

Analysis of Major Issues for Donors of Forestry-Related ODA, Using the Text Network Method

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Summary

The aim of this study is to analyse the major issues relating to ODA in the field of forestry as carried out by the international community, by analysing academic papers in this field published in international journals managed by the publishing house Springer, and performing text network analysis on them. The OECD's Development Assistance Committee (DAC) oversees aid to developing countries. This study analyses the extent to which countries that are members of the DAC have been providing aid to the forestry sector in recent years, and examines the major issues relating to ODA projects in the forestry sector. From the analysis of the academic papers, seven main topics were derived. The study suggests that it is not only OECD DAC member countries, but also all countries that wish to provide ODA in the forestry sector in the future, that need to take into account the seven topics identified here when implementing policies in this area.

Keywords: *Forestry ODA, text network analysis, forestry and environment, OECD DAC.*

1 Introduction

Today, the international community strongly emphasizes the importance of the environment from the perspective of sustainable development (Bae et al., 2012; Busse and Groning, 2009; Choi et al., 2017). However, there is in general little interest in forests in developing countries, with the result that policies to foster and protect forests have not been properly established. In consequence, forests are being degraded, many are being converted to other uses, and desertification is sharply increasing (Dupont et al., 2015; Ham and Min, 2014; Hoffmann et al., 2010). This phenomenon greatly affects the inhabitants of developing countries, many of whom are economically dependent on forests. It is said that the total area covered by forests in developing countries amounts to approximately 2.2 billion hectares. Around 22 per cent of this area is managed by mountain villagers and indigenous peoples.

The majority of these residents live in absolute poverty, making a living on hugely below-average incomes (Jang et al., 2015; Kang, 2014). In addition, they face many difficulties owing to natural disasters caused by climate change. Recognizing this problem, international organizations and advanced donor countries have recently strengthened ODA in the forestry sector as a means of addressing these difficulties in rural areas in developing countries.

Major aid donors such as the UK, the USA, Germany, Japan and Korea, which are members of the OECD Development Assistance Committee (DAC), carry out ODA projects in the forestry sector, specifically in order to solve social, economic, environmental and rural problems in developing countries (Moyo, 2009; Kim et al., 2013; FLRM site). Investment in this area has been considerable. However, most donor countries invest

much less in the forestry sector than in the public administration, education and health sectors. Since policy know-how and levels of technology in the forestry field have developed greatly throughout the world, there is a need for major donor countries to make a powerful contribution to forest policy and forest conservation in developing countries by expanding the scale of ODA in the forestry field.

Looking at forest policy from a global perspective, it may be said that it is gradually developing from encouragement for traditional recreational activities in connection with leisure sports such as mountain biking, paragliding, forest horseback riding, trekking and auto campgrounds (Gardtner et al., 2013). In the forestry sector, high-value-added industries such as phytoncide extraction using leaves have been activated, mainly in the health industry (Korea Forest Service, 2019). Many countries are changing policy direction towards sustainable forest development and enacting policies geared towards health promotion and disease prevention by creating a ‘healing forest’ such that all citizens can access (Lawrence, 2018; Navarro and Pereira, 2015; Secco et al., 2017; Sekot, 2017). In the process, many developed countries have upped their levels of forest policy and have developed various technologies relating to forests. If various programmes in the field of forestry ODA are more actively supported, use of these technologies should help to greatly improve the natural environment in developing countries in the long run (Son, 2018; Toscani and Sekot, 2018; Toscani and Sekot, 2017; Toscani and Sekot, 2015).

In recognition of this, this study intends to perform text network analysis on the research results regarding forestry-related ODA papers published in international journals managed by the internationally-renowned Springer publishing house. This allows us to analyse the issues that these papers discuss, and to explore the direction ODA policy in the forestry sector might take for developing countries in the future.

2 Theoretical Discussion

There are, to date, few studies dealing with ODA in the field of forestry. The reason for this is that, from an international perspective, the forestry sector receives only a small amount of ODA and the number of projects being carried out is relatively small. As Table 1 shows, the amount of forestry-sector ODA provided by OECD DAC member countries to developing countries was around USD 516 million in 2015 and USD 480 million in 2019, which is considerably lower than the amount for 2015. Total forestry-related ODA provided by OECD DAC member countries to developing countries over the past five years amounts to approximately \$2.35 billion (Korea Forest Service, 2020).

