A Corpus-based Critical Ecological Discourse Analysis of Corporate Annual Environmental Reports:

China Three Gorges Corporation as an Example

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With the construction of the largest water dam in the world, China's Three Gorges Dam, many severe environmental problems have emerged along the Yangtze River. Its constructor, the China Three Gorges Corporation (CTGC), publishes an annual environmental report (AER) to address the ecological problems. This study aims to investigate these reports from the perspective of ecolinguistics under the Story Theory put forward by Arran Stibbe (2015). This study addresses three questions: 1) Are there any beneficial, ambivalent, or destructive discourses in China Three Gorges Corporation's annual environmental reports? 2) If so, how is each story being constructed? 3) What suggestions and implications can we obtain from the analyses of these stories?

To answer these questions, 10 English AERs published from 2008 to 2017 by CTGC were collected to compile a corpus with a size of 114,770 tokens. Six story types, including frame, metaphor, evaluation, identity, erasure, and salience, were then chosen for analysis with the combination method of ecolinguistics, corpus linguistics, and critical discourse analysis. The results show that, within the frame story, the sustainable development frame and the green development frame were ambivalent discourses. Within the metaphor story, RIVER AS A TOOL FOR MAKING MONEY, NATURE IS A MACHINE, ECOLOGICAL DAMAGE IS AN ACCIDENT, and COMPANY IS A HUMAN were destructive discourses; NATURE IS A COMPETITION and CLIMATE CHANGE IS A WAR were ambivalent discourses. Within the evaluation story, using three purr-words (*clean*, *new*, and *renewable*) to describe energy formed a destructive discourse. Within the identity story, the use of the pronouns *we* and *our* distanced more-than-human participants from human participants, which formed a destructive discourse. Within the erasure story, the nominalization of the word *pollute* formed a destructive discourse. Within the salience story, describing endangered fish species with abstract words and describing fish as a type of resource formed two destructive discourses, and using the basic level word *fish* formed a beneficial discourse.

Based on these judgments, this study concludes that the beneficial discourse should be promoted, the destructive discourses should be resisted, and the positive parts of the ambivalent discourses should be highlighted while their negative parts should be rejected. These findings can contribute to our understanding of the ecological discourse of the water dam.

Avainsanat – Nyckelord – Keywords
Ecolinguistics, corpus linguistics, critical discourse analysis, environmental reports

Säilytyspaikka – Förvaringställe – Where deposited
Helsinki University Library

Muita tietoja – Övriga uppgifter – Additional information

Contents

1. Introduction

Nowadays, human beings are facing severe ecological crises, for example, climate change, species extinction, and plastic pollution in the oceans, and many of them happened along with humans' development of the natural environment. To solve these environmental issues, many new techniques and products have been invented, such as green/clean energy. However, these solutions could also bring new environmental problems. For example, building large water dams to generate the so-called clean energy—hydroelectricity could, at the same time, cause irreversible and systemic environmental damage. For instance, with the construction of China's Three Gorges Dam, the largest water dam in the world, geological disaster, climate change, biodiversity loss, and other huge impacts are emerging along the Yangtze River (New & Xie, 2008; Jackson & Sleigh, 2000). So, it might not be enough to solve environmental issues by just resorting to science and technology, and ecolinguistics, a newly emerged filed in recent years, begins to find solutions to the ecological issues from the perspective of language use in ecological discourses. One typical ecological discourse can be the corporate environmental reports published by large companies, for example, oil companies, the products of which are often environment influential.

The environmental report is one subtype of the corporate report, which is one of the essential corporate discourse types building and displaying corporate identities. There are several types of corporate reports, including the annual report (AR), (annual) social responsibility report (ASRR), (annual) sustainability report (ASR), and (annual) environmental report (AER). They are often published annually, have different target readers, and all show a specific aspect of corporate identities or images. AR is mainly used to provide financial and future plans to its shareholders and other public readers (Ditlevsen, 2012; Fuoli, 2018). As for ASSR, ASR, and AER, unlike AR, they reflect the concept that "corporate social responsibility is essentially a concept whereby companies decide voluntarily to contribute to a better society and a cleaner environment." ("COM (2001) 366—Green paper—Promoting a European framework for corporate social responsibility—EU monitor," n.d.). It is not hard to see that these three types of corporate reports are highly connected and sometimes overlap with each other. Moreover, they are also important environmental/ecological discourses from the perspective of ecolinguistics, because it is in these reports that commercial companies report, discuss, and respond to the ecological issues officially. (Alexander, 2018)

In this research, the ecological discourses I will focus on are the 10 AERs published from 2008-2017 by the China Three Gorges Corporation (CTGC), the constructor of China's Three Gorges Dam. The reason why I choose AER is that it focuses more on the ecological or environmental issues when compared with the AR and ASRR provided by CTGC.

To analyze CTGC's AERs ecologically is an interesting topic. On the one hand, the critical discourse analysis of corporate environmental reports is under-researched. Many CDA focus on the annual reports or social responsibility reports. For example, Fuoli (2012) studies IKEA's social responsibility construction by analyzing its social reports; Fuoli (2018) analyzes the stance in 2011 corporate annual and social responsibility reports; Ditlevsen (2012) investigates the visual elements and macrostructure of a Danish company's annual report. On the other hand, in the field of ecolinguistics, although some research has been done on corporate, advertising, and media discourse (Alexander, 2018), little attention has been paid to water dam discourse. However, it deserves our attention due to the fact that water dams could have great influence on the environment.

The ecolinguist Arran Stibbe (2015) has put forward a theoretical framework of story, in which eight store types are used to analyze the linguistics features of ecological discourse. This framework enables the discourse analyst to assess whether a discourse is beneficial, ambivalent, or destructive according to his or her ecosophy. Accordingly, in this study, based on the ecosophy that not only the wellbeing of humans but also that of more-than-humans should be maintained, I will investigate ten AERs produced by CTGC to address the following research questions under the story framework:

1. Are there any beneficial, ambivalent, or destructive discourses in the China Three Gorges Corporation's annual environmental reports?

2. If so, how is each story being constructed?

3. What suggestions and implications can we obtain from the analyses of these stories?

2. Theoretical framework

In this section, I first introduce the basic notion of ecolinguistics from the perspective of ecosophy and its relationship with language. Then, I explain the concept of ecosophy and the ecosophy of this study. Last, I introduce the story theory put forward by Stibbe (2015).

2.1 Definition of ecolinguistics

As we can see from the word ecolinguistics, there are two parts: ecology and language. Ecology has different interpretations. For example, Steffensen & Fill (2014, p.7) summarizes four ecologies of language: the first one holds that language occurs together with symbol systems in a particular zone; the second one says that it is in a natural ecology made up of ecosystemic and biological circumstance that language exists; the third one deems that language speakers' situations and discourse communities are shaped by the language-related cultural and social factors; and the forth one adopts a cognitive perspective that language is facilitated by the vigorousness between environment and its biological entities. Additionally, Stibbe (2015, p. 9) defines ecology from the perspective of the vital relations between human beings, other life on the Earth, and the natural environment they rely on, accentuating the well-being of humans and more-than-humans. Stibbe's definition aligns with the traditional Chinese ecosophy of Tianrenheyi (天人合一), which emphasizes the unity between humans and nature (Chen, 2007). It is a philosophical concept put forward by a famous Daoist-Zhuangzi (庄子), and it advocates humans' awe, respect, and love to the nature.

The second question is how ecology links with language. According to Stibbe (2015, p.2), it is the language that shaped our way of thinking and conceptualizing the world, thus determining how we interact with others and nature. A typical example can be the metaphor we often use in the daily life—THE EARTH IS OUR MOTHER. To some degree, this metaphor shapes our relationship with the Earth that human being is the son of the Earth. This further influences our interaction with the Earth, and it suggests that we should respect and love our mother and should not pollute the environment. In other words, the language we are exposed to will influence how we treat the ecosystem. Then ecolinguistics is:

> *The life-sustaining relationships of human with other humans, other organisms and the physical environment, with a normative orientation towards protecting the systems that humans and other forms of life depend on for their wellbeing and survival.*
>
> (Alexander & Stibbe, 2014, p.105)

In this study, according to the above definition of ecolinguistics, what I am trying to do is to identify what kind of relationship is constructed between the three parts—humans (e.g., the constructor of the Three Gorges Dam), non-human life (e.g., those endanger fish species), and the environment (e.g., Yangtze River) by the language used in CTGC's AERs.

Another critical issue to consider here is the scope of ecolinguistics. Based on the definition above, Alexander & Stibbe (2014, p.104) further conclude:

> *Ecolinguistics is more than just the analysis of texts which happen to be explicitly about the environment, and is more than just a metaphorical way of thinking about language contact. Instead, ecolinguistics is, primarily, the 'ecological analysis of discourse'.*

That is to say, the discourse analyzed by ecolinguistics can be any discourse type, not limited in those closely related to the environmental issues. It aims to expose what kind of relationship between humans, more than human species, and the physical environment is constructed in the discourse and whether this relationship is life-sustaining.

2.2 Ecosophy

Ecosophy, the philosophy of ecology, was put forward by Naess (1995), referring to the ethical or philosophical standards containing ecological consideration. Stibbe (2014, 2015, 2018) holds that there is a spectrum of ecosophy which varies from anthropocentric to ecocentric, localist to anarchist, neoliberal to socialist, and optimistic to pessimistic, and these ecosophies can overlap with each other. Ecolinguists can choose, extent, or combine any kind of existing ecosophy, or develop a new one by themselves (Stibbe, 2015).

The analyst's ecosophy will determine his or her ecological judgement on whether an event is ecologically acceptable or not. For example, if one holds the anthropocentric ecosophy, he might think the development of oil and other natural unrenewable resources does not matter as long as human's needs are met. However, if one holds the ecosophy of ecocentric, this development is unacceptable since the wellbeing of other-than-humans will

be influenced. However, it is hard to tell which ecosophy is good or bad, and there is no universally acknowledged one because different people have different social and educational backgrounds (Huang & Chen, 2016). The ecosophy of this study is similar to that of Stibbe (2015) and Zhuangzi that humans should regard themselves as a part of the nature and respect other life on the Earth, and not only the wellbeing of humans but also that of more-than-humans should be maintained.

2.3 Stibbe's Story framework

According to Fill & Mühlhäusler (2001), there are two approaches to ecolinguistics: Haugen's approach and Halliday's approach. The former is also called linguistic ecology, which holds that language has its own ecological environment, and the living condition of a language depends on the society the language is in and the people using the language (Haugen, 1972). The latter focuses on the role languages play in ecological issues, and what linguists can contribute to the environment protection (Halliday, 2009). Within Halliday's approach, critical discourse analysis has been chosen as the main perspective by many researchers trying to analyze the daily language usage critically to make it more environmental-friendly. In this study, I will follow the Halliday's approach.

The core of Halliday's approach is the concern about the ecosystem that life lives by, and how language influences the ecosystem. Within this paradigm, many approaches have been taken by different scholars, and they usually carry out their research by analyzing some linguistic features or language phenomena ecologically. Some scholars analyze discourses from the perspective of systemic functional linguistics. For examples, the analysis of meta-functions and grammatical metaphors in natural poetry (e.g., Huang, 2018); the analysis of register, semantics and lexicalgrammatics in ecological assessment reports (e.g., Zhao, 2016); and the analysis of transitivity system in eco-discourse (e.g., Gong & Liu, 2018; Chen, 2019). At the same time, other scholars choose the critical discourse analysis approach. For example, Alexander (2018) analyzes the euphemisms, nominalizations, purr-words, and the future tense forms in Coca-Cola's replenish report with the help of corpus linguistic methods; Moser (2015) investigates the importance of reconceptualizing language from the ecocentric perspective; Ponton (2015) analyzes several metaphors for nature in a UK government white paper. Moreover, there is a discussion about the positive discourse analysis (PDA) versus the critical discourse analysis

(CDA). CDA is interested in searching for the negative discourses, whereas PDA focuses more on the discourses promoting the environmental protection. In other words, CDA tends to expose the problematic discourses destructing the environment while PDA aims to display the beneficial discourses promoting the environment protection (Stibbe, 2017).

Based on the Halliday approach, Arran Stibbe (2015) has provided an integrated framework in his book *Ecolinguistics: language, ecology and the stories we live by*. In this book, he puts forward the concepts of story, and the story we live by:

> *Stories are cognitive structures in the minds of individuals which influence how they perceive the world.*
>
> *Stories-we-live-by are stories in the minds of multiple individuals across a culture.*
>
> (Stibbe, 2015, p.6)

Table 1 shows the eight forms of story including *ideology, framing, metaphor, evaluation, identity, conviction, erasure,* and *salience*. They will be described in the following parts.

Table 1 Eight forms of story

Form of story	Definition	Manifestation in language
Ideology	A story of how the world is and should be which is shared by members of a group	Discourses, i.e. clusters of linguistic features characteristically used by the group
Framing	A story that uses a frame (a packet of knowledge about an area of life) to structure another area of life	Trigger words which bring a frame to mind
Metaphor (a type of framing)	A story that uses a frame to structure a distinct and clearly different area of life	Trigger words which bring a specific and distinct frame to mind
Evaluation	A story about whether an area of life is good or bad	Appraisal patterns, i.e. Patterns of language which represent an area of life positively or negatively
Identity	A story about what it means to be a particular kind of person	Forms of language which define the characteristics of certain kinds of people

Conviction	A story about whether a particular description of the world is true, uncertain or false	Facticity patterns, i.e. Patterns of linguistic features which represent descriptions of the world as true, uncertain or false
Erasure	A story that an area of life is unimportant or unworthy of consideration	Patterns of language which fail to represent a particular area of life at all, or which background or distort it
Salience	A story that an area of life is important and worthy of consideration	Patterns of language which give prominence to an area of life

(Stibbe, 2015, p.17)

The first story type is *ideology*. It is about how we understand the world, and it is often shared within a social group (Stibbe, 2015, p.23). Although Stibbe (2015) lists ideology as a separate story type, as shown in Table 1, it is more like an umbrella term that can cover the other seven stories. In other words, it is realized by a discourse type (e.g., a story) or a group of discourses (e.g., six or seven stories) that are constructed by different linguistic features and used by certain groups. So, the combination of different stories together forms a certain ideology. Moreover, under the setting of ecolinguistics, a more important question is whether a discourse (story) can promote the environment protection. Stibbe (2015) has pointed out three types of discourse: beneficial discourse, destructive discourse, and ambivalent discourse. Beneficial discourses refer to those stories contributing to environmental protection, destructive discourses refer to those stories causing damage to the environment, and ambivalent discourses are those stories in the middle. Then, we should promote the beneficial discourses and resist the destructive discourses; as for the ambivalent discourses, we should preserve their positive part and resist their negative part. (Stibbe, 2015, p.24-33). For example, the Chinese president XI Jingping put forward a slogan in 2017: "我们既要绿水青山，也要金山银山。宁要绿水青山，不要金山银山，而且绿水青山就是金山银山。" (Clean waters and green mountains are invaluable assets and we need all of them, but we should give priority to the formers.) (Literature Research Office of the CPC Central Committee, 2017) This discourse can be an ambivalent discourse as it underlines the importance of environmental protection while describing the natural world as humans' assets.

