

# Comparative Analysis of Current Situation of Watershed Ecological Protection Research between China and Foreign Countries

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**Abstract:** In order to compare the research status in the field of watershed protection between China and foreign countries, this paper uses the Web of Science database and CNKI database as the data source, and citespace analysis tools to display the statistical results of data in the form of knowledge maps from the aspects of the number of papers, keyword co-occurrence, The results show that: ① The research on river basin protection in various countries shows a trend of overall rise and intermittent fluctuation, and China has a feature of high volume of documents and low centrality; ② China's research mainly covers the Yangtze River Economic Belt, ecological compensation, land use, sustainable development, water resources, etc., while foreign research focuses on deforestation, eutrophication, protected areas, land use change, fisheries, etc. This paper summarizes the research hotspots and research methods of watershed protection in China and foreign countries.

**Keywords:** Watershed Protection; Comparative Analysis; CiteSpace

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## 1. Introduction

Promoting high-quality economic development with high-level ecological environment protection, and implement the concept of "green water and green mountains are golden mountains and silver mountains" [1]. Great protection of the Yangtze River Economic Belt, ecological protection of the Yellow River basin and high-quality development have become major national strategies. Watershed are the birthplace of human civilization. Protecting the ecological environment of watersheds is not only the basic requirement for maintaining regional ecological environment security, but also the inevitable requirement for reflecting the national comprehensive economic strength and expanding global influence. In addition, the current international river basin situation is not optimistic, the integrity of river basin ecosystem protection is still insufficient, the contradiction between water resources development and protection has not been effectively resolved, and the water ecological environment situation is still severe. River basin protection is a hot area for scholars to study in China and abroad.

## 2. Data source

The foreign literature data used in this paper is from the core collection of Web Of Science, which is used for advanced retrieval. The retrieval theme is around the famous foreign watershed protection research. The literature content is designated as article, and the selected time span is from 2015 to 2021. There are 744 literature records in the retrieval results. The Chinese literature data used in this paper is from CNKI, with the key words of watershed protection policy, Yangtze River protection policy, and Yellow River protection policy. The time span is also from 2015 to 2021, and 608 documents were retrieved.

### 3. Correlation analysis

#### 3.1 Analysis of Document Quantity

From 2015 to 2021, there were 744 international WOS documents and 608 Chinese CNKI documents. The total number of documents published by scholars in other countries was slightly higher than that in China. The number of documents in other countries increased first and then decreased in the past five years, with dozens fewer in the past year. Although the total number of documents issued in China has decreased by 25 during 2016-2017, the overall number of documents issued is on the rise, and the research on this topic is closely related to national policies. In recent years, the policies for the protection of the Yangtze River and the protection of the ecological environment have received increasing attention from various academic circles.

#### 3.2 Keyword co-occurrence analysis

In all CNKI research literature, the highest frequency keyword is the Yangtze River Economic Belt, with a frequency of 80 and a centrality of 0.59, followed by ecological compensation (36), the Yellow River Basin (27), high-quality development (22), green development (14), and ecological civilization (12) from high to low, among which the Yangtze River Economic Belt, ecological compensation, high-quality development, ecological civilization, land use and other key words have prominent centrality. It shows that in recent years, the Yangtze River Economic Belt, high-quality development, and ecological civilization have been the hot topics, and it can be seen that China's river basin protection research is closely related to the relevant national policies, mostly focusing on ecological compensation, high-quality development, green development and other strategic policies.

In all WOS research literature, the highest frequency keyword is protection, the frequency is 151, and the following keywords from high to low are policy, impact, forest harvesting, management, climate change, land use, ecosystem services, Amazon, etc., of which the key words of forest harvesting, policy, protection, ecosystem services, Amazon are central.

Table 1 Top Ten High Frequency Co-occurrence Keywords of CNKI and WOS Watershed Protection Research in 2015-2021

number	CNKI co-occurring high-frequency keywords			WOS co-occurring high-frequency keywords		
	keywords	frequency	Centrality	keywords	frequency	Centrality
1	Yangtze River Economic Belt	80	0.59	conservation	151	0.11
2	eco-compensation	36	0.29	policy	124	0.14
3	Yellow River basin	27	0.08	impact	122	0.01
4	high-quality development	22	0.15	deforestation	117	0.16
5	green development	14	0.05	management	106	0.04
6	ecological civilization	12	0.25	climate change	102	0.06
7	land utilization	12	0.2	land use	88	0.05
8	sustainable development	11	0.08	ecosystem service	86	0.12
9	Yangtze river basin	11	0.06	amazon	78	0.09

10	Yangtze River Protection	10	0.13	biodiversity	76	0.02
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## 4. Discussion

River basin protection is a complex and long process. How to coordinate social and economic development and ecological environment protection, and solve resource conflicts and ecological environment problems caused by various development activities, it is necessary to formulate corresponding policies by comprehensively considering the current situation of resources and environment, social and economic activities and other factors [2]. This paper gives the following aspects that can be strengthened and developed:

(1) Improve the policy mechanism for environmental quality management, strengthen assessment and accountability, and provide positive incentives to give full play to the synergy of various policy tools in the field of watershed protection. At the same time, according to the polluter pays principle (PPP), high pollution charge standards or environmental tax rates will be implemented for basins with substandard environmental quality [3]. Second, improve the risk prevention and risk management and control policy system for watershed protection, advance prevention system, in-process disposal policy, post accident compensation and repair system, and further improve the identification, assessment and compensation system for watershed damage [4].

(2) Improve the market-based watershed ecological compensation mechanism. First, establish a diversified compensation model that focuses on government compensation, supplemented by non-governmental compensation and market compensation. In addition to capital compensation, introduce excellent enterprises, talents, industrial assistance, establish industrial parks, etc. effectively coordinate the relationship between upstream and downstream stakeholders in the basin, and achieve mutual benefit [4].

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