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The multimedia communication model enhances public awareness of sustainable development and climate change adaptation in the Mekong Delta

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Abstract: As the Mekong Delta faces increasingly severe impacts from climate change, communication has become an essential tool for enhancing public awareness and promoting adaptive behaviors. However, most current campaigns remain overly generic, lacking in localized depth and failing to harness the full potential of multimedia communication to engage collective memory, cultural symbolism, and emotional resonance. This study assesses the effectiveness of a multimedia communication model in raising awareness of sustainable development and encouraging climate-adaptive actions among residents in five key provinces of the Mekong Delta: Cần Thơ, Vĩnh Long, Tiền Giang, Hậu Giang, and Trà Vinh. Employing a mixed-methods approach, the research combines quantitative surveys of 500 participants with in-depth qualitative interviews of 25 key informants and interpretive analysis of communication content. The findings reveal that over 70% of participants expressed an intention to take positive action after exposure to the multimedia messages, while approximately 60% reported concrete behavioral changes. Localized content—utilizing familiar imagery, regional dialects, and culturally embedded symbols—demonstrated significantly higher impact than standardized formats. Crucially, multimedia communication not only enhanced cognitive awareness but also activated environmental memory, fostered a sense of responsibility, and reinforced ecological moral norms. Based on these insights, the study advocates for the implementation of multimedia communication as a community-based intervention strategy. The model should integrate localized content, generational targeting, and collaboration with grassroots organizations to transform perception into sustainable behavioral change.

Keywords: *Climate change, Collective memory, Environmental behavior, Localization, Multimedia communication, Mekong delta.*

1. Introduction

The Mekong Delta, one of the world's three largest and most climate-vulnerable river deltas, is experiencing increasingly severe impacts from climate change. Rising sea levels, saltwater intrusion, erosion, crop failures, and altered flood cycles are not only destabilizing ecosystems but also directly threatening the livelihoods, cultural heritage, and social security of nearly 20 million residents. In this context, communication is emerging as a strategic tool for raising public awareness, fostering adaptive behaviors, and aligning local actions with broader sustainable development goals.

Despite its growing importance, climate change communication in the Mekong Delta remains limited in effectiveness. Much of the content remains overly generalized, lacking cultural specificity and local resonance. The absence of interactive formats, indigenous symbolism, and context-sensitive language undermines the communicative potential to generate meaningful engagement and long-term

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behavioral change. As Moser argues, climate communication is only effective when it operates within *cultural cognitive frames*—that is, interpretive structures shaped by local symbols, memories, and emotions [1]. Furthermore, as Nixon emphasizes, modern climate communication must move beyond linear information delivery to function as a *moral discourse space*, where values, responsibilities, and collective memory are negotiated and reimagined [2]. In an era of globalized media but localized reception, communication must be redefined not merely as a transmission channel, but as an ethical and cognitive platform—where individuals not only comprehend climate issues but also *feel*, *remember*, and *act* upon them.

1.1. Research Objectives and Questions

In response to the aforementioned challenges, this study aims to assess the effectiveness of a multimedia communication model tailored to the cultural and ecological context of the Mekong Delta in enhancing climate awareness, promoting adaptive behavior, and cultivating a sense of environmental responsibility.

The specific objectives are as follows:

(1) To evaluate the extent to which multimedia communication enhances local climate knowledge and awareness;
(2) To measure the degree of behavioral transformation resulting from increased awareness;
(3) To analyze key mediating factors influencing communication effectiveness, including symbolic, cultural, generational, and technological dimensions.

Accordingly, the study is guided by the following central research question:

To what extent can multimedia communication transform climate awareness into sustainable behavior within the culturally specific context of the Mekong Delta—and through what mechanisms?

2. Literature Review and Theoretical Framework

2.1. Overview of Related Research

2.1.1. Environmental Communication and Behavioral Change

A substantial body of research has emphasized that effective climate communication must extend beyond the transmission of factual information. It should also evoke emotional engagement, activate memory, and connect with deeply held personal values to catalyze behavioral change [1, 3]. The *Engagement Ladder* framework delineates a cognitive-emotional progression whereby communication guides audiences from awareness to understanding, then to value alignment, and ultimately to action [4]. Achieving this progression requires messages that are not only evidence-based but also symbolically rich, emotionally resonant, and culturally meaningful.

Narrative-based climate communication has been identified as a particularly effective strategy, especially within culturally rooted communities [5, 6]. Narrative formats help make information more relatable, personalize abstract risks, and foster emotional identification. Furthermore, empirical research has shown that integrating visual tools—such as risk maps, illustrations, and animated storytelling—can significantly enhance audience recall and increase the likelihood of pro-environmental behavior [7].

In the Vietnamese context, environmental communication efforts remain largely policy-driven or limited to school-based education initiatives, typically relying on conventional formats such as posters, leaflets, and slogans [8]. While several multimedia campaigns have been introduced by non-governmental organizations, these initiatives often lack a strong theoretical foundation and have not undergone rigorous empirical evaluation. Notably, there is a significant absence of mixed-methods studies that examine both the cognitive and behavioral impacts of communication efforts, as well as how audience responses may differ based on age, gender, or educational background.

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2.1.2. Communication in the Mekong Delta Region

The Mekong Delta has been widely recognized as one of Southeast Asia's most climate-vulnerable regions, yet it also possesses substantial potential for community-based communication and localized resilience strategies [9, 10]. It is particularly susceptible to environmental threats such as sea level rise, saltwater intrusion, and riverbank erosion. At the same time, the region is deeply rooted in symbolic communal life, characterized by traditional practices such as village temples, floating markets, pagoda festivals, and agricultural cooperatives—each serving as a cultural touchstone for collective identity.

Despite these socio-cultural assets, climate communication in the Delta remains largely fragmented, short-term, and project-based. Most initiatives lack comprehensive frameworks to assess the extent to which awareness is translated into sustained behavioral change—particularly through formats such as videos, imagery, and local-language messaging. A critical shortcoming is the pervasive reliance on standardized Vietnamese with neutral voiceovers, which often fails to capture regional tonal nuances. This creates a symbolic distance, rendering communication less relatable, especially for older adults or ethnic minorities whose engagement is shaped by localized speech patterns and cultural references.