Table 1 ODA performance in forestry sector of OECD DAC member countries (2015–2019) (unit: USD million)

	Time period	2015	2016	2017	2018	2019	Total
<i>Donor(s)</i>							
DAC countries, total		516.9182	396.8082	578.2105	383.5102	481.1459	2356.593
Australia		8.331965	0.031851	0.055653	0.101387	0.072756	8.593612
Austria		3.417374	2.09023	1.515388	2.296469	0.732246	10.05171
Belgium		4.915217	1.402846	3.82327	5.681164	3.82754	19.65004
Canada		1.928266	0.895186	1.231917	2.195597	3.595269	9.846235
Czech Republic		0.848794	0.75269	0.75587	0.340915	0.015711	2.71398

Denmark		6.129116	1.867782	0.100226	1.251544	1.666154	11.01482
Finland		38.63211	27.96108	32.75501	11.82002	29.28805	140.4563
France		22.74154	20.2079	189.2094	5.536404	86.4174	324.1127
Germany		69.31356	66.43058	77.74421	123.7864	120.6087	457.8834
Greece		..	..	..	..	..	0
Hungary		..	0.683744	..	..	0.010788	0.694532
Iceland		0.601989	0.729232	1.19918	1.27737	1.153686	4.961457
Ireland		..	..	..	..	..	0
Italy		7.814773	0.331855	0.490817	1.507824	0.622218	10.76749
Japan		113.5058	116.8376	80.70831	78.79169	86.0756	475.919
Korea		8.953192	7.20668	14.54857	14.72231	13.60942	59.04018
Luxembourg		1.722671	1.912089	5.109552	2.784604	5.113834	16.64275
Netherlands		14.82775	5.709293	2.861924	5.100717	3.169809	31.66949
New Zealand		0.061739	0.065034	0.171238	0.16863	0.360733	0.827374
Norway		4.251206	3.874099	1.761719	2.151379	1.878596	13.917
Poland		0.034303	0.020952	0.068144	0.058203	0.00826	0.189862
Portugal		0.121216	..	0.072294	..	..	0.19351
Slovak Republic		..	0.00481	0.0179	0.00504	0.01319	0.04094
Slovenia		..	0.337499	0.002058	..	0.223889	0.563446
Spain		1.025061	0.28161	0.658397	1.261484	1.152557	4.379109
Sweden		15.99636	19.63889	23.90548	36.15554	31.8622	127.5585
Switzerland		7.917074	5.727194	4.090811	12.20826	3.848248	33.79158
United Kingdom		181.6999	107.179	134.931	70.16509	82.91702	576.8921
United States		2.127247	4.628472	0.42211	4.14221	2.902092	14.22213

Source: OECD STAT.

As Tables 1 and 2 indicate, the country that provides the largest amount of forestry-related ODA is the UK, which has provided around \$570 million over the last five years. Next come Japan and Germany, which have also provided large amounts of such aid to developing countries.

Table 2 Major donors of forestry ODA

		1	2
		In-Degree Centrality	Out-Degree Centrality
1	United Kingdom	0.000000	19.892830
2	Japan	0.000000	16.411001
3	Germany	0.000000	15.789083
4	France	0.000000	11.176299
5	Finland	0.000000	4.843319
6	Sweden	0.000000	4.398568
7	Korea	0.000000	2.035868
8	Switzerland	0.000000	1.165227
9	Netherlands	0.000000	1.092051
10	Belgium	0.000000	0.677587
11	Luxembourg	0.000000	0.573888
12	United States	0.000000	0.490418
13	Norway	0.000000	0.479897
14	Denmark	0.000000	0.379821
15	Italy	0.000000	0.371293
16	Austria	0.000000	0.346611
17	Canada	0.000000	0.339525
18	Australia	0.000000	0.296331
19	Iceland	0.000000	0.171085
20	Spain	0.000000	0.151004

Figure 1 is a network diagram showing the amount of aid provided by individual donors. The score between each node and link shows the size of the aid.



Figure 1 Forestry ODA provided by major donors

It should be noted that, compared to demands for aid in other sectors, developing countries are not actively demanding ODA projects in the forestry sector from donors. Political leaders in developing countries are faced with a huge amount of tasks that need to be carried out urgently for their people, and so forestry projects are not a priority for policy consideration (Chianca, 2008; FAOSTAT, 2020; BMNT, 2019). When donor countries carry out ODA projects, they must basically meet the demands of developing countries, and so the forestry sector, which has low priority in these countries, is marginalized when decisions are made on aid projects. However, in the long run, it is important to protect the forests in developing countries that are now being degraded, and to create more forests so as to contribute to a sustainable environment. Therefore, forestry-sector ODA projects for developing countries have a very important meaning for advanced donor countries, regardless of whether they are in demand or not (Weltin et al., 2017; Weiss et al., 2019). Aid donors should actively raise the issue of fostering the forestry sector with political leaders in developing countries and should strive to provide aid on a larger scale. At the same time, donors in developed countries should provide forestry-sector aid multi-dimensionally, that is, not from a short-term but from a long-term, environmentally friendly perspective.

