

Ecological Awareness Analysis: A Transitivity Analysis of TED Environmental Talk

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ABSTRACT

This study examines how public ecological awareness is constructed in a TED Talk, *The Unexpected, Underwater Plant Fighting Climate Change*, using transitivity analysis within Systemic Functional Linguistics and ecosophy. Adopting a qualitative approach, the study analyses process types, participant roles, and circumstantial elements to explore how ecological meanings are encoded. The findings show that material processes dominate, positioning seagrass ecosystems as active agents, while relational and mental processes assign ecological value and engage audience cognition. The discourse is predominantly eco-beneficial, reflecting ecosophy principles of diversity and harmony, and interaction and coexistence. The study demonstrates how linguistic choices shape ecological orientation in public science discourse. Importantly, this study contributes to the growing field of ecolinguistics by illustrating how language can promote environmentally responsible perspectives in widely accessible media. It also offers practical insights for science communicators and educators on how discourse strategies can be employed to enhance public engagement with climate change issues.

Keywords: Ecological Discourse Analysis, Transitivity, Ecosophy, TED Talks

1.0 INTRODUCTION

In the context of accelerating climate change and biodiversity loss, fostering public ecological awareness is an urgent global task (Vira & Saragih, 2022). TED Talks have become an influential platform for public scientific communication by combining scientific insights with accessible language and engaging storytelling (Bevitori, 2024; Sugimoto & Thelwall, 2013). This study explores the link between discourse, ecological orientation, and ecological awareness in a TED Talk entitled *The Unexpected, Underwater Plant Fighting Climate Change* delivered by marine ecologist Carlos M. Duarte. In this talk, Duarte explains the ecological function of seagrasses and their role in climate regulation. With over 1.7 million views as of 6 June 2025, the talk exemplifies how public scientific discourse communicates ecological knowledge and promotes environmental awareness.

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This study adopts a qualitative approach, synthesising Ecological Discourse Analysis (EDA) (Stibbe, 2021) and Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2014), particularly the transitivity system as the analytical framework. EDA examines how language not only reflects ecological issues but also shapes ecological worldviews and human-nature relationships. Recent research has highlighted how grammar encodes ecological values and ideologies in different discourse types (Wu, 2018). However, limited attention has been paid to how ecosophy principles, such as diversity, harmony, and interaction, are realised at the grammatical level.

Addressing this gap, this study investigates how ecological meaning is constructed in public science discourse through a clause-by-clause transitivity analysis using the UAM Corpus Tool (version 6). It focuses on process types, participant roles, and circumstantial elements to examine how ecological messages and values are encoded in the talk.

While previous studies have examined rhetorical and multimodal features in TED environmental talks, fewer have explored grammatical resources, particularly transitivity, in constructing ecological meaning (Oswari, 2021). In addition, although ecosophy has gained attention in ecolinguistics, its application to linguistic analysis remains limited (He & Wei, 2018). This study integrates SFL-based transitivity analysis with ecological orientation and ecosophy to provide a multi-dimensional account of ecological meaning construction in TED discourse. The study is guided by three research questions:

- i. What are the transitivity features of this speech?
- ii. What are the ecological orientations of this speech?
- iii. How are ecosophical values constructed through the interplay of transitivity features and ecological awareness in the discourse?

By examining a widely viewed TED Talk through this framework, the study contributes to ecolinguistics by demonstrating how linguistic choices relate to ecological orientation and ecosophical meaning, and by offering insights for public science communication.

2.0 LITERATURE REVIEW

This section outlines the current landscape of ecolinguistic research, focusing on Ecological Discourse Analysis (EDA), the transitivity system in SFL, and ecosophy. It highlights how language constructs ecological meaning and identifies gaps in grammar-based ecolinguistic analysis, particularly the limited integration of transitivity systems with ecosophical evaluation and the lack of research on public science discourse such as TED Talks (Fill & Penz, 2022; He & Wei, 2018; Stibbe, 2021).

