

# Ecological Discourse Analysis of News Reports on Japanese Nuclear Wastewater Discharge from the Perspective of Transitivity: Based on UAM Corpus Tool Corpus Annotation Software

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## Abstract

In August 2023, Japan began to discharge the first nuclear wastewater, bringing about serious damage to the Marine ecological environment, which has attracted considerable media attention internationally. Drawing on the transitivity in Systemic Functional Linguistics and influenced by the ecosophy principles of “diversity and harmony, interaction and coexistence”, this study uses UAM Corpus Tool software to annotate and conduct ecological discourse analysis of the news reports on Japan discharging nuclear wastewater in *China Daily*. The results show that the action process represents the largest share (67.38%), and then the relational process (11.89%) and the communicative process (9.59%). The mental process takes up a smaller share (5.41%), while the existential process (1.8%) and the behavioral process (0.33%) have the smallest proportions. Through the analysis of the components of each annotated process, it is found that when the agent in the action process, the identified subject in the relational process, the communicator in the communicative process, and the sensor in the mental process are all Japan or the Japanese government, the discourse exhibits a negative ecological orientation. Conversely, when these components refer to other Asian countries, a positive ecological orientation is presented. The above research reveals the types of transitivity processes in news discourse and the ecological meanings represented by each process, disclosing the hazards of nuclear wastewater and providing insights for promoting the harmonious development between humans and nature.

**Keywords:** News reports, Japanese nuclear wastewater discharge, ecosophy, transitivity system, UAM Corpus Tool

## 1. Introduction

Ecological linguistics, as an emerging interdisciplinary field, has experienced vibrant growth and development over the past two decades. Its research encompasses two primary models<sup>[1]</sup>: the “Haugen model” which emphasizes language diversity, the preservation of endangered languages, and the development of language policies, and the “Halliday model” which explores ecological issues and the role of language in ecology through language<sup>[2]</sup>. Language serves as a medium of social intervention, urging linguists to shoulder societal and ecological responsibilities by enhancing human awareness of environmental conservation<sup>[3]</sup>. Thus, ecological discourse analysis within the Halliday model is advantageous in promoting public engagement in ecological conservation efforts. Initially, due to a lack of consensus on terminology, research scope, and methodologies, ecological linguistics under the Halliday model drew heavily from Critical Discourse Analysis (CDA) theories. Scholars such as Carvalho and Burgess<sup>[4]</sup>, Wodak and Meyer<sup>[5]</sup>, and Stibbe<sup>[6]</sup> utilized ecological CDA to critically analyze discourse, as seen in their studies. In 2014, the academic journal *Language Sciences* dedicated a special issue to discussing the establishment and development of ecological linguistics, emphasizing the discipline’s role in ecological discourse analysis (EDA). Since then, numerous scholars have employed EDA to study discourse

with ecological perspectives. Hansen explored how Western media report ecological issues like climate change and biodiversity loss through EDA<sup>[7]</sup>. Wang Xiaodong evaluated Chinese government policy discourse in ecological civilization construction using EDA<sup>[8]</sup>. Liu Junwen analyzed environmental reporting in mainstream Chinese media, focusing on language use and discourse strategies<sup>[9]</sup> by EDA. Zhang Lihua examined how Chinese corporations construct environmental responsibility in their social responsibility reports using EDA<sup>[10]</sup>. Recent EDA research has particularly concentrated on diplomatic discourse<sup>[11,12]</sup>, climate change news reporting<sup>[13,14]</sup>, and natural poetry<sup>[15]</sup>. Studies specifically analyzing ecological discourse on Japanese nuclear wastewater discharge news have been limited<sup>[16,17]</sup>, primarily approached from legal perspectives.

