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A Bibliometric Analysis of SDG 15-Life on Land

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Abstract: *Sustainable Development Goal 15 (SDG 15) seeks to safeguard terrestrial ecosystems, prevent desertification, and put an end to the loss of biodiversity. With rising environmental issues, research pertaining to SDG 15 has also increased globally. This research utilizes bibliometric analysis to chart the landscape of research on SDG 15 drawing data from scientific databases. VOSviewer and Bibliometrix were utilized to examine the trends in publications, authorship networks, citations, and keywords co-occurrences. The results show increased academic interest in SDG 15, especially from China, UK, India, and the USA. The major themes are interdisciplinary collaboration, technology contribution to conservation, and policy interventions. Co-authorship and citation networks show an open and integrating research community. The review emphasizes the increasing international concern for sustainable land management and conservation of biodiversity. It also emphasizes the importance of internation collaboration, evidence-based policy-making, and holistic approaches to manage ecological problems and attain SDG 15 indicators.*

Keywords: Sustainable Development Goals, land degradation, biodiversity conservation, bibliometrics, environmental policy, deforestation, sustainable land use

1. Introduction

It involves caring for our lands, forests, and wildlife to keep them healthy and able to sustain life; this is Sustainable Development Goal 15-Life on Land. To prevent deforestation, conserve biodiversity, and combat desertification is this aim that allows nature and man to live together peacefully. The rapidly converging rate of biodiversity loss threatens the ecosystem services that are crucial to maintenance of ecological balance and human well-being (Martínez et al., 2023), according to United Nations (2022), which highlight the fact that agricultural practices are major causes of tree loss at the global level; 100,000 km2 of forest are now cut down every year because of unsustainable agricultural activities, urbanization, and climate change. International treaties such as the Global Biodiversity Framework are established at Kunming and Montreal; it direct states to

incorporate aspects in global policies to mitigate threats to conservation strategies and sustainable land management, and biodiversity preservation in general.

Bibliometric analysis is a very good technique to assess research patterns, recognize key contributors, and draw maps of scientific interrelations in this field. It investigates the global research efforts related to SDG 15 by analyzing the publishing trends, citation networks, and emerging topics with tools like VOSviewer and Bibliometrix. The study intends to identify interdisciplinary connections, significant studies, and gaps in knowledge necessary for championing sustainable land management and biodiversity conservation by providing an extensive assessment of the intellectual framework and development of SDG 15 research. The purpose of SDG 15 is to sustain, restore and promote the sustainable use of ecosystems, to benefit future generations with a healthy planet. Sustainable Development Goal 15 (SDG 15) is to maintain sustainable and harmonious development between land management and biodiversity. Through such an investigation of research trends, key contributors, and thematic advancements, we would hope to reflect on the total progress made and on the continuing challenges in the quest for sustainable land management. This study emphasizes the importance of cooperation to develop innovative approaches to safeguarding crucial terrestrial resources.

2. Literature Review

Though the article discusses the Sustainable Development Goals, particular emphasis has been afforded to SDG 15, which mainly aims to protect ecosystems and stop the loss of biodiversity. It presents the Kunming-Montreal Global Biodiversity Framework (GBF) as a roadmap to reach these goals by 2030. The article also talks about important areas like using biodiversity in a sustainable way, protecting nature with respect for people's rights, and closing the funding gap for biodiversity. However, the author wants that all the progress made could be lost if the new GBF promises are not included in the SDG framework.

The research data on SDG 15 can partly be studied using VOSviewer, which helps to see research patterns and find key focus areas and partnerships in SDG 15 studies. A study showed that the UK is the top country in research on sustainable practices, including SDG 15, and also the strongest partner in SDG 15 collaborations (Riaz et al.,2023). SDG 15 research looks at protecting biodiversity, using land wisely, and how changes in the environment effect nature human health. Folayane et al. (2024) studied the links between SDG 15 and early childhood carries (ECC). They found that environmental factors like soil and water quality may affect human health. Their review showed different indirect connection between land use and health problems, especially through land management.