The second story form is *frame*. Based on different areas, including cognitive science, linguistics, artificial intelligence, and sociology, the frame is defined as a story activated by some trigger words, reflecting how people act in a certain area of life. (Stibbe, 2015, p. 46). Frames are mental structures helping humans to understand the world and reality. (Lakoff, 2006,

p. 25) To put it simply, it is like a working framework that leads us to perform in a certain way. If a framework is ecological-friendly, then people will tend to protect the environment. For example, under the frame of sustainable development, what we do should not run out of the resources for the future generation, and anything against this goal will not be encouraged. By analyzing what frames are involved in the CTGC's reports, we can better understand how it deals with those ecological issues.

The third story form is *metaphor*. According to the cognitive linguist Lakoff (1999), there are two domains—source domain and target domain; metaphors are the mapping from the former to the latter, triggered by a specific word(s). To put it simply, metaphors refer to using something we are familiar with to help us understand the things that we are not familiar with. Besides, Stibbe (2015, p. 64) defines metaphor by combing it with frames, and he holds that some vivid frames are used in metaphors to help structure an area of life. Most importantly, we are living by metaphors (Lakoff & Johnson, 2003). As important cognitive structures, metaphors help us understand the world and influence our way of thinking, thus influencing how we behave, including how we interact with the environment. So, it is important to analyze metaphors from the perspective of ecolinguistics. Many researchers have analyzed ecology-related metaphors (e.g., Keulartz, 2007; Krementsov & Todes, 1991; Russill, 2011), discussing how they influence our attitudes and behaviors towards environmental issues. In this study, I am interested in what ecological metaphors have been used by CTGC in its reports, and to determine how they are used under the setting of water dam discourse.

The fourth store category is *evaluation*. It refers to the store in which people show their judgment on what is bad and good about an area of life. (Stibbe, 2015, p.84) According to Martin & White (2007), evaluations can be realized by appraisal items—linguistic features. As shown in Table 2, there are five types of appraisal items, including explicit and implicit appraisal expressions, grammatical structures, and morphologically marked and unmarked expressions. Moreover, purr-words are also important items for the realization of evaluation. According to Alexander (2009 & 2018), they refer to the euphemistic or positively sounding words, and they can have a cumulative effect when they cluster together. Companies often use them to construct a positive image for certain things, such as their self-image and products. For example, words like *commitment* and *engage* are the typical purr-words used by corporates to create a reliable and trustworthy corporate image to the public. (Alexander, 2018). The same strategy could also be used by CTGC when it comes to the environmental issues. In

this study, I am interested in what purr-words are used by CTCG to influence people's evaluation of it.

Table 2 Appraisal items

Appraisal items	Examples
Explicit appraisal expressions	*good, bed, right, wrong*
Implicit appraisal expressions	*tasty, cute, normal*
Grammatical structures	*A thread of X*
Morphologically marked words	*happy, unhappy, like, dislike*
Unmarked expressions	*increase, more, lower, less*

Identity is the fifth story type. It is "a story about what it means to be a particular kind of person" (Stibbe, 2015). Like other stories, identity will also influence how we interact with others, and it is constructed partly by the language as well. When it comes to the environment, certain linguistic features will help to construct ecological identity, thus influencing the way we treat the environment. One important way to analyze ecological identity is to investigate the construction of outgroups and ingroups in the text, and whether the nonhumans are included in the ingroup (Stibbe, 2015). The concept of ingroup is often associated with pronouns such as *us*, referring to the group where one feels he or she belongs to, while the outgroup is on the contrary (Stibbe, 2015). An important method to put more-than-humans in the ingroup is through the use of the first-person pronouns *we* and *our*. They are usually used to refer to humans rather than other species in our daily life, which reflects the difference between humans and nonhuman life. CTGC is not a person; however, as a corporation, it is often personalized in the reports. So, we can analyze how CTGC use *we* and *our* in the reports to determine how it treats nonhuman life.

Conviction is the sixth story type. According to Stibbe (2015, p.129), convictions are stores reflecting how people think about what is false, true, uncertain, and certain. They can be manifested by five facticity patterns: presuppositions (e.g., describing a pollution as a problem, which presupposes there is a solution), hedges (e.g., the pollution might/may influence…), quantifiers (e.g., using a lot of or many instead of using concrete numbers), appealing to authority (e.g., quotation from an environment expert), and modal verbs (e.g., X is, X must be, X can be). (Stibbe, 2015, p.130) These linguistics features can cluster together to show whether a description is true or false, or certain or uncertain.

The seventh story type is *erasure.* It refers to the story showing whether people think a area is not important or deserves no attention, and it is realized by the erasure patterns by which a life area is constructed as unimportant or peripheral. (Stibbe, 2015, p.146) There are two main ways of erasing: not mentioning the things or using linguistic strategies such as passive voice, nominalization, hyponymy, metaphor, transitivity, etc. (Stibbe, 2015, p.149) Among them, nominalization can be one of the most often used and most effective strategies to erase the actor. It can obscure agency, leaving who is responsible unstated (Baker, 2006), and a great many of ideological opportunities can be offered by it (Fowler, 1991). In this study, I am interested in what environmental issues have been erased by CTGC in its report, especially through the method of nominalization.

The last story type is *salience*. In comparison to the erasure, it refers to the story indicating what people think is of great importance and deserves our attention; it can be realized by the salient visual or linguistics patterns that can descript something as specific, tangible, and vibrant. (Stibbe, 2015, p. 162) Visual features like color and size are often used in visual analysis, while linguistic analysis often focuses on the abstraction level, metaphor, transitivity, vitality, and focus (Stibbe, 2015). Here I will investigate the saliency of fish in terms of abstract level. As we know, with the construction of the Three Gorges Dam, almost every type of fish in the Yangtze River has been influenced.

In this study, I focus on the following six stories: *frame, metaphor, evaluation, identity, erasure,* and *salience*. The reason why I choose them is that their language manifestations are easy to identify and analyze with the corpus linguistics methods.

3. Material and methods

In this section, I first present how I collected, cleaned, and managed the material and data. Second, I discuss the corpus linguistics methods that will be used to analyze the data. After that, I illustrate what linguistic features will be focused on in the analyses of different story types.

3.1 Data collection, cleaning, and management

For this research, a corpus of 10 English annual environmental reports (AER) published from 2008 to 2017 by CTGC was compiled. These 10 AERs in PDF format were downloaded from

the website of CTGC[1]. Almost every AER contains chapters like “Message from Top Management”, “Corporation Profile”, “Management System”, “Energy Development”, “Ecological Conservation”, “Pollution Prevention and Control”, “Monitoring and Research” and “Public Concerns”. (See Figure 1)

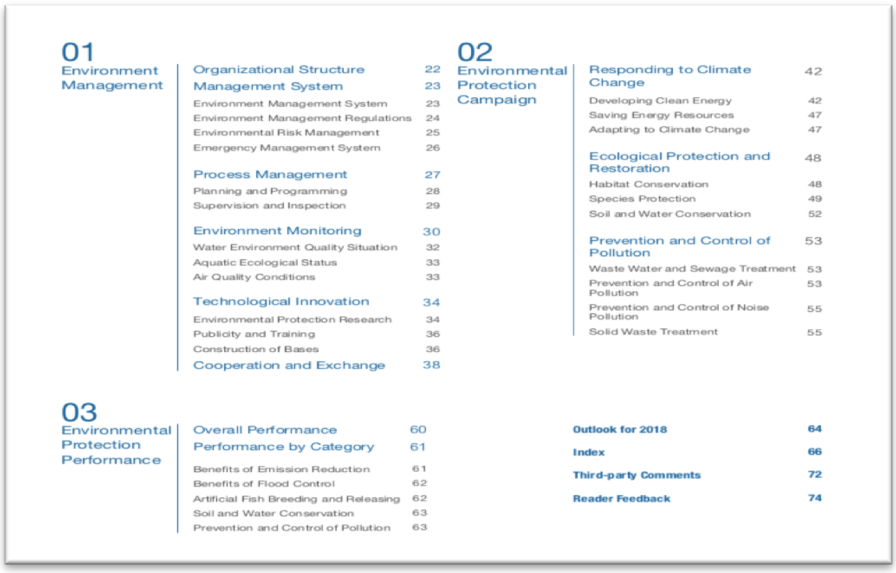

Figure 1

There are two steps involved in the corpus construction. At first, these 10 AERs in PDF format were downloaded from the website of CTGC. Secondly, all the pdf files were manually annotated to the HTML and TXT formats to be searchable and editable, and they can be used for general study. Figure 2, 3, 4, and 5 show the reports in the original pdf format and the HTML format in the Sublime editor, and the TXT format in the Plain Text Editor, and the HTML format in the Chrome, respectively.

[1]https://www.ctg.com.cn/english/report_qry_menuId_equ_cf30fdc6bbf94442af603cec06e6fcea_and_page_equ_1.html