Fukushima Daiichi Nuclear Power Plant discharged treated wastewater into the Pacific Ocean in August 2023, which has sparked significant global controversy. This action has sparked widespread debate and scrutiny both within Japan and internationally due to its significant environmental, political, and social ramifications. Consequently, it has emerged as a pivotal topic for ecological and media discourse analysis. Media outlets play a crucial role not only in disseminating information to the public but also in shaping public perceptions and attitudes towards environmental issues. News reports surrounding complex and controversial topics, like the discharge of nuclear wastewater, construct discourse frameworks that influence how the public understands and reacts to these issues. Elements such as vocabulary choices, metaphors, and narrative structures used in these reports significantly impact audience interpretations. Guided by an ecological philosophical perspective<sup>[18]</sup> and drawing on Systemic Functional Linguistic theory, this study employs ecological discourse analysis using the UAM Corpus Tool. Designed for manual and semi-automatic annotation of textual and visual data, this software is adept at linguistic corpus annotation, making it invaluable for linguistic research endeavors<sup>[19]</sup>. Specifically, the study aims to analyze the transitivity processes within news reports on the Fukushima nuclear wastewater issue as covered by the China Daily. By doing so, it seeks to uncover types and the ecological implications associated with different transitivity processes, thereby shedding light on the hazards posed by nuclear wastewater. Ultimately, the study aims to promote a harmonious relationship between humans and nature and to foster a proactive ecological conservation ethos within society, in line with principles of ecological linguistics.

## 2. Theoretical Foundation

### 2.1 Ecosophy

The concept of ecosophy was first introduced by Naess in 1973, defining it as “ecological wisdom”, which pertains to the fundamental wisdom of Earth’s life systems<sup>[20]</sup>. It serves as a guiding principle of wisdom-in-action to direct our behaviors<sup>[21]</sup>. Within ecological linguistics, ecosophy is an essential topic that distinguishes it from other linguistic disciplines. Ecological discourse analysis, reliant on ecosophy, contributes to the promotion of the sustainable functioning of ecosystems. Scholars have put forth various ecophilosophical perspectives: under the model proposed by Halliday, the focus is on the relationship between humans and nature, while Xu Feng and Gao Yi advocated for “unity of humans and nature”<sup>[11]</sup>. Huang Guowen, He Wei, and Zhang Ruijie respectively proposed “harmonious” ecosophy<sup>[22]</sup> and “harmonious ecological place theory”<sup>[1]</sup>, interpreting ecosophy from static perspectives. Ecosophy should integrate both static and dynamic dimensions, playing a proactive guiding role in the sustainable development of ecosystems<sup>[21]</sup>. The ecosophy of “diversity and harmony, interaction and co-existence”, combining dynamic and static elements, embodies the characteristics of sustainable ecosystem operation, aligning with ecological principles as a highly comprehensive and universal perspective. Moreover, this ecological philosophy originates from traditional Chinese philosophy while incorporating Marxist thought<sup>[13]</sup>. Therefore, the philosophy aligns well and can be employed to guide ecological discourse analysis.

### 2.2 Transitivity system

Transitivity system, as a crucial component of ecological discourse analysis, unveil humanity’s comprehension, experience, and cognition of the objective world, primarily encompassing three grammatical elements: participants, processes, and environmental roles<sup>[23]</sup>. Traditional transitivity system involves participants such as “agent”, “patient”, “carrier”, “attribute”, and “environmental participant”, which are relatively general roles. They can be further categorized into agent participants (comprising individual and collective agents), physical locales, social locales, and non-human life agents<sup>[1]</sup>. The delineation of process systems lacks precision, and the international ecodiscourse transitivity analysis model formulated by He Wei and Wei Rong reconstructed the roles

of participants by classifying them into “living entities” and “non-living entities”<sup>[21]</sup>. Living entities are further divided into human life (encompassing all citizens) and non-human life forms (including animals and plants), while living entities also comprise individual participants and collective participants. Non-living entities encompass physical participants such as geographical locations, mountains, and rivers, and social participants including political, economic, and cultural aspects. Furthermore, they also restructured the process systems, which include six linguistic ontological process types—action processes, mental processes, relational processes, behavioral processes, communicative processes, and existential processes—and three subsystems: beneficial processes, detrimental processes, and neutral processes. Beneficial processes align with the proposed ecophilosophical perspective, while detrimental processes contradict the ecophilosophical perspective, and neutral processes neither align with nor go against the proposed ecophilosophical perspective. Consequently, this system can be utilized to analyze news coverage of Japan’s nuclear wastewater discharge, aiding in distilling beneficial discourse, detrimental discourse, and neutral discourse.