Ecolinguistics examines how language shapes ecological perceptions and promotes or undermines sustainability. EDA investigates how discourse constructs ecological worldviews and influences human-nature relationships (Penz & Fill, 2022; Stibbe, 2021). Recent research has shifted attention from environmental themes to linguistic structures, emphasising how ecological meaning is constructed through language (Alexander & Stibbe, 2014). Despite these advances, there remains a need for more grammar-based ecolinguistic research (Fill & Penz, 2018).

Ecosophy provides an evaluative framework for classifying discourse as eco-beneficial, eco-ambivalent, or eco-destructive, based on principles such as diversity and harmony, and interaction and coexistence (He & Wei, 2018). It highlights how language assigns agency and value to human and non-

human entities and shapes ecological attitudes (He & Liu, 2020; Wei & He, 2019). However, ecosophy has rarely been systematically applied in linguistic analysis. This study addresses this gap by combining ecosophy with transitivity analysis to examine ecological orientations in TED environmental discourse

Systemic Functional Linguistics (SFL) provides a framework for analysing how language represents experience (Halliday & Matthiessen, 2014). Transitivity in SFL categorises processes, participants, and circumstances and is widely used to analyse experiential meaning. In ecological discourse, transitivity reveals how agency is distributed between human and non-human actors and how responsibility is constructed (Li *et al.*, 2025). Previous studies suggest that assigning agency to non-human entities supports an ecocentric perspective, although tensions between anthropocentric and ecocentric representations may still emerge (Stibbe, 2021). Despite its analytical potential, SFL remains underutilised in ecolinguistic research, particularly in relation to ecosophical evaluation (Fill & Penz, 2018).

TED Talks play a key role in recontextualising ecological knowledge for public audiences through accessible and engaging discourse (Sugimoto & Thelwall, 2013; Bevitori, 2024). They construct ethical and affective positions that encourage environmental awareness. However, most studies focus on rhetorical or multimodal features, with limited attention to grammatical mechanisms such as transitivity in ecological meaning construction (Alexander & Stibbe, 2014). This study brings a linguistic perspective to the analysis of ecological positioning in TED environmental communication.

While previous research has examined ecological narratives and rhetorical strategies in TED Talks, few studies have integrated SFL transitivity analysis with ecosophy to examine how grammatical choices construct ecological orientations. In addition, limited attention has been paid to English public scientific discourse as a site of ecological meaning construction.

This study addresses these gaps by analysing transitivity features and ecological orientations in Carlos Duarte's TED Talk through a framework that combines SFL and ecosophy. It contributes to ecolinguistics by demonstrating how linguistic choices shape ecological orientation and by providing insights for public science communication.

3.0 METHODOLOGY

This study adopts a qualitative analytical approach to explore how public ecological awareness is constructed through English in public scientific communication. It is theoretically grounded in Systemic Functional Linguistics (SFL) and ecosophy. Systemic functional linguistics provides a linguistic framework for analysing transitivity features (Halliday & Matthiessen, 2014), while ecosophy provides criteria for assessing the ecological orientation of discourse (He & Wei, 2018). The sample for the study is a TED Talk entitled 'The unexpected, underwater plant fighting climate change' by marine ecologist Carlos M. Duarte. This talk was chosen because of its high public engagement (over 1.7 million views as of June 2025) and its clear ecological focus, especially in explaining the climate-regulating function of seagrasses. Figure 1 shows an overview of the research process.

As can be seen in Figure 1, this research uses Halliday and Matthiessen's (2014) transitivity system as a framework for analysis. The transitivity elements reveal how ecological values and ecological awareness are constructed in discourse. In order to capture the transitivity features in the research sample, the speeches were manually annotated using the UAM Corpus Tool (version 6), which is designed for multi-

