

Knowledge structure and Research Fronts of Western Land Policy Research

--Based on the Knowledge graph of CiteSpace

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Abstract: In this paper, with Web of Science(WOS), selected as the literature search engine, policy as the subject search word, and English document record of Land Use since it was created (1993-2018) as the data source, by using the information visualization technology and tool (CiteSpace) of dynamic network analysis to conduct literature co-reference analysis and clustering analysis and draw the knowledge map of the front of land policy research, it reflects the important literature and important characters in the field of land policy research, and shows the knowledge structure relationship and evolution law in this field. It is found that in the past ten years, the topic of land policy research is concentrated, the basis of common knowledge is clear, and the subject has not yet formed a clear branch of discipline. The author's subject background has transited from economics and sociology to ecology, geography, agriculture, earth science, economy and finance and other interdisciplinary fields. The development trend of each cluster shows that the three research groups, including rural environmental governance and land transformation, ecological environment protection and land use, management system and policy adjustment, have a prominent position in the western land policy research; The recent hot spot of western land policy research has turned to the Keywords fields including “transformation, agriculture, impact, biodiversity, government management and ecosystem services, climate change, rural development, forest development and so on.

1. Introduction

The common paradigm of classifying subject knowledge structure is to sort out the encyclopedia by the recognized “great master” in the field. As far as land policy research is concerned, although many people have put forward the research framework, it is quite controversial. This has a great relationship with the fact that land policy research is essentially a complex interdisciplinary subject. Since 2000, the most prominent characteristics of land policy research show that many research hot spots have been intertwined and change continuously and the sudden change of theoretical tone.

This paper attempts to change from subjective judgment to objective econometric analysis, using the relationship quoting and quoted in bibliometric analysis tools to describe the knowledge structure and context of land policy research, and then clearly judges the research basis and research hot spots of land policy research. CiteSpace, based on the theory of scientific knowledge graph (mapping knowledge domains), and the basic hypothesis that “scientific knowledge itself is constantly changing”, carries out the visual analysis of the relationship between the development process and structure of scientific knowledge, which has the possibility of visualization of multivariate, time-sharing and dynamic citation analysis, and is mainly used for the exploration of the development trend and model of scientific literature.

2. Introduction of CiteSpace tools and data acquisition

The research field of public policy involves a wide range of fields. In order to limit the scope of research to the scope of land use policy research, by choosing from the Land Use Policy Journals in the core library of web of science (WOS) platform with “policy” used as the subject words, the

literature types limited to three types: article, review, conference papers and the time cut-off point of the journal covering from 1993 (the year of its inception) to 2018, a total number of 1498 English literature are searched. When selecting Land Use Policy, first of all, we consider the authority of the journal in the field of land research (the impact factor of the journal is 2.768), and the journal ranks 16/104 in the Western Environmental Studies magazine; Secondly, this journal has a clear subject category and has the uniqueness in the field of land research. In order to check whether there are omissions in journals meeting the above two conditions, Citesace has been used to analyze a total of the first 30 references to be referenced in 1498 literature each year. After being cited and analyzed, the missing periodicals were inspected, 1498 source journals of the literature cited in the study were taken, and the first 20 periodicals were examined. It was found that there were no other journals satisfying the above two conditions. The Citespace parameter is set from 1993 to 2018, with a time span of 1 year, and pruning sliced networks is selected to narrow the network and consolidated network of each year (Fig. 1).