### 3. Research Methodology

#### 3.1 Research questions

This study endeavors to address these research inquiries: (1) What is the distribution of process components in the corpus of Japan’s nuclear wastewater discharge from *China Daily*? (2) What is the ecological orientation of the participants in the process components? Does it align with the ecosophy adopted in this study?

#### 3.2 Corpus selection

As a national comprehensive media outlet and one of the most authoritative mainstream media in China, *China Daily* is committed to providing accurate and timely information to the global audience through diverse communication channels around the clock. With a daily page view exceeding 42 million, it effectively demonstrates its influence worldwide. This study utilized corpus from *China Daily*, starting from Japan’s first nuclear wastewater discharge on August 24, 2023, and culminating with the news collected up to December 31 of the same year. A total of 15 typical news reports related to Japan’s nuclear wastewater discharge were extracted by manually entering “Japan nuclear waste water” on *China Daily*’s official website. These news language data were then transformed into UTF-8 format using a text document and subsequently underwent a cleaning process to remove spaces, blank lines, and special characters, resulting in a total character count of 11,812.

#### 3.3 Analytical tool

The UAM Corpus Tool is an advanced textual corpus annotation tool that enables linguistic researchers to annotate, retrieve, and statistically analyze language data for linguistic studies<sup>[19]</sup>. In accordance with the research requirements, the UAM Corpus Tool allows users to custom-label text analysis, facilitating the processing and analysis of language data. In this study, the UAM Corpus Tool 3.0 was employed to annotate transitivity system, as illustrated in Figure 1. The process annotation in the transitivity system drew inspiration from the process system constructed by He Wei and Wei Rong<sup>[24]</sup>, while other functional grammar annotations followed the system framework of *Systemic Functional Grammar* (second edition)<sup>[25]</sup>. Based on this corpus annotation software, the study involved the statistical analysis of participants and processes in the selected discourse. Due to the flexibility of environmental components’ positions, no statistical analysis was conducted in this regard. After identification and annotation using the tool, the study obtained the types and corresponding frequencies and distributions of the transitivity processes in the discourse on Japan’s nuclear wastewater discharge, analyzing the primary grammatical types and the underlying meanings expressed by these primary grammatical resources. To minimize the subjectivity of manual analysis, the author collaborated with another researcher with a linguistic background for the initial round of corpus annotation and data statistics, yielding an approximate match of 95%. Subsequently, discussions were conducted on different segments, and peer experts provided guidance to reach a consensus, thus ensuring the credibility and validity of the data.