layer linguistic analysis. The script was downloaded from the official TED Talks website (https://www.ted.com/talks/carlos_m_duarte_the_unexpected_underwater_plant_fighting_climate_change), and 61 sentences were included in the speech after removing irrelevant elements, such as timing, applause cues, and acknowledgements. Each of these sentences was segmented and coded for process type, participant, and circumstance. For example, in the clause “*We can engage in active restoration, such as my colleagues in Virginia have done,*” the main process “engage” is categorised as a material process, representing a tangible ecological action. The participant “we” functions as the Actor, indicating human agency in initiating restoration. The phrase “in active restoration” represents the Goal of the action, while the embedded clause “such as my colleagues in Virginia have done” reinforces the action by providing an example of similar ecological efforts, with “my colleagues in Virginia” as an implicit Actor and “have done” as another material process. This example illustrates how process types and participant roles are identified in practice. Such manual annotation was consistently applied to all clauses in the dataset to ensure the reliability of the analysis.

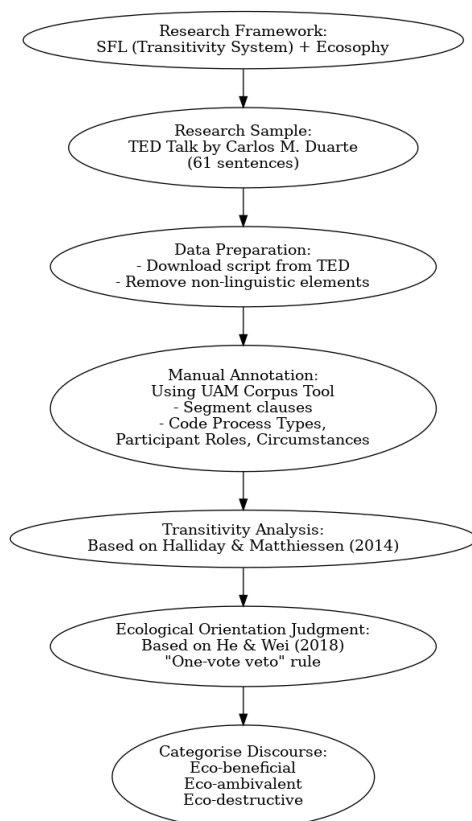


Figure 1 Research Procedure of The Study

The ecotype of a discourse can be systematically analysed, and one of the dimensions is transitivity analysis (Stibbe, 2021). Therefore, in this study, the sample was first subjected to transitivity analysis.

Next, considering the process type, participant role, and circumstance role, the discourse is identified based on the ecosophy of ‘diversity and harmony, interaction and coexistence’, to consider if the discourse is eco-beneficial, eco-destructive, or eco-ambivalent. The specific method for determining the ecological orientation of a discourse is the ‘one-vote veto system’ (He *et al.*, 2021). Specifically, a discourse can only be viewed as eco-beneficial if all three transitivity elements are ecologically beneficial. On the other hand, if one of them is ecologically destructive or ecologically ambivalent, then the discourse can be viewed as eco-destructive or eco-ambivalent, as shown in Table 1.

Table 1 Ecological Orientation of Discourse

| Process | PR | CR | Discourse Ecological Orientation |
|-------------|-------------|-------------|----------------------------------|
| beneficial | beneficial | beneficial | eco-beneficial discourse |
| beneficial | beneficial | ambivalent | eco-ambivalent discourse |
| beneficial | ambivalent | ambivalent | |
| ambivalent | ambivalent | ambivalent | |
| beneficial | beneficial | destructive | eco-destructive discourse |
| beneficial | ambivalent | destructive | |
| beneficial | ambivalent | ambivalent | |
| ambivalent | ambivalent | destructive | |
| ambivalent | destructive | destructive | |
| destructive | destructive | destructive | |

This two-layer analysis (Figure 2), combining grammar and ecological interpretation, provides a comprehensive understanding of how ecological awareness is constructed through language. This research approach thus bridges the gap between linguistic form and ecological function, providing both descriptive insights into grammar and interpretative evaluations of ecological meaning. In doing so, this study

contributes to a growing body of ecolinguistic research that is concerned with the role of language in shaping ecological sustainability (Alexander & Stibbe, 2014; Stibbe, 2021).

