

# Contradicting Knowledge Map of Greenways: A Comparative Analysis Based on English and Chinese Literature

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## Abstract

Greenway is a flexible concept with diverse forms in different contexts. Recently in China, greenways have achieved rapid growth and become national policy. The widely implemented greenways also led to the first national document on greenway planning and design, *Guidance of Greenway Planning and Design*, which was issued by the Ministry of Housing and Urban-rural development. However, there have been two distinct perceptions of greenways in existing Chinese literature. On the one hand, some researchers argue that greenways show strategic values in providing social integration and economic growth. On the other hand, many local scholars and officials criticize that there are excessive artificial constructions and the greenways fail to provide necessary ecological benefits. In order to develop a general understanding of the conflicting greenway perceptions in different contexts (i.e. English and Chinese), this article will collect data from WOS and CNKI databases and then illustrate it as two knowledge maps using *VOSviewer*. The analysis shows that ecological conservation, resident perception, and greenway planning have been the core issues in greenway literature, which now have rich meanings and features. In contrast with greenway research in English, greenway research in China is still at the beginning stage and focuses primary on greenway function. However, unlike international greenway research, green transportation, and urban recreation are now influential greenway functions in Chinese greenway discourse. Although the enhancement of the transportation function and urban location are responses to the increasing need for non-motorized transport and open spaces, the discourse also reflects the problems of excessive urban development and the lack of ecological concerns in urban China.

## Introduction

Greenways are linear green corridors that are planned, designed and managed for recreational, ecological, or cultural purposes (Ahern, 1995, Fabos, 1995). Although greenways have common values in providing environmental benefits, greenways have diverse functions and forms in different contexts (Toccolini, Fumagalli, & Senes, 2006). For instance, in the United States, abandoned railways are one major type of greenway resources, which combine both green corridor and trails together to promote recreational activities (Shafer, Lee, & Turner, 2000). In West Europe, while ecological networks serve as a landscape strategy to provide ecological protection (Jongman, Kùlvik, & Kristiansen, 2004), greenways have been recognized as approaches to provide non-motorized travel (European Greenways Association, 2000; Transport for London, 2010). In Singapore, the greenway concept was implemented into in “Park Connector”, which aims at promoting opportunities for recreational activities by connecting green spaces on this densely developed island (Tan, 2006). Therefore, the concept of greenway has reached to a variety of functions and meanings due to different landscape context, planning activities, and institutional arrangements. Turner (1998) argues that greenways are “a route which is good from an environmental point of view” (Turner, 1998, p138). From this perspective, greenways have a unique capacity in

simultaneously integrating natural resource conservation and public health promotion (Keith, Larson et al., 2018).

In China, the greenway campaign has achieved rapid growth since 2010. By 2017, over 160 cities and 30 provinces had their own greenway schemes (Liu, 2017). Many cities regard ecological conservation as one of the major functions of greenway and point out the role of greenway in urban ecology. For instance, in Pearl River Delta Greenway Planning, ecological benefits are the primary consideration in the process of site selection. But the existing literature and practices focus more on recreational and traffic functions of greenways, rather than their value of ecological conservation or disaster prevention. The literature also raises questions around the following tension: Are greenways “green paths” for urban commuters, or a “green corridors” for ecological restoration in an urban environment? Therefore, to the ongoing debate in China, the central questions of this study are: Whether greenway research in China have distinct characteristics comparing with international greenway research and what could Chinese scholars learn from international greenway research? In order to answer these questions, we compare the perception of greenways in two different literature contexts (one in Chinese and one in international scholarship) by using VOSviewer to construct and visualize bibliometric networks of greenways.

## **Background and Literature Review**

Knowledge Graph is an intuitive visualization tool that provides a simpler, better way to understand the interactions of terms and concepts that define a field – here means greenways (Linton, 2011). As a freely available computer program, VOSviewer provides an accessible opportunity for establishing a full picture of all greenway-related researches by “creating, visualizing, and exploring bibliometric maps of science” ([www.vosviewer.com](http://www.vosviewer.com)). With a text mining function that can identify relevant noun phrases and a unified mapping and clustering approach, the program can be used to examine network co-citation data and the co-occurrence of terms (Waltman, Van Eck, & Noyons, 2010). On this basis, VOSviewer has recently been used by many researchers for text analysis, cluster analysis, and knowledge mapping, to explore research trends or display visualization results in a particular field (Gobster, 2014). In reference to Gobster’s methodology, this paper employs the VOSviewer program to explore the intellectual landscape of greenway discourse by comparing Chinese and international scholarship and through a qualitative comparison of cooccurrence terms maps across the past two decades (1998-2018).