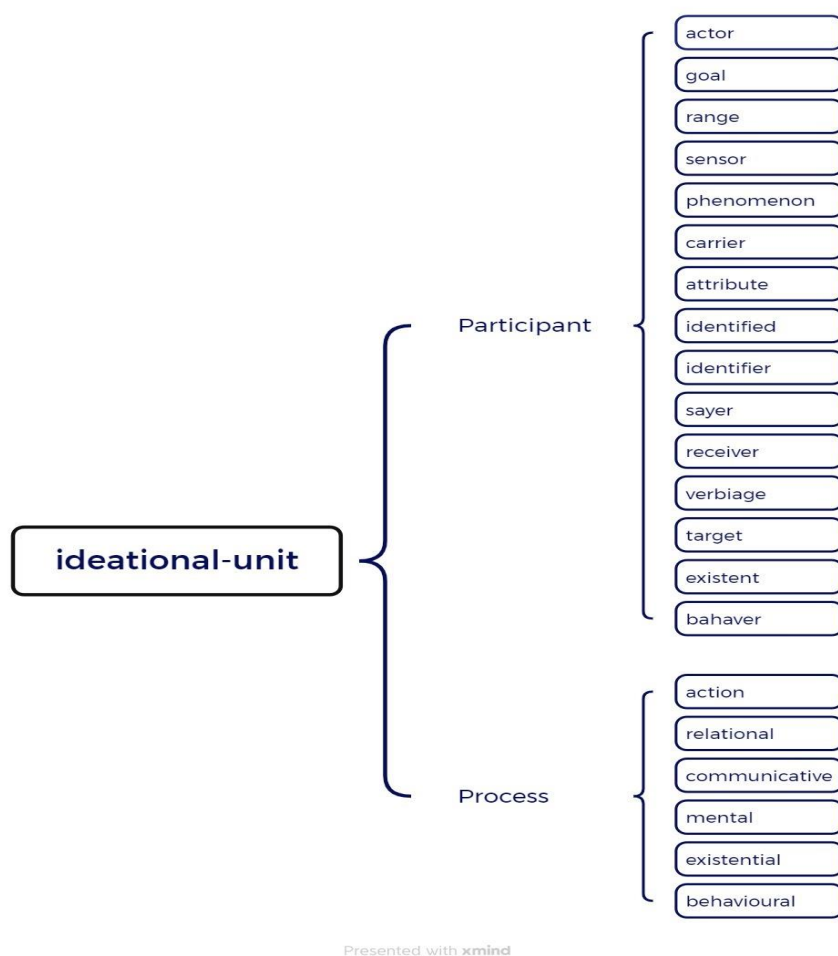


Figure 1 Transitivity system annotation scheme

#### 4. Transitivity Analysis and Discussion

##### 4.1 Distribution of process components

As a vital aspect of the transitivity system, processes convey the thoughts and actions of participants. They depict specific events occurring within a context, serving as crucial components of the experiential world that connect participants with environmental elements<sup>[23]</sup>. Different processes reflect people’s varied experiences of the subjective and objective worlds, each bearing unique functions. Describing processes involves two steps: first, distinguishing different process types through their verbal nature, and second, considering the roles of participants and other evaluative factors to determine their ecological orientation<sup>[1]</sup>. Hence, in the context of ecological discourse analysis, different process types and participant roles in news reports can convey diverse ecological discourse meanings. Table 1 depicts the transitivity processes distribution in the language data.

Table 1 Transitivity types and frequency statistics

Types of Transitivity	Frequency of Occurrence	Proportion
Action Process	822	67.38%
Relational Process	145	11.89%
Communicative process	117	9.59%
Mental Process	66	5.41%
Existential Process	22	1.8%
Behavioral Process	4	0.33%
Total	1176	96.4%

According to the table 1, Japanese nuclear wastewater news reports contain a total of 1,176 transitivity processes. Among them, the action process holds the highest proportion (67.38%), followed by the relational process (11.89%), and the communicative process (9.59%). The mental process constitutes a smaller share, at only 5.41%, while the existential and behavioral processes are relatively negligible and therefore not discussed further. The predominance of the action process may be attributed to its critical role in constructing experiences, facts, and actions. News ecological discourse aims to foster a socially affirmative trend towards environmental protection, thus motivating the public's ecological conservation actions, which explains the frequent appearance of action processes in news discourse. For instance, Sun Ju and Guo Jinhui's ecological discourse analysis of reports on the Amazon rainforest fires reveals that action processes dominate, followed by relational and communicative processes<sup>[2]</sup>. Similarly, Cao Jin and Yang Mingtuo's ecological discourse analysis of online news<sup>[23]</sup> yielded parallel conclusions, with all three studies showing that the proportion of action processes exceeds 50%. This may be due to the use of materials sourced from the *People's Daily* in these studies, with ecological news texts focusing on constructing facts and expressing actions. Furthermore, a comparative study of ecological discourses in Chinese and English public service advertisements on environmental protection found that action and relational processes also dominate in Chinese advertisements, with the mental process accounting for a relatively larger share compared to the three aforementioned studies. This is because mental processes help foster positive emotional connections between people and nature, urging audiences to understand nature correctly and undertake actions to protect the environment<sup>[26]</sup>, which is the core of public service advertisements. Hence, Chinese ecological discourse predominantly emphasizes action-oriented activities to inspire the audience to partake in environmental protection efforts, thereby improving the natural environment.