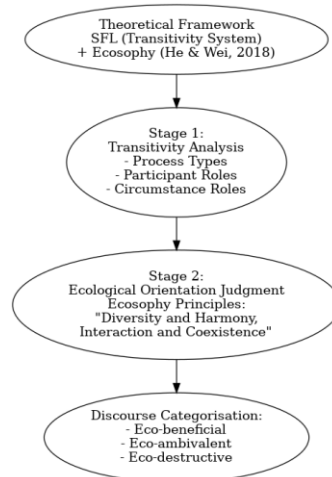


Figure 2 Analytic Framework of This Study

DATA ANALYSIS AND RESULTS

This study examines the transitivity features and ecological orientations of the TED Talk *The Unexpected, Underwater Plant Fighting Climate Change* by analysing process types, participant roles, and circumstantial elements.

i. Transitivity Features

As shown in Table 2, material processes clearly dominate the discourse, followed by relational and mental processes. This pattern indicates that ecological meaning is mainly constructed through actions and dynamic interactions, which is consistent with the functional role of transitivity in representing experience (Halliday & Matthiessen, 2014). For example, in “seagrass captures carbon”, the material process assigns the role of Actor to a non-human entity, highlighting its active ecological role and supporting an ecocentric perspective (Stibbe, 2021).

Relational processes are used to assign identity and value to ecological entities. In “*Seagrasses are the champions of carbon sequestration*”, the relational structure presents seagrasses as valuable ecological actors. Mental processes, although less frequent, engage audience cognition and emotion. Expressions such as “*We understand the role of seagrasses*” invite shared recognition and support the idea of interaction and coexistence.

Participant roles further support these patterns. As shown in Table 2, Goal and Actor are the most frequent roles, which reflects a strong focus on ecological action. Importantly, non-human entities

frequently function as Actors. This suggests a clear shift away from human-centred representation and positions nature as an active force, a pattern also observed in ecological discourse studies (Li *et al.*, 2025). Carrier and Attribute roles also contribute to assigning identity and value to ecological entities.

Circumstantial elements provide important contextual grounding. Time and Location situate ecological processes within scientific contexts, while Cause and Manner highlight ecological relationships. Expressions such as “*because of the biodiversity it supports*” and “*using tiger sharks as partners*” emphasise interdependence and co-agency between humans and nature.

Table 2 Distribution of Transitivity Features, Participant Roles, and Circumstantial Elements

| Category | Type | Frequency | Percentage |
|--------------------------|-------------|-----------|------------|
| Process Type | Material | 82 | 67.21% |
| | Relational | 24 | 19.67% |
| | Mental | 14 | 11.48% |
| | Existential | 1 | 0.82% |
| | Verbal | 1 | 0.82% |
| Participant Role | Goal | 47 | 29.75% |
| | Actor | 45 | 28.48% |
| | Carrier | 20 | 12.66% |
| | Attribute | 18 | 11.39% |
| | Senser | 12 | 7.59% |
| | Phenomenon | 10 | 6.33% |
| | Others | 6 | 3.80% |
| Circumstance Role | Time | 20 | 30.77% |
| | Location | 12 | 18.46% |
| | Cause | 10 | 15.38% |
| | Manner | 7 | 10.77% |
| | Others | 16 | 24.62% |

Note. Percentages are calculated separately within each category.

ii. Ecological Orientation

The discourse is predominantly eco-beneficial (see Figure 3), with most clauses promoting ecological harmony and sustainability, while only a small proportion describe ecological damage. Clauses such as “Seagrass meadows protect the shoreline from erosion” present nature as a key contributor to environmental stability. In contrast, eco-destructive clauses mainly refer to human activities, such as “*Trawling wiped out the seagrass beds*”, which serve to highlight environmental risks.

The absence of eco-ambivalent discourse suggests a deliberate rhetorical choice to avoid uncertainty. This supports a clear and persuasive environmental message. It also aligns with previous studies which show that TED climate discourse often uses positive framing to engage audiences (Bevitori, 2024). However, this strong positive orientation may also simplify ecological complexity and reduce space for critical reflection on environmental challenges.

