South Asia. *Earth*, *2*(1), 86–110. DOI: https://doi.org/10.3390/earth2010006.

Mali, A., Zhen, X., & Bakshi, B. R. (2025). Bridging net-zero, nature-positive, and people-positive goals: A case study in the polyester industry. *Computers & Chemical Engineering*, *202*, 109276. DOI: https://doi.org/10.1016/j.compchemeng.2025.109276.

Marselle, M. R., Hartig, T., Cox, D. T. C., De Bell, S., Knapp, S., Lindley, S., Triguero-Mas, M., Böhning-Gaese, K., Braubach, M., Cook, P. A., De Vries, S., Heintz-Buschart, A., Hofmann, M., Irvine, K. N., Kabisch, N., Kolek, F., Kraemer, R., Markevych, I., Martens, D., … Bonn, A. (2021). Pathways linking biodiversity to human health: A conceptual framework. *Environment International*, *150*, 106420. DOI: https://doi.org/10.1016/j.envint.2021.106420.

Martín, G., Erinjery, J. J., Ediriweera, D., Goldstein, E., Somaweera, R., de Silva, H. J., Lalloo, D. G., Iwamura, T., & Murray, K. A. (2024). Effects of global change on snakebite envenoming incidence up to 2050: A modelling assessment. *The Lancet Planetary Health*, *8*(8), e533–e544. DOI: https://doi.org/10.1016/S2542-5196(24)00141-4.

Martín-Antón, M., Del Campo, J. M., Negro, V., Frades, J. L., Moreno Blasco, L. J., & Jiménez Verdejo, J. R. (2020). Land Use and Port-city Integration in Reclamation Areas: A Comparison between Spain and Japan. *Journal of Coastal Research*, *95*(sp1), 278–282. DOI: https://doi.org/10.2112/SI95-054.1.

McKeon, K., Woodruff, J. D., Yellen, B., Fernald, S. H., & Sheehan, M. C. (2022). Invasive water chestnut hinders tidal wetland development. *Earth Surface Processes and Landforms*, *47*(6), 1409–1424. DOI: https://doi.org/10.1002/esp.5323.

Meineche, A. S., Pedersen, V. D., & Astefanoaei, M. (2024). On the use of open source tools for land use and land cover change monitoring. *Proceedings of the 32nd ACM International Conference on Advances in Geographic Information Systems*, 541–544. DOI: https://doi.org/10.1145/3678717.3691245.

Mishra, A., & Arya, D. S. (2024). Assessment of land-use land-cover dynamics and urban heat island effect of Dehradun city, North India: A remote sensing approach. *Environment, Development and Sustainability*, *26*(9), 22421–22447. DOI: https://doi.org/10.1007/s10668-023-03558-6.

Myangan, O., Kawahigashi, M., Oyuntsetseg, B., & Fujitake, N. (2017). Impact of land uses on heavy metal distribution in the Selenga River system in Mongolia. *Environmental Earth Sciences*, *76*(9), 346. DOI: https://doi.org/10.1007/s12665-017-6664-z.

Nath, R., & Deka, S. (2025). Urbanization and its impact on microclimate dynamics and thermal comfort: A predictive assessment of Guwahati's evolving landscape. *Environmental and Sustainability Indicators*, *28*, 100964. DOI: https://doi.org/10.1016/j.indic.2025.100964.

Noda, K., Yoshida, K., Shirakawa, H., Surahman, U., & Oki, K. (2017). Effect of Land Use Change Driven by Economic Growth on Sedimentation in River Reach in Southeast Asia: —A Case Study in Upper Citarum River Basin—. *Journal of Agricultural Meteorology*, *73*(1), 22–30. DOI: https://doi.org/10.2480/agrmet.D-15-00021.

Ntajal, J., Höllermann, B., Falkenberg, T., Kistemann, T., & Evers, M. (2022). Water and Health Nexus—Land Use Dynamics, Flooding, and Water-Borne Diseases in the Odaw River Basin, Ghana. *Water*, *14*(3), 461. DOI: https://doi.org/10.3390/w14030461.

Nyairo, R., Hasegawa, T., Fujimori, S., Wu, W., & Takahashi, K. (2022). Socio-economic trajectories, urban area expansion and ecosystem conservation affect global potential supply of bioenergy. *Biomass and Bioenergy*, *159*. DOI: https://doi.org/10.1016/j.biombioe.2022.106426.