## 4.2 Transitivity analysis and ecological discourse significance

### 4.2.1 Action process

The action process is utilized to depict activities involving relevant participants, conveying an entity performing an activity or executing an action upon other entities<sup>[27]</sup>. The participants in this process include the actor (agent) who performs the action and the goal (receiver) who receives the action. Statistical data indicate that the action process has the highest proportion, with its primary function being the establishment of objective facts or the expression of actions and behaviors. The following reports articulate action-related activities from various perspectives, such as the consequences of the Japanese government's release of nuclear wastewater, and the reactions of Japanese society and neighboring countries or citizens towards the Japanese government's actions:

- (1) Japan **is gambling** with the global marine environment and people's health. (2023.08.27)
- (2) The Japanese government **is causing** secondary harm by discharging the nuclear- contaminated water into the ocean. (2023.08.27)

Examples (1) and (2) illustrate the action processes related to the harm caused by the discharge of nuclear wastewater. In Example (1), the actor of the action process is "Japan", and the action verb chosen is "gamble", which carries a negative connotation. The use of the present continuous tense indicates the ongoing nature of the action, subtly implying that "Japan" continuously engages in actions that damage the ecological environment for its own benefit, reflecting Japan's anthropocentric ecological values. The "global marine environment" is both the receiver of the action and the ecological context, indicating that Japan is "gambling" with a human environment, suggesting it places itself above the ecosystem and does not consider itself a part of it, thereby conveying a negative ecological significance. In Example (2), the phrase "the Japanese government + **is causing**" is utilized. The participants are again non-human social actors, and the action process is led by the continuous form of the verb "cause" rather than by more neutral synonyms like "lead to" or "bring about," which can have both positive and negative connotations. The verb "cause" inherently carries a stronger negative implication. Additionally, the use of the present continuous tense underscores the persistence of the negative action, linking to the earlier mention of Japan releasing large amounts of radioactive material into the ocean 12 years prior, highlighting Japan's ongoing destructive behavior towards the ecological environment. The manner adverbial clause at the end of the clause describes how Japan is damaging the ecological environment, specifically by releasing nuclear wastewater into the ocean. This implies the disregard of Japan for the worth of non-human natural entities and its

delusional aspiration to dominate nature, which contradicts the ecosophy of “diversity and harmony, interaction and co-existence”, categorizing this narrative as ecologically destructive discourse.

(3) The decision of the Japanese government and the Tokyo Electric Power Company **has been condemned** by many sectors of civil society in Japan, such as fishers and ecologists. (2023.09.07)

(4) And when Japan began executing the discharge plan, China, **took** emergency measures to prevent contaminated seafood from Japan from entering the domestic market. (2023.09.07)

(5) People **attend** a rally against Japan's dumping of nuclear-contaminated wastewater into the ocean in Malaysia, Aug 27, 2023. (2023.08.28)

In Example (3), the subject of the action process, is both a non-living social participant and the semantic goal, indicating that the reporter highlights this as the topic of discussion, thus directing readers' attention to the event itself. The subsequent action process employs the negatively connotated verb “condemn”, which suggests that many groups within Japanese society deem the discharge of nuclear wastewater as an erroneous action, leading to public denunciation. This makes the public aware that Japanese social groups also hold opposing views, thereby deepening their understanding of the situation and sparking negative public opinion against the ecological destructive actions, thus contributing to ecologically beneficial discourse. Examples (4) illustrates action processes where both the actor and the goal are non-living social participants, The goal “emergency measures” indicates that China promptly responded to the discharge incident, signifying China's dissociation from Japan's disregard of natural laws and wanton ecological destruction, thereby reflecting a positive ecological orientation. In Example (5), the participants are the human population—specifically the people of Malaysia—showing that as subjective agents within the ecosystem, humans play a central role in ecological operations, aiding in the alignment between natural ecology and social ecology, and fostering the synergistic development of nature and human society<sup>[2]</sup>, thus representing ecologically beneficial discourse. These three examples collectively illustrate the shared awareness of a community of life among neighboring countries and citizens in addressing marine pollution issues, aligning with the ecological wisdom of “the unity of heaven and man, and abiding by natural laws” from traditional Chinese philosophy, indicating a positive behavioral trend.