3 Research Design

As stated in the Introduction, this study intends to derive policy implications by analysing international academic papers dealing with ODA issues in the forestry field written by forestry researchers. Springer maintains papers published by around one hundred and forty internationally-renowned academic journals.. (It is recognized that, since papers published in other journals are excluded from the analysis, this study is subject to certain limitations.) The analysis program to be used in this study is Netminer 4.4, which has the advantage of being able to directly use the research results of journals managed by Springer.

Because there are relatively few research papers dealing with ODA in the forestry field, rather than focusing on the titles of papers, only 1,000 papers containing ‘forestry’ and ‘ODA’ as keywords throughout the entire paper are extracted and analysed. Only papers published between 2017 and 2021 were included, these having a total of 4,356 authors. Rather than the whole of the extracted papers being analysed, only the summaries of the papers were analysed. In terms of the analysis method, it was decided to perform issue analysis on ODA projects in the forestry field by performing word-cloud analysis, topic modelling analysis, connection centrality analysis, and P F n e t a n a l y s i s f o r t e x t (Scott, 2012; Leavitt et al., 2009; Lim, 2019; Hansen et al., 2010; Cartier-Bresson, 2006).

4 Analysis Result

4.1 Basic analysis

A total of 12,775 core keywords are contained in the summaries of the 1,000 papers. As a basic operation, word-cloud analysis was performed on these, and the result is shown in Figure 2.



Figure 2 Word cloud analysis results for forestry ODA

As Table 3 shows, the word that appeared the most was ‘development’ (571 times), followed by ‘change’ (511 times), ‘forest’ (493 times) and water (420 times).

Table 3 Frequency of occurrence of keywords constituting the network

		1	2	3	4	5	6
	of Speech(F	Frequency	Word length	Name Type	uthor	Keywoi	Distance
1	development	571.0	11.0	"_"	"False"	1.0	
2	change	511.0	6.0	"_"	"False"	1.0	
3	forest	493.0	6.0	"_"	"False"	1.0	
4	water	420.0	5.0	"_"	"False"	1.0	
5	country	366.0	7.0	"_"	"False"	1.0	
6	climate	347.0	7.0	"_"	"False"	1.0	
7	growth	344.0	6.0	"_"	"False"	1.0	
8	area	332.0	4.0	"_"	"False"	1.0	
9	level	328.0	5.0	"_"	"False"	1.0	
10	system	324.0	6.0	"_"	"False"	1.0	
11	emission	288.0	8.0	"_"	"False"	1.0	
12	policy	262.0	6.0	"_"	"False"	1.0	
13	region	253.0	6.0	"_"	"False"	1.0	
14	factor	243.0	6.0	"_"	"False"	1.0	
15	resource	239.0	8.0	"_"	"False"	1.0	
16	production	239.0	10.0	"_"	"False"	1.0	
17	activity	238.0	8.0	"_"	"False"	1.0	
18	datum	237.0	5.0	"_"	"False"	1.0	
19	role	229.0	4.0	"_"	"False"	1.0	
20	use	222.0	3.0	"_"	"False"	1.0	
21	impact	220.0	6.0	"_"	"False"	1.0	
22	carbon	215.0	6.0	"_"	"False"	1.0	
23	process	210.0	7.0	"_"	"False"	1.0	

4.2 Topic analysis

First, we conducted topic analysis. ODA projects relating to forestry are mainly concerned with problems that have arisen prior to the aid being offered. Policymakers involved in forestry-related ODA should be able to answer the question, ‘What are the major issues relating to ODA in the forestry sector?’ Answering this question allows us to know what the main issues are regarding ODA projects for underdeveloped countries that have been conducted to date. It also allows aid donors to understand what the implications are for the direction of the ODA projects in the forestry sector that they will provide.

For this purpose, topic analysis was performed using the Netminer program. From the results, it can be seen that the major issues relating to ODA in the forestry sector may be divided into seven groups, as shown in Figure 3.