According to (Zhang et al. 2023), a global decadal assessment on SDG 14 (Life Below Water) and SDG 15 (Life on Land) showed that conservation efforts made towards these two goals enhanced sustainability of terrestrial ecosystems, particularly in biodiversity hotspots, notwithstanding regional variations in progress, with poor countries lagging behind. Bari et al. (2024) carried out studies using remote sensing to address human-induced changes in the environment, demonstrating how deforestation and land-use changes result in one form of species-loss, and stressing the need for advanced monitoring systems in environmental decision-making. Sharma et al. (2022) investigated home garden agroforestry systems and their importance in sustaining the environment. The findings revealed that such systems support biodiversity conservation, food security, and climate change mitigation efforts, making them instrumental in sustainable land use. Several studies

have pointed out the ecological and economic impacts of biodiversity loss, a case in point being Li et al. (2023), who synthesized literature on reforestation and concluded that those afforestation projects that increase the forest cover in areas are often characterized by monoculture plantations, which fail to promote biodiversity. Likewise, Nguyen et al. (2024) have claimed that pressure exerted on the cities through urbanization leads to a reduction in the amount of green area available, which further harms the local wildlife. Technology advancement in conservation has also attracted considerable research, such as that conducted by Rodríguez et al. (2023) on the application of artificial intelligence in monitoring deforestation, indicating an improvement in predictions of losses of forests under the machine learning models. Further studies concerning genetic diversity in reforestation are discussed by Tanaka et al. (2024) concerning the need to preserve native species. Community-based conservation approaches represent another significant current focus. For example, González et al. (2023) stressed the importance of indigenous knowledge in sustainable land management, evidencing that many of these traditional practices are often in line with contemporary conservation goals. As for Ahmed et al. (2024), this work highlighted that local engagement in participatory reforestation projects led to better outcomes in the long run. Among these studies, common themes emerge concerning the urgent need for policy interventions to halt biodiversity loss, the role of technology in monitoring and mitigating land degradation, and the need to integrate local and indigenous knowledge in conservation strategies. The findings collectively emphasize that achieving SDG 15 requires an interplay of disciplines: ecologists, technologists, and social scientists working together for a more sustainable future.

3. Methodology

To study research trends and developments related to sustainable development goal 15 (SDG 15)-Life on Land, This study used a bibliometric analysis is a quantitative approach that uses computer-based and statistical methods to examine academic literature. Data for this study was taken from trusted scientific data bases, ensuring wide coverage of relevant research. The study analyzed publication trends, citation counts, authorship patterns, and word co-occurrence. Tools like VOSviewer and bibliometrics were used to create network maps and visualizations. This study also identifies key authors, organizations, and journals that contribute to SDG 15 research. Thematic clustering helps in finding important research areas and emerging trends.

3.1 Main information regarding the Data collection

There is continuous research seen from the dataset's 65 publications and notable annual growth rate of 25.99%. With an average of 22.87 citations per paper, each one demonstrates substantial scholarly attention and influence. Interestingly, it lists 3986 references, demonstrating the breadth of the research and the links. The average number of co-authors per document, with 381 authors participating, is 6.14, demonstrating the authors' cooperation. Co-authorship from other nations is present in roughly 50.77% of articles, indicating its global perspective. The dataset includes a variety of materials from reputable sources.

To enhance the transparency and reproducibility of our bibliometric analysis, we have provided a more detailed description of the data source and search strategy utilized. The literature was accessed from the Dimensions database, which was selected because of its extensive coverage of high-impact, peer-reviewed journals across a wide range of subject areas. The search was conducted on March 2, 2025, using the following keywords and phrases: Life on Land AND ("land

degradation" OR "biodiversity" OR "ecosystem"), applied to article titles, abstracts, and keywords specifically. The inclusion criteria were limited to peer-reviewed journal articles published between 2019 and 2025 that are directly relevant to Sustainable Development Goal 15. 65 publications were identified as meeting these criteria and included in the final analysis. While the sample size might seem low for a bibliometric study on global SDGs, the strict filtering process ensured that only the most relevant and high-quality studies were included. We do note this as a limitation and suggest that future studies extend by including additional databases such as Web of Science or Scopus, and using broader search parameters to obtain a larger dataset for more in-depth analysis.