Recent studies have also documented significant generational disparities in communication effectiveness. While younger demographics primarily engage via social media and mobile platforms, older populations depend on traditional channels such as public loudspeakers, local television, and neighborhood meetings. These findings highlight the need for a stratified communication model—one in which a core message is delivered across multiple formats tailored to varying levels of technological access, cultural familiarity, and cognitive reception.

2.1.3. Research Gaps

Based on the review above, three critical gaps emerge in the field of environmental communication in Vietnam, particularly within the Mekong Delta region:

- The absence of an integrated model connecting communication, culture, and behavior at the provincial level.

Most existing studies examine these elements in isolation—such as message content, communication channels, or behavioral outcomes—without establishing a holistic analytical framework grounded in local context and indigenous cognitive structures [11, 12]. This lack of systemic cohesion has led to communication programs that are often unsustainable, difficult to scale, and ill-equipped to adapt across culturally diverse regions.

- Limited research assessing communication effectiveness across age groups, technological platforms, and folk-symbolic repertoires.

Environmental campaigns frequently employ uniform messaging strategies that overlook key differences in linguistic patterns, emotional cadence, and culturally mediated risk perception. As noted in recent analyses, such perceptual misalignments significantly reduce the likelihood that increased awareness will result in meaningful behavioral change [6].

- A shortage of empirical data integrating both quantitative and qualitative insights from grassroots communities.
  While much of the existing literature is descriptive or technically focused, few studies utilize mixed-methods approaches to comprehensively evaluate impact. Notably, there remains a lack of research that simultaneously examines individual behavior and explores the emotional, mnemonic, and ethical dimensions activated through multimedia communication [7]. This gap hinders the design of models that effectively address both the breadth (i.e., communication reach) and depth (i.e., psychosocial and cultural structure) of target populations.

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2.2. Theoretical Framework

2.2.1. Theory of Planned Behavior Ajzen [13].

The Theory of Planned Behavior (TPB) explains human behavior as a function of three interrelated components: attitude toward the behavior, perceived social norms, and perceived behavioral control. According to Ajzen [13] perceived behavioral control "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" [13]. This component is particularly crucial for bridging the gap between intention and action, especially in contexts where individuals lack sufficient social support, institutional infrastructure, or access to relevant communication resources.

In this study, such dynamics are clearly evident in the provinces of Tran [9] where survey data reveal a high degree of environmental intention but a significantly lower level of actual behavior. This discrepancy underscores the pivotal role of perceived behavioral control—not only as an internal psychological construct but also as a proxy for the structural and technological conditions that either enable or constrain environmental engagement at the community level.

2.2.2. Value–Belief–Norm Theory Stern [14].

The Value–Belief–Norm (VBN) theory identifies intrinsic moral motivation as a central mechanism driving pro-environmental behavior. It posits that personal values, ecological beliefs, and a sense of moral responsibility converge to activate personal norms—internalized obligations that guide individual action. As articulated by Stern and colleagues, "Proenvironmental behavior occurs in response to personal moral norms that are activated by beliefs about adverse consequences to others and the perceived ability to reduce those threats" [15].

In this study, VBN provides a critical conceptual foundation for the qualitative analysis. Across a diverse range of in-depth interviews, participants consistently expressed themes of intergenerational duty, environmental memory, and localized ecological ethics. The VBN framework is particularly useful in explaining why certain individuals engage in environmentally responsible behavior even in the absence of direct material incentives—guided instead by deeply held personal norms and a belief that their actions have moral significance beyond self-interest.

2.2.3. Multimedia Learning Theory Mayer [16].

Multimedia Learning Theory asserts that learners absorb and retain information more effectively when content is presented simultaneously through two cognitive channels: visual and auditory. Mayer refers to this as the dual-channel assumption, emphasizing that learning is enhanced when these channels operate in parallel and reinforce one another. As he explains, "Humans have two separate channels for processing information: one for auditory/verbal material and one for visual/pictorial material" [16].

In the context of climate communication, this dual-channel approach provides a compelling rationale for the effectiveness of multimedia content—particularly when localized using familiar voices and culturally embedded imagery. Such design elements help bridge emotional and cognitive engagement, making complex or abstract messages more relatable. Mayer also cautions that learning may be impaired when content is cognitively overloaded or when verbal and visual elements are not meaningfully integrated—conditions that often arise in regions like the Mekong Delta, where overly technical or culturally detached messages can alienate audiences and reduce receptivity.

This theory directly informs the communication model developed in this study. By integrating regional dialects (auditory), scenes of rural life (visual), and carefully calibrated pacing (design), the model aims to create an emotionally resonant and cognitively accessible multimedia experience—one that not only informs but also empowers local communities to act.

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2.2.4. Semiotics and Cultural Symbolism Barthes [17] and Hall [18].

Semiotics offers a critical framework for analyzing how meaning is constructed and transmitted through language, symbols, and culturally embedded codes. In Roland Barthes' theory, a sign is not merely the connection between a signifier and its signified, but part of a larger discursive system that generates secondary layers of meaning—what he famously terms myth. As Barthes explains, "Myth is a type of speech... a system of communication... It transforms history into nature"[19].

This insight reveals that even seemingly ordinary cultural references—such as a water buffalo, a thatched-roof home, or the melodic intonation of a Mekong Delta accent—can carry deep symbolic associations with identity, morality, and communal memory.

In rural Vietnam, the use of agrarian imagery, local dialects, and folkloric metaphors in communication serves as a form of embedded cultural symbolism, capable of activating collective emotional resonance. According to Hall, the power of symbols lies not in their objective content, but in their capacity to generate cultural resonance and produce shared interpretive frameworks. As he observes, "Meaning is not simply fixed by the sender; it is also decoded by receivers based on cultural context and shared codes" [18].

This study draws upon semiotic logic to enhance the localization, symbolic depth, and affective effectiveness of multimedia communication. The goal is to design content in which audiences do not merely hear a message, but also see themselves reflected in it—transforming reception into cultural recognition and identification.

3. Methodology and Research Data

3.1. Research Design

This study employs a mixed-methods design, combining both quantitative and qualitative approaches to ensure methodological triangulation and enhance the validity of findings [20]. The rationale for this approach lies in the multidimensional nature of climate communication, which involves not only behavioral metrics but also emotional and cultural undercurrents. A multi-layered analytical framework was adopted to capture both (1) measurable behavioral outcomes and (2) collective affective-symbolic responses situated within local community contexts [21].

3.2. Quantitative Method

Sample: A total of 500 participants were surveyed across five provinces in the Mekong Delta: Can Tho, Vinh Long, Hau Giang, Tien Giang, and Tra Vinh.