Painter, L., Nallar, R., Fleytas, M. D. C., Loayza, O., Reinaga, A., & Villalba, L. (2020). Reconciliation of cattle ranching with biodiversity and social inclusion objectives in large private properties in Paraguay and collective indigenous lands in Bolivia. *Agricultural Systems*, *184*, 102861. DOI: https://doi.org/10.1016/j.agsy.2020.102861.

Pena-Regueiro, J., Sebastiá-Frasquet, M.-T., Estornell, J., & Aguilar-Maldonado, J. A. (2020). Sentinel-2 Application to the Surface Characterization of Small Water Bodies in Wetlands. *Water*, *12*(5), 1487. DOI: https://doi.org/10.3390/w12051487.

Phanmala, K., Lai, Y., & Xiao, K. (2023). Impact of Land Use Change on the Water Environment of a Key Marsh Area in Vientiane Capital, Laos. *Water (Switzerland)*, *15*(24). DOI: https://doi.org/10.3390/w15244302.

Polat, S., Tunç, M., Özşahin, E., Tamam, L., & Göker, P. (2023). Bibliometric Analysis of Articles Published in Cukurova Medical Journal Between 2011 and 2022. *Cukurova Medical Journal*, *48*(4), 1405–1411. DOI: https://doi.org/10.17826/cumj.1348988.

Pourhashemi, S., Naemi, M., Boroughani, M., & Kambezidis, H. (2025). The effect of land-use forecasting on dust source susceptibility mapping in Iran. *Environmental Challenges*, *21*, 101334. DOI: https://doi.org/10.1016/j.envc.2025.101334.

Priono, Y., & Ellisa, E. (2025). Riverside Settlements in Palangka Raya City: Balancing Tradition, Urbanization, and Environmental Sustainability. *Civil Engineering and Architecture*, *13*(4), 2876–2894. DOI: https://doi.org/10.13189/cea.2025.130406.

Proswitz, K., Edward, M. C., Evers, M., Mombo, F., Mpwaga, A., Näschen, K., Sesabo, J., & Höllermann, B. (2021). Complex Socio-Ecological Systems: Translating Narratives into Future Land Use and Land Cover Scenarios in the Kilombero Catchment, Tanzania. *Sustainability*, *13*(12), 6552. DOI: https://doi.org/10.3390/su13126552.

Ramírez-Cando, L. J., Mora-Ochoa, Y. I., Freire-Sanchez, A. S., & Medina-Rodriguez, B. X. (2025). Life Cycle Sustainability Assessment of Agriproducts in Latin America: Overview Based on Latent Dirichlet Allocation. *Sustainability*, *17*(11), 4954. DOI: https://doi.org/10.3390/su17114954.

Romero, A., Kremer, R. K., & Marx, W. (2010). The Scientific Road of Manuel Cardona: A Bibliometric Analysis. *Annalen Der Physik*, *523*(1–2), 179–190. DOI: https://doi.org/10.1002/andp.201000090.

Rony, Md. R. H., Jannat, F. A., Adhikari, A., Ahomed, S., Haque, Md. R., Rahman, Md. Z., & Rahman, Md. M. (2025). The effects of Socio-economic conditions and land use pattern on land surface temperature and urban heat Island at saint martin's Island in Bangladesh. *Theoretical and Applied Climatology*, *156*(10), 541. DOI: https://doi.org/10.1007/s00704-025-05739-x.

Rosas, S. R., Kagan, J., Schouten, J. T., Slack, P. A., & Trochim, W. M. K. (2011). Evaluating Research and Impact: A Bibliometric Analysis of Research by the NIH/NIAID HIV/AIDS Clinical Trials Networks. *Plos One*, *6*(3), e17428. DOI: https://doi.org/10.1371/journal.pone.0017428.

Rudiarto, I., Handayani, W., & Sih Setyono, J. (2018). A Regional Perspective on Urbanization and Climate-Related Disasters in the Northern Coastal Region of Central Java, Indonesia. *Land*, *7*(1), 34. DOI: https://doi.org/10.3390/land7010034.

Salim, M. Z., Choudhari, N., Kafy, A. A., Nath, H., Alsulamy, S., Rahaman, Z. A., Aldosary, A. S., Rahmand, M. T., & Al-Ramadan, B. (2024). A comprehensive review of navigating urbanization induced climate change complexities for sustainable groundwater resources management in the Indian subcontinent. *Groundwater for Sustainable Development*, *25*, 101115. DOI: https://doi.org/10.1016/j.gsd.2024.101115.

Santoso, D. H., Puryani, P., Algary, T. A., Moch. Chaeron, & Hilmi, I. K. (2025). Land Use Change Analysis Using Plugin MOLUSCE in Yogyakarta Urban Agglomeration Area. *INSOLOGI: Jurnal Sains Dan Teknologi*, *4*(2), 160–169. DOI: https://doi.org/10.55123/insologi.v4i2.5032.