4. Results and Discussion

4.1 The total number of papers increasing year by year on Life on land which can be observed in the following table:
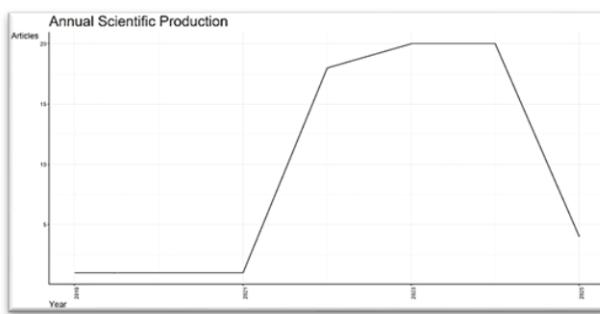

Fig 1. Annual Scientific Production

Fig 1 illustrates a considerable jump in the number of papers from 2019 to 2025, showing a surge in research effort and the likelihood of additional expansion in the subject. This pattern highlights the subject's flexibility and adaptability to changing conditions, making it a significant and exciting field for both present and future researchers.

Leaders in Knowledge Generation

China is at the top of the list with 23 scientific publications, followed by the US with 8, India with 10, and the UK with 11. Canada, Japan, Switzerland, Germany, the Netherlands, and Australia also contribute significantly. By highlighting each country's scholarly contributions to the topic of Life on Land, this quantitative analysis deepens our understanding of its importance and worldwide influence.

Cited sources
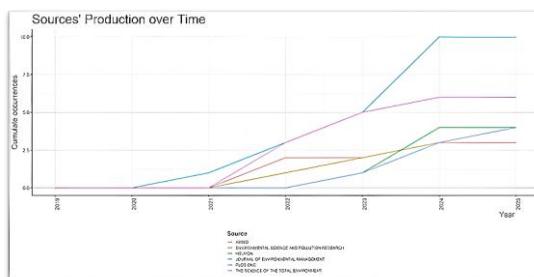
Fig 2. Sources Dynamics

Fig 2 shows the trend of research articles in terrestrial life-focused journals produced between 2019 and 2025. The scholarly production has been steadily rising, with a major uptick in 2022 and sustained rise in the years that followed. With a significant increase in the quantity of publications, the "Journal of Environment Management" has become a well-known journal. Furthermore, "Heliyon" and "The Science of the Total Environment" have demonstrated consistent involvement in this field. Reflecting larger trends in research, this trend highlights a growing emphasis on terrestrial ecosystems and sustainability.

4.2 Co-Citation Author
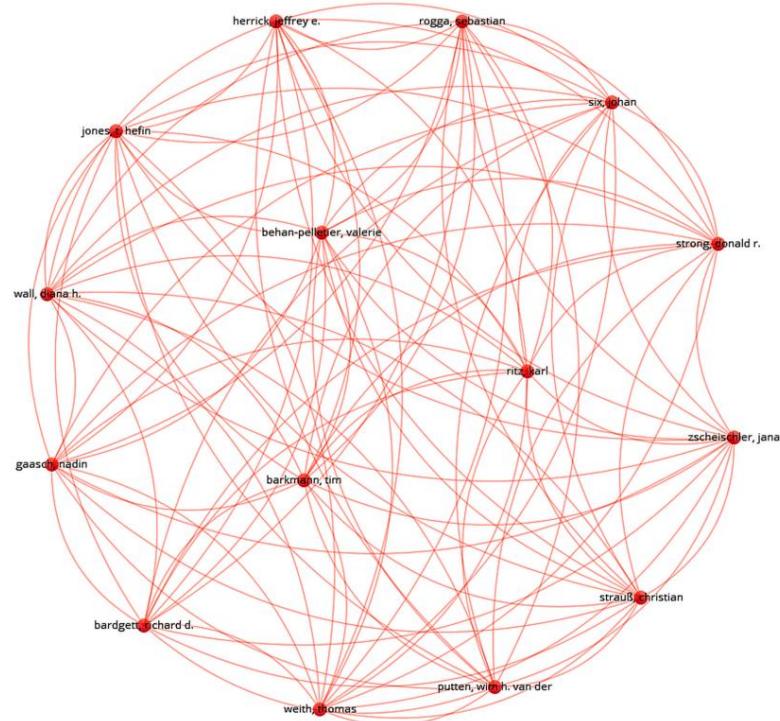
Fig 3. Co-citation cited author

Fig 3 The network graph illustrates collaboration patterns among researchers, with nodes representing individuals and edges indicating co-authorships. The high density of connections suggests a tightly-knit research community, with larger nodes indicating key contributors. The structure reveals clusters of frequent collaborators, offering insights into academic dynamics. Quantitative measures like degree and betweenness centrality can further elucidate knowledge flow and identify influential researchers. This analysis aids in understanding research trends and optimizing academic networking strategies.