Instrument: A structured questionnaire was developed comprising 25 observed variables, using a 5-point Likert scale for response measurement [22].

Variables: The survey explored levels of media exposure, changes in environmental awareness, actual behaviors, and behavioral intentions.

Analysis Tools: Data were analyzed using SPSS software, applying descriptive statistics, group comparisons (t-tests and ANOVA), and Pearson correlation analyses.

3.3. Qualitative Method

Data Collection: In-depth, semi-structured interviews were conducted with 50 purposively selected individuals, including teachers, commune officials, farmers, and youth union members.

Sampling Strategy: A purposive sampling technique was employed to ensure representation across various age groups, genders, and community roles [23].

Data Analysis: Thematic analysis was used to code and interpret emotional narratives, ecological memories, and culturally embedded symbols. NVivo software supported coding consistency and interpretive depth.

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3.4. Communication Model Design

The communication model piloted in this study was informed by theoretical and empirical insights on multimedia learning and symbolic representation.

Content Design: The materials featured localized visual imagery (e.g., rural landscapes), regionally familiar voiceovers (Southern Vietnamese dialects), and culturally resonant metaphors.

Distribution Channels: Multimedia content was disseminated via Facebook, Zalo, public loudspeakers, school-based activities, and community meetings.

3.5. Limitations and Reliability

The survey sample exhibited imbalances in gender and educational background, which may affect generalizability.

Variations in local technological infrastructure constrained equitable access to digital content.

Some qualitative responses may be influenced by social desirability bias, potentially distorting self-reported perceptions and behaviors [24].

4. Results

4.1. Survey Structure

To ensure representativeness and accurately capture the diversity of audiences exposed to environmental communication in the Mekong Delta (ĐBSCL), this study surveyed 500 residents across five key provinces: Cần Thơ (130 respondents), Vĩnh Long (100), Trà Vinh (100), Tiền Giang (90), and Hậu Giang (80). These provinces were selected based on two primary criteria: (1) direct exposure to climate change impacts—such as salinity intrusion, land erosion, and flooding—and (2) substantial access to modern communication infrastructure. The sample was stratified by both geographic location and social role to reflect the complex layers of message reception and dissemination within the community.

Table 1.
Sample Distribution by Province and Social Role (n = 500).

Criterion	Category	Number	Percentage (%)
Survey Location	Cần Thơ	130	26.0
	Vĩnh Long	100	20.0
	Trà Vinh	100	20.0
	Tiền Giang	90	18.0
	Hậu Giang	80	16.0
Social Role	Farmers/Fishers	300	60.0
	Students	150	30.0
	Commune Officials/Teachers	50	10.0

The sampling strategy prioritized individuals involved in agriculture and aquaculture (60%), as they are among the most directly affected by extreme climate events and interact frequently with natural ecosystems. Cần Thơ—recognized as the Mekong Delta's economic and media hub—accounted for the largest proportion of the sample (26%), underscoring its central role in the regional dissemination of multimedia-based environmental messages.

In addition, the sample was analyzed by key demographic variables such as gender and age to assess technological access, levels of environmental concern, and the capacity for behavioral response across generational groups. This demographic segmentation supports a more nuanced understanding of how communication effectiveness may vary across different social strata.

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4.2. Demographic Profile of Respondents

Table 2 presents the demographic composition of the survey sample (n = 500), categorized by gender and age group. This distribution provides an essential foundation for subsequent analysis related to media accessibility, environmental awareness, and behavioral responsiveness.

Table 2.
Demographic Structure of the Survey Sample (n = 500).

Factor	Category	Percentage (%)
Gender	Male	46.0
	Female	54.0
Age Group	15–17 years old	12.0
	18–30 years old	38.0
	31–45 years old	23.0
	Over 45 years old	27.0

The largest age group represented in the sample is individuals aged 18 to 30, accounting for 38%. This demographic is typically more digitally literate and actively engaged with multimedia communication platforms. In contrast, participants over the age of 45—comprising 27% of the sample—are more susceptible to climate-related risks yet often face limitations in accessing new technologies and environmental information. This demographic stratification serves as a critical analytical lens in later sections, particularly for evaluating differences in media receptivity and the potential for behavior change. It also echoes findings from previous research indicating that generational factors significantly shape the efficacy of environmental communication [1].

4.3. Regional Access to Technology and Media

Table 3 outlines the levels of technological access and preferred media channels across five surveyed provinces in the Mekong Delta. The data reveal marked regional disparities in both infrastructure and communication habits.

Table 3.
Access to Technology and Media Channels by Province.

Province	Ownership of Personal Devices (%)	Access to Social Media (%)	Primarily via Traditional Channels (%)
Cần Thơ	89.2	84.6	12.3
Vĩnh Long	86.0	79.4	16.5
Tiền Giang	74.3	71.6	24.7
Trà Vinh	63.0	59.2	42.1
Hậu Giang	61.7	57.5	45.8

Cần Thơ and Vĩnh Long demonstrate the highest levels of digital access, with over 85% of respondents owning personal devices and regularly engaging with social media. These figures reflect the strong presence of digital infrastructure and a younger population active in digital communication. In contrast, Trà Vinh and Hậu Giang remain heavily reliant on traditional media such as communal loudspeakers, local radio broadcasts, and face-to-face community meetings. One interviewee from Hậu Giang remarked: *"I don't use my phone much, but when the village loudspeaker announces a landslide, everyone pays close attention."*

In Trà Vinh—where a large Khmer ethnic community resides—a local primary school teacher emphasized the importance of linguistic and cultural adaptation: *"Environmental messages need Khmer subtitles for people to pay attention. Even if the topic is serious, hearing it in our own language makes it easier to understand."* These qualitative insights reinforce existing scholarship asserting that language, voice, and cultural symbolism significantly affect the cognitive framing and emotional resonance of climate communication [1, 2]. Taken together, the combination of quantitative patterns and qualitative

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feedback illustrates the deliberate design of the sample to capture demographic and regional diversity in technology usage, media access, and communication preferences. These findings serve not only as an evaluative baseline for the multimedia communication model but also as a guide for tailoring content to local cultural and infrastructural contexts [1].