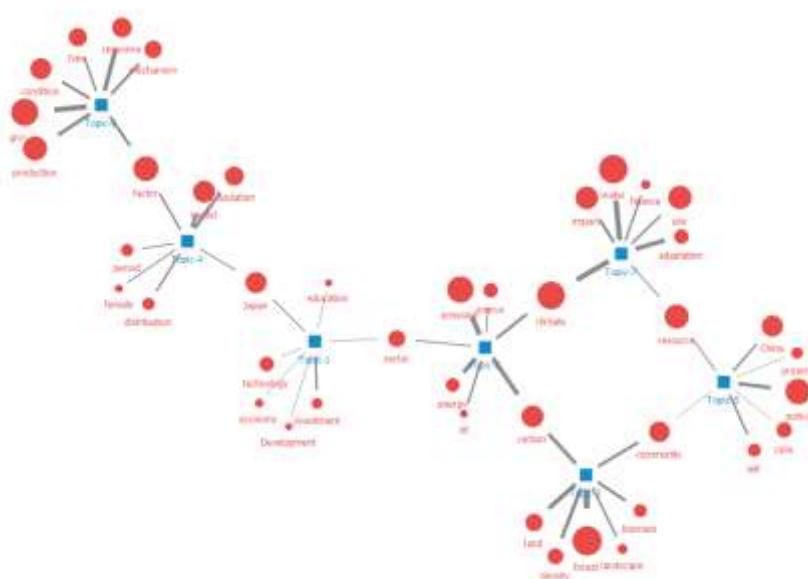


Figure 3 The seven major topics related to ODA in the forestry sector

Topic 1, shown in Figure 4, consists of seven keywords: *Japan, education, investment, development, economy, technology* and *sector*. Of these, the word with the highest degree of connection with Topic 1 is *investment*, at 0.032. This suggests that investment in the forest sector in developing countries should be carried out from a technological and economic point of view. In addition, it emphasizes the need for aid to be accompanied by education. Considering that Japan is emerging as a donor country, it can be inferred that that country is playing an important role in ODA in the forestry sector. Another implication is that forestry-sector ODA needs to be accompanied by economic activity and education if it is to achieve strong results: it is important for it to be connected to economic activities such as education for forestry workers and the manufacture of forestry-related products.

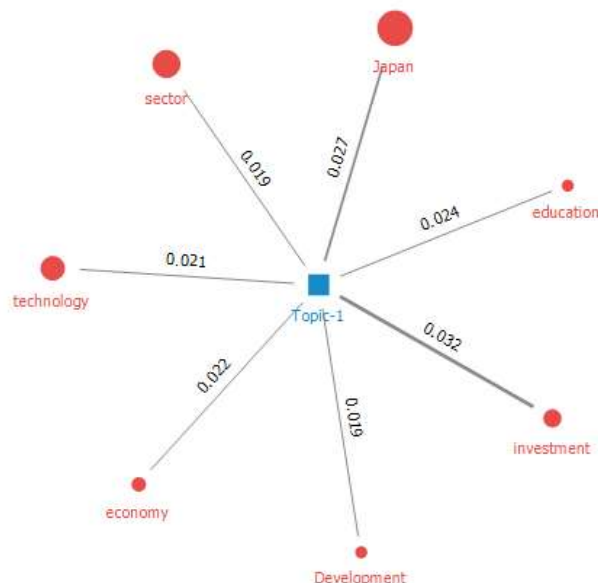


Figure 4 Topic 1: combination of investment, education and economy

Figure 5 shows the words making up Topic 2. Topic 2 is composed of *forest*, *biomass*, *land*, *carbon*, *community*, *density* and *landscape*, and in terms of degree of connection with Topic 2, *forest* scores highest, at 0.195, followed by *land* and *density*. Topic 2 shows that *forest* embodies a core concept and contributes to the ecological environment of the local community.

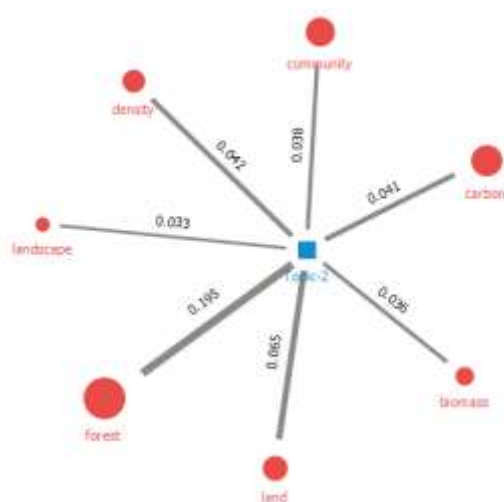


Figure 5 Topic 2: contribution of forests to the ecological environment

Figure 6 shows the constituent words of Topic 3. Topic 3 consists of *climate*, *carbon*, *source*, *energy*, *oil*, *sector* and *emission*. Of these seven words, *emission*, at 0.132, has the highest association score. The core concept of Topic 3 is *emission*, and the phases in Topic 3 are in the order *energy*, *carbon* and *climate*. In other

er words, Topic 3 suggests that forestry aid could improve climate and environments, and serve as a new energy source.