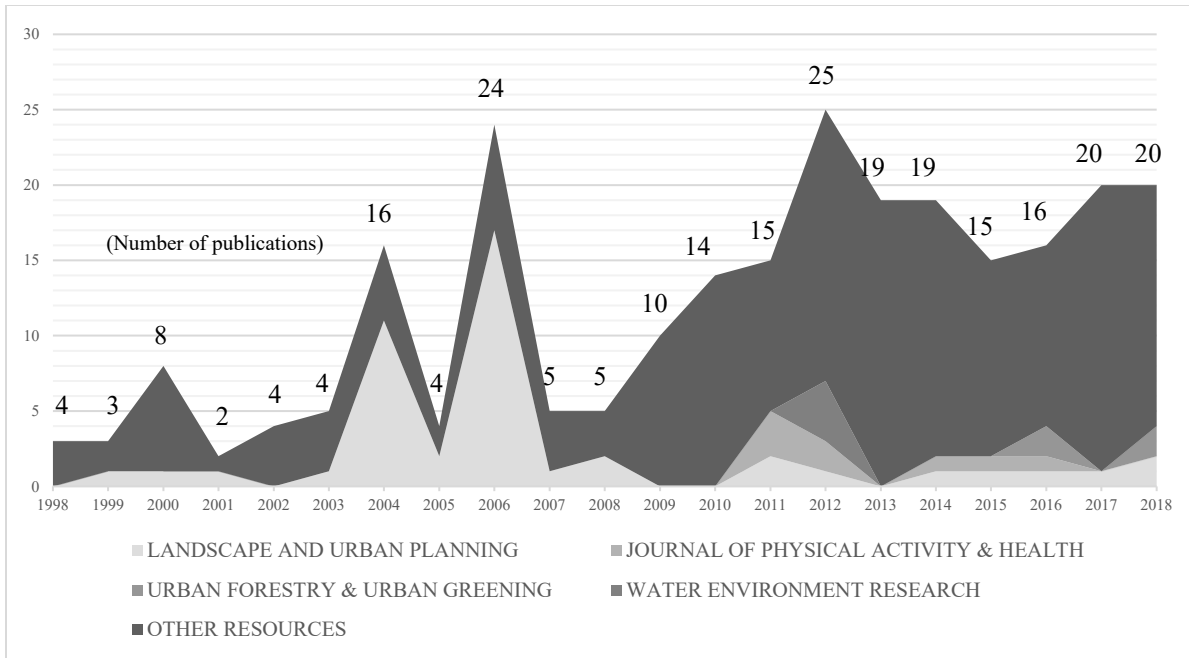
In the field of landscape research, Gobster (2014) use VOSviewer to map the themes and trends of landscape knowledge with data from journal *Landscape and Urban Planning*. According to his research, human dimensions now is an important field in landscape planning and urban ecology, in which perception, preference, and activities of human are receiving increasing attention. Meanwhile, greenway and greenway planning emerge in the 1990s as the linking elements crossing researches of landscape and ecological planning, and landscape analysis and human dimensions (Gobster, 2014). Meijering et al. (2017) further argue that “human dimensions” and “built environment” are two urgently needed topics in landscape architecture, in which existing differences of consensus between continents should be noticed. From this perspective, it is still hard to find a precise definition of greenway that is appropriate for all context worldwide (Palardy, et.al., 2018). Therefore, the comparison of greenway research between different contexts provides an approach to establish an in-depth understanding of the issues of greenways in China.