4.4. Climate Change Awareness

Climate change (CC) presents not only an environmental threat but also a cognitive and social challenge, where public perception plays a critical role in shaping adaptive behavior and fostering environmental responsibility. As Stern notes, sustainable actions do not arise from coercion or fear, but from an integrated system of values, beliefs, norms, and awareness of consequences [15]. Likewise, Lakoff emphasizes that people interpret complex phenomena not through raw information, but via *cognitive frames*—mental structures shaped by culture, emotion, and lived experience [25]. Therefore, assessing climate change awareness requires measuring not only factual knowledge but also the depth of individual understanding and emotional engagement with the issue. A survey conducted among 500 respondents across five provinces revealed a generally high level of climate awareness, though with observable variations by geographic region, age group, and access to information. The detailed results are summarized in Table 4.

Table 4.
Mean Scores of Climate Change Awareness (Likert Scale: 1–5).

Survey Item	Mean (M)	Standard Deviation (SD)
I am aware of extreme weather events (e.g., saltwater intrusion, erosion) in my area.	4.21	0.61
I understand the causes of climate change (e.g., greenhouse gases, deforestation).	3.84	0.75
I know how to adapt to climate impacts such as saline water or unusual floods.	3.43	0.91
I believe that climate change is an urgent issue affecting my community's future.	4.52	0.47

The highest average score was recorded for the perceived urgency of climate change (M = 4.52), indicating a strong sense of concern within the community. In contrast, the lowest score was associated with knowledge of concrete adaptation strategies (M = 3.43), suggesting a significant gap in practical preparedness. As one respondent from Tiền Giang shared: *"We know the saltwater comes every year, but no one tells us what to do except to be careful with the water."*

These findings underscore the importance of communication strategies that extend beyond basic information dissemination. Effective messaging must engage local cognitive frames, cultural narratives, and emotional resonance—aligning with broader insights from climate communication research [14, 25].

4.5. Regional and Generational Differences in Understanding Climate Change Causes

Table 5 presents regional variations in respondents' understanding of the causes of climate change, measured on a 5-point Likert scale.

Table 5.
Understanding of Climate Change Causes by Province (Mean Scores, Likert Scale 1–5).

Province	Mean (M)
Cần Thơ	4.20
Vĩnh Long	4.00
Tiền Giang	3.70
Hậu Giang	3.30
Trà Vinh	3.10

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The results reveal a clear relationship between communication infrastructure and the depth of scientific understanding. Respondents in Cần Thơ and Vĩnh Long—where digital device usage exceeds 85%—scored significantly higher in conceptual knowledge. In contrast, Trà Vinh and Hậu Giang, with the lowest levels of access to modern media (around 60%), reported the lowest scores.

Age-group analysis further underscores this cognitive gap: respondents aged 18–30 achieved an average score approximately 0.8 points higher than those over 45, indicating a substantial generational divide in climate literacy.

Qualitative data from in-depth interviews reinforce these patterns. A teacher from Vĩnh Long noted: *"Students now learn about climate in geography class. When they see videos or infographics about CO_2, they quickly understand and even explain them to their parents."* Meanwhile, a 67-year-old woman from Trà Vinh shared: *"I keep seeing the land erode, but I thought it was just bad luck from the heavens. Those explanations about climate causes feel too far removed."*

Such responses highlight not only generational and educational disparities, but also the role of cultural framing in environmental cognition. As Lakoff observed, *"every complex concept is structured by pre-existing metaphors and cultural frames"* [25]. These findings emphasize that effective communication must do more than transmit information—it must actively reframe climate change in ways that align with local narratives, values, and symbolic systems.

In summary, while public awareness of climate-related phenomena is relatively high across the Mekong Delta, substantial gaps remain in understanding the causes and actionable responses. To bridge this gap, climate communication must evolve from passive information delivery to active engagement strategies. Following Moser and Dilling's framework for environmental communication [12] three key recommendations are proposed:

1. Simplify abstract concepts to enhance cognitive accessibility;
2. Visualize consequences to foster emotional engagement;
3. Link specific actions to familiar, everyday contexts to facilitate behavioral change.

4.6. Evaluation of the Multimedia Communication Model

The multimedia communication model on climate change was designed to meet three core criteria: (1) accessibility, (2) perceptual engagement, and (3) dissemination potential. According to Mayer, effective reception occurs when information is conveyed through multiple sensory channels simultaneously, enhancing cognitive processing and retention [16]. Complementing this view, Jenkins argues that in a convergent media environment, content is only successful when it is shared, discussed, and "remixed" within communities [26]. From this perspective, the following analysis evaluates the performance of the model at both the individual and community levels.

4.6.1. Accessibility and Audience Engagement

Following exposure to the multimedia content—including short videos, infographics, podcasts, and interactive maps—survey participants across five provinces reported high levels of satisfaction regarding clarity, audiovisual appeal, cultural relevance, and willingness to engage with similar content in the future. Table 6 presents the comparative evaluation by province.

Table 6.
Provincial Comparison of Communication Model Evaluation (Likert Scale: 1–5).

Evaluation Criterion	Cần Thơ	Vĩnh Long	Tiền Giang	Trà Vinh	Hậu Giang
Content is easy to understand	4.71	4.58	4.53	4.39	4.32
Visual and audio elements are vivid	4.76	4.65	4.62	4.51	4.49
Relevant to local daily life	4.48	4.42	4.36	4.27	4.22
Interest in accessing similar content	4.80	4.74	4.68	4.65	4.62
Composite average	4.69	4.60	4.55	4.46	4.41

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Cần Thơ ranked highest across all categories, a result attributed not only to its advanced media infrastructure but also to high digital literacy among its youth population. Vĩnh Long also showed strong performance, particularly due to the integration of environmental communication into schools and mass organizations. In contrast, Trà Vinh and Hậu Giang scored lower, especially in terms of "clarity" and "local relevance," indicating an ongoing need for further localization of language, symbols, and storytelling methods.

These results suggest that while the multimedia model demonstrates high adaptability and effectiveness overall, its impact can be significantly enhanced through culturally sensitive customization at the local level.

4.6.2. Dissemination and Community Sharing Behavior

Beyond individual reception, the multimedia communication model was also highly effective in generating broader social diffusion. Table 7 presents the proportion of participants who reported engaging in post-exposure behaviors such as sharing, discussing, or reusing the communication materials.

Table 7.
Content Dissemination Rates by Province (%).