Senyel Kurkcuoglu, M. A., Ozenen-Kavlak, M., Duymus, H., & Cabuk, S. N. (2025). Assessing UHI Impacts of Land Use Changes in Urban Development Areas through LCZ Classification. *Computational Urban Science*, *5*(1), 42. DOI: https://doi.org/10.1007/s43762-025-00200-1.

Shayiti, B., & Kasimu, A. (2025). Spatiotemporal Variation and Driving Mechanisms of Land Surface Temperature in the Urumqi Metropolitan Area Based on Land Use Change. *Land*, *14*(11), 2252. DOI: https://doi.org/10.3390/land14112252.

Sperry, R., & Bender, G. (2020). Airport buildings: A key opportunity for sustainability in aviation. *Journal of Airport Management*, *14*(3), 234. DOI: https://doi.org/10.69554/ONLE9347.

Sun, B., & Robinson, D. (2018). Comparison of Statistical Approaches for Modelling Land-Use Change. *Land*, *7*(4), 144. DOI: https://doi.org/10.3390/land7040144.

Tomar, S., & Kulkarni, K. S. (2025). Reclaiming cities in India: Nature-based approaches for climate-resilient urban design. *Theoretical and Applied Climatology*, *156*(10), 510. DOI: https://doi.org/10.1007/s00704-025-05780-w.

Turner, B. L., Lambin, E. F., & Reenberg, A. (2007). The emergence of land change science for global environmental change and sustainability. *Proceedings of the National Academy of Sciences*, *104*(52), 20666–20671. DOI: https://doi.org/10.1073/pnas.0704119104.

Vadrevu, K. P., & Ohara, T. (2020). Focus on land use cover changes and environmental impacts in South/Southeast Asia. *Environmental Research Letters*, *15*(10). DOI: https://doi.org/10.1088/1748-9326/abb5cb.

Wang, J., Zhou, W., Pickett, S. T. A., Yu, W., & Li, W. (2019). A multiscale analysis of urbanization effects on ecosystem services supply in an urban megaregion. *Science of the Total Environment*, 662, 824–833. DOI: https://doi.org/10.1016/j.scitotenv.2019.01.260.

Wu, K., Li, Y., Peng, P., Li, Y., Peng, S., Lu, P., Zhang, D., & Zhou, S. (2025a). Elevated chromium levels and potential health risks among six heavy metals in agricultural soils of China. *Environmental Research*, *287*, 123106. DOI: https://doi.org/10.1016/j.envres.2025.123106.

Wu, Z., Huang, X., Liu, X., Meadows, M. E., Chen, R., & Li, L. (2025b). Land use changes and their effects on poverty in Inner Mongolia, northern China. *Geography and Sustainability*, *6*(4), 100269. DOI: https://doi.org/10.1016/j.geosus.2025.100269.

Xie, Y., Mei, Y., Guangjin, T., & Xuerong, X. (2005). Socio-economic driving forces of arable land conversion: A case study of Wuxian City, China. *Global Environmental Change*, *15*(3), 238–252. DOI: https://doi.org/10.1016/j.gloenvcha.2005.03.002.

Xiong, W., Li, J., & Liu, B. (2025). Coastal Wetland Conservation and Urban Sustainable Development Synergy Pathway Research: Insights from Qingdao and Weihai for Qinhuangdao. *Sustainability*, *17*(21), 9902. DOI: https://doi.org/10.3390/su17219902.

Xu, P., Guo, Y., & Fu, B. (2019). Regional Impacts of Climate and Land Cover on Ecosystem Water Retention Services in the Upper Yangtze River Basin. *Sustainability*, *11*(19), 5300. DOI: https://doi.org/10.3390/su11195300.

Yuan, X., Bai, X., Zhou, Z., Luo, G., Li, J., Ran, C., Zhang, S., Xiong, L., Liao, J., Du, C., Dai, L., Li, Z., Xue, Y., Long, M., Luo, Q., Zhang, X., Li, M., Shen, X., & Yang, S. (2025). Global impacts of land use on terrestrial carbon emissions since 1850. *Science of the Total Environment*, *963*. DOI: https://doi.org/10.1016/j.scitotenv.2024.178358.

Zambrano, L., & González-Salazar, C. (2025). Health in the Time of Nature Crisis. *Archives of Medical Research*, *56*(7), 103256. DOI: https://doi.org/10.1016/j.arcmed.2025.103256.