Figure 2

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                <ol>GB/T 36000-2015 Guidelines for
                National Standard of People's Repu
                <ol>Sustainability Reporting Guide
                Reporting Initiative (GRI).</ol>
                <ol>Hydropower Sustainability Asse
                Hydro- power Association (IHA).</o
            </ul>
        </p>
    <h2>Languages Available</h2>
        <p>
            The annual reports on environmental pr
            in both Chinese and English editions,
            version and online electronic version.
            downloaded from the web- site of CTG (
            printed hardcopies, please email mi_ch
            86-10-57081673.
        </p>
    <h2>Further Reading</h2>
        <p>
            For more information, please visit the
            http://www.ctg.com. cn). Other related
            environmental protection can be found
            documents:Ecological and Environmental
            Three Gorges Project Annual Report of
            Social Responsibility Report of China
            Social Responsibility Report of China
            Responsibility Report of Hubei Energy
```

Figure 3

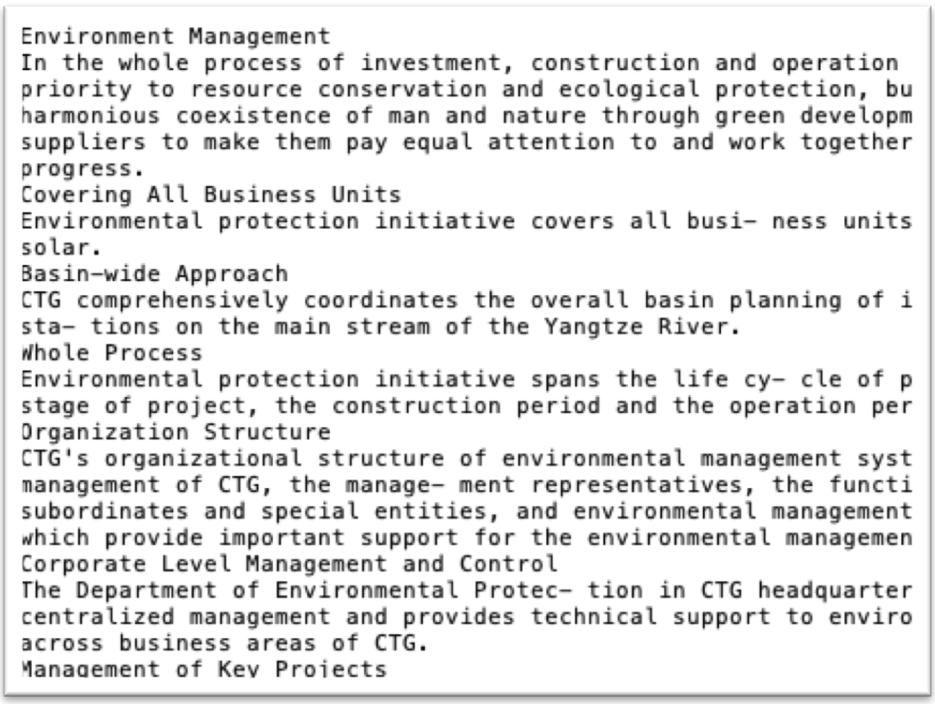


Figure 4

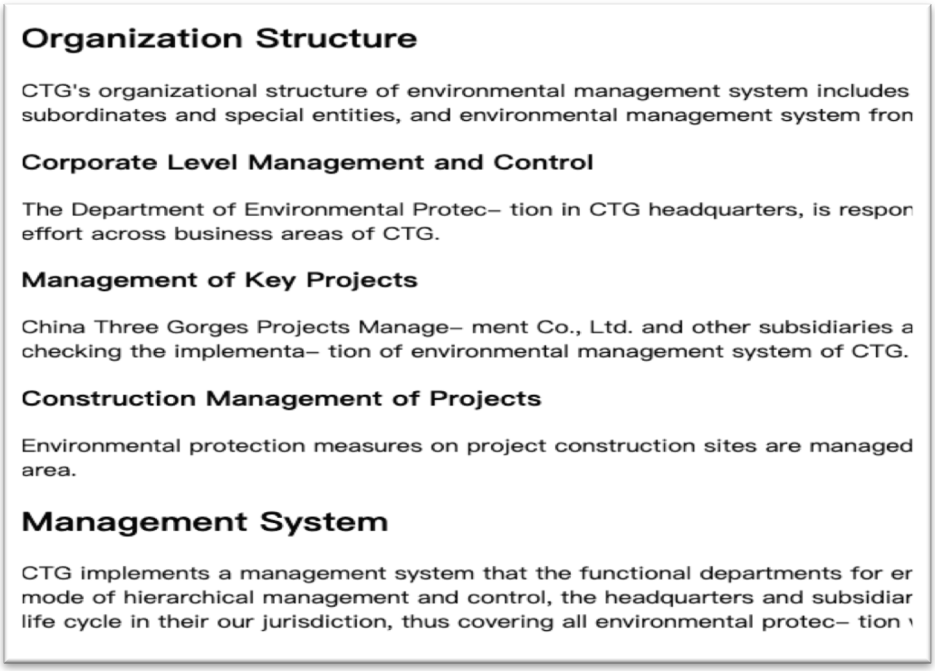


Figure 5

Table 3 Metainformation of the corpus

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	ALL
Number of tokens with stopwords and punctuations	8771	8609	9425	9671	13861	13071	13634	12221	17290	17642	*114770*
Number of tokens without stopwords and punctuations	4788	4778	5051	5200	7802	7388	7794	6788	9550	9622	*68761*

Table 3 shows the metainformation of the corpus. As can be seen, this corpus has a size of 114,770 tokens, including stopwords[2] and punctuation, and 68, 761 tokens excluding stopwords and punctuation. These figures were generated by the NLTK package in Python.

Since all the reports are copyrighted by default, I need to ask the company for permission if I really need to redistribute or share the original material with other researchers. But I can share the analysis results (e.g., keyword list, frequency) I obtained or cite a small amount of text from the original material without permission. Moreover, all the data are stored on my own computer. One backup is stored on my own mobile hard disk, another backup is stored on my cloud storage space, and they are all protected by passwords. However, since all the reports are publicly available, they don't need very special security and privacy protection. I will not share the TXT and HTML versions with others, as there are some copyright concerns. Anyone who is interested in the reports can download them via the official website links I provide.

3.2 Methods

In this study, three primary tools are used during the process of data obtaining, cleaning, documenting, and analyzing: Sublime Text 3.2.1, AntConc 3.5.7, and Python 3.6. Sublime Text, a plain text editor, was used to write HTML and TXT files; the NLTK (Natural Language Toolkit), a library in the programming language—Python, was chiefly used to clean data (e.g., tokenize sentences and words, and remove stopwords) and obtain frequency data; and AntConc,

[2] Stopwords is a concept commonly used in the natural language processing (NLP) area. It is a wordlist of any word that a language analyst wants to remove due to his or her research design in the preprocessing. In this study, I used the default English stopwords provided by the NLTK package in Python, and they are the words such as *and, the, to*, etc. (see https://www.ranks.nl/stopwords for the complete list)

a multipurpose corpus linguistics software, was generally used to conduct collocation and concordance analysis. In the following part, I will briefly introduce the main corpus techniques applied to implement the actual analysis.

First, frequency analysis was used in this study. Frequency is a basic concept in corpus linguistics and often used in the discourse analysis. For example, if a word is used more frequently than another one by a user, it can reveal the user's intentions. (Baker, 2006) In other words, language is not used randomly, and the ideological position can be reflected by the choice of words (Stubbs, 1996). Frequency data can be represented as a wordlist containing all the words and their raw frequency. It can enable the researcher to have a general impression of what the corpus is about by investigating what are the most often used words. However, as grammatical words such as *the, and, to,* etc. always take up a large percentage of the whole word frequency of almost all the language (Baker, 2006, p.53), we can remove these stopwords from the very beginning. The NLTK package in Python has provided a very comprehensive list of stopwords, and it only takes one or two lines of code to exclude all these stopwords in the corpus. Besides, by comparing the frequency data of the original corpus with that of a reference corpus (usually a general-purpose corpus, e.g., *British English wordlist 2016*), the linguistics features of the original corpus can be better displayed. Besides, to make a comparison between different corpus with different size valid, the raw frequency should be transformed to the relative frequency. This can also be easily obtained by the NLTK package in Python. With just a few lines of code (see Appendix 8), the stopwords removing and relative frequency transforming can be realized at one go.

Second, collocates analysis was used to identify specific linguistic features. According to Scott (2004), collocation lists are made up of clusters or words that are found to appear repeatedly in the company of each other. We can better understand a word by its accompanied words, for example, what kind of semantic meaning is produced for a word by its collocation. In this study, most of the collocate lists were generated by the corpus linguistics tool AntConc; but the collocation list displayed in Table 6 was generated by Python. After the collocates were detected, they were further investigated in their context with the help of concordance lines, which is the technique of KWIC (Key Word in Context). Moreover, the semantic prosody was also investigated for some items. It refers to the positive or negative association with an item, reflected by its frequently appeared collocations (Sinclair, 1995). For example, CTGC could be associated with a positive semantic prosody if its collocations include many positive meaning words.

However, when it comes to the implementation, the frequency analysis, collocate analysis, KWIC and other practices were performed back and forth, which is a very common practice in the corpus assisted discourse analysis: the recursive "shunting" (Partington & Marchi, 2015) between searching these linguistic features with the help of corpus linguistics tools and reading them closely with the help of concordance lines. All in all, applying corpus linguistics methods to assist the discourse analysis in this study has at least three advantages. First, they can offer enough efficiency and objectivity that are impossible to be offered by manual analysis (Hunt, 2015, p. 266). Second, subtle ideological representations indicated by the repetitive lexical combinations are less likely to be missed by corpus analysis (Baker & Levon, 2015, p. 230). Third, qualitative critical discourse analysis can be hugely improved by applying more quantitative corpus linguistics methods. (Alexander, 2018)

Last but not the least, when it comes to the identification of discourse type, as I have mentioned in the section 2.2, the linguistic features inherently are not beneficial, destructive, or ambivalent. They are classified as beneficial, destructive, or ambivalent just according to the analyst's ecosophy under the setting of water dam discourse in this study. People may have different opinions on the discourse type if they hold different ecosophies under different settings.

3.3 Linguistic features of each story in focus

A fact that cannot be ignored is that stories carrying rich semantic and pragmatic information cannot be identified and described directly and easily by the corpus tools. In other words, corpus tools cannot tell us which type of story there is in the data. However, they can assist us in detecting each story's manifestation in language—linguistic features. In this study, I analyzed the following linguistic features: trigger words, purr-words, first-person pronouns *we* and *I*, normalization, basic level words, and abstract words. I first detected them by the corpus tools and analyzed them subsequently, e.g., analysis of frequency, collocation, and concordance.

To be specific, trigger words were used for analyzing frames and metaphors. As shown in Table 1, trigger words activate a frame in people's minds, and they can be used to identify the frame. So, the key step to identify a frame is the recognizing of trigger words. According to previous research (Manji & Coill, 2002; Sachs, 2009), one of the most commonly analyzed frames is the development frame; hence, the word *development* can be a good starting point. Same to frame, metaphor is also manifested by trigger words, so we can also begin with certain words that can be used metaphorically. In this study, I am interested in whether CTCG has used some

metaphors to describe itself, the environmental issues, and more-than-human beings. So, the key step is to find out potential trigger words of these aspects. The words CTGC used to describe itself mostly are *ctg* and *ctgcp*; words related to environmental issues can be *nature*, *climate change*, and *ecological*; words of more-than-human beings that are closely related to water dam can be *river* and *fish*. Accordingly, I first searched these trigger words in the corpus and obtained their collocation lists. Then I shortlisted them according to either their frequency or semantic feature. Moreover, I followed the following four steps (Stibbe, 2015) to analyze the metaphors: first, identifying the source domain and target domain; second, finding out the mapping process, and analyzing the potential reasoning patterns behind it; fourth, discussing the advantages and disadvantages of using the metaphor from the perspective of ecolinguistics.

Purr-words were used for exploring evaluation. In this study, I chose to begin with the word *energy*, because it would be interesting to see how CTGC, as an energy-providing corporate, describes its product. I first obtained the collocation list of it; then I analyzed the concordance lines of its typical collocation to determine the potential purr-words.

Identity was analyzed with the help of two first-person pronouns: *we* and *our*. Person pronouns have been studied by many researchers (e.g., Hyland, 2005; Wales, 1996). Hyland, (2005) in his interpersonal metadiscourse model, puts them under the category of self-mentions and argues that they can be used to construct authorial identity in the texts. In this study, they can also be used to investigate identity construction but from the perspective of ecological identify construction. The analysis began with the search of *we* and *our* in the corpus; then I further investigated their context with the help of concordance lines.

When it comes to erasure, as mentioned earlier, it can be realized by not mentioning the objects or using linguistic strategies such as passive voice, nominalization, etc. (Stibbe, 2015, p.149) It is easy to find out what has not been mentioned and we can just search the words related to the things we are interested in in the corpus to see whether it appears or not. For example, the controversial issues like an earthquake, ecological immigrants, and downstream lakes' drying up. However, when it comes to linguistic strategies, it is more complicated. In this study, I focused on the nominalization as it is powerful yet much easier to be detected by the corpus tools in contrast with others. The word I focus on is *pollute* because pollution is a big issue of the water dam, and how CTGC responds to the pollution issues can be reflected by its way of nominalizing this word. In terms of realization, firstly, I listed all the word forms of the lemma *pollute*, including the nominal (pollution, pollutions), verb (pollute, polluted, pollutes,

polluting), adjective (polluted), and adverb (pollutedly). Then, I searched them in the corpus and compared their frequencies.

Salience was explored with the focus on the basic level and abstract words. When we say one thing is salient, we mean that thing is important and deserves our attention. The salience can be realized by the salient patterns, and they are usually brilliant, precise, and distinct linguistics or visual demonstrations. (Stibbe, 2015, p. 162) Visual features like color and size are often used in visual analysis, while linguistic analysis often focuses on abstraction level, metaphor, transitivity, vitality, and focus (Stibbe, 2015). In this study, I focus on the abstraction level. According to Stibbe (2015), the more abstract the word is, the less salient is the object that is represented. Using hyponymy words can be a way to make an object more abstract. The first step for this analysis is to choose an area of life or an object. As we know, with the construction of the Three Gorges Dam, almost every type of fish in the Yangtze River has been influenced. So, I investigated the saliency of different endangered fish species in terms of the abstract level. Previous close reading has helped me to identify these "fish words": *fish*, *spinibarbus sinensis*, *schizothorax prenanti*, *triplophysa anterodorsalis*, *oreias (mountain loach)*, *schizothorax dolichonema*, *anabarilius liui*, *liobagrus marginatoides,* and *Chinese sturgeon.* The second step is to search these words in the corpus and analyze them with the help of concordance tools.

4. Results and analysis

This section begins with the analysis of the general lexical features of the current corpus. Then, I report a detailed analysis of frame, metaphor, evaluation, identity, erasure, and salience, respectively. The analyses include how each story is manifested by the linguistic features found in the corpus, what kind of ecological meaning each story reflects, and what discourse type each story can belong to according to the ecosophy of this study.

4.1 A glimpse of what the texts are about

The gist of this corpus can be obtained by looking at the general lexical features of the texts. In this part, these lexical features were analyzed: the word frequency of the whole corpus and that of each report, including and excluding stopwords; and the most salient collocations of the whole corpus.

First, as I have mentioned before, the current corpus is made up of annual environmental reports, and we could expect some lexical features different from that of the general English discourse. To figure out these features, I compared the current corpus with two reference wordlists: the *British English wordlist 2016* (BE06) and the *American English wordlist 2016* (AmE06) (Anthony, 2019). Unlike my corpus, these two wordlists are for general purposes, showing more common features of the British and American English. Table 4 shows the top 30 words and their frequencies in my corpus, the BE06 wordlist, and the AmE06 wordlist, respectively.

As can be seen, the results meet our expectations. The top 30 words in the BE06 and AmE06 are almost stopwords (e.g., *the, of, and, etc*.), whereas in the CTGC corpus, only the top 6 words are stopwords and most of the top 30 words of it are content words. These content words are all related to the environmental/ecological issues: *environmental, project, ctg, protection, water, construction, three, river, energy, gorges, hydropower, management, power, ecological, system, development,* and *monitoring*.