Post-exposure behavior	Cần Thơ	Vĩnh Long	Tiền Giang	Trà Vinh	Hậu Giang
Shared with family or friends	71%	67%	62%	58%	57%
Discussed in group settings (e.g., schools, unions)	65%	60%	55%	51%	49%
Reposted or engaged with content on social media	53%	51%	48%	41%	37%
Suggested integration into schools or public programs	78%	74%	70%	68%	66%

These figures suggest a multidirectional pattern of content diffusion—both horizontally (across social groups) and vertically (into educational and community platforms). A student in Vĩnh Long shared: *"I really liked the clip on saltwater intrusion—we posted it in our class group and sent it to our teachers for extracurricular activities."* Similarly, a youth union leader in Trà Vinh remarked: *"We printed posters from the video and used them for a quiz game with middle school students—they picked it up quickly."*

4.6.3. Areas for Improvement and Recommendations for Localization

Despite strong overall performance, some feedback—especially from participants in Trà Vinh and Hậu Giang—indicated that the content did not fully resonate with local sensibilities. One elderly resident from Cầu Kè observed: *"The text in the clip was too small—I couldn't read all of it. If someone spoke in Khmer, more elders in our neighborhood would watch it."* This underscores a key principle in communication design: effectiveness depends not only on accurate content but also on the alignment of language, voice, and symbolic representation with the target audience.

Based on this insight, the following localization improvements are recommended:

- Employ local narrators such as fishermen, elders, or students to enhance cultural familiarity;
- Incorporate Khmer-language voiceovers or provide multilingual subtitles for ethnic minority communities;
- Produce low-bandwidth versions compatible with rural loudspeakers, older televisions, and basic mobile devices.

4.6.4. Summary of Section 4.6

The multimedia communication model demonstrated high effectiveness in audience reception (composite M = 4.58/5), emotional engagement, and content dissemination (with over 60% of respondents in most provinces reporting sharing behaviors). However, notable regional differences highlight the need for deeper localization in terms of culture, language, and technology. These findings affirm the importance of designing media content that not only informs but also frames messages within

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culturally resonant narratives [16] leverages participatory diffusion networks [26] and prioritizes contextual relevance for behavior change [12].

4.7. Post-Communication Behavior and Action Intentions

According to the Theory of Planned Behavior (TPB) Ajzen [13] pro-environmental behavior is shaped by three core factors: personal attitude, perceived social norms, and perceived behavioral control. The Value–Belief–Norm (VBN) theory further emphasizes the role of internal moral obligation in sustaining long-term environmental action [14].

This section evaluates the effectiveness of the multimedia communication model on two levels:

Actual behavior change;

Formation of long-term action intentions.

4.7.1. Actual Behavior Change

Survey data from 500 respondents across five Mekong Delta provinces are summarized in Table 8.

Table 8.
Behavior Change and Action Intention Rates Post-Communication (%).

Behavior / Intention	Cần Thơ	Vĩnh Long	Tiền Giang	Trà Vinh	Hậu Giang	Average
Conserving water/electricity	72%	70%	67%	63%	61%	66.6%
Reducing single-use plastic waste	68%	64%	60%	56%	52%	60.0%
Participating in local environmental activities	53%	49%	48%	44%	40%	46.8%
Intention to join future campaigns	78%	74%	71%	68%	66%	71.4%
Feeling responsible for the environment	84%	80%	77%	74%	72%	77.4%

These results indicate a measurable impact on both behavior and mindset. While immediate behavior changes such as water/electricity conservation and reduced plastic use were common, even stronger responses were recorded in terms of future intent and environmental responsibility.

4.7.2. Intention to Act and Moral Responsibility

While actual behavioral change remains modest, respondents demonstrated a notably strong intention to take action. More than 70% expressed a clear willingness to continue engaging in environmental campaigns, and over 77% reported a strong sense of moral responsibility toward their ecological surroundings—an encouraging signal consistent with the Value–Belief–Norm (VBN) theory.

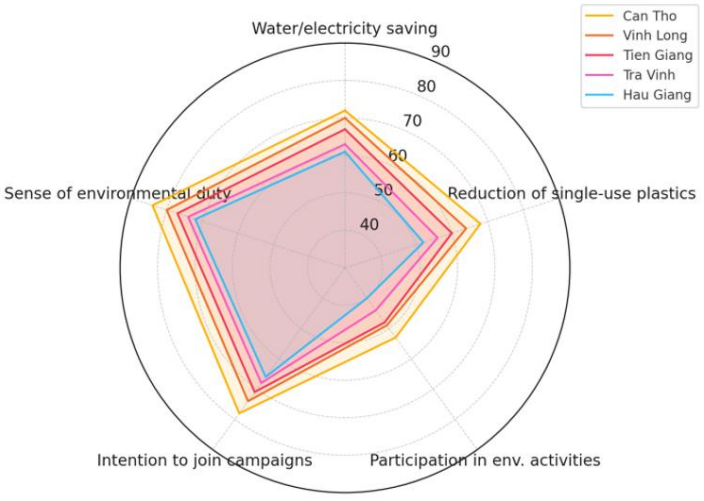

Figure 1.
Radar – Behavioral and Intentional Strength by Province.

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The radar chart reveals that Can Tho demonstrates the most comprehensive alignment between environmental behavior and intention. In contrast, Tra Vinh and Hau Giang exhibit prominent "moral peaks" yet lack corresponding behavioral foundations—vividly illustrating the intention–action gap when perceived behavioral control is limited, as posited by the Theory of Planned Behavior (TPB).

4.7.3. Provincial Performance – Where Does Each Province Excel?

To assess the overall environmental engagement of each locality, a composite visualization was utilized:

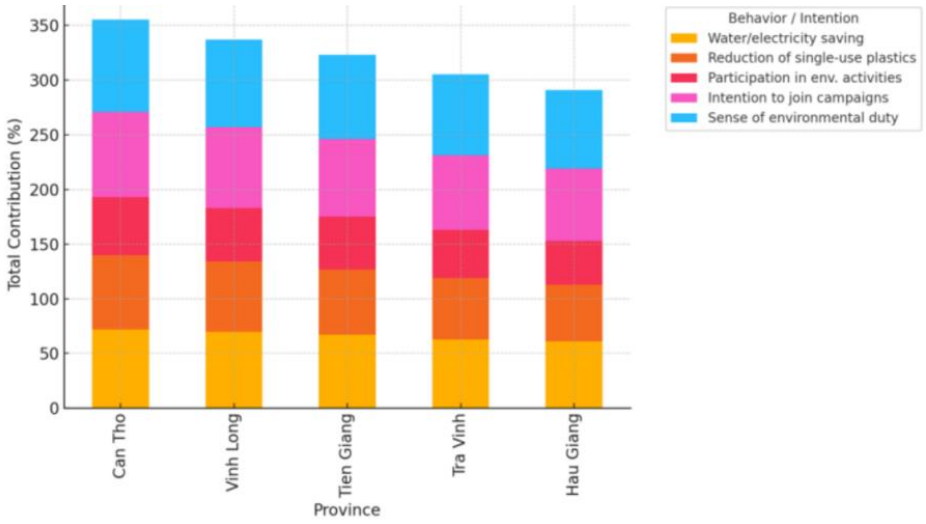

Figure 2.
Stacked bar chart- Combined environmental behavior and intention by province.