## Methods and Data

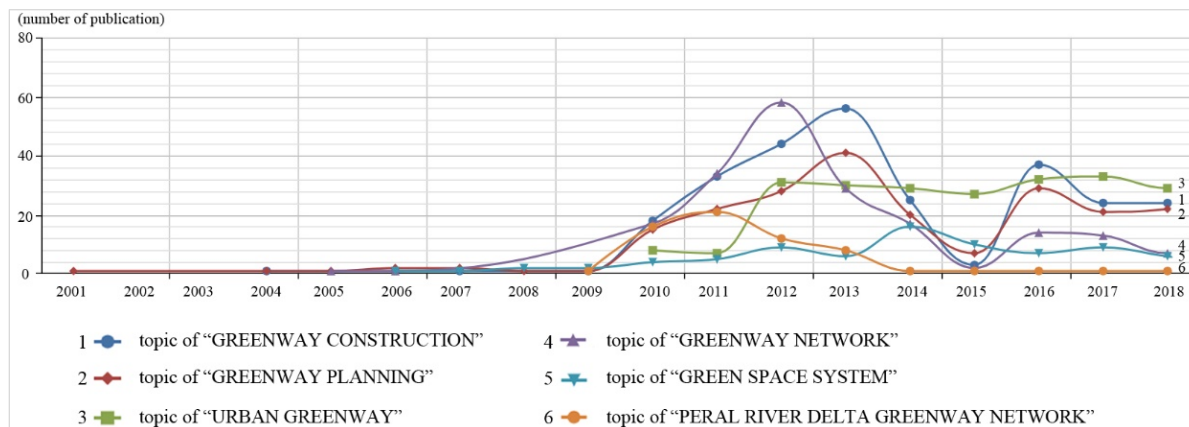
We collect data of greenway literature from two databases: Web of Science (WOS) and China Academic Journal Network Publishing Database (CNKI). The core analytical data was collected in July 2018. We deployed the search rules as: “greenways” in subject term fields (i.e. title, abstract, and keyword) of all research papers published and employed in above two platforms, including published articles, review articles, and conference papers, but excluding other material such as news, editorials, and notes. Searching “greenway” as the subject term in “Web of Science”, we got 256 papers from 1998 to 2018. According to the annual publication graph (Fig.1), *Landscape and Urban Planning* was the primary journal of early greenway literature, especially in the year of 2004 and 2006, when special issues of greenway were published. Since 2008, the number of publications was on the rise, and the proportion of other journals has been rapidly increasing. While the greenway movement continues in different countries, research on greenways has gradually become a hot topic in international academic literature.

Similarly, we used “*lvdao* (greenway in Chinese)” as the keyword in CNKI and collected 250 articles from Chinese Core Journals. Through the internal analysis program of CNKI, the subjects with the most occurrences in literature are displayed by the year of publications (Fig.2). Based on the preliminary analysis of terms frequency, we can identify that “greenway construction”, “greenway planning”, and “urban greenway” are the three most widely used terms in greenway literature in China. These keywords also reflect the urban focus of greenway development in China. Since the beginning of the greenway movement in the Pearl River Delta in 2010, because of the promotion of local government, greenway construction has achieved rapid growth, especially in urban areas. Meanwhile, the number of greenway-related publication saw a dramatic increase. However, the promotion to the economic, ecological, and social environment that greenways combined are limited, due to the fragmental supporting landscape and the densely built environment in urban China. Therefore, the function and the actual effects of greenways based on aestheticized greenway planning remain to be discussed. In this context, due to the practice-oriented traits of greenway movement, the ecological value and supporting landscape of greenways has received less attention. That is why terms like “sustainability”, “resilience”, and “green corridor” did not appear in the top six terms list. Additionally, for further analysis in VOSviewer, we extracted the English titles, abstracts, and keywords from these articles and eventually got 163 valid samples, while some articles do not have the corresponding English translation.

To prepare the text data for input into VOSviewer, the title, abstract, and keywords information of each valid article from two databases was respectively merged into a single text file. To allow for an adequate number of terms to be included in each term map, the threshold number of co-occurrence was set to be 5, which means only the terms that co-occurred more than five times would be displayed in the maps. We further deleted some irrelevant terms, such as “age”, “author”, and “month”. In the end, we had 143 terms from CNKI and 254 terms from WOS.



**Figure 1** Articles on WOS with abstracts used in the analysis, by journal and year of publication (the top five journals with the most publications)



**Figure 2** Articles on CNKI with abstracts used in the analysis, by subjects and year of publication (the top six subjects with the highest frequency)

## Results

The result shows the two co-occurrence term maps for greenway literature based on WOS data (Fig.3) and CNKI data (Fig.4) in VOSviewer label view, respectively. Each term or concept is represented by a colorful circle, the size of the circle and its label represent the frequency of the word. The distance of two circles illustrate the relatedness of these concepts, and the color of each circle represents the cluster they may belong. While the size and the color of circles between different maps cannot be compared, their size within one map accurately reflects the frequency of each term.

In the term map based on WOS data (Fig.3), three clusters can be identified through the color and clustering degree: namely the “ecological dimension cluster” (blue and a part of green, lower left side) surrounded by “habitat”, “species”, “conservation”, “plant”, etc.; the “social dimension cluster” (red, right side) reflected by terms such as “urban greenway”, “resident”, “perception”, and “user”; and the “planning dimension cluster” (yellow and a part of green, higher left side) embodied “greenway planning”, “sustainability”, “route”, and “application”. Although the planning dimension cluster seems to be less concentrated, it has penetrated into the other two groups. In the term map based on CNKI data (Fig.4), there are also three clusters. Terms such as “person”, “community”, “tourism”, and “recreation” constitute the first cluster - the human and social dimension cluster. The second cluster surrounded by terms such as “sport”, “urban greenway”, “green transportation”, “greenway construction”, and “development strategy”, which incarnate the sporting spirit and political status of greenway movement in China. In addition, according to the map, the ecological dimension cluster is less concentrated, scattered around the social dimension cluster and the strategic dimension cluster. By this cluster, terms like “ecological network”, “green infrastructure”, and “landscape ecology” interspersed among the other two groups.