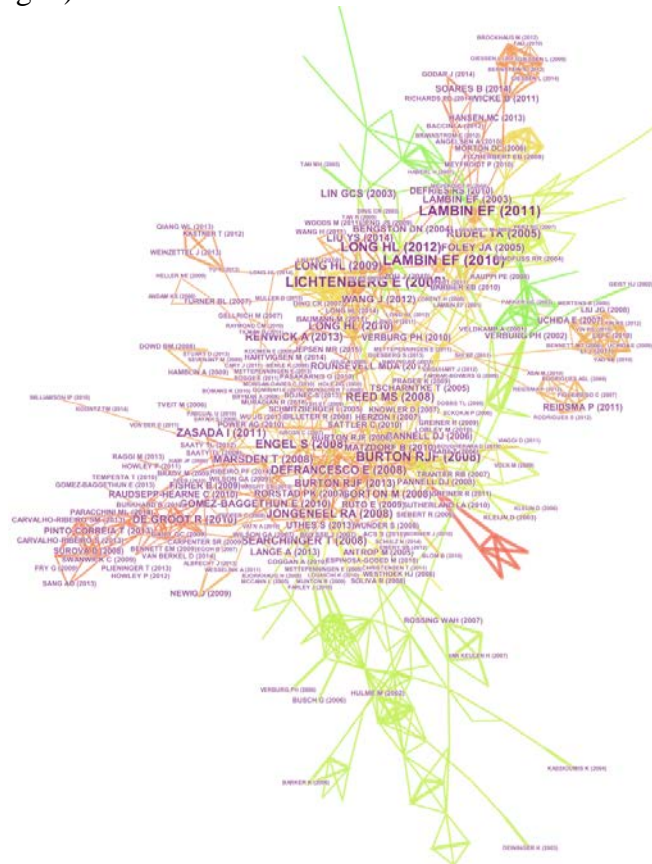


Fig. 1 Co-citation analysis of Land Use Policy literature from 1993 to 2018

3. The Knowledge Structure of Western Land Policy Research

In 1973, Henry Small, an American intelligence scientist, proposed Co-citation Analysis, which refers that the two documents appeared in the list of references of the third cited literature. The two documents formed a co-cited relationship. The excavation of the co-cited relationship of the spatial data set of the documents was considered as the co-cited analysis of the literature. Co-cited literature will serve as the knowledge basis of a subject, while the literature referenced by the co-cited literature will serve as the front of the subject.

In this paper, the relationship map of 1498 references in Land Use Policy from 1993 to 2018 is analyzed, and the research direction of land policy is analyzed by cluster analysis through the co-citation frequency relation of different references in the map, and then the research basis of a single research direction is analyzed concretely. The results of Citespace operation show that there are 688 cited literature nodes and 1541 connections between nodes. The clustering index Modularity Q of knowledge network is 0.8505 (it is generally believed that when Modularity is over

0.3, the network community structure is prominent), and Mean silhouette value is 0.3994 (The value range is from 0 to 1 and the higher the value is in the range, the stronger the similarity in the same cluster is), which indicates that the effect of the network clustering results is better. It can be seen that after 2000, the literature mainly focuses on the largest sub-network of fig. 2, which shows that in recent years, the common knowledge foundation of western land policy research is clear, the theme is more concentrated, and the discipline has not yet formed a powerful branch of discipline (Figure 2).

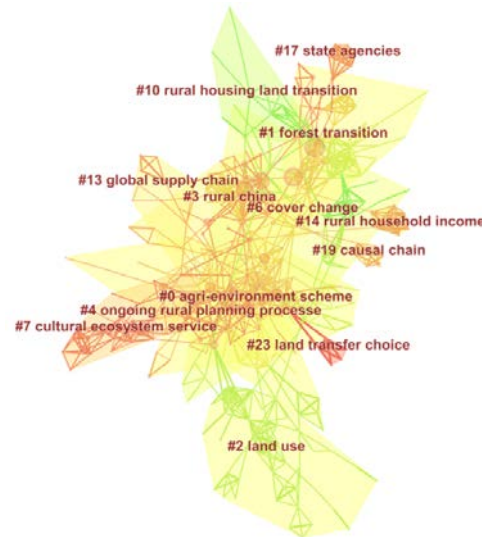


Fig. 2 Analysis of co-citation and clustering of Land Use Policy literature from 1993 to 2018

From the perspective of time axis map, the knowledge source of land policy research since 1990s is traced back to the theoretical works of economists, sociologists and ecologists such as WILLIS, KG, Marsden T, Fuller R J. After 2000, land policy research has entered an active period, which is not only a sharp increase in the frequency of literature node citation, but also a richer subject background of literature node authors, ranging from agronomy (Verburg PH), anthropology (Rudel TK), Land economy (Ian Hodge; E.E.Guillem et al.), geography (Sandra R. Baptista; Long Hualou; Liu YS; Darla K. Munroe; Gould KA et al.), economics and finance (Edward B. Barbier), Geo-science (M.D.A. Rounsevell), to agriculture(Eva Kerselaers), etc.). At the same time, it can be seen that the subject background of literature node authors is mainly concentrated in geography.