The stacked bar chart illustrates the overall comprehensiveness of each province's engagement.

- Can Tho emerges as a "comprehensive exemplar," benefiting from a strong combination of technological infrastructure and school-based communication initiatives.
- Vinh Long and Tien Giang demonstrate a relatively balanced distribution between environmental awareness and concrete action.
- Tra Vinh and Hau Giang would benefit from targeted support models to help convert intention into behavior—particularly through the enhancement of local institutions, policy mechanisms, and community-based networks.

4.8. Summary of Section

The multimedia communication model demonstrated strong effectiveness in generating behavioral change (average >60%) and activating long-term action intentions (average >70%), particularly among younger demographics. However, as emphasized in behavioral theory [13] intention alone does not guarantee sustained action. To bridge this gap, several structural interventions are recommended:

- Enhance community-level infrastructure to support collective environmental action;
- Strengthen interconnectivity between local institutions such as communes, schools, and civic groups;
- Introduce localized incentive mechanisms to encourage and normalize pro-environmental behavior.

These strategies are essential to transitioning from awareness to habitual, sustainable practices.

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4.8.1. Key Qualitative Insights: Narrative, Memory, and Community Cognition

While quantitative data reveal how the communication model influenced knowledge and behavior at a measurable scale, qualitative findings uncover the lived, emotional, and symbolic dimensions of how individuals engage with environmental content. This aligns with cognitive and framing theory, which suggests that environmental understanding is mediated by metaphor, narrative, and collective memory rather than information alone [25].

In-depth interviews with 25 individuals across five Mekong Delta provinces produced a rich "living archive" of perspectives. These narratives show that communication is not merely a process of information reception—it becomes a reflective space where individuals reinterpret environmental realities and locate themselves within the broader context of climate vulnerability, ancestral memory, and moral responsibility.

Key insights from these interviews were categorized into distinct thematic codes, presented in Table 9.

Table 9.
Thematic Coding of Qualitative Data with Illustrative Quotes.

Core Theme	Common Perceptions / Manifestations	Illustrative Quote
Environmental memory	Media reactivates memories of floods, droughts, and historic climate events	"I remember 1998, water up to my knees—just like in the clip…" (Male, 67, Tiền Giang)
Folk metaphors for climate	Climate change interpreted through spiritual or moralized narratives	"I thought it was God testing us, not deforestation…" (Farmer, Hậu Giang)
Emergent agency and responsibility	Recognition of personal role in environmental problems and solutions	"I realized I was part of the problem, so I started a cleanup group." (Female, 17, Trà Vinh)
Access barriers: language, age	Older adults face challenges due to font size, narration speed, and dialect usage	"The words were too small and fast—I couldn't follow everything." (Bà Sáu, 73, Trà Vinh)

4.8.2. Memory-Activating Visuals

Multimedia content—particularly video and animated formats—proved effective in triggering collective environmental memory. For instance, a 67-year-old resident of Tiền Giang stated:

> "I watched the clip where water flooded the street—it brought back memories of 1998, when it reached our doorstep."

This aligns with Halbwachs [27] theory of *collective memory*, where individual recollections are embedded within shared social and visual frameworks [27].

4.8.3. Folk Metaphors: Interpreting Climate Through Cultural Frames

Many respondents interpreted environmental change through folk metaphors, reflecting deeply rooted cultural beliefs. Expressions such as "God's wrath," "the forest's revenge," or "earth's fury" were common. A farmer in Hậu Giang reflected:

> "I always thought it was God testing us. I didn't realize deforestation had anything to do with it."

This demonstrates what Lakoff and Johnson describe as *cultural frame metaphors*—conceptual tools that localize abstract phenomena through familiar moral and symbolic lenses [25].

4.8.4. From Passive Reception to Active Participation

The most impactful communications were those that led individuals to see themselves as agents of environmental change. A student in Trà Vinh shared:

> "I realized I was contributing to the river waste, so I encouraged my friends to start a cleanup group."

This shift illustrates a transition from an external to an internal locus of control, where individuals move from passive observation to active responsibility.

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4.8.5. Barriers of Comprehension and Access

Despite overall effectiveness, barriers to access were evident, particularly among elderly participants. Common issues included small text size, fast narration, and unfamiliar vocabulary. A 73-year-old woman from Trà Vinh explained:

> "The content was interesting, but the font was too small, and everything was in the standard dialect—I couldn't understand all of it."

These insights highlight the need for inclusive design, including regional dialects, alternative formats, and media tailored to intergenerational accessibility. A summary of accessibility findings is provided in Table 10 (Section 4.6).

Table 10.
Media Reception Characteristics by Audience Group.

Audience Group	Primary Access Channels	Climate Interpretation	Post-Exposure Behavioral Tendencies
Elderly (60+)	Television, commune loudspeakers	Folk metaphors, personal recollections	Emotional resonance; limited behavioral response
Mid-aged farmers (40–59)	Radio, basic mobile phones	Practical framing, grounded in agricultural experience	Interest in concrete solutions; need for clear guidance
Youth (15–30)	Smartphones, social media	Scientific logic intertwined with emotional appeal	Distinct behavioral patterns: conservation, sharing, group initiatives
Teachers and civil servants	Schools, social media	Ethical framing, environmental justice	Collective action; integration into curricula and civic institutions

4.9. Summary of Section

Qualitative findings reveal that multimedia communication functions not merely as an information delivery system but as a dynamic medium that engages memory, emotion, and cultural identity. The model's strength lies in its ability to:

- Activate environmental memory and evoke emotionally anchored community experiences;
- Reframe natural disasters through folk narratives and culturally embedded metaphors;
- Empower individual agency, fostering a transition from passive awareness to proactive engagement;
- Surface structural barriers related to age, language, and technological access.