4.3 Co-Authorship Author
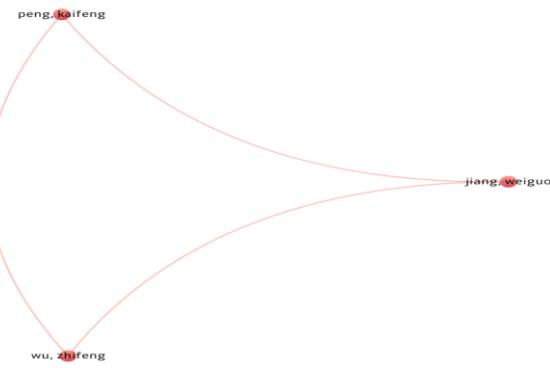
**Fig 4.** Co-authorship author

Fig 4 The collaboration network on "Life on Land," as seen using VOSviewer, shows a small team of researchers, with Jiang Weiguo serving as the main link between Wu Zhifeng and Peng Kaifeng. This little network raises the possibility that the field's research is still in its infancy or that it only reaches a specific demographic. Growing partnerships may increase transdisciplinary influence, resulting in better conservation tactics and new understandings of biodiversity preservation and sustainable land use. Addressing issues like habitat loss and deforestation may be possible with a more integrated network. Additional quantitative analysis, such as clustering techniques and centrality metrics, may reveal gaps and chances for more scientific collaboration.

4.4 Country Citation
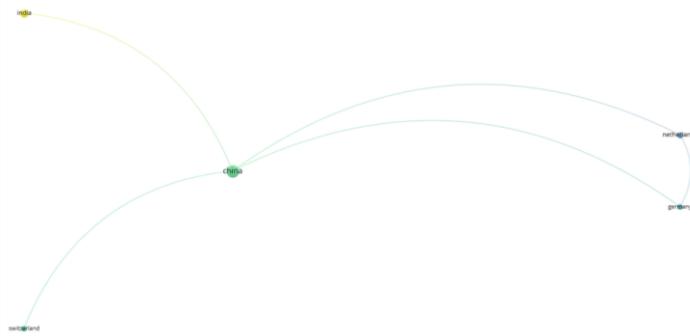
Fig 5. Citation-Countries

Fig 5 China is a central hub connecting other nations like India, Switzerland, Germany, and the Netherlands in the country collaboration network on "Life on Land," as displayed with VOSviewer. A gradient of colors shows how partnerships have changed over time, with more recent partnerships shown in yellow and older partnerships in blue and green. China's ties reflect its role in promoting international cooperation, whereas Germany and the Netherlands have a significant link that indicates a tight scientific alliance. Even though there is a growing body of research in this field, the few existing partnerships indicate that greater collaborations, particularly in areas with high biodiversity, could improve knowledge sharing and bolster international conservation initiatives.