To the clustering results (figure 2), CiteSpace identifies a total of 157 clusters, most of which are small and scattered, but from the clustering feature value, Modularity is 0.8677 (it is generally believed that Modularity over 0.3 means that the network community structure is significant), and Mean Sihouette is 0.3061 (The value range is from 0 to 1 and the higher the value is in the range, the stronger the similarity in the same cluster is). The fitting degree of the network is better. To a certain extent, it shows that the largest sub-network plays a dominant role in the whole network. The largest sub-network contains 13 text. It can be classified as three research groups:rural environmental governance and land transformation, ecological environmental protection and land use, management system and policy adjustment according to the research content.

On the whole, the research of land policy has obvious problem orientation. In the same subject problem, according to the refinement of the research problem, it is divided into different branches. Rural environmental governance and land transformation are the focus of attention in the field of land policy in recent years, which has formed a three-dimensional research framework from many perspectives, such as ecological environment protection, planning, rural diversity protection and so on.

4. The recent research hotspots of western land policy

By using CiteSpace to analyze the related documents in WOS in Land Use Policy from 1993 to 2018, selecting the top 100 keywords of frequency in each time segment to form a network with

every year as a separate time slice, and through counting methods of MST+Pruning the merged network+Pruning the sliced networks to reduce the knowledge network of all time slices and the overall network of all documents, the Keywords note network were as follows. After the above processing, a total of 1918 keyword nodes were obtained, and there were 861 connections between them (figure 3).

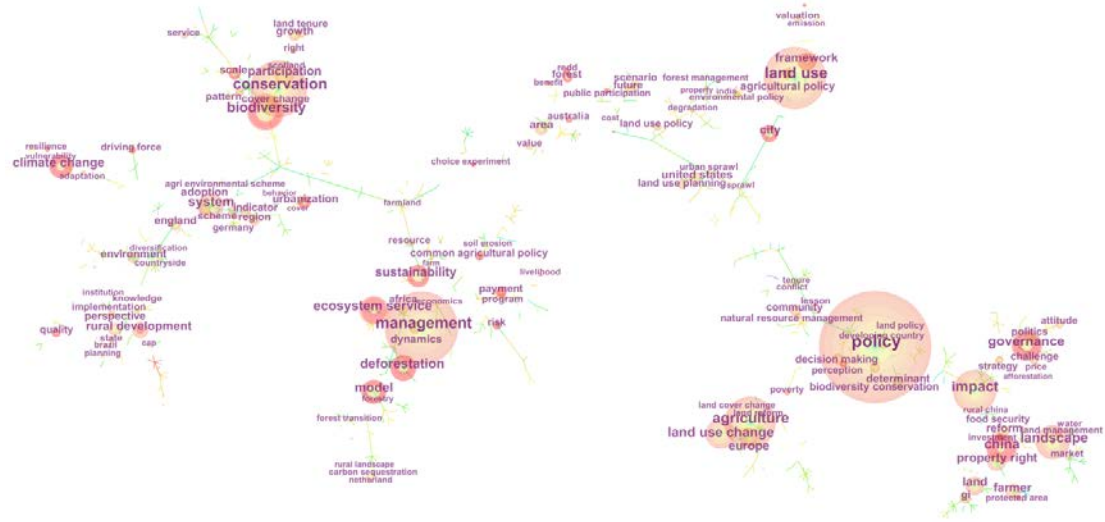


Fig. 3 1993-2016 Land Use Policy Keyword co-occurrence analysis of policy study.

4.1 Distribution of disciplines

As can be seen from figure 3, the keywords with high co-citation frequency of (CITATION COUNTS) mainly include policy, management, land use, transformation, agriculture, impact, biodiversity, government management, China and so on. The main research areas are the United Kingdom, the United States, Germany, the Netherlands, China, Australia. High frequency keywords, which have a co-citation relationship with the above high frequency words, are the focus of attention in recent years, as shown in Table 1.