These insights confirm that the most fertile ground for sustainable behavioral transformation lies at the intersection of communication, memory, and ecological ethics—a convergence supported by Halbwachs [27] theory of collective memory Halbwachs [27] and Lakoff and Johnson [25] framework of conceptual metaphor [25].

4.10. Determinants Influencing the Effectiveness of the Multimedia Communication Model

The effectiveness of environmental communication extends beyond message content. It is shaped by a constellation of contextual variables—reception environments, individual capabilities, and sociotechnical infrastructures. Drawing from both qualitative and quantitative data, the study identifies four key categories of determinants that influence the reception, emotional resonance, and dissemination of multimedia communication in the Mekong Delta context [12].

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Table 11.
Determinants Influencing the Effectiveness of the Multimedia Communication Model.

Determinant Group	Specific Indicators	Impact on Communication Effectiveness
1. Technological infrastructure and device access	Smartphone, social media, television, and loudspeaker usage levels directly affect access to communication.	Provinces with strong infrastructure (e.g., Cần Thơ, Vĩnh Long) scored higher; loudspeaker/TV-based regions require adaptive formats.
2. Cultural framing and local symbolism	Use of local language, folk metaphors, and traditional storytelling enhances accessibility.	Localized content achieves greater dissemination; regional voices and familiar symbols strengthen emotional engagement Ajzen [13].
3. Demographic and generational traits	Age and educational level influence message processing and behavioral response.	Content should be stratified: youth favor interactive formats, while older adults require clarity and familiarity Barthes [19].
4. Organizational environment and community linkage	Presence of intermediaries (schools, unions, cooperatives) supports collective adoption.	Messages integrated into collective settings are more likely to lead to group behavior; in isolated areas, communication often remains individual Barthes [17].

4.10.1. Technological Infrastructure and Device Access

Access to content is directly tied to personal devices and telecommunications infrastructure. In Cần Thơ and Vĩnh Long, where smartphone and social media usage exceeds 85%, respondents reported significantly higher satisfaction with the communication model.

By contrast, in Hậu Giang and Trà Vinh, a substantial portion of the population (30–40%) still relies on basic phones, local television, or commune loudspeakers. This limits access to interactive formats, requiring parallel content strategies—one modern and interactive, the other simplified and compatible with low-tech platforms.

4.10.2. Cultural Framing and Local Symbolism

Messages are more readily received when they incorporate local language, metaphor, and narrative structures. As observed in Section 4.5, many interviewees interpreted climate events through folk metaphors such as *"heaven's wrath," "forest rebellion,"* or *"earth's revenge."*

When messages are framed purely in scientific terms, a cognitive gap emerges. Thus, localization—in voice, imagery, and narration—is not optional but essential. A campaign narrated *"in the voice of the village"* can far outperform a professionally produced but culturally detached clip [25].

4.10.3. Demographic and Generational Reception Traits

Age, education, and social role significantly influence both reception and behavioral response. The study revealed:

- Youth (18–30): Fast reception, strong behavioral follow-through, peer-to-peer sharing
- Middle-aged (40–59): Practical concerns, moderate engagement, preventive action
- Seniors (60+): Strong memory retention, low action rates; require familiar formats

These findings suggest that multimedia content should be tiered by generation, delivering the same message through age-appropriate styles and framing [13].

4.10.4. Organizational Environment and Community Linkage

Multimedia content is most effective when embedded in collective social spaces—schools, women's unions, youth associations, agricultural cooperatives. These organizations act as intermediaries, helping transform media into community action.

As a teacher in Vĩnh Long shared:

> "When students watched the clip in class and then made posters on water saving, they remembered it and acted right away."

In contrast, in areas lacking community structures (e.g., remote Trà Vinh), communication tends to remain at the individual level, with limited social reinforcement or behavioral diffusion [12].

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Summary of Section 4.9

The effectiveness of multimedia communication in the Mekong Delta is shaped by the intersection of four critical determinant groups:

- Technological infrastructure (devices, connectivity)
- Cultural framing and localization (language, symbolism)
- Generational and demographic characteristics
- Organizational and community engagement

To replicate and scale the model successfully, communication strategies must be adaptively localized—ensuring that messages do not merely reach audiences, but truly resonate, circulate, and transform behaviors across contexts.

5. Discussion

5.1. Multimedia Communication as a Cognitive Restructuring Tool

This study affirms that a multimedia communication model—when designed with high levels of localization and strong visual aesthetics—can transcend the role of mere information transmission to reshape how local communities conceptualize climate change. According to Mayer's dual-channel learning theory [16] and Fleming's visual–auditory reception model [28] multimedia formats such as videos, infographics, and interactive maps activate the sensorial-emotional-cognitive system more effectively than text-based methods.

By embedding visual elements rooted in familiar settings—rice fields, rural roads, irrigation canals—the model bridges the psychological distance between abstract environmental phenomena and daily life. This is especially significant in rural contexts where climate change is often perceived as a distant or governmental issue, disconnected from individual behavior.

5.2. From Communication to Behavior: Gaps and Mediating Conditions

A critical contribution of this research is its illumination of the intention–behavior gap, as theorized by the Theory of Planned Behavior (TPB) [13] and the Value–Belief–Norm (VBN) model [14]. While over 70% of participants expressed intent to act sustainably, only around 60% reported concrete behavioral change—especially among those with limited technological access or weak community networks.

This finding underscores that communication alone is insufficient for lasting behavioral transformation without supportive social environments. Such environments may include classrooms, peer-based action groups, or cooperatives that integrate media content into everyday interactions. These intermediary structures play a crucial role in translating messages into collective action, aligning with Jenkins' theory of convergent culture: it is not the content, but the networks of sharing, that determine diffusion and impact [26].

5.3. Localization as the Key To Semiotic Resonance

Another core finding concerns the role of language, symbolism, and local voice in achieving communicative resonance. Content only becomes effective when audiences recognize themselves in it—when symbolic empathy is activated. Many respondents did not interpret messages through technical terms (e.g., salinity intrusion, sea-level rise), but through locally grounded imagery such as "brackish water in the canal," "fruit trees shedding leaves," or "shrimp dying across the pond."