The comparison between two maps shows that although these two maps both contain a social dimension cluster, their focus and clustering level are different. In the first map, the ecological perception of greenway occupies a larger proportion, and the content is more abundant, including specific terms such as birds, trees, plants, and biodiversity. Moreover, the perception and attitude of greenway users constituted the key element of the human and social dimension cluster, which is a particular core issue of current greenway research. From this perspective, international greenway literature not only focuses on the users of greenways but also on the stakeholders affected by the greenway. On the one hand, to the users of greenways, their concerns, perceptions, activity types, and usage patterns have been heavily investigated. Terms in social dimension cluster such as “physical activity”, “user”, “trail”, “urban greenway”, “facility”, and “attention” reflect its recreational function and urban focus. On the other hand, to the residents that are living close to greenways, their attitude, concerns, and participate wills, are also receiving increasing attention. Terms like “neighbourhood”, “participant”, “resident”, and “influence” reflect its community-based focus.

In contrast, the latter map based on CNKI data shows less attention to ecological factors of greenways, because issues like species composition, vegetation diversity and habitat are missing in this map. Additionally, both maps contain a human dimensions cluster reflected by terms such as “user”, “neighbourhood”, “physical activity” in the first map, with associated terms such as “person”, “community”, and “exercise” in the second map. However, WOS terms map is more fully developed across all clusters than it is in CNKI map. For example, in the human dimensions cluster, CNKI terms map only focus on abstractive terms such as “connectivity”, “accessibility”, and “tourism”, while detailed terms “location”, “pattern”, and “physical activity” could be found in WOS term map. These seemingly contradictory findings also reflect to the different strategies of greenway development in two different contexts. As a national policy, the greenway movement in China focuses more on its social and environmental benefits on a regional scale. For urban greenways, they are considered a mitigation measure to promote public health in populated urban areas, because these greenways provide access to urban green spaces and provide opportunities for both citizens and tourists to enjoy diverse recreational activities.