4.5 Text and Keyword Analysis
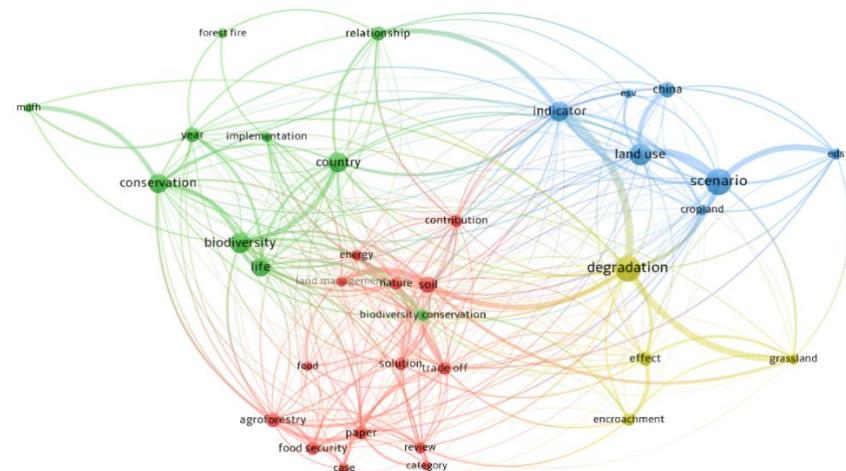
Fig 6. Text analysis

Fig 6 The VOSviewer network analysis of "Life on Land" demonstrates a multidisciplinary approach to sustainable land management by highlighting interrelated issues such biodiversity, conservation, land use, and soil. A color gradient shows changing research patterns, with more current subjects like trade-offs and encroachment becoming more popular. Strong ties between agroforestry, food security, ecosystem sustainability, and biodiversity protection highlight the necessity of striking a balance between protecting the environment and supporting human lifestyles. Concepts such as "scenario," "indicator," and "relationship" highlight how crucial modeling is to combating land degradation. In conservation studies, the use of country-specific words, like "China," demonstrates regional influences. In line with UN Sustainable Development Goal 15: Life on Land, this analysis emphasizes the necessity of integrated strategies to preserve biodiversity and foster ecological resilience.

4.6 Co-citation cited sources:
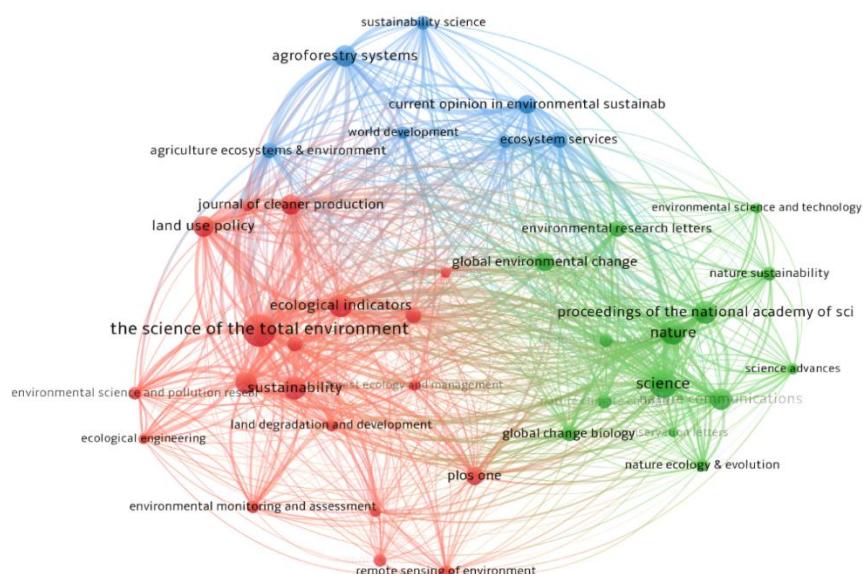
Fig 7. Co-citation cited sources

The network visualization in Fig 7 shows the links between scholarly publications and study areas pertaining to "Life on Land." Green shows high-impact publications like Nature and Science in Global Change Biology, blue highlights agroforestry and ecosystem management, and red promotes environmental sustainability and land use policy. These color-coded clusters show subject groups. The close connections between land management, climate change, sustainability, and remote sensing demonstrate a robust interdisciplinary approach. In line with the global sustainability goals, especially SDG 15: Life on Land, and highlighting the necessity of integrated policies to safeguard terrestrial ecosystems, this visualization highlights the significance of scientific collaboration in addressing biodiversity conservation and sustainable land use.