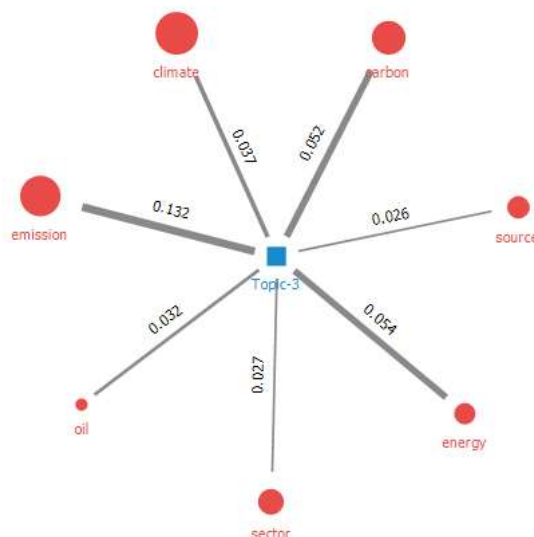


Figure 6 Topic 3: environmental improvement and energy

Figure 7 presents Topic 4. This consists of *Japan*, *distribution*, *population*, *model*, *factor*, *female* and *period*. Of these seven words, *model* scores highest at 0.046, followed by *population*, and the linkage score is 0.041. The characteristics of Topic 4 suggest the necessity for establishing a new model for forest ODA, one in which women should play a significant role.

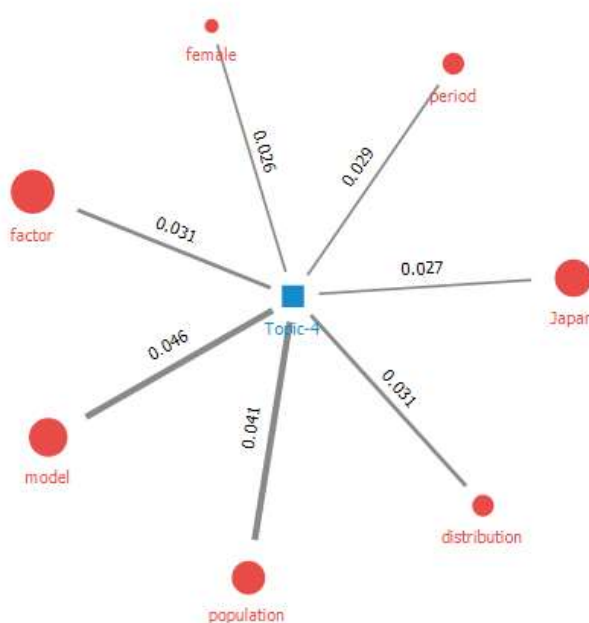


Figure 7 Topic 4: necessity for model setting

Figure 8 illustrates Topic 5. Topic 5 consists of *policy*, *case*, *project*, *community*, *aid*, *China* and *resource*. Of these, *policy* shows the highest correlation at 0.043, followed by *China* and *aid*. Topic 5 foregrounds the importance of clear-sighted policy in providing forest ODA. In particular, China is emerging as a donor country which provides aid to developing countries in various fields. In the process, it is pointed out that countries receiving aid from China are also experiencing problems of subordination due to their receipt of aid.

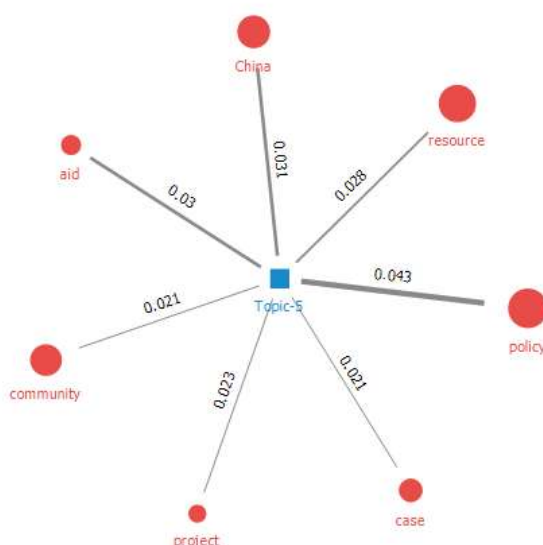


Figure 8 Topic 5: policy issues for countries receiving aid from forest ODA

Figure 9 provides data on the words composing Topic 6. Topic 6 consists of *growth*, *condition*, *population*, *response*, *factor*, *type* and *mechanism*. Of these, *growth*, at 0.081, has the highest degree of connection with Topic 6. Next, the degree of connectivity is shown in the order *response*, *production*, and so on. Topic 6 suggests that forest ODA should contain a mechanism that leads to economic growth.