#### 4.2.2 Relational processes

Within the transitivity system, relational processes pertain to the identity, characteristics, location, ownership, and associations of the participants involved<sup>[24]</sup>. The participants in these processes are the Carrier and the Attribute. In this study, relational processes were predominantly employed to describe the hazards posed by the nuclear wastewater discharge and the reactions of various countries to this discharge, thereby highlighting the ecological impact of the nuclear wastewater release and showcasing the attitudes of different nations towards it. For instance:

(6) The global media's focus on Japan's Fukushima facility **is** a reminder to the world that the nuclear disaster at Fukushima continues and more broadly. (2023.08.29)

(7) This(the release of nuclear-contaminated water) **is** a uniquely hazardous long-term radiation threat to the environment, especially the marine ecosystem. (2023.08.29)

(8) While Japan **is** not the first nation to resort to ocean disposal of radioactive waste, the West's defense of Japan's actions draws attention to its own historical behavior. (2023.08.29)

Examples (6) to (8) are all identifying relational processes, with the semantic structure of “Token - non-human social participant + relational process (is) + Value”. In Example (6), the non-human social participant “global media's focus” acts as the Token, guiding readers to pay greater attention to the media's focal point. The Value “a reminder” implies that the media is prompting the public to become aware of certain issues. The subsequent appositive clause introduced by “that” explains “a reminder”, with the relational process “continues” indicating a sense of enduring action, subtly suggesting that the nuclear disaster at Fukushima will persist. This relational process, through the interaction between social participants, influences public thought and encourages ecological protection behaviors, thus having strong ecological benefits. In Example (7), the Token is “the release of nuclear-contaminated water”, directing readers' focus to the event itself. The Value employs the negatively connotated word “threat”, augmented by the adjective phrase “uniquely hazardous long-term”, indicating the prolonged

dangers posed by the discharge of nuclear wastewater. This serves to amplify public attention on the issue, thereby motivating people to take actions to protect the environment, and carries a positive ecological significance. In Example (8), the relational process manifests Japan's "anthropocentrism", viewing the ocean, a non-human natural entity, as a tool and resource for human use, elevating humanity's status. Coupled with the following clause, it suggests that Western countries similarly believe that humans can dominate nature and can sacrifice natural ecosystems to further national economic development, thus reflecting a negative ecological orientation.

(9) The melted nuclear fuel inside Chernobyl reactor number 4 **remains** highly dangerous with no technology yet invented to remove it. (2023.08.29)

(10) China **is** not alone in its principled opposition to Japan's selfish action of releasing the radioactive water into the ocean. (2023.09.07)

Examples (9) and (10) are attributive relational processes. In Example (9), the Carrier is the non-human physical participant "the melted nuclear fuel", directing readers' attention to the situation itself. Additionally, the use of the negatively connotated term "dangerous", coupled with the degree adverb "highly", heightens readers' awareness of the hazards posed by nuclear wastewater pollution, thus contributing to ecologically beneficial discourse. In Example (10), the Carrier is China—a non-human social participant—indicating that China is among the countries opposing the discharge of nuclear wastewater, rather than being the sole objector. This exemplifies the interdependence of subsystems within the social ecosystem, showcasing a collective consciousness of shared destiny among nations, which significantly fortifies ecological beneficence.

#### 4.2.3 Communicative process

The communicative process outlines the activities where participants use language to exchange information. The participants involved include the communicator and the communicated content<sup>[24]</sup>. The communicative process encompasses both direct and indirect quotations, primarily concerning the various parties' comments on the discharge of nuclear wastewater. Indirect speech predominantly comprises the Japanese side's explanations of the situation, while the direct speech in the communicative process mainly quotes experts' evaluations of Japan's nuclear wastewater discharge, which possess significant authority and credibility.