5. Discussion and Implications

According to Zhang et al. (2023), wetland changes have a major effect on carbon storage in urban coastal areas, underscoring the necessity of conservation measures to meet SDG 15.1. Yang et al. (2023) emphasize the significance of land management strategies by providing additional evidence of how human expansion has accelerated the loss of biodiversity in Asia. In their discussion of the socio-ecological effects of woody encroachment, Ding and Eldridge (2024) promote sustainable management techniques as a means of maintaining ecosystem health. The environmental effects of displacement brought on by conflict are highlighted by Ahmed et al. (2024), who show how changes in land usage worsen degradation.In order to show their applicability to sustainable land use, Thomas et al. (2023) examine land degradation neutrality indicators in agricultural settings. In order to improve degraded lands and promote long-term sustainability, Jinger et al. (2024) suggest horti-silviculture and soil moisture conservation as practical options. When taken as a whole, these studies highlight the necessity of community-based strategies, technology advancements, and coordinated policies to counteract biodiversity loss and advance sustainable land management under SDG 15. The SDG 15 study's discussion emphasizes the increasing interest in environmental policies, sustainable land use, and biodiversity protection among researchers. The bibliometric analysis shows a consistent rise in scholarly output, especially between 2019 and 2025, suggesting that the sustainability of terrestrial ecosystems is becoming more widely recognized.Although the US, China, the UK, and India are the top providers, the study shows that more international cooperation is required. The preservation of biodiversity, the use of artificial intelligence and remote sensing in ecosystem monitoring, and the socioeconomic effects of conservation policies are important areas of study. The results highlight how crucial it is to incorporate scientific knowledge into governmental decisions in order to support conservation initiatives. Protecting biodiversity could be greatly improved by growing technological applications and establishing international research collaborations. To guarantee the successful implementation of SDG 15, future studies should focus on issues including urbanization, genetic variety in afforestation, and sustainable agriculture techniques.

6. Conclusion

Attract great interest to the sustainability of biodiversity protection, sustainable land-use and environmental policies. Bibliometric studies of life in the land sustainable development goal (SDG) show a huge hike in academic outputs from 2019 towards 2025, which indicates an increasing global interest in terrestrial ecosystem sustainability. Key results point out that China, the United Kingdom, India, and the United States are the biggest donors to SDG 15 research. However, many international partnerships are restricted. The data reveal a bias within a multidisciplinary and cross-border interaction. Research topics emphasize here include biodiversity conservation and artificial

intelligence in ecosystem monitoring as well as the socioeconomic impacts of conservation strategies. Research results that would require attention are to use scientific inputs in politics for ensuring conservation. Expanding technologies, building global research partnerships, and engaging local communities may enhance biodiversity protection. Increased collaboration across disciplines, application of state-of-the-art technology, and robust legal frameworks might contribute tremendously to halting biodiversity loss and sustaining life on land.The study is really validating towards having a question concerning Sustainable Development Goal 15: Life on Land; it is contributing towards important aspects of increased interest in biodiversity conservation, sustainable land use, and environmental policies. The bibliometric study depicts an ever-growing volume of academic outputs from 2019 and is now projected toward 2025. This has further emphasized global interests in terrestrial ecosystem sustainability. Major results would show that the maximum contributions to SDG 15 research are from China, the United Kingdom, India, and the United States. International thesis creation is often limited even thus, reinforcing the need for more multidisciplinary and cross-border interaction. Some important research areas defined in this paper-related biodiversity conservation and artificial intelligence in ecosystem monitoring, and the social-economics consequences of conservation strategies. It would open up a great deal for scientific outcomes to be embedded in promoting the common cause of conservation. Following the implementation of advanced technology, global collaborative research networks could then be formed to involve local communities in conservation efforts that contribute to biodiversity status. Global efforts may contribute greatly to the feat by promoting interdisciplinary collaboration, enhanced adoption of advanced technologies, and improved legal frameworks to stop biodiversity loss and build a sustainable future for life on land.

Scope for the future study:

Future studies can broaden the coverage of different publishers over different periods.
A systematic literature review (SLR) could yield deeper insights into this topic.
Experts engaged in thematic analysis would surely bring a lot of value to future research.
There is potential for study on the linking of this topic to other Sustainable Development Goals (SDGs).

Future research needs to study developmental challenges, including urbanization, genetic diversity in afforestation, and eco-friendly agriculture for the effective fulfillment of SDG 15.
Shortcomings of the study:

Publications envisaged include those up to and during the years, 2019-2025.
Only Dimensions AI and Google Scholar research was included.
In this study no further objectives and their relevance to "life on land" were examined.
The small size falls short for any conclusion, but this can be widened in the future for more detailed investigations.

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