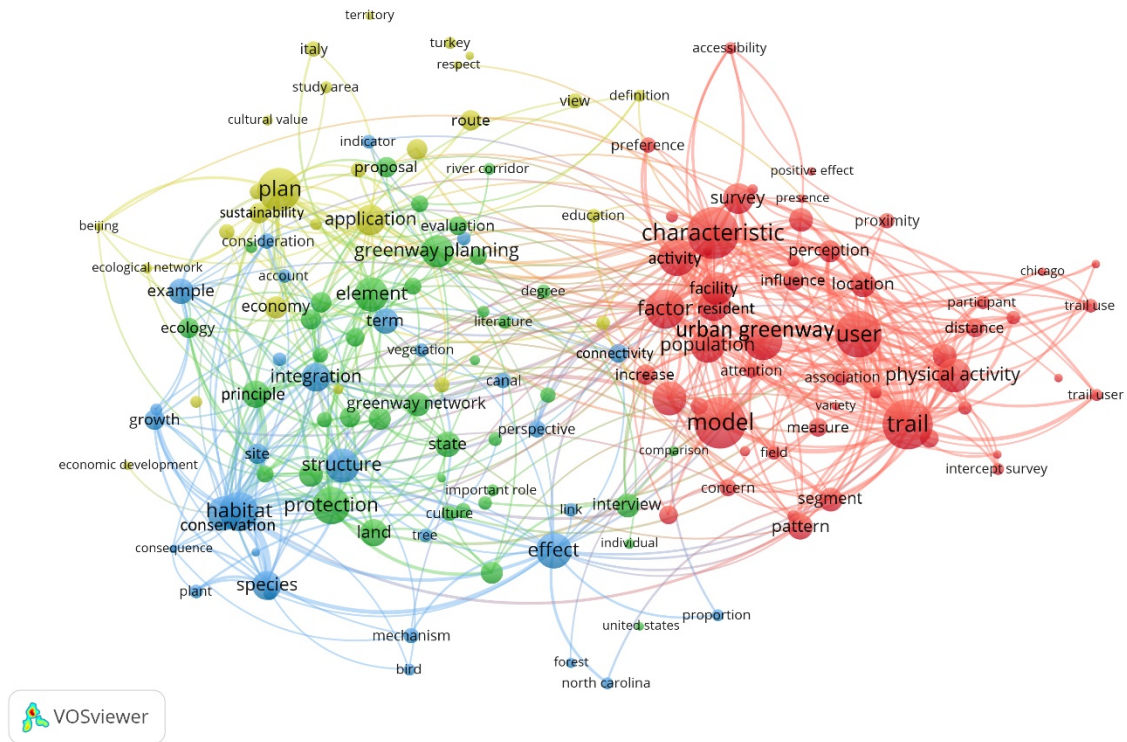


Figure 3 Greenways knowledge map based on WOS data

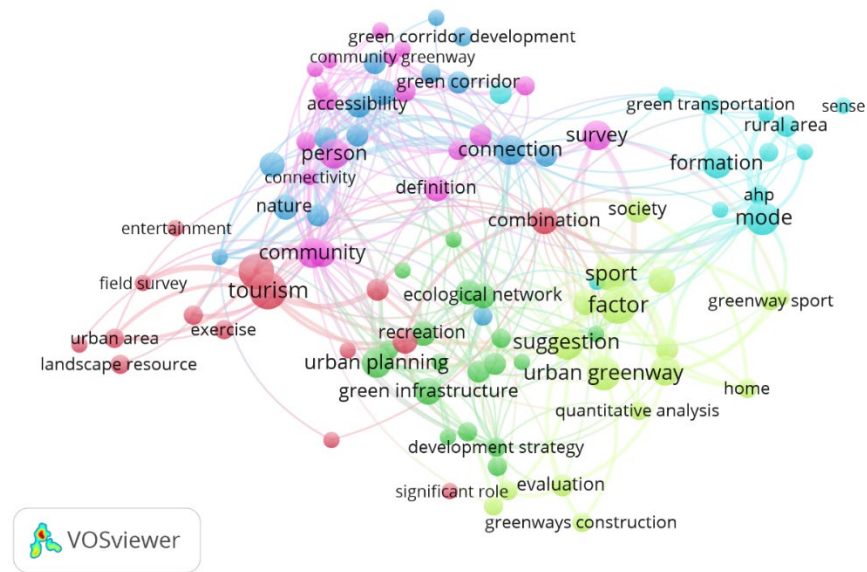


Figure 4 Greenway knowledge map based on CNKI data

## Discussion and Conclusion

This analysis of term maps of greenway literature reviews the content and system of greenway researches over the past two decades. The two maps reflect the current contradicting perception and the distinct approaches of greenway development in two different contexts, one in Chinese literature and one in

international literature. In global practices, ecological and environmental benefits are regarded as one of the major functions of greenways, which has shown in Fig.3. However, due to the different understanding of greenway concept, the greenway planning approaches are different as well. For instance, greenways are also referred to as “green trails” or “green corridor” in the United States and are regarded to be “non-motorized commuting routes” in European countries. This contradictory perception could also be found in Chinese literature, where the greenway is mostly seen as a “bikeway” in urban parks or “commuting routes” in urban areas.

Although the contradiction between ecological nature and social benefits still exist in Chinese greenway planning literature, the transportation function of greenways has been receiving more attention recently, due to the large population and densely developed urban environment. Meanwhile, after early rapid construction, the focus of greenway development has shifted from commuting and entertainment-based functions to more specialized features such as bikeways for athletes and green trails for adventure. Social benefits and human response of greenways has obtained more attention from greenway planners and researchers. According to the two terms maps, in addition to the ecological dimension cluster, the social and human dimension cluster meet a greater emphasis. Nevertheless, the ecological and environmental function of greenway in Chinese literature is still not prominent. This is noteworthy as it has been argued that these functions play an important role in natural resource conservation and urban environment improvement.

In conclusion, this paper used VOSviewer to analyze the terms and perceptions of greenway literature in domestic and international contexts, based on WOS and CNKI data respectively. The terms maps illustrate different perceptions of greenway knowledge, diverse functions of greenway planning, and distinct patterns of greenway development in two literature contexts. According to the comparative analysis of clustering relationship, the social and human factor has been highlighted in both Chinese and English contexts, while ecological and environmental features receive less attention in Chinese literature. In contrast with the full-developed international greenway literature, the concept of greenway in China is more simplified because of the normalization of spatial policy and the rapid growth of greenway construction. Therefore, the co-occurrence value of greenway resources and the management of future greenway development are an important topic for the current greenway research in urban China.

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