Table 4 CTGC VS BE06 VS AmE06

Corpus	CTGC		BE06_wordlist		AmE06_wordlist	
Rank	Word	Frequency	Word	Frequency	Word	Frequency
1	the	7909	the	59163	the	60056
2	and	5748	of	30733	of	30331
3	of	5245	and	28069	and	28973
4	in	2834	to	26319	to	26036
5	to	1818	a	23106	a	23926
6	for	1346	in	19425	in	19923
7	*environmental*	1260	that	10572	that	12279
8	*project*	1044	it	9446	s	10047
9	*ctg*	1019	for	9275	for	8910
10	*protection*	958	was	9241	i	8663
11	on	957	is	8996	is	8420
12	*water*	880	i	8256	was	8391
13	*construction*	857	s	8231	it	8370
14	*three*	783	on	7464	as	7393
15	*river*	774	with	7464	he	7320
16	a	710	as	6901	with	6971
17	was	710	he	6884	on	6932
18	*energy*	663	be	5479	his	5585
19	*gorges*	659	at	5336	at	4829
20	*hydropower*	638	his	5177	you	4779
21	as	627	you	4989	her	4700

22	with	607	this	4850	be	4651
23	*management*	602	by	4685	by	4546
24	*power*	602	from	4542	she	4500
25	*ecological*	558	are	4491	but	4449
26	*system*	543	but	4381	from	4352
27	*development*	530	had	4330	this	4326
28	*monitoring*	515	her	4244	are	4226
29	by	496	she	4189	had	4032
30	were	490	have	4176	not	4020

Second, generated by the NLTK tools, Table 5 shows the top 10 words in the whole corpus, excluding stopwords (see Appendix 1 for the complete top 50 words). As we can see, *environmental*, unsurprisingly, is still the most frequently used content word (178.43/10,000 words) as these are environmental reports in the first place, followed by *project*, *ctg*, *protection*, *water*, *construction*, *three*, *river*, *gorges*, *hydropower*, etc. However, whether these frequently used words also appear in a similar manner in each year's report is also important because by investigating each report's most frequent words, we can see whether the theme of each year varies.

Hence, with the help of NLTK tools, Table 6 further shows the top 10 words of each report (see Appendix 2 for the complete list). As we can see, among them, the words *environmental*, *ctg*/*ctgpc*, *protection*, *river*, *water*, *ecological*, *power*, *construction*, *project*, and *three* appear in all 10 reports; *energy* and *management* appear in 8 reports; and *hydropower* appears in 9 reports. Here, the most frequently used words shown in Table 6 are very similar to that of Table 5. This similarity of the basic lexical features may suggest that the core issues concerned in each year's report almost remain the same over the period of 10 years, which could help us to make some general judgement later on the whole corpus.

Third, collocations can help us better understand the theme of the text. Here, I used the NLTK package to generate the multi-word expressions co-occurring commonly. Table 7 shows the 20 most salient collocations in the corpus, and they are divided into 6 groups according to their meaning. As can be seen, most of them are about energy-related and environmental issues. For example, *flood control,* and *wastewater treatment* indicate the main disaster/pollution categories; *installed capacity*, *wind power*, and *clean energy* may suggest that CTGC not only produce hydroelectricity by the water dam but also by other so-called green/clean energy types, and the numeric phrase *million tons* could reveal the high level of energy-producing. Moreover,

two fish names—*Chinese sturgeon* and *coreius guichenoti* appear frequently, which shows they might be the most endangered fish species. Also, the place-related collocations such as *nature reserve* and *gorges reservoir,* and the direct mention of the river name *yangtze river* could give us a hint of the affected area of the three gorges project.

To sum up, these lexical features give us a glimpse of this corpus. We could at least know that it is about CTGC's massive energy-providing project in the area of Three Gorges and Yangtze River, some fish species are influenced, and flood and wastewater could appear.

Table 5 Overall frequency list without stopwords (top 50)

	Token	Counts	Relative frequency (/10000 words)
1	environmental	1317	178.43
2	project	1159	157.02
3	ctg	1071	145.1
4	protection	1017	137.78
5	water	916	124.1
6	construction	910	123.29
7	three	857	116.11
8	river	823	111.5
9	gorges	718	97.27
10	hydropower	684	92.67

Table 6 Frequency list of each report without stopwords (top 20)

2017	[('environmental', 204), ('ctg', 203), ('protection', 167), ('river', 150), ('water', 118), ('ecological', 117), ('development', 110), ('yangtze', 106), ('power', 97), ('energy', 90)]
2016	[('ctg', 214), ('environmental', 205), ('protection', 174), ('management', 116), ('hydropower', 110), ('construction', 107), ('ecological', 105), ('energy', 100), ('river', 90), ('water', 86)]
2015	[('construction', 117), ('environmental', 115), ('ctg', 99), ('water', 91), ('protection', 84), ('project', 84), ('river', 78), ('hydropower', 76), ('management', 62), ('wastewater', 59)]
2014	[('project', 130), ('environmental', 129), ('ctg', 108), ('protection', 88), ('construction', 87), ('fish', 82), ('three', 81), ('river', 80), ('monitoring', 75), ('water', 74)]
2013	[('environmental', 140), ('ctg', 110), ('project', 103), ('protection', 91), ('water', 82), ('river', 82), ('construction', 79), ('three', 78), ('hydropower', 76), ('management', 76)]

2012	[('environmental', 138), ('three', 121), ('project', 120), ('ctg', 111), ('water', 111), ('construction', 109), ('gorges', 100), ('protection', 86), ('system', 83), ('management', 78)]
2011	[('project', 117), ('environmental', 104), ('three', 85), ('protection', 82), ('water', 79), ('construction', 78), ('gorges', 75), ('ctg', 70), ('river', 61), ('development', 50)]
2010	[('project', 260), ('three', 166), ('ctg', 156), ('environmental', 148), ('gorges', 146), ('system', 128), ('protection', 124), ('water', 116), ('river', 114), ('construction', 112)]
2009	[('project', 81), ('three', 76), ('ctgpc', 72), ('gorges', 66), ('construction', 65), ('conservation', 60), ('river', 59), ('environmental', 58), ('water', 57), ('hydropower', 55)]
2008	[('project', 128), ('water', 102), ('environmental', 76), ('construction', 75), ('protection', 69), ('three', 62), ('fish', 61), ('gorges', 58), ('river', 55), ('area', 45)]

Table 7 20 most salient collocations in the corpus

Environment-related actions (5)	Energy-related words (5)	Places (4)
environmental protection emission reduction flood control aggregate processing wastewater treatment	installed capacity clean energy gorges project power generation wind power	three gorges construction areas nature reserve gorges reservoir
Numeric fact (1)	Animals (3)	Rivers (2)
million tons	Chinese sturgeon endemic fish coreius guichenoti	yangtze river jinsha river

4.2 Frames

By analyzing frames ecologically, we could have a deeper understanding of how they can influence our environment. One of the very commonly analyzed frames is the development frame. Table 8 shows the top 10 collocations of development on the left, and we can identify 2 interesting ones: *sustainable development* (50 times), and *green development* frame (45 times). These two development frames are worth our attention as they are very closely related to the environmental issues, and they have widely appeared in social media reports and government plans.

Table 8 Collocation of "development" (top 10)

Rank	Frequency	Collocation
1	115	*hydropower* development
2	74	*the* development

3	52	*energy* development
4	50	***sustainable* development**
5	45	***green* development**
6	13	*and* development
7	12	*project* development
8	10	*power* development
9	9	*economic* development
10	9	*on* development

4.2.1 Sustainable development frame

Table 9 shows an extract of the concordance lines of *sustainable development*. As can be seen, the words associated with sustainable development include *establishing, pursuit, promote,* and *achieve*. These action verbs all indicate that sustainable development is the goal that CTGC tries to achieve.

Sustainable development refers to the development that can continue in the long term. It was initially put forward by the Brundtland Report in 1987, and China released its national sustainable development report in 2012. CTGC has put itself and its development of hydropower under the sustainable development frame, which is always connected with many positive issues. For example, in (1), CTG links the hydropower development with the clean energy development, and claims it can contribute to environment protection; in (2), it emphasizes the fact that it has made great contribution to the great cause of sustainable development; and in (3), it further underlines its adherence to the national "Belt and Road" strategy and its essential contribution to the progression of sustainable development.

(1) "CTG has constantly been implementing the concept of environmental protection, enhancing the overall environmental protection, practicing the relevant responsibility and incorporating the philosophy of environmental protection into all stages of its work, from planning and designing, to construction and operation. This combines hydropower development with **sustainable development**, and achieving a win-win between **clean energy development and eco-environment protection**." (2011)

(2) "the Report highlights CTG's full time-space environmental management philosophy and practices, perfectly embodying CTG's commitment to social responsibility and outstanding contributions to the pursuit of **sustainable development**." (2016)

(3) “Closely following the national “Belt and Road” Initiative and speeding up the implementation of the “going global” strategy, the Corporation endeavors to improve the “going global” of the Chinese hydropower industry. In addition, its overseas business has become an essential pillar of growth for **sustainable development**.” (2014)

Within the sustainable development frame, the benefits of the next generation and current people’s needs are both taken into consideration, and the development is restricted at a level that will not exhaust the capacity of the environment. However, this frame implies that humans’ development can be permanent, and ignores the fact that the environment’s capacity is limited in essence. The hydropower seems to be sustainable as it does not burn fossil fuels but just uses water’s geopotential energy to turn the generator. As long as there is water, there is constant hydropower. Nevertheless, to generate hydropower by a water dam is not that simple. The water used by Three Gorges Dam is from the Yangtze River, and with the completion of impoundment, a series of environmental issues will emerge, and the natural balance will be broken along the whole river basin. (Baxter, 1977; Chen & Xie, 2007; Ye et al., 2014) Most importantly, many damages are permanent, such as the extinction of species in the drained downstream lakes. In this regard, the development of hydropower is not sustainable at all, and the sustainable development frame can be an ambivalent discourse.

Table 9 “Sustainable development” concordance

1	ration. This combines hydropower development with	sustainable development	, and achieving a win-win between
2	Secretary-general of China Business Council for	Sustainable Development	(CBCSD) This represents the 12th Annual
3	Secretary-General of China Business Council for	Sustainable Development	comment2 Annual Report on Environmental Protection
4	borrowing and absorbing the cream from the	sustainable development	concept and the successful cases of
5	Farm Pakistan (Pvt) Ltd follow CTG's	sustainable development	concept, and attach great importance to
6	and outstanding contributions to the pursuit of	sustainable development	. Enhanced content. The Report+B38 content
7	practice in energy-saving and emission-reducing,	sustainable development	for climate change adaptation, CTG co-
8	making contribution to implementing the UN 2030	sustainable development	goal and realize the goal that
11	y recognized its social responsibility to achieve	sustainable development	in harmony of human with nature
12	recognized by its social responsibility to achieve	sustainable development	in harmony of human with nature
13	become an essential pillar of growth for	sustainable development	. In hydropower development, CTG observes the
14	, society, resources and environment as well as	sustainable development	. It has had extensive and far-

4.2.2 Green development frame

Another subframe is the green development frame. The word *green* can trigger some green-related images in people's minds. Within this frame, the source domain is the greenness of natural plants, and the target domain is humans' development. As plants grow without hurting the environment but contributing to the environment, under this frame, humans' development will also be beneficial to the environment, and everything related to green will be environmental-friendly and pollution-free. Moreover, green development is a relatively new frame in the reports when compared with the sustainable development frame. As can be seen in Figure 7, the latter already occurred in 2008, and generally speaking, its hit showed a gradually increasing trend. Whereas, as shown in Figure 6, the hit of the green development appeared only after 2011 in the plot, and it occurred most frequently in 2016 and 2017.

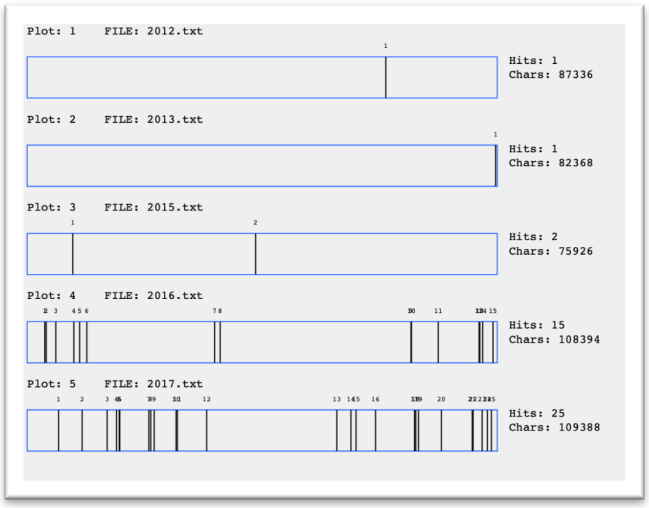


Figure 6 Concordance plot of green development

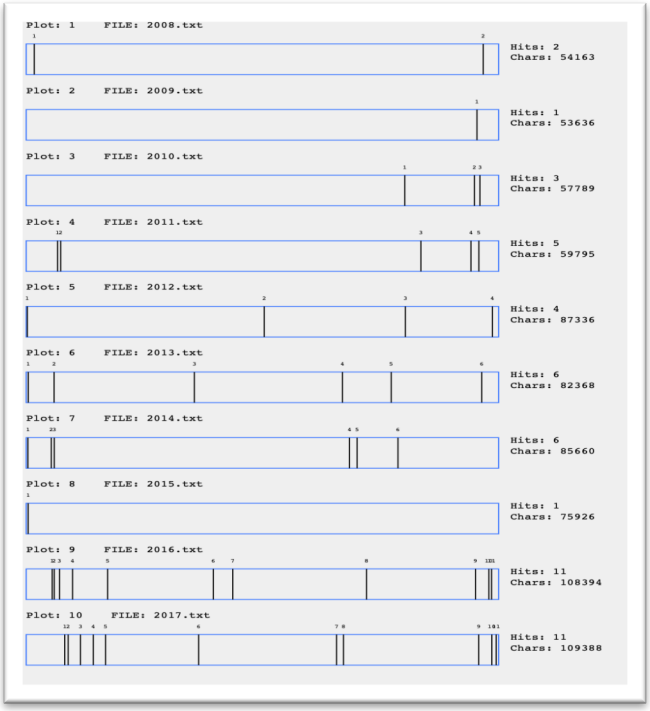


Figure 7 Concordance plot of sustainable development

Table 10 shows the extract from the *green development* concordance, similar to the sustainable development, the left collocations of it are words and phrases like *adhere to, lead, ensure, promote, implement*, etc. These collocations show that CTGC is taking action under the green development frame. The concept of this development frame is originally from the environment movement in 1970 in UAS (Rocky Mountain Institute, 1998), and subsequently, it has become more and more popular all over the world. In China, the green development is one of the five development concepts put forward in the *Fifth Plenary Session of the 18th Communist Party of China (CPC) Central Committee* in 2015, which can explain why it seems to become more dominant than sustainable development as it suddenly occurred more often in 2016 and 2017 (It occurred 15 times in 2016 and 25 times in 2017, while sustainable development occurred 11 times in 2016 and 2017). It has 7 core goals:

"1. Maintain the basic state policy of saving resources and protecting the environment;

2. Maintain sustainable development;

3. Follow a developmental path characterized by higher productivity, general affluence and a sound ecosystem;

4. Accelerate the building of a resource-conserving and environmentally friendly society;
5. Realize harmony between human beings and nature;
6. Advance the program of building a beautiful China;
7. Make new contributions to global environmental security."

(Translated by China Academy of Translation, 2015)

As we can see, it is actually a new pattern under the sustainable development frame. For CTGC, as shown in (4), it describes its implementation of green development as providing clean energy, keeping a balance between energy production and environmental protection, protecting fish habitat, doing ecological protection research, controlling the discharge of pollutants, and issuing green bonds. However, the green development frame could also justify the actions of developing so-called clean or green energy, especially the hydroelectricity, that sounds green but still costs damages to the environment. For example, the wind power station, which is often described as green and zero carbon emission, can kill birds and influence birds' migration with its massive rotor blades, produce noise pollution and heavy metal pollution (Jaber, 2014). Not everything labeled itself green is really green, and we should be aware of the abuse of green development frame. Hence, the green development frame can be an ambivalent discourse.