(11) Japanese government officials **had said** the radioactive water had to be discharged into the sea to avoid accidental leaks and create space for storing more wastewater. (2023.09.07)

(12) Tokyo Electric Power Company (TEPCO) **said** it plans to start the second phase of discharging nuclear-contaminated water from the Fukushima Daiichi Nuclear Power Plant into the Pacific likely in October. (2023.09.12)

Examples (11) and (12) are both communicative processes involving indirect speech, representing the Japanese perspective on nuclear wastewater discharge. In Example (11), the semantic configuration is "Communicator—a group of human participants + Communicative process (had said) + Communicated content". The use of "had said" indicates that Japan has consistently stated to the public, prior to the wastewater discharge, that the purpose of the action was to avert unintended leaks and provide additional capacity for wastewater storage. The modal verb "had to" rather than "must" is used in the communicated content, suggesting that Japanese government officials perceive the discharge as an objective necessity rather than a discretionary choice. This rhetorical strategy attempts to legitimize the wastewater discharge as a necessary action, misleading the public into believing in its justification, thus representing a destructive communicative process. In Example (12), the participant is the non-human social entity TEPCO, describing Tokyo Electric Power Company's plan to conduct a second round of nuclear wastewater discharge into the Pacific Ocean in October. By positioning a non-human social entity as the communicator, the focus on subjectivity is emphasized, thereby reducing the ecological focus of the discourse. Additionally, treating the non-human natural element (the Pacific Ocean) as a resource to be exploited without regard for its inherent value reflects a negative emotional disconnection from other factors within the ecosystem. This interaction showcases an anti-ecological, destructive verbal behavior.

(13) Most of the people around the world **have said** they will no longer consume seafood from Japan because of health concerns. (2023.09.07)

(14) "Japan is aware that with the release of nuclear-contaminated water into the sea, there is a likelihood of unpredictable ecological damage and harm to human health." **said** Chen Xiang, an associate research fellow with the Institute of Japanese Studies at the Chinese Academy of Social Sciences. (2023.09.19)

(15) "Why doesn't Japan use it to recycle or for any other purpose? Unfortunately, the action shows that whatever Japan is dumping is not good for humanity and the land resources of the country, so it is using the sea as a dump yard," **said** Haider, deputy director general of National Institute of Maritime Affairs (NIMA) of Pakistan. (2023.09.09)

Examples (13) through (15) illustrate the remarks of citizens from various countries regarding the waste. Example (13) is an indirect speech process, describing the global populace's statements about ceasing the consumption of Japanese seafood, expressing resistance to the discharge of the wastewater. The participants in this clause are groups of human entities, highlighting the proactive role humans, as subjective ecological factors, play within the ecosystem. This communicative process has the potential to raise public awareness about protecting marine ecology, thus qualifying as an ecologically positive discourse. Examples (14) and (15) are communicative processes involving direct speech, detailing authoritative figures from different countries discussing the detrimental effects of the discharge. The communicators in these clauses are individual human participants: a researcher from the Institute of Japanese Studies at the Chinese Academy of Social Sciences and the Deputy Director of the Pakistan Institute of Oceanography. Their conveyed messages are more representative and authoritative. Furthermore, the content of their speech reflects concerns regarding ecological and human health, indicating a positive emotional connection. Therefore, these communicative processes help enhance global awareness of the hazards associated with nuclear wastewater discharge, awakening public consciousness for ecological protection, and can be considered beneficial discourse.

#### 4.2.4 Mental processes

Within the transitivity system, mental processes represent cognitive activities, illustrating how participants express their likes, dislikes, approval, disapproval, belief, or doubt about other participants through emotions, desires, and cognition [24]. The participants in such processes are the Sensor and the Phenomenon. In this study, the mental processes primarily concern the apprehensions of various groups regarding the discharge and the intentions of the Japanese side.