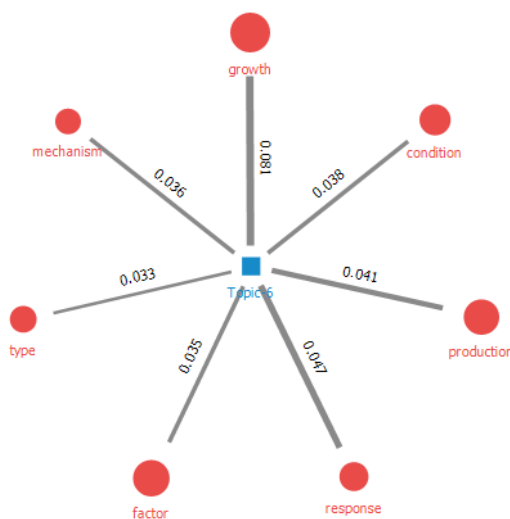


Figure 9 Topic 6: growth mechanism

Figure 10 presents Topic 7. Topic 7 consists of *water*, *impact*, *adaptation*, *use*, *resource*, *finance* and *climate*. Of these, *water* has the highest degree of connection with Topic 7, at 0.157. The next most closely related word is *climate*, followed by *adaptation* and *use*. Topic 7 suggests that ODA projects should be carried out with consideration of the relevance of climate to forest ODA.

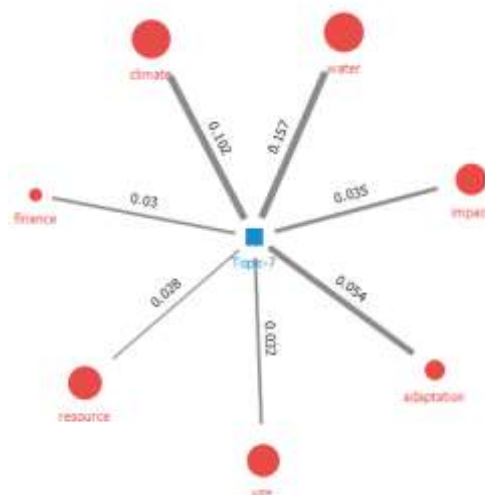


Figure 10 Topic 7: relevance to climate

4.3 Degree centrality analysis

It is necessary to analyse which among the words of the language network constituting forest ODA play the most important role in the network. The concentric circles shown in Figure 11 provide this information. As Figure 11 indicates, *climate* is located at the very core of the concentric circles, and words such as *policy* and *impact* are located at the centre.

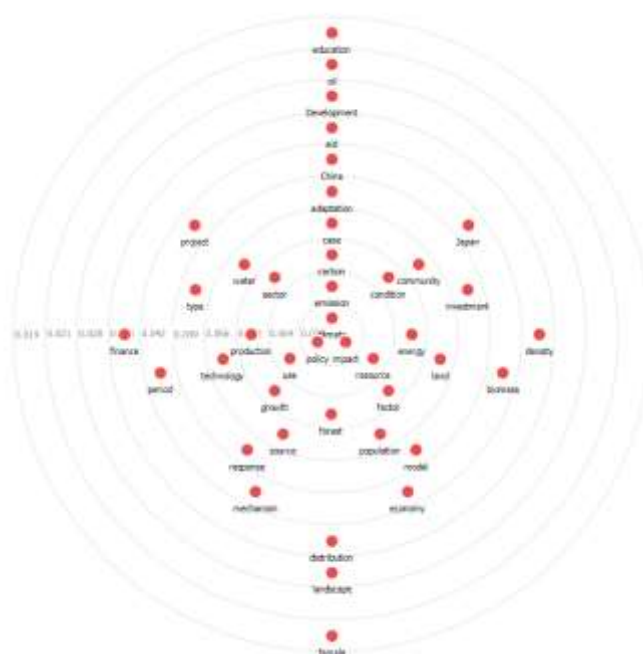


Figure 11 Concentric circle analysis result

Table 4 shows the connection centrality score for each word, allowing us to identify the words that play an important role in the network.