Table 1 Analysis of High Frequency keyword Co-citation Network

High frequency keyword	Citation Keywords	Co-citation of high frequency keywords
policy	decision making;determinant;biodiversity conservation;land policy;community;natural resource management	biodiversity conservation;community; decision making;
management	dynamics;ecosystem service;degorestation;economics	ecosystem service; degorestation
land use	framework; agritural policy	framework; agritural policy
conservation	participation;pattern;scale;Scotland	participation
agriculture	land use change;Europe;land reform	land use change;Europe
impact	strategy; rural China	strategy
biodiversity	Cover change	Cover change
landscape	land management;market;water	land management;market
governance	politics; challenge; price; attitude	politics; challenge
China	property right;reform;investment	property right;reform

Through the clustering analysis of keyword construction knowledge network (using LLR algorithm), a total of 141 clusters were formed, of which 40 were large-scale clusters. Among them, Modularity is 0.9566 (it is generally believed that when Modularity is over 0.3 it means that the network community structure is significant), and Mean Silhouette is 0.2915 (The value range is from

0 to 1 and the higher the value is in the range, the stronger the similarity in the same cluster). This result reflects the wide range of topics involved in land policy research and the diversity of perspectives on the same research topic. As shown in figure 4, the internal similarity of clustering is the strongest (Sihoutte > 0.7), and the 10 clusters with the largest number of keywords are as follows: ecological protection (land cover); land reform; deforestation; government department (part); market; growth management; Canada; tenure; California; evolution; environmental change.

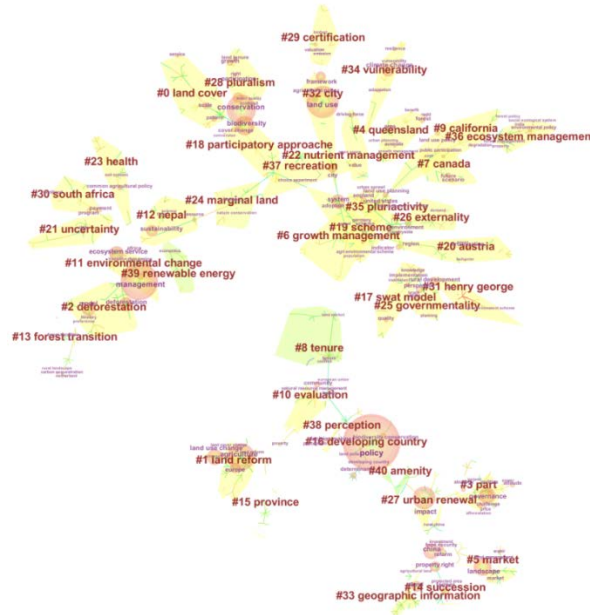


Fig. 4 Clustering analysis of knowledge network based on keyword construction

4.2 Network of co-citation authors

Since 1993, the most active land policy researchers, the early scholars include FAO, Rudel TK, Wunder S, Verburg PH, Ligh Enberg E, Long HL; medium-term scholars include Healey P, Wilson GA, Burton RJF, Potter C, North DC, Ministry O, Eoley JA, Millennium EA, Lowe P, etc; recent scholars include Ostrom E, World B, Lambin EF, Millennium EA, De Groot R, Deininger K. Although the distribution of scholars in western land policy research is scattered, it has also formed obvious schools and research teams, focusing on FAO, Verburg PH, Light EI, nberg E in the early stage, and Healey P, Burton RJF, Wilson GA ,North DC, Eoley JA, North DC in the middle ; Lambin EF, World B, Deininger K recently, forming a more decentralized network of researchers (see Figure 5).

At the same time, the core authors of VerburgPH, MullerD, Viaggi D, RaggiM, Zasada, LongHL, LiuYS, MorrisJ, Hanley N have formed a relatively large network of transnational partners, with good historical evolution. The internet Modularity is 0.9537, and Mean Sihouette 0.6771. The network has high degree of completeness and good clustering similarity(see Fig. 6).