(4) "Implement **green development** through the whole life cycle. In addition to providing clean energy to the society, CTG is committed to realizing harmony between energy production and ecological environment by continuing to carry out fish habitat protection and ecological protection research in river basins. CTG strictly implementing measures for mitigating environmental impact and improving ecological environment." (2017)

Table 10 Extract from "green development" concordance

1	to the road of ecological priority and	green development	, adhered to the philosophy of building
2	and nature. Habitat Conservation. CTG adheres to	green development	, and gives top priority to ecological
3	onal clean energy group, implementing and leading	green development	and has formed a philosophy of
4	the Belt and Road Initiative and Promoting	Green Development	and in consideration of current hydropower
5	harmonious coexistence of man and nature through	green development	, and works closely with suppliers to
6	ommunity. In June 2012, adopting "Energy Saving,	Green Development	" as the theme, CTG organized its
7	and the philosophy of ecology first and	green development	. By continually improving the environmental mana
8	. The Report is well-structured. In the	Green Development	2016 Chapter, the Report concisely illustrates t

9	clean energy, promote low-carbon, cyclic, and	green development	, comprehensively promote all works including envi
10	was suc- cessfully connected to grid Establishing	green development	credit in international market CTG successfully
11	cooper- ation and implemented the concept of	green development	. CTG achieving results in multiple sectors
12	ineering environment protection and the forums of	green development	, CTG applied the latest environmental protection
13	environmental protection as a priority to ensure	green development	. 1. CTG establishes the Leading Team for
14	energy development is an important part of	green development	. CTG has been committed to becoming
15	Prevention and Control of Pollution Adhering to	green development	, CTG strictly controls the discharge of
16	Three Gorges, actively promoting the concept of	green development	, developing the Yangtze River, providing clean
17	to the principles of ecological priority and	green development	, earnestly serve the economic development of
18	, with the newly added theme of leading	Green Development	for Building Ecological Civilization, highlight
19	ed throughout the country. Feature Topic: Leading	Green Development	, for Ecological Progress Ecological protection co
20	tion Symposium for International Projects and the	Green Development	Forum.With these platforms, it hopes

For these two frames, the better alternatives can be *limited sustainable development* and *limited green development*. Here, I added the word *limited,* which has two meanings. First, it aims to point out the fact that no development can be completely sustainable and green. So, people should be aware of the potential damage caused by humans' development of the environment. Second, it indicates the development should be limited in amount, degree, and range. For example, we should not build as many water dams as we want; the size of the water dam should not be too large; the water dam that will bring tremendous pressure to the ecosystem should not be constructed.

4.3 Metaphors

In this study, via the close reading, I have identified six metaphors, and they are RIVER AS A TOOL FOR MAKING MONEY, NATURE IS A COMPETITION, CLIMATE CHANGE IS A WAR, NATURE AS A MACHINE, ECOLOGICAL DAMAGE IS AN ACCIDENT, and COMPANY IS A HUMAN. In the following sections, I will analyze them in detail.

4.3.1 RIVER AS A TOOL FOR MAKING MONEY

Making the Yangtze River a Golden waterway has been a slogan in China for many years, and it is one of the key reasons for building the Three Gorges Dam. Here the source domain is a golden waterway, and the target domain is the Yangtze River. On the one hand, the Yangtze river is constructed as a method of transportation. Once it is treated as a way of transportation, it is materialized and simplified. In other words, it will encourage people to focus on its physical properties and treat it as a cold and emotionless object just like highways or railways made up of concrete and metal, the only function of which is to be sailed by ships. Besides, the Yangtze River is also described as a tool for making big money. As we can see from (5), great attention has been paid to the numeric facts of how many ships, passengers, and cargo can be transported on this *Golden Waterway*. The word *golden* has a strong semantic association with money, making people focus on the huge regional and national economic benefits this waterway can produce, and this improvement of navigation resulted from the construction of Three Gorges Dam is then strengthened.

> (5) "TGP has made Yangtze the real "**Golden Waterway**". The annual average freight volume has increased fivefold while transportation cost reduced about 1/3. As of December 31st, 2013, in ten years, the total number of vessels passed through the TGP ship locks accumulatively reached 570,000, with 10.01 million passengers, and 640 million tons cargo." (2014)

However, as shown in (6), it might be a golden waterway for humans, but a death way for other habitats, which has been acknowledged by CTGC. To conclude, the Yangtze River is more than just a way of transportation or a cash cow, it is the home to thousands of lives, and it has its intrinsic value. With this regard, this metaphor can be a destructive discourse and should be resisted.

> (6) "With further development of the "**Golden Waterway**" status of the Yangtze River, the increase in the number of vessels, tonnage and horsepower has led to increase of noise and vibration which caused Chinese sturgeon injuries from time to time. Abovementioned various causes made **Chinese sturgeon face extinction threat**." (2014)

Instead of describing the Yangtze River as a golden waterway, it is bettered to describe it as *a golden ecosystem*. By using the latter, the value of the Yangtze River has shifted from the economic aspect to the ecological aspect. This would encourage people to take action to protect

the Yangtze River and remind humans that they are also part of this ecosystem. Then, building the large water dam would be resisted because it will cause damage to the ecosystem in which humans also live.

4.3.2 NATURE IS A COMPETITION

The expression *win-win* reflects the metaphor that NATURE IS A COMPETITION. In this metaphor, the source domain is competition, and the target domain is the environment. In most cases, this metaphor will put us in a situation where there must be a winner, and human beings should try their best to maximize their interests. However, as shown in Table 11, the *win-win* expression embodies the cooperation and mutual benefit between energy development and environmental protection and minimalize the competition element. As can be seen in (7), this metaphor encourages humans to reach a balance between meeting humans' needs of energy and protecting the environment. So, it can be an ambivalent discourse.

Table 11 "Win-win" concordance

1	ent with sustainable development, and achieving a	win-win	between clean energy development and eco-environment protection
2	coordinated matter so that sustainability and	win-win	outcomes can be delivered. We continuously
3	whole business field, trying to realize a	win-win	result in clean energy development and
4	make the best efforts to realize the	win-win	result of clean energy development and
5	innovate desertification control in China for the	win-win	situation of photovoltaic power generation and
6	local integration, balance stakeholders, mutual benefit and	win-win	, strives to achieve the harmonization of

(7) "This combines hydropower development with sustainable development, and achieving a **win-win** between clean energy development and eco-environment protection". (2009)

4.3.3 CLIMATE CHANGE IS A WAR

Combat usually refers to the fighting during a war, so the use of the word *combating/combat* could trigger the metaphor that CLIMATE CHANGE IS A WAR. Table 12 lists the concordance of *combating*.

Table 12 "Combating" concordance

1	environmental protection fund has been established.	Combating	Climate Change. CTG jointly conducted the optimize

2	promote the harmony between human and environment.	Combating	Climate Change. CTG strives to become a

The close reading shows that these two phrases are all section titles in the report. For example, in (8), under this title, CTG describes its development of clean energy, such as wind power and solar power, as the fighting against climate change. It also highlights that its hydropower project could control flood and replenish water, which would help us to win the war and reduce the consequence of the war.

> (8) "**Combating Climate Change**. CTG strives to become a world-class clean energy corporation. Having developed a global plan, it spares no effort to develop clean energy like hydropower, wind power and solar power and makes full use of the overall benefits of hydropower projects in terms of flood control and water replenishment, in their efforts to alleviate and adapt to climate change." (2016)

Within this frame, the relationship between nature and human beings is much tenser. For a war, there are two sides-enemy and us, and the method to win the war is resorting to violence. Then, this can be an ambivalent discourse. On the one hand, it raises people's awareness of how serious the situation is, forcing people to take action to protect the environment as soon as possible. On the other hand, once there is a war, there must be some sacrifices. For example, ignoring the well-being of disadvantaged groups by forcing them to take more responsibilities. Moreover, once people have won the war, it would nourish human beings' arrogance that they can conquer the nature. Hence, it can be an ambivalent discourse.

4.3.4 NATURE AS A MACHINE

The phrase *ecological operation* could trigger the metaphor NATURE AS A MACHINE. First of all, we need to understand what the ecological operation is. It is a term used in the field of reservoir regulation, referring to "*a kind of treatment method for eco-environmental goal in reservoir comprehensive dispatching"* (Zhang Hongbo et al., 2011, p. 1120) In this metaphor, the source domain is a machine, and the target domain is the nature. Human beings are playing the role of an operator. For example, an engineer. As can be seen in (9), one function of this machine—fish reproduction is broken, and the engineer—CTG has used some repairing techniques to restore this function.

> (9) "CTG has conducted **ecological operations** for 5 consecutive years to facilitate the natural reproduction of 4 major Chinese domestic fish in the middle reaches of Yangtze

River and created favorable hydrological conditions for fish reproduction, thus protecting the aquatic life." (2016)

This metaphor can be a destructive discourse. Firstly, although it aims to protect the environment, it puts nature in a subordinate position that nature is just a big machine made up of different parts and serving human beings. Once a function does not work well, human beings can repair it by, for instance, replacing the broken parts or redesigning the machine to create a better function. These all manifest human beings' absolute control over the nature. Additionally, it might make people think that it is easy to solve environmental problems as there are always some methods to repair a machine. Moreover, it will fade people's sense that, in fact, they are the problem maker, and it is humans that should make a concession.

4.3.5 ECOLOGICAL DAMAGE IS AN ACCIDENT

Table 13 "Accident" concordance

1	ted an emergency plan for environmental pollution	accidents	, All of its subsidiaries and departments made
2	discharge of harmful substances caused by equipment	accidents	Amorphous dust Discharge of industrial waste water
3	discharge of harmful substances caused by equipment	accidents	. Amorphous dust. process management CTG implem
4	ed the emergency plan for environmental pollution	accidents	, and all the secondary bodies and departments
5	ed the Emergency Plan for environmental pollution	accidents	, and all the secondary bodies and departments
6	.In 2016, CTG didn't encounter any environmental	accidents	, and its environmental risks were mostly mitigat
7	to maintain a record of zero environmental	accidents	and to minimize the impact of production
8	Sturgeon In 2015, according to the survey of	accidental	capture of Chinese sturgeon at Jiangyin Monitor
9	tion, thus effectively preventing environmental	accidents	; CTG completed the Annual Environmental Risk
10	lankton, fish, heavy metal residues and pollution	accidents	in the waters of the conservation areas
11	Power Station for getting prepared for pollution	accident.	In 2009, 1.86 tons of zinc wastes were disposed
12	aquatic organism's toxicity test and fish-dying	accident	monitoring was carried out in the nature
13	test of aquatic organisms in polluted areas;	accidents	of dead fish from pollution. Fish spawning
14	the environment and pursue zero environmental	accidents	, to achieve harmonious coexistence between people
15	mental responsibility incidents; no occurrence of	accidents	which receive administrative or criminal penalti
16	, fish heavy metal residues and pollution	accidents	within the protected areas in breeding season

In Table 13 we can find that almost all the accidents are associated with environment-related things, for instance, pollution. This leads to the metaphor: ECOLOGICAL DAMAGE IS AN ACCIDENT. The source domain is the ecological damage, and the target domain is the accident. As shown in (10), CTGPC states that it has taken actions to control harmful solid wastes and prevent oil leakage in case of an accident. We know that if something happens by accident, it happens by chance; thus, the troublemaker should not be blamed too much.

> (10) "CTGPC strengthened controlling of hazardous solid wastes through green maintenance of power plants and upgrading of oil-using units and compiled Emergency Response Plan for Oil Leakage in the Three Gorges Power Station for getting prepared for **pollution accident**." (2019)

However, does the pollution really happen by chance? How big is the chance? Who will suffer from the accident? Is the damage permanent? No, the pollution is unavoidable, the chance is big, more than human beings will suffer, and many damages can be permanent. So, this metaphor is destructive as it helps to cover the truth that there will be no fish-dying and pollution from poison wastes if the dam is not built. A better alternative can be replacing accident with the *human-made disaster*. Then, the primary responsibility, the unavoidability, and the extent of damage are all clear. Humans should be responsible for the environmental problems that are not easy to be solved if they are disasters.

4.3.6 COMPANY IS A HUMAN