This insight deepens Barthes' notion of semiotic resonance Barthes [19] which asserts that signs gain meaning and power only when anchored in culturally expressive realities. Consequently, the most impactful communication is not the most sophisticated, but the most culturally attuned—the message that "speaks in the voice of the neighborhood," not in distant technocratic language.

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5.4. Communication as an Ethical and Affective Space

Finally, the study reveals that environmental communication serves not just as an informational vector but as an ethical and emotional ecosystem. Over 77% of participants reported a heightened sense of responsibility toward their environment after engaging with the media content. This response reflects more than cognitive alignment—it signals the activation of internalized moral norms, a key construct within the VBN framework [14].

When effectively deployed, multimedia does not merely educate; it evokes a lived sense of belonging—"I am part of this ecosystem"—which serves as a foundation for environmental moral agency. At this threshold, communication is no longer just a tool, but a moral space, where civic identity and ecological responsibility converge.

6. Recommendations

6.1. Deep Localization of Communication Content

This study confirms that communication becomes significantly more effective when messages are conveyed in a local voice—not only in terms of language, but also through symbols, imagery, storytelling techniques, and emotional rhythms specific to each region. To enhance perceptual and cultural resonance, the following strategies are recommended:

- Feature local narrators (e.g., fishermen, farmers, students, women) to anchor content in lived experience;
- Provide bilingual subtitles (e.g., Vietnamese–Khmer or Vietnamese–regional dialects) in multiethnic areas;
- Design modular content formats that are easily reconfigured to suit microcultural contexts.

These approaches reduce perceptual distance and increase symbolic affinity, aligning with Barthes' theory of semiotic resonance Barthes [19] and Lakoff and Johnson [25] cognitive metaphor framework [25].

6.2. Strengthening Local Communication Infrastructure

The impact of media messages is magnified when embedded within physical social networks—intermediary institutions such as schools, women's unions, youth groups, and agricultural cooperatives. These entities serve as amplifiers that recontextualize media and promote behavioral change.

6.2.1. Recommended Actions

- Integrate communication content into both formal curricula and extracurricular programs (middle and high school);
- Train leaders of civic organizations and community groups in environmental content dissemination;
- Establish commune-level communication hubs that support outreach through posters, loudspeakers, and communal video screenings.

This network-based model reflects Jenkins' theory of convergent media: the effectiveness of communication is shaped as much by its distribution architecture as by its content [26].

6.3. Generational and Cognitive Stratification of Content

A major finding of this study is the variation in media engagement across age groups and technological familiarity. While younger audiences gravitate toward fast, interactive, and shareable formats, older populations prefer slow-paced, clear, and familiar content.

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6.3.1. Implementation Strategies

- Develop age-specific content suites: TikTok and YouTube for youth; Facebook and radio for middle-aged adults; TV and public loudspeakers for seniors;
- Provide content at multiple levels of complexity: accessible infographics for general audiences; long-form analysis for educators and administrators;
- Ensure compatibility with basic mobile devices and household televisions to enhance accessibility.

This reflects a tiered communication strategy, ensuring that the right message reaches the right audience via the right format.

6.4. Long-Term Investment in Climate Moral Communication

Finally, the study emphasizes that sustainable behavioral change arises not only from knowledge transfer but from moral engagement, emotional resonance, and community identity. These are the foundations for cultivating climate citizenship—individuals who act not from fear, but from a sense of belonging and ethical responsibility.

6.4.1. Key recommendations

- Transition from short-term campaigns to long-duration narrative immersion, allowing for gradual value transformation;
- Incorporate intergenerational and ethical messaging (e.g., "for our grandchildren's future," "protecting ancestral lands") across all content formats;
- Develop new evaluation metrics that assess emotional engagement, memory activation, and ecological moral agency, offering alternatives to purely cognitive outcome measures.

This aligns with Stern's model of environmentally significant behavior Stern [14] and Thomashow [29] theory of ecological identity [29].

7. Conclusion and Academic Implications

7.1. General Conclusion

This study demonstrates that the multimedia communication model can effectively enhance public awareness and promote climate-adaptive behavior in Vietnam's Mekong Delta (ĐBSCL). Quantitative data reveal that over 70% of participants expressed positive behavioral intentions, while 60–70% reported actual changes—such as resource conservation, waste sorting, and participation in environmental initiatives.

Qualitative findings further indicate that communication not only raises awareness but also activates collective memory, restructures cognitive frameworks related to climate perception, and evokes ecological moral norms. Communication effectiveness increases significantly when content is localized—anchored in familiar symbols, dialects, and settings. However, sustainable behavior only emerges when communication is supported by social infrastructure and technological accessibility.

7.2. Academic Implications

At the theoretical level, this study contributes to three key areas:

Extending the TPB and VBN frameworks: By integrating qualitative dimensions, this research introduces collective memory, regional identity, and localized moral sentiment as mediating variables that influence environmental behavioral intent—extending the explanatory scope of the Theory of Planned Behavior (TPB) and the Value–Belief–Norm (VBN) model [13, 14].

Bridging multimedia communication and cognitive theory: The results emphasize the role of imagery, folk symbolism, and visual–auditory interaction in shaping environmental cognition.

This expands concept of media cognition by embedding it in localized semiotic contexts [16].

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Proposing a climate moral communication framework: The study shows that sustainable behavior is not driven by information alone, but by internal moral norms and a sense of belonging to a vulnerable community. This lays theoretical groundwork for future models that incorporate emotional resonance and collective identity as drivers of behavioral transformation.

7.3. Practical Implications

- Climate communication campaigns must be deeply localized, reflecting the language, culture, and media habits of diverse populations in the Mekong Delta.
- Communication should be embedded in community spaces—such as classrooms, markets, cooperatives, and civic organizations—where collective behavior can be activated.
- Local governments should develop climate moral communication policies as part of sustainable development strategies, with secure funding and periodic evaluation mechanisms.

7.4. Future Research Directions

This study opens several promising pathways for future investigation:

1. Cross-regional comparative studies: Extend the communication model to other areas of Vietnam (e.g., the Central Highlands or South-Central Coast) to explore regional differences in perception, symbolism, and behavioral response.

2. Youth-focused digital media research: Investigate how platforms such as TikTok, YouTube, and podcasts influence the ecological consciousness and lifestyle choices of younger generations.

3. Development of ecological moral metrics: Design and validate a scale to assess moral responsibility, intergenerational awareness, and long-term sustainable environmental behavior.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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