Table 4 Connection centrality analysis result

		1	2
		In-Degree Centrality	Out-Degree Centrality
1	climate	0.082854	0.082854
2	policy	0.077987	0.077987
3	impact	0.076065	0.076065
4	resource	0.075102	0.075102
5	use	0.074203	0.074203
6	emission	0.070700	0.070700
7	carbon	0.068752	0.068752
8	forest	0.068551	0.068551
9	production	0.067120	0.067120
10	energy	0.065642	0.065642
11	sector	0.065208	0.065208
12	growth	0.064962	0.064962
13	factor	0.063510	0.063510
14	condition	0.062719	0.062719
15	water	0.062042	0.062042
16	population	0.061949	0.061949
17	case	0.060688	0.060688
18	source	0.058900	0.058900
19	technology	0.057069	0.057069
20	community	0.056984	0.056984

As Table 4 shows, *climate* has the highest in-degree and out-degree centrality, followed by *policy*, *impact*, and so on. In other words, it can be seen that forest ODA was basically instigated for the purpose of offering long-term solutions to the climate problem, and should be continuously carried out at the level of government policy. Figure 12 shows the network between keywords that play an important role in forest ODA.

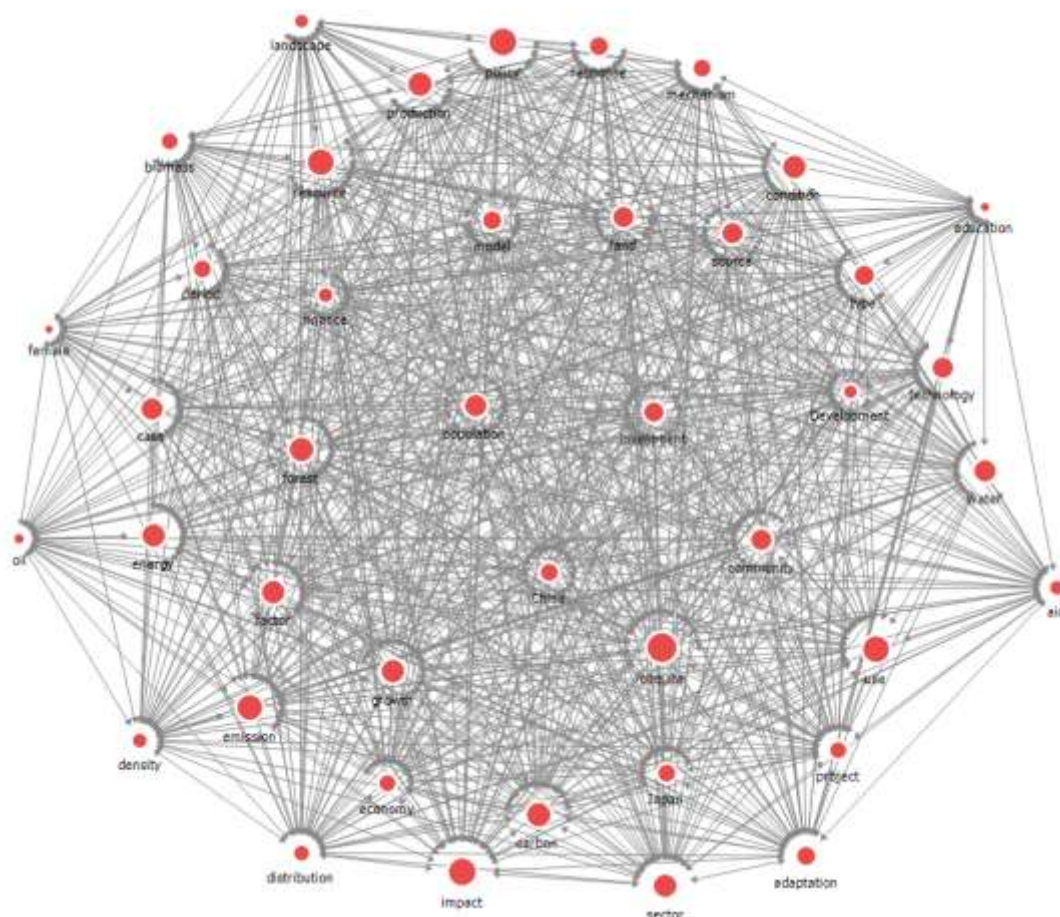


Figure 12 Network of connections between keywords

A network diagram that summarizes Figure 12 is presented more concisely in Figure 13, based on the PFnet analysis results. This diagram allows the understanding of complex networks by condensing them into keywords and relationships between words.