CTG is the most frequently used name referring to the China Three Gorges Corporation in this report, so we can begin with the collocations of CTG. The most frequent collocation of CTG is *has* (appears 138 times), a marker for present perfect tense, which indicates what CTG has done. *Will* (appears 40 times) is another important collocation of *ctg*, and it shows what CTG will do in the future. Table 14 lists some concordances of *ctg has* and *ctg will*, and we can find that CTG has been personalized by using words that are often used to describe human behaviors. For example, *adopted*, *conducted*, *established*, *realized*, etc. Moreover, many words are modified by a positive adverb or adjective, such as *actively*, *always*, *profoundly*, *firmly*, *systematically*, etc. So, a very positive prosody can be found around CTG. Now we can know what kind of "person" CTG is portrayed: a reliable, active, powerful, responsible and professional person who has done a great many things to protect the environment and will keep doing these in the future. The problem of this metaphor is that if CTG is such a perfect person,

it is less possible that it can make big mistakes, including causing damage to the environment. As a result, people may support its actions and will lower their vigilance of the potential danger it could bring to the environment. Most importantly, it could make us forget who the troublemaker is and the bad characteristics this person has. Hence, the metaphor COMPANY IS A HUMAN can be a destructive discourse.

Table 14 "CTG has/will" concordance

CTG has *actively carried out* a lot of work. Get to
CTG has *adopted* the whole process environmental management, including setting up
CTG has *always endeavored* to control the impacts of the industrial
CTG has *conducted* environmental risk identification at each construction zone from
CTG has *conserved* the territorial ecosystem. In 2014, CTG mainly carried out
CTG has *established* a scientific research platform for aquatic life protecting
CTG has *organized* a study and demonstration program for the ecological
CTG has *profoundly realized* its social responsibility in the eco-environmental
CTG has *released* more than 5 million Chinese sturgeon in various sizes,
CTG has *strictly followed* the Law on Environmental Impact Assessment of
CTG will *carry out* the ecological restoration and protection of the
CTG will *carry out* aquatic ecological restoration and protection of the
CTG will *closely focus on* the strategic target of building a
CTG will *continue* the strategic objective of building a world-class
CTG will *firmly undertake* the new missions entrusted by the Central
CTG will *further improve* the comprehensive benefits of the cascade complexes
CTG will *plunge into* work with a sense of responsibility and
CTG will *strengthen* the operational management of the Three Gorges Project
CTG will *take* the comprehensive benefits of upper Yangtze mainstream
CTG will *systematically execute* our environment protection work.With emphasis on

4.4 Evaluation

As an energy-providing corporate, it is interesting to see how CTGC describes its product. Table 15 shows the top 10 collocates of energy on the left according to their frequency. Among them, it is easy to identify three words sound positive: *clean* (201 times), *new* (50 times), and *renewable* (16 times).

Table 15 Collocates of "energy" (top 10)

1	201	***clean* energy**
2	53	*of* energy
3	50	***new* energy**
4	37	*for* energy

5	28	*the* energy
6	25	*and* energy
7	16	*on* energy
8	16	***renewable* energy**
9	15	*solar* energy
10	12	*flow* energy

These three words are the three purr-words that CTCG uses to describe its product—energy. (see Appendix 3, 4, and 5 for the concordances of "clean energy", "new energy", and "renewable energy".) These evaluations aim to convince the reader that what CTG provides, produces, and develops is clean, new, and renewable energy. As we know, when something is claimed to be clean, it is free from dirt; when it is new, it is worth trying; when it is renewable, there is no reason to refuse it.

However, is the energy provided by CTG, especially its main product—the hydroelectricity, really so fantastic? Apparently, hydroelectric does not produce greenhouse gas like other fossil fuels; however, the environmental cost of generating hydroelectricity is still very high. At least the impact is much bigger when compared with, for example, thermal power plants. The emission of exhaust gas can be stopped immediately once the thermal power plant is shut down. However, the systemic and long-term damage to the ecosystem caused by the water dam cannot be easily removed by shutting down a hydroelectric dam. If we just accept the marketing of clean energy without a second thought, more and more hydroelectric dams would be built to cater to the need. Hence, using these three purr-words to modify the hydroelectric could form a destructive discourse.

An alternative way of describing energy could be adding the word *partly* to the phrase: the partly clean energy and the partly renewable energy. Similar to the previously mentioned development frames, there seems to be no energy that can be completely clean and renewable. If we admit the energy can just be partly clean and renewable, we could be more cautious when choosing the energy type to consume.

4.5 Identity

Through the close reading of the KWIC of *we* and *our*, I found that almost all of them refer to CTGC itself, and none of them have included any non-humans such as fish, birds, river, trees,

etc. (See Appendix 6 and 7 for the concordance of *we* and *our*) However, these non-human participants are the crucial parts in maintaining the ecosystem of Yangtze River. Besides, the concordance of CTG/CTGC has given us the impression that it has constructed itself as an environment protector. Table 16 lists the top 9 collocates of CTG on the right, and we can find that there are many words related to actions, such as *has*, *will*, *actively*, and *conducted*. They can indicate what CTG has done and will do.

Table 16 Collocates of "CTG" (top 9)

Rank	Frequency	Collocate
1	138	ctg *has*
2	54	ctg *management*
3	50	ctg'*s*
4	40	ctg *will*
5	32	ctg *is*
6	24	ctg *actively*
7	18	ctg *conducted*
8	18	ctg *established*
9	18	ctg *in*

Further close reading of the concordances shows that most of them are about what actions CTG has taken or will perform to protect the environment. For example, in (12) and (13), we can find the identity CTGC tries to build is an environment protector for the endangered species such as Chinese sturgeons:

> (12) "Through careful research and meticulous maintenance, **CTG has** created an **environment** suitable for endangered species." (2017)
>
> (13) "CTG **established** a research platform for aquatic life resource protection in hydropower development based on its Chinese sturgeon Research Institute, which was responsible for the technical research on the protection of Chinese sturgeon and rare and endemic fish species in the Yangtze River as well as the publicity and education on eco-environmental protection." (2014)

Then, in (14), CTG states its goal in the future is to develop renewable energies and make the best use of the Three Gorges project. Here, it shows itself as a clean energy provider:

> (14) "CTG **will** actively exploit **renewable energies** such as wind power for providing the society with clean energy, fully display the comprehensive benefits of the Three Gorges

Project in flood control, power generation, navigation and ecological water compensation, aiming at reaching a harmony situation between clean energy development and eco-**environment protection**." (2010)

In (15) and (16), by emphasizing the research on ecological conservation is always its focus, and showing its resolve to realize the ecological civilization in the Yangtze River economic belt by deepening its studies on the environment, CTGC builds another identity as an environmental researcher:

(15) "The **CTG has** always attached great importance to the research on ecological conservation." (2009)

(16) "CTG **will** deepen major special studies on ecological environments and contribute efforts to the construction of the Yangtze River Economic Belt into a model for ecological civilization." (2017)

Moreover, as shown in (17), an identity of an environment operator is constructed by pointing out the ecological operation it has performed to save the four endangered Chinese carps:

(17) "CTG **conducted ecological operation** for the natural reproduction of the four major Chinese domestic carps in the middle reaches of the Yangtze River for the seventh consecutive year." (2017)

It is understandable that a company like CTGC tries to build these positive identities out of its interests. Also, it is good that at least this identity has made CTGC take actions to make up for the environmental damages caused by it. However, there are three issues needing further consideration. First, these identities might help CTGC to blur the truth that it is also the environment destroyer, thus shifting people's attention from criticizing it to accepting it. Second, those identities also indirectly give consumers identities of being clean-, green-, and renewable-energy consumers, further facilitating the environmental destruction. Third, the exclusive use of first-person pronouns has drawn a clear distinction between itself and non-humans, leaving them in the outgroup. The identity of environment protector, researcher, and operator seems to leave CTGC in a supreme status that it has the right to take the life and well-being of all the non-humans in the area. However, as a water dam company, it must realize that it cannot survive and succeed without the sacrifice of non-humans (e.g., Chinese sturgeons have to give up their migration plan), thus it should treat them as the same group members, and their living conditions deserve respect. Hence, these identities could form a destructive discourse.

4.6 Erasure

In the corpus, a typical example is the nominalization of *pollute*. As mentioned before, the lemma *pollute* has four different grammatical forms, and they are nominal (pollution, pollutions), verb (pollute, polluted, pollutes, polluting), adjective (polluted), and adverb (pollutedly). Table 17 shows the frequency of these different forms.

Table 17 Frequency of 4 forms of pollute

Type	Word	Frequency
Nominal	pollution	105
	pollutions	0
Verb	pollute	0
	polluted	0
	pollutes	0
	polluting	1
Adjective	polluted	4
Adverb	pollutedly	0

As we can see in Table 17, the nominal type *pollution* occurs 105 times while the verb type and the adjective form only occurs 1 and 4 times, respectively. Interestingly, although the adjective form *polluted* is not nominal, it is typically used within a noun phrase when modifying the noun *areas* (see Table 18). Similarly, the verb form *polluting* actually acts as a gerund (a verb form functioning as a noun), as shown in its context (see (18)). In this regard, the *polluted areas* and *polluting* can also be counted as nominals.

Table 18 “Polluted areas” concordance

1	resources. Toxicity test of aquatic organisms in	polluted areas;	accidents of dead fish from pollution.
2	resources. Toxicity test of aquatic organisms in	polluted areas;	accidents of dead fish from pollution.
3	fish from pollution, and toxicity test of	polluted areas.	Reproductive ecology, spawning field and
4	fish from pollution, and toxicity test of	polluted areas.	Reproductive ecology, spawning field and

(18) “The diesel generators used at site have been strictly inspected and protected to avoid **polluting** the surrounding soil and water body from oil leakage.” (2008)

What has been erased here is who is responsible for the pollution. As shown in (19), CTGPC, who should be responsible, only appears when it needs to emphasis great attention has been

paid to the pollution. However, when it comes to the specific pollution, e.g., noise pollution, CTGPC is erased.

> (19) "**CTGPC paid great attentions to prevention and control of pollution** in the process of hydropower projects construction and power generation. Industrial and domestic wastewater was treated with professional methods and domestic waste was managed with regulations. **Measures were taken to prevent and reduce dust and noise pollution**. Control of hazardous solid waste was enhanced and clean-up work of drifters on mainstreams of reservoir areas was strengthened." (2009)

Further investigation on the collocations of pollution gives us more comprehensive information. Table 19 shows the top 10 collocates of pollution on the left and right, respectively. Although some of them are used to against pollution, e.g., *pollution control* and *pollution prevention*, and some refer to concrete pollution types, e.g., *water pollution*, they are all abstract concepts which will, as Schleppegrell (1997, p.55) indicates, "suppress the expression of agency". In the reports, only the nominal form of pollute can be seen, effectively decreasing readers' attention on the responsibility the troublemaker—CTGC should take. So, the nominalizing of pollute could form a destructive discourse.

Table 19 Collocates of "pollution" (top 10)

Rank	Frequency	Left	Frequency	Right
1	16	pollution control	14	of pollution
2	12	pollution prevention	12	environmental pollution
3	7	pollution, and	8	water pollution
4	6	pollution caused	6	includes pollution
5	6	pollution sources	6	the pollution
6	5	pollution accidents	5	air pollution
7	4	pollution and	5	and pollution
8	4	pollution in	5	noise pollution
9	3	pollution source	4	from pollution
10	2	pollution ctg	3	low pollution

4.7 Salience

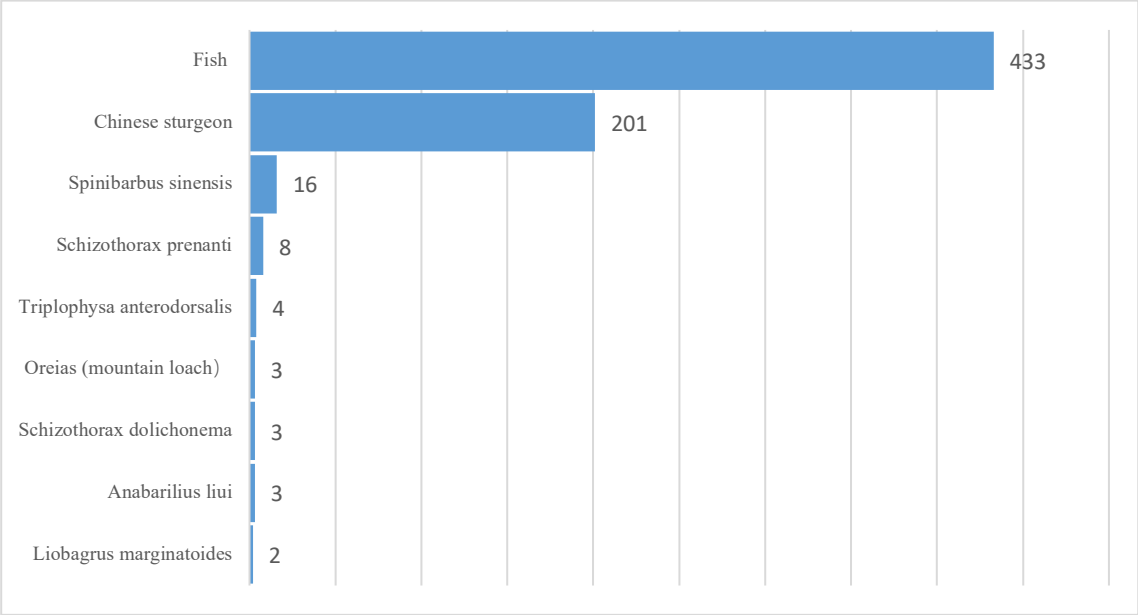
Here I investigate the saliency of fish in terms of abstract level. As we know, with the construction of the Three Gorges Dam, almost every type of fish in the Yangtze River has been influenced.

According to Stibbe (2015), the more abstract the word is, the less salient is the object that is represented. Hence, *spinibarbus sinensis*, *schizothorax prenanti*, *triplophysa anterodorsalis*, *oreias (mountain loach)*, *schizothorax dolichonema*, *anabarilius liui*, and *liobagrus marginatoides* can be the most abstract words, as they are all scientific names that are too terminological to be known by laymen. When they come to our eyes, it is, in fact, very hard to activate any images of them. A better alternative is to use their local names that people are much more familiar with in their daily life. When compared with the Latin names, the word *fish* is less abstract. As Lakoff & Wehling (2012) suggest, basic level words are the most powerful words activating the motor program and image in our brain. *Fish* is a basic level word as everyone could encounter it in our daily life, easily reminding us of a vivid and clear image and the scenario when we interact with fish. As for the *Chinese sturgeon,* although it is also a hyponym of fish and scientific word, it can also immediately activate a salient image, at least in Chinese people's mind. It has been one of the most famous endangered species in China since the construction of the first water dam—Gezhou Dam in the Yangtze River. Its situation became even worse with the construction of the second but the largest dam—Three Gorges Dam. These two dams cut off its migration route, making its population suddenly collapse to the edge of extinction (Zhang et al., 2014). By using the word Chinese sturgeon, Chinese people will be reminded of the terrible situation that Chinese surgeons are facing and will strengthen the awareness of protecting them.

However, it is not enough to just realize saliency from the perspective of word choice. How many times a word appears also contributes a lot to its saliency. So, I determine how many times fish and its hyponyms appear in the corpus. As we can see in Figure 6, quantitatively speaking, the word *fish* is still the most salient one appearing 433 times. Then comes *Chinese sturgeon* (201), *spinibarbus sinensis* (16), *schizothorax prenanti* (8), *triplophysa anterodorsalis* (4), *oreias (mountain loach)* (3), *schizothorax dolichonema* (3), *anabarilius liui* (3), and *liobagrus marginatoides* (2).