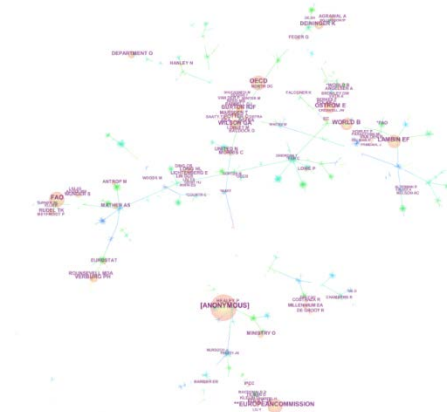


Fig. 5 Visual analysis of land policy research authors



Fig. 6 The network of high degree of completeness and good clustering similarity

4.3 change and evolution of disciplines

Figure 7 shows the temporal change trend of hot keywords in land policy research since 1990. The larger the radius of nodes is, the higher the frequency is. The crimson outer ring mark is a sudden (BURST) node, which represents the frontier of knowledge network research. Since 2000, all these including growth management, nature conservation, energy / fuel, ecology, landscape change, transition are the focus of land policy research, and the embodiment of land policy in the era of globalization, ecological destruction, economic transformation and development.

Through the (BURSTS) analysis of sudden test, it can be seen that China, ecosystem services, climate change, framework, common agricultural policy, management, rural development, perception, forest development, city, etc., are the key nodes of sudden nature, and the leading research and research of land policy.

At the same time, it is found that the hot topics such as land payment, project, planning and design, urbanization, land market and so on still have great attention before 2000, and the connection between the hot keywords before and after 2000 in figure 7 is still very dense.

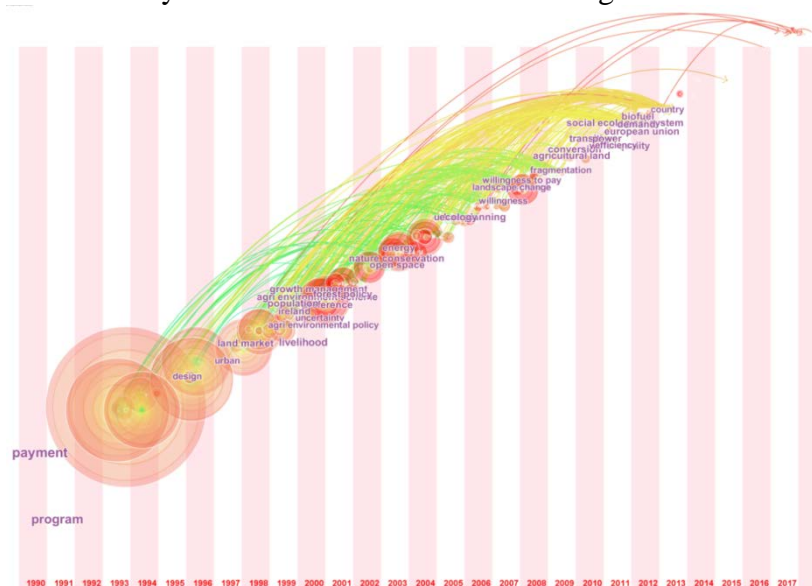


Fig. 7 Annual Change in Keywords of Land Use Policy Policy Study, 1993-2018

5. Conclusion

This paper analyzes the literature data of land policy research with the help of CiteSpace measurement tool, excavates the knowledge foundation, development context and research hot spot of western land policy research from the angle of “literature tracking”, which is a new attempt to the research of western land policy. Studies have shown that:

First, in the past ten years, the theme of land policy research is concentrated, the basis of common knowledge is clear, and the subject has not yet formed a clear branch of discipline. The author's subject background has transitioned from economics and sociology to ecology, geography, agriculture, earth science, economy and finance and other interdisciplinary fields.

Secondly, the subject network is perfect as a whole, and the largest sub-network contains 13 documents, which can be classified into three research groups: rural environmental governance and land transformation, ecological environment protection and land use, management system and policy adjustment.

Third, the recent research hot-spots of western land policy point to the high exposure keywords “China, ecosystem services, climate change, framework, common agricultural policy, management, rural development, forest development, and city”.

The deficiency of this paper is that the CiteSpace tool requires the same threshold of citation rate for the literature at different time points, which may ignore the important literature with short publication time. In addition, although Land Use Policy is the most representative academic journal of land policy, it is limited to technical means and can not bring the land policy papers in other journals into the scope of this analysis, which will affect the results of the analysis to a certain extent.

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