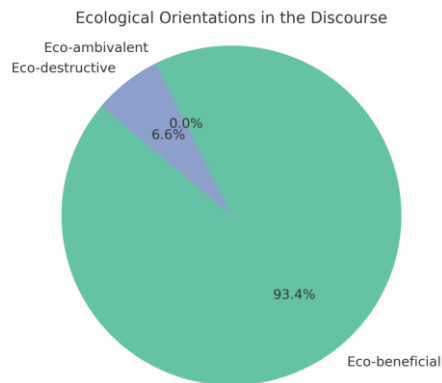


Figure 3 Ecological Orientations in the Discourse

iii. Interplay of Transitivity and Ecosophical Values

The findings show that ecosophical values are constructed through the interaction of transitivity features and ecological orientation. The frequent use of non-human Actors assigns agency to nature, while relational processes attribute value and identity. Mental processes further support emotional engagement and help bridge the human–nature relationship, reflecting the role of language in shaping ecological meanings (Stibbe, 2021).

For example, in “*We were surprised when we found a clone that occupied 15 kilometres*”, mental and material processes work together to construct both human perception and ecological agency. The non-human entity functions as an Actor, which highlights its autonomy. Similarly, relational constructions such as “*This is one of the oldest living things on the planet*” assign value and promote recognition of ecological importance.

These patterns show that ecological meaning is not only expressed through vocabulary but also through grammatical choices. By representing nature as active and valuable, the discourse reflects the ecosophy principles of diversity and harmony, and interaction and coexistence (He & Wei, 2018).

DISCUSSION

The findings suggest that ecological meaning in TED discourse is mainly constructed through material and relational processes that foreground action and value attribution. This supports previous studies which argue that ecological storytelling relies on assigning agency to non-human entities (Alexander & Stibbe, 2014; Stibbe, 2021). It is also consistent with recent transitivity-based research in environmental discourse, which shows that non-human agency plays a key role in shaping ecological meaning (Li *et al.*, 2025).

At the same time, this study extends previous research by showing how transitivity patterns work together with ecosophy to construct ecological values at the grammatical level. This provides a more detailed account of how language shapes ecological orientation. In particular, the integration of grammar and value evaluation responds to recent calls for more systematic, linguistically grounded approaches in ecolinguistics (Penz & Fill, 2022).

However, the findings also reveal a limitation. The strong eco-beneficial orientation may reflect a strategic choice to persuade audiences, but it may also reduce the representation of ecological conflict and uncertainty. This aligns with recent research on TED climate discourse, which suggests that positive framing is often used to promote audience engagement and action (Bevitori, 2024). As a result, the discourse may present a relatively simplified version of human–nature relations.

Overall, the study shows that public scientific discourse does not only describe ecological issues but also actively constructs ecological awareness and promotes particular environmental values.

4.0 CONCLUSION

This study examined how public ecological awareness is constructed through language in the TED Talk *The Unexpected, Underwater Plant Fighting Climate Change*, using transitivity analysis within SFL and ecosophy. The findings show that material processes dominate the discourse, positioning seagrass ecosystems as active agents in climate mitigation, while relational and mental processes attribute ecological value and engage audience cognition. Circumstantial elements provide scientific context and support a persuasive environmental narrative. The predominance of eco-beneficial discourse (93.4%) reflects alignment with ecosophy values, particularly diversity and harmony, and interaction and coexistence, while the frequent use of non-human Actors supports an ecocentric perspective. The study demonstrates that integrating transitivity and ecosophy can reveal how language shapes ecological meanings and ethical orientations. However, the single-case design limits generalisability, and future research should extend this framework to larger corpora or multimodal eco-texts. Overall, the findings highlight the role of public discourse in promoting ecological awareness and sustainable values. Importantly, this study contributes to the growing field of ecolinguistics by illustrating how language can promote environmentally responsible perspectives in widely accessible media. It also offers practical insights for science communicators and educators on how discourse strategies can be employed to enhance public engagement with climate change issues.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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