In summary, the more salient both qualitatively and quantitatively a word is, the more sympathy and emotion it can trigger in people's minds. Using the basic level word fish can form a beneficial discourse, whereas using the Latin names that most people would feel strange to can form a destructive discourse.

Figure 6 Quantitative counts of fish and its hyponyms



4.7.1 How non-humans are represented: fish as an example

Now let us further investigate how fish is represented. Table 20 displays the top 5 collocates of fish on the right according to the frequency rank, and the top 3 (*fish species*, *fish breeding*, and *fish recourses*) are chosen for the further analysis.

Table 20 Frequency of "fish" collocates (top 5)

Rank	Frequency	collocate
1	48	fish *species*
2	41	fish *breeding*
3	24	fish *resources*
4	21	fish *in*
5	15	fish *nature*

First of all, let us look at *fish species*. Table 21 displays its concordance, and it is easy to find that a negative semantic prosody is associated with fish species, as they are accompanied by words such as *rare, endemic, unique, distinctive,* and *special*. These words indicate that the fish species are facing great danger.

Table 21 Extract form "fish species" concordance

1	. Status of Fish Resources Rare and Endemic	Fish Species	and Important Commercial Fish Species In 2015,
2	species in lower Jinsha River, there were 151	fish species	appeared in the Upper Yangtze Rare

3	of Chinese sturgeon and rare and endemic	fish species.	Artificial Propagation Technology System of Chi
4	protection measures for the rare and endemic	fish species	at the upstream of the Yangtze
5	the natural reserve for rare and endemic	fish species	at the upper Yangtze River, and
6	the Natural Reserves for Rare and Endemic	Fish Species	at the Upper Yangtze River. Monitoring
7	,000 Nationa Natural Reserve for Rare and Endemic	Fish Species	at Upper Yangtze River species:Acipenser
8	ui section), with 4,477 individuals of 36 endemic	fish species	being monitoredn, among which 19 species were
9	such areas as the protection of habitats,	fish species	bird species, and plant species, water
10	on fishes Conducting proliferation and release of	fish species	Conducting research on habitat protectionmechanis
11	The system monitors mainly rare and Unique	fish species	important economic fish resources, fish spawning
12	propagation and releasing of rare and distinctive	fish species	in Jinsha River and Minjiang River,
13	propagation and releasing of rare and endemic	fish species	in Jinsha River and Minjiang River,
14	hydropower development showed that among the 160	fish species	in lower Jinsha River, there were 151
15	cipenser dabryanus, mullet, and other distinctive	fish species	in the main course of upstream
16	acipenser dabryanus, mullet and other distinctive	fish species	in the main course of the

The second one is *fish breeding*. From table 22, we can see that the right parts are mostly *releasing station*. These stations, located at the different tributary of the Yangtze River, are the places where the rare and endemic fishes are *bred*, *fattened*, and *released* to the river as the supplemental supply of fishery resources. The question is, why they need artificial propagation? Who has caused this situation?

Table 22 Extract from “fish breeding” concordance

1	Huangbaihe site, and the Rare and Endemic	Fish Breeding	and Releasing Station at Xiluodu-Xiangjiaba
2	erve their aquatic habitats. The establishment of	fish breeding	and releasing stations as well as
3	eparation), Huangbaihe Base, the Rare and Endemic	Fish Breeding	and Releasing Station at Xiluodu-Xiangjiaba
4	-Xiangjiaba projects on the Jinsha River, and	Fish Breeding	and Releasing Station at Wudongde-Baihetan
5	, Chongqing Breeding and Releasing Station, etc.	Fish Breeding	and Releasing Station at Wudongde-Baihetan
6	2013 and start trial operation. Rare and Endemic	Fish Breeding	and Releasing Station at Xiluodu-Xiangjiaba
7	the end of 2012, the Rare and Endemic	Fish Breeding	and Releasing Station at Xiluodu-Xiangjiaba
8	Yibin and Luzhou section of the Yangtze.	Fish Breeding	and Releasing In 2012, CTG released 16 first
9	engineering facilities on mainstream Yangtze and	fish breeding	and releasing stations on Yangtze. It

10	other rare and endemic fish of Yangtze,	fish breeding	and releasing, ecological regulation, as well
11	fishes was summarized. Procypris rabaudi parent	fish breeding	, artificial propagation and fish fry breeding
12	three sites, the Three Gorges Dam Area	Fish Breeding	Center, the Huangbaihe site, and the
13	- Banan, and Chuishui Renhuai, etc. In the	fish breeding	, fattening, and wintering periods in 2013, fish
14	cross-section for abovementioned fish. In the	fish breeding	, fattening, and wintering periods, fish habitats
15	show that it greatly promoted the natural	fish breeding	in its downstream Yichang. Corporate Profile
16	will be constructed or purchased; 8,774.7 m2 of	fish breeding	ponds and 360 m3 of impounding ponds
17	been expropriated for management-use houses and	fish breeding	ponds; 1,786.9 m2 of offices and auxilliary
18	ts to create hydrological conditions suitable for	fish breeding	, thus protecting aquatic organisms. In order

Fish resource is another typical collocation of fish. It shows that fish is treated as a type of resource. Once they are identified as resources, they are at human beings' disposal; thus, they can be developed, sold, and used. On the other hand, resources are limited and should be well monitored. Here they are represented as a passive group, and as if their only duty is to serve for human beings. As we can see in (20), although all sorts of systems, devices are built up to protect these rare and endemic species, their future is still bleak as long as they are regarded as resources.

> (20) "By accumulating basic data of rare and endemic fishes in the upper Yangtze River and the conservation, as well as through dynamic monitoring of the environment and **fish resources**; The system will predict undesirable trends and release warnings, propose measures to mitigate negative influence." (2011)

Nevertheless, in fact, the meaning of their existence is far more than just being resources to be monitored and used. They are the habitants of the river and the essential part of the whole ecosystem.

The above classification of discourse type is based on my ecosophy that humans should regard themselves as a part of the nature and respect other life on the Earth, and not only the wellbeing of humans but also that of more-than-humans should be maintained. For the same story, people having different ecosophy, ideology, and value would classify it differently. The identification of the above stories in this study is not the only option. For example, one may think developing hydroelectricity with the water dam is essential because China is still the largest developing

country. Its energy demands, rather than environmental protection, should be met first; thus, describing hydroelectricity as a kind of clean and green energy is a beneficial discourse.

5. Conclusion

To conclude this study, let us first review the three research questions put forward in the beginning:

1. Are there any beneficial, ambivalent, or destructive discourses in the China Three Gorges Corporation's annual environmental reports?

2. If so, how is each story being constructed?

3. What suggestions and implications can we obtain from the analyses of these stories?

To answer the first and second questions, I analyzed six types of stories in the China Three Gorges Corporation's ten annual environmental reports, including the frame, metaphor, evaluation, identity, erasure, and salience. Through the investigation of their linguistic manifestations, one beneficial, four ambivalent, and nine destructive discourses were found in the reports.

With regard to the frame, two ambivalent discourses were identified: the sustainable development frame and the green development frame. Under the first frame, CGTC would take some actions that are beneficial to the environment, for example, limiting its resource consumption under a certain level that would not hurt next generation's benefits; whereas, this frame helps to justify the construction of the Three Gorges Dam, which is in essence not sustainable at all to the environment. As for the second frame, similar to the former, under this frame many so-called green energies or clean energies are developed such as wind power, which does help to reduce the damages to the environment to some degree; however, this frame could also make us ignore the damage the green/clean energies cause to the environment.

With regard to the metaphor, six metaphors were analyzed. Among them, four were found to be destructive discourses: RIVER AS A TOOL FOR MAKING MONEY, NATURE IS A MACHINE, ECOLOGICAL DAMAGE IS AN ACCIDENT, and COMPANY IS A HUMAN; two can be ambivalent discourses: NATURE IS A COMPETITION and CLIMATE CHANGE IS A WAR. These destructive stories and the negative parts of the ambivalent stories found in the water dam discourse reflect a kind

of non-life-sustaining relationship, in which humans (represented by CTGC) and the artifact (water dams) are suppressing other life and trying to conquer the environment.

RIVER AS A TOOL FOR MAKING MONEY only highlights the aspect of profit-making from the Yangtze River but ignores the fact that the Yangtze River is at first the home of enormous number of more-than-humans. NATURE IS A MACHINE is reflected by the use of *ecological operation*, and it reduces people's respect for the environment. If nature is treated as a machine, any damage caused to it, such as the pollution to the Yangtze river and the extinction of fish species, can be easily fixed. ECOLOGICAL DAMAGE IS AN ACCIDENT helps CTGC to evade the responsibilities of causing damages to the environment as accidents are always happened by chance. COMPANY IS A HUMAN is destructive as in the report, CGTC was constructed as a perfect person who had taken many actions to protect the environment. This could cover the fact that CTGC is a for-profit company, the main product of which is the large water dam that is of great devastation to the environment. NATURE IS A COMPETITION, in the first place, puts humans and nature in a tense relationship where one's victory is accompanied with the other's failure. However, in the report, CTGC used the expression of *win-win*, which maximizes the cooperation and minimizes the competition between the nature and humans. CLIMATE CHANGE IS A WAR points out the urgent ecological situation we are facing; thus, actions need to be taken right away; nevertheless, there must be sacrifices if there is a war, which could force the disadvantaged groups to take more responsibilities.

With regard to the evaluation, three purr-words were analyzed: *clean, new,* and *renewable*. These three purr-words were used to evaluate CTGC's main product—hydroelectricity, and they can be classified together as a destructive discourse. These words only emphasized the good part of hydroelectricity but overlooked the fact that the environmental cost of generating it can be very high.

As regards the identity, the pronouns *we* and *our* were frequently used. CTGC used these two words exclusively in most cases to refer to itself, while the endangered fish species influenced by the Three Gorges Dam were not included as ingroup members. This can be a destructive discourse, as it distanced the more-than-human participants from human participants. Moreover, CTGC created three positive environmental identities for itself: environment protector, clean energy provider, environment researcher, and environment operator.

When it comes to the erasure, a typical environment-related word *pollute* was found to be nominalized. Among the 10 reports, only the nominal form of pollute can be found, which, to

some degree, erased the agent of pollution—CTGC. So, this can be a destructive discourse which could help to shirk the responsibility.

As for the salience, some fish species were less salient as their names were too scientific to be known by most people, which makes it hard to trigger the vivid images in people's minds; thus their endangered situation can be ignored. Hence, they could form a destructive discourse. Besides, the most salient word in the reports was *fish* both qualitatively and quantitatively: it was a basic level word, and it was the one appearing most frequently in contrast to other words used to address fish species. This can be a beneficial discourse as it could trigger the concrete images of fish in people's minds, giving rise to more empathy. Moreover, fish was constructed as a type of resource at human beings' disposal, and their intrinsic value as an important member of the ecosystem was ignored. So, this can be a destructive discourse.

The analyses of these stories can help us to uncover the environment-unfriendly ideology hidden in the water dam discourse and improve our understanding of this type of ecological discourse that has not received enough attention. As mentioned before, water dams, unlike other types of energy-generating devices, have an influence on the environment that is always long-term and systemic. However, they are often positively described via the use of specific linguistic features such as the purr-words *clean/sustainable/green energy* or the tempting metaphor RIVER AS A TOOL FOR MAKING MONEY. These linguistic features could accumulate and form certain story types. For example, some frames and metaphors can be used to mislead people into supporting some practices that sound environment-friendly, but in fact, are not. Some evaluation stories can be used to amplify the benefits of some products that can be pollutants to the environment. Some erasure stories could erase not only the victims of pollution but also the polluters who should be responsible. Then, as mentioned before, the beneficial discourses should be promoted; the destructive discourses should be resisted; and, as for the ambivalent discourses, we should praise the positive parts and reject the negative parts.

However, one thing that must be mentioned here is that the judgments on the stories are made according to the analyst's ecosophy, which could vary from person to person and could result in different opinions about the same story. For example, an analyst who holds to the anthropocentrism may think the metaphor RIVER AS A TOOL FOR MAKING MONEY is not a destructive discourse since it prioritizes humans' benefits. To sum up, by identifying these stores, analyzing their linguistic features ecologically and critically, and exposing them to the public, we can learn to be more vigilant when seeing these discourses. Similar analyses could

also be performed with other large environment-influential companies' ecological discourses, such as the environmental reports of Coca-Cola and Royal Dutch Shell.

Second, as mentioned in the theory section, this study uses Halliday's approach, aiming to investigate the interaction between language and ecosystem. Based on that, the story framework put by Stibbe (2015) further explores what role that language can play in the life-sustaining interaction between the physical environment, humans, and more-than-humans. This study finds that the story framework works well in linking different linguistic features with ecological issues. It integrates different linguistic theories into a unified system, enabling us to analyze the ecological discourses from a more comprehensive and systemic perspective. However, this theoretical framework appears to have the following limitations: first, the story is limited to only eight forms. Further research could discover more story types by doing more empirical studies on different types of ecological discourse. Second, we cannot ignore the fact that the frequency and the modes of presentation also matter. In other words, although a story can be beneficial, destructive, or ambivalent, its influence is minimal if it only appears once in the texts. Also, the effect is different when a story is put forward by a celebrity rather than an average person. Besides, different modalities have different effects. The story represented in a picture, or a video can be more vivid and eye-catching than just being described in words. Hence, future research could do some multimodal ecological discourse analyses.