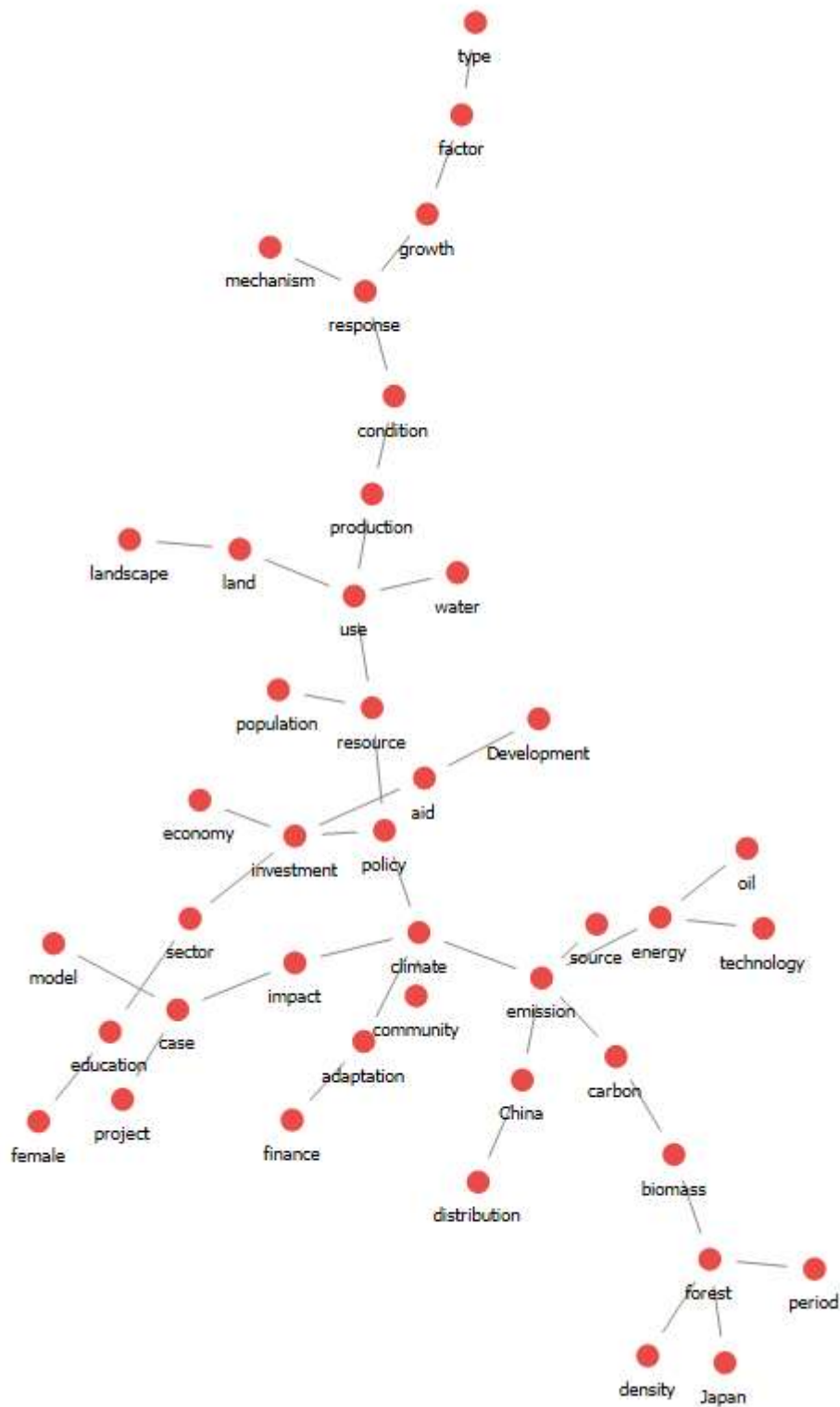


Figure 13 Core network by PFnet

From Figure 13, it is possible to ascertain what kind of connection each word has with other words. As this figure also suggests, the results of network analysis that can identify the connections between words should prove very helpful in terms of future analysis of forest ODA.

5 Conclusion

Today, the environment and environmental concerns are assuming ever-increasing importance. Consequently, forests the world over are in the spotlight. In recognition of this, this study has attempted to derive policy implications from text network analysis of research results on forestry-related ODA published in international journals managed by the internationally-renowned Springer publishing house. Through this study, it is possible to analyse the major issues regarding forestry ODA that these academic papers deal with, and to explore the direction ODA policy in the forestry sector should take for developing countries in the future.

These major issues can be summarized as being seven: the combination of investment, education and economy; the contribution of forests to the ecological environment; environmental improvement and energy; the need to establish a forest ODA model; policy issues for countries receiving forestry-related ODA; growth mechanisms; and relevance to climate. When donor countries provide forestry-related ODA to developing countries, it is necessary for them to provide adequate education regarding these issues. In addition, it is important for them to link the economies of countries receiving forest ODA and other kinds of aid, the need to set up an appropriate model for future forest ODA, and the ecological environment in which aid is provided.

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