(16) ROK fishers **are worried** about their seafood products. (2023.08.28)

(17) I (a foreign expert) **find** the Japanese decision especially puzzling for two reasons. (2023.09.07)

Examples (16) and (17) illustrate emotional mental processes reflecting the concerns of South Korean fishermen about the consequences of nuclear wastewater discharge and the incomprehension among foreign experts regarding Japan's actions. Example (16), despite using the term "are worried", which conveys negative emotions within the ecological context, represents the group's (i.e., South Korean fishermen) concern over marine products. However, it does not explicitly criticize the actions of the ecological stakeholders, thus classifying it as ecologically neutral discourse. In Example (17), the Sensor is a foreign expert, lending a high degree of authority to the discourse. Additionally, the term "puzzling" used to describe the phenomenon highlights the individual participant's—namely, the expert's—negative attitude towards the actions of the ecological stakeholders. This demonstrates the participant's affection and inclination towards marine ecology, conveying a positive ecological significance.

(18) Tokyo Electric Power Company, **plans** to remove the estimated 600-1,100 tons of melted nuclear fuel at three of Fukushima's reactors (the precise amount is not known) are not based on any credible engineering analysis — there is effectively no workable plan. (2023.08.29)

(19) All of this (violation of human rights) the Japanese government **wanted** to erase from public debate and media scrutiny. (2023.08.29)

Examples (18) and (19) present volitional mental processes, with non-human social entities as the Sensors, specifically "Tokyo Electric Power Company" and "the Japanese government", respectively. Example (18) describes the Tokyo Electric Power Company's plan to discharge a substantial quantity of nuclear fuel into the

ocean without any reliable engineering analysis. This action reflects Japan's anthropocentric attitude, prioritizing economic benefits over environmental health. Additionally, the release of the nuclear wastewater into the Pacific Ocean will result in radioactive contamination affecting South Korea, the United Kingdom, Australia, and China. Therefore, the discharge of Fukushima's nuclear wastewater represents a transboundary marine environmental issue<sup>[10]</sup>, which undermines international harmony and contravenes the ecosophy of "diversity and harmony, mutual benefit, and coexistence", thus classifying it as ecologically destructive discourse. Example (19) illustrates the Japanese government's attempt to cover up the violation of fishermen's human rights, indicating their exploitation of workers to maximize profits. According to Marxist ecological thought, the primary aim of capital is to accumulate wealth, even at the cost of the well-being of individuals and societal relations<sup>[13]</sup>. This behavior by the Japanese government disrupts the harmonious relationship between people and society, transmitting a negative ecological significance.

## 5. Conclusions

This paper analyzes eco-discourse by examining the transitivity system in People's Daily news reports on Japan's nuclear wastewater discharge, guided by the ecological philosophy of "diversity and harmony, mutual benefit, and coexistence". The study examines the types of processes and their ecological discourse meanings. The findings indicate that in the transitivity types, action processes constitute the largest proportion. These processes primarily describe the outcomes of the Japanese government discharging nuclear wastewater, as well as the reactions from Japanese society and neighboring countries or individuals. The analysis reveals that when the actors are Japan and the Japanese government, a negative ecological significance is exhibited, whereas when other countries are the actors, a positive ecological significance is demonstrated. Secondly, relational processes also describe the harm caused by the nuclear wastewater discharge and the attitudes of various countries towards this act, thereby drawing public attention to the issue and enhancing ecological awareness among the populace. Communicative processes present the comments and evaluations from different parties about the nuclear wastewater discharge, reflecting the attitudes and stances of various countries, and aim to galvanize public opinion against the discharge. Mental processes represent emotional connections and volitional tendencies, indicating the concerns of various groups about the nuclear wastewater discharge and the intentions of the Japanese side. These could resonate with the public, raising ecological awareness and prompting ecological protection actions. Moreover, social participants and human actors, as the primary participants in clauses, are used to emphasize the severity of nuclear pollution and the positions of different countries, thereby attracting greater public attention to the issue and generating public discourse, which in turn promotes ecological protection actions. As an important medium for information dissemination, the content of news media significantly influences people's thoughts. Through the analysis of news discourse, this study assesses whether the selected texts align with the ecological philosophy employed in the study, advocating for beneficial discourse that adheres to this philosophy. This helps to integrate the ecological philosophy into the ideology, making it accepted by the public and ingrained in everyone's mindset. This research can provide insights for the selection of eco-discourse in news reporting and promote harmonious development between humans and nature.

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