Finally, from the analyses in this study we can find that linguistics can also contribute to environmental protection by investigating the impact of language use on the ecosystem we are living by. On the one hand, more destructive stories need to be identified and marked out. This can be done by doing more ecological linguistic analysis on those commercial discourses in our daily life. On the other hand, we could also discover and highlight more beneficial stories. For example, I have put forward some alternative stories such as using the limited green/sustainable development frames, replacing the word *accident* with human-made disaster, and replacing the golden waterway with the golden ecosystem to describe the Yangtze River. More beneficial stories can be found from the ecological literature such as the Japanese haiku and Chinese landscape poetry, the language of which often emphasizes the positive interaction between humans and nature.

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Appendix 1 Overall frequency list without stopwords (top 50)

	Token	Counts	Relative frequency (/10000 words)
1	environmental	1317	178.43
2	project	1159	157.02
3	ctg	1071	145.1
4	protection	1017	137.78
5	water	916	124.1
6	construction	910	123.29
7	three	857	116.11
8	river	823	111.5
9	gorges	718	97.27
10	hydropower	684	92.67
11	power	650	88.06
12	management	634	85.89
13	energy	615	83.32
14	system	601	81.42
15	ecological	592	80.2
16	development	575	77.9
17	monitoring	545	73.84
18	yangtze	493	66.79
19	fish	455	61.64
20	conservation	439	59.48
21	environment	434	58.8
22	projects	415	56.22
23	operation	388	52.57
24	chinese	388	52.57
25	wastewater	385	52.16
26	area	376	50.94
27	station	375	50.8
28	reservoir	360	48.77
29	china	347	47.01
30	research	323	43.76
31	treatment	313	42.41
32	rare	292	39.56

33	xiangjiaba	262	35.5
34	areas	259	35.09
35	report	249	33.73
36	clean	247	33.46
37	resources	247	33.46
38	wind	246	33.33
39	endemic	244	33.06
40	control	241	32.65
41	generation	241	32.65
42	waste	241	32.65
43	measures	239	32.38
44	soil	235	31.84
45	flood	220	29.81
46	quality	216	29.26
47	sturgeon	215	29.13
48	xiluodu	210	28.45
49	total	208	28.18
50	jinsha	198	26.82

Appendix 2. Frequency list of each report without stopwords (top 20)

2017	[('environmental', 204), ('ctg', 203), ('protection', 167), ('river', 150), ('water', 118), ('ecological', 117), ('development', 110), ('yangtze', 106), ('power', 97), ('energy', 90), ('hydropower', 87), ('management', 81), ('construction', 81), ('environment', 72), ('project', 71), ('three', 69), ('operation', 65), ('station', 65), ('china', 64), ('wind', 62)]
2016	[('ctg', 214), ('environmental', 205), ('protection', 174), ('management', 116), ('hydropower', 110), ('construction', 107), ('ecological', 105), ('energy', 100), ('river', 90), ('water', 86), ('monitoring', 83), ('power', 81), ('development', 76), ('chinese', 74), ('three', 72), ('environment', 69), ('station', 67), ('project', 65), ('system', 57), ('gorges', 55)]
2015	[('construction', 117), ('environmental', 115), ('ctg', 99), ('water', 91), ('protection', 84), ('project', 84), ('river', 78), ('hydropower', 76), ('management', 62), ('wastewater', 59), ('fish', 57), ('power', 55), ('three', 47), ('energy', 47), ('operation', 47), ('ecological', 46), ('system', 46), ('projects', 44), ('treatment', 43), ('waste', 39)]
2014	[('project', 130), ('environmental', 129), ('ctg', 108), ('protection', 88), ('construction', 87), ('fish', 82), ('three', 81), ('river', 80), ('monitoring', 75), ('water', 74), ('chinese', 74), ('management', 70), ('gorges', 65), ('system', 64), ('yangtze', 62), ('sturgeon', 62), ('power', 61), ('hydropower', 58), ('wastewater', 58), ('ecological', 53)]
2013	[('environmental', 140), ('ctg', 110), ('project', 103), ('protection', 91), ('water', 82), ('river', 82), ('construction', 79), ('three', 78), ('hydropower', 76), ('management', 76), ('system', 69), ('gorges', 61),

	('monitoring', 59), ('development', 58), ('power', 57), ('energy', 52), ('yangtze', 49), ('environment', 47), ('ecological', 46), ('wastewater', 46)]
2012	[('environmental', 138), ('three', 121), ('project', 120), ('ctg', 111), ('water', 111), ('construction', 109), ('gorges', 100), ('protection', 86), ('system', 83), ('management', 78), ('monitoring', 68), ('energy', 62), ('hydropower', 60), ('power', 60), ('reservoir', 55), ('river', 54), ('wastewater', 53), ('ecological', 50), ('conservation', 45), ('china', 44)]
2011	[('project', 117), ('environmental', 104), ('three', 85), ('protection', 82), ('water', 79), ('construction', 78), ('gorges', 75), ('ctg', 70), ('river', 61), ('development', 50), ('power', 50), ('energy', 49), ('system', 48), ('hydropower', 47), ('management', 42), ('reservoir', 42), ('area', 40), ('yangtze', 39), ('station', 39), ('ecological', 38)]
2010	[('project', 260), ('three', 166), ('ctg', 156), ('environmental', 148), ('gorges', 146), ('system', 128), ('protection', 124), ('water', 116), ('river', 114), ('construction', 112), ('power', 106), ('energy', 98), ('hydropower', 94), ('development', 92), ('wastewater', 82), ('reservoir', 80), ('monitoring', 72), ('conservation', 72), ('ecological', 70), ('management', 68)]
2009	[('project', 81), ('three', 76), ('ctgpc', 72), ('gorges', 66), ('construction', 65), ('conservation', 60), ('river', 59), ('environmental', 58), ('water', 57), ('hydropower', 55), ('wastewater', 55), ('energy', 53), ('protection', 52), ('power', 52), ('system', 47), ('environment', 43), ('ecological', 39), ('fish', 37), ('yangtze', 35), ('monitoring', 34)]
2008	[('project', 128), ('water', 102), ('environmental', 76), ('construction', 75), ('protection', 69), ('three', 62), ('fish', 61), ('gorges', 58), ('river', 55), ('area', 45), ('development', 40), ('projects', 37), ('ctgpc', 32), ('power', 31), ('xiangjiaba', 31), ('soil', 30), ('ecological', 28), ('research', 28), ('xiluodu', 27), ('conservation', 26)]

Appendix 3. Extract from “clean energy” concordance

1	ower production through optimal regulation CTG increased the production of	clean energy	according to the operation status and the real upstream
2	the premise of protecting the environment and orderly development of	clean energy	, and attaches great importance to the ecological and environmental
3	he concept of green development, developing the Yangtze River, providing	clean energy	and constructing a beautiful home. In 2016, CTG closely followed
4	gical water compensation, realizing the harmony between the development of	clean energy	and environmental protection. Clean energy development Comprehensive bene
5	to build a world-class clean energy conglomerate, vigorously develop	clean energy	, and make greater contribution on building a beautiful China.
6	and an unremitting effort to promote the sustainable development of	clean energy	and promote a harmonious development between human and nature.
7	was obtained. Energy Saving and Emission Reduction To Actively Develop	Clean Energy	and Realize Energy Saving and Emission Reduction The CTG
8	of the Central Committee of the CPC, take provision of	clean energy	, build a better home as own responsibility, with firmer
9	such as wind and solar power, and actively expanded its	clean energy	business overseas. The CTG has taken real actions to
10	contributions to responding to and mitigating climate change. Developing	Clean Energy	Clean energy development plays an important role in achieving

Appendix 4. Extract from “new energy” concordance

1	wind power and solar energy, and strives to build	new energy	business as its second business pillar and become a
2	wind power and solar energy, and strives to build	new energy	business as its second business pillar and become a
3	safety of China energy system. In 2016, CTG persistently expanded	new energy	business like wind power, photovoltaic power and pumped-storage.
4	were certified, both making steady progresses. In 2015, the CTG 鈥	new energy	business reached a new level. The installed capacity in
5	4000 MWh. The energy efficiency analysis for China Three Gorges	New Energy	Cixi Wind Farm found out that its annual electricity
6	of CTG, China International Water & Electric Corp., China Three Gorges	New Energy	Co., Ltd., China Three Gorges Technology and Economy Development
7	equals to 74.9102 million tons of CO2 reduction.China Three Gorges	New Energy	Co., Ltd. generated 10.085 TWh of power, which equals to 3,529,800
8	of wind power, photovoltaic and other projects, China Three Gorges	New Energy	Co., Ltd. strictly abides by the red lines for
9	with photovoltaics and sea-buckthorn Constructed by China Three Gorges	New Energy	Co., Ltd, Gansu Dazhaitan Photovoltaic Power Station actively im-
10	2nd 2012. Water and soil conservation plan for China Three Gorges	New Energy	Co. Xitieshan Mining area Wind Farm (49.5MW).March 21st 2012.

Appendix 5. Extract from “renewable energy” concordance

1	to lead the development of offshore wind and other new	renewable energy	, and to display itself as a world-class large-
2	gration and administrative confirmation have been completed. In 2012, the	renewable energy	development of CTG progressed steadily. The increase of authorized
3	sector cooperation with the Tibet Autonomous Region. In 2011, CTG	renewable energy	developments progressed steadily. Installed wind power capacity reached 1,
4	Ministry of Environmental Protection, Beijing Normal University and China	Renewable Energy	Engineering Institute), National Engineering Research Center Resources Eff
5	Ministry of Environmental Protection, Beijing Normal University and China	Renewable Energy	Engineering Institute) and the National Engineering Research Center of
6	ental protection in 2010 Note Investment for Environmental Protection for	renewable energy	, overseas business and donations are all included in others)
7	hydropower, optimizing thermal power, boosting nuclear power and promoting	renewable energy	power. Regarding building the Three Gorges Project and Developing
8	enterprises that had extraordinary performance in gas, coal, nuclear and	renewable energy	project, and occupied the leading position in the industry

Appendix 6. “We” concordance

1	gives top priority to ecological protec- tion.	We	actively explore new roads for ecological protect
2	and landfill of construction and domestic wastes.	We	also enhance standardized management to reduce th
3	operation of domestic sewage treatment stations.	We	also innovate environmental protection technologi
4	s ability to implement its social responsibility,	we	are eager to hear your voice. Please

5	and domestic sewage in a proper way.	We	construct and improve treatment facilities inspec
6	and win-win outcomes can be delivered.	We	continuously strengthened ecological and environm
7	ghout the construction and operation of projects.	We	effectively prevent and control the adverse im-
8	01 environmental management system certification.	We	enhance post responsibility management and intern
9	economic and social development. By doing so,	we	hope that a greater number of people
10	mprehensive coordination, and dynamic management,	we	managed emergency plans, organized training and d
11	to respect, accommodate to and protect nature.	We	must give high priority to making ecological
12	onmental pollution and a deteriorating ecosystem,	we	must raise our ecological awareness of the
13	identify defects and problems. In this way,	we	optimize and improve the management system and
14	ion's ability to implement social responsibility,	we	particularly hope to know your comments and
15	campaign called and the Chinese Sturgeons:	We	protect the beautiful Yangtze River was simulta
16	spawning of the four domestic Chinese carps;	we	reached agreements on environmental protection wi
17	19th CPC National Congress in 2017 advocates that	we	should firmly establish a socialist outlook on
18	opment into production, management and operation.	We	strictly implement emission reduction measures fo
19	oject construction activities on the environment.	We	strictly implement the Three Simultaneities syste
20	of environmental conditions. At the same time,	we	will carry out diversified training ac- tivities

Appendix 7. “Our” concordance

1	Mother River of the Chinese nation with	our	actions. In 2018, guided by Xi Jinping Thought
2	ervation and environmental protection into all of	our	business, increasing the energy conservation and
3	pand into new industry forms, continue optimizing	our	business layout, and push ahead with the
4	and 66 special fishes and their habitat in	our	country, including paddlefish, acipenser dabryanu
5	and a deteriorating ecosystem, we must raise	our	ecological awareness of the need to respect,
6	man and nature co-exist harmoniously, contribute	our	efforts to the protection of ecological environme
7	g eco- logical environment and mitigating impact.	Our	environmental management covers the whole life
8	vironmental Fund, CTG will systematically execute	our	environment protection work.With emphasis on the
9	activities through the life cycle in their	our	jurisdiction, thus covering all environmental pro
10	sset, treating the ecological environment like	our	life. CTG deeply implements President Xi

11	, and more pragmatic style. Let us remember	our	mission by heart, work together to tackle
12	of environmental protection in order to 欽涊 rotect	our	Mother River and to Establish a Green
13	oration will make unremitting efforts to practice	our	own declaration: contributing clean energy, leadi
14	ironmental Protection Environmental protection in	our	report includes not only the environmental manage
15	ironmental Protection Environmental protection in	our	report includes not only the environmental manage
16	ironmental Protection Environmental protection in	our	report includes not only the environmental manage
17	ironmental Protection Environmental protection in	our	report includes not only the management of
18	ironmental Protection Environmental protection in	our	report includes not only the management of
19	pollution control meets local standards and meet	our	responsibility to the environmental. In 2017, CT
20	tivities on environmental protection, cultivate	our	staff with the sense of environmental protection
21	15% of the total energy consumption, it is	our	unshirkable responsibility to vigorously develop
22	to give us your valuable opinions on	our	work and report. How would you evaluate
23	to give us your valuable opinions on	our	work and report. 1. How would you evaluate
24	, all power stations and every step of	our	work strike a balance between human and

Appendix 8. Some codes used in the python

```
t1=0
t2=0
processed_data1={}
for file in os.listdir('.'):
  if file.endswith('.txt'):
    f=open(file, 'r')
    r=f.read()
    tokened_txt1=word_tokenize(r.lower())
    tokened_txt2=[]
    t1+=len(tokened_txt1)
    f.close()
  print(file, 'number of token with punctuations and stopwords: ', len(tokened_txt1))

  for w in tokened_txt1:
    if w.isalpha()== True:
      if w not in stop_words:
        tokened_txt2.append(w)
  processed_data1[file]=tokened_txt2
  t2+=len(tokened_txt2)

  print(file, 'number of token without punctuations and stopwords: ', len(tokened_txt2))

print(t1, t2)
```