



Audrezara Journal of Communication and Social Research (AJCSR), Vol. 2(2), 159-172, 2026.



AUDREZARA JOURNAL OF COMMUNICATION AND SOCIAL RESEARCH (AJCSR)

Vol. 2, Issue 2, pp. 159-172, August, 2026.

DOI: <https://doi.org/10.5281/zenodo.22150429>

E-ISSN: 3121-9721

Artificial Intelligence and Multimodal Environmental Communication: Text, Image and Sound

JaneMaura Ogechukwu Madu

Department of English Language, National Open University of Nigeria



ORCID:

<https://orcid.org/0009-0004-9469-293x>

*Corresponding Author: jmaura333@yahoo.com

History: Received: May 28, 2026; Revised: July 20, 2026; Accepted: July 27, 2026.

Abstract

Environmental communication plays a critical role in shaping public understanding, attitudes, and actions toward environmental sustainability and climate change. Environmental challenges such as climate change, deforestation, pollution, and biodiversity loss require effective communication strategies that can reach diverse audiences and inspire action. Traditionally, environmental communication has relied heavily on textual reports, policy documents, and scientific publications, which are often inaccessible to non-expert audiences. With the rapid advancement of Artificial Intelligence (AI), new possibilities have emerged for enhancing environmental communication through multimodal approaches that integrate text, image, and sound. This study explores how AI-driven multimodal systems can be leveraged to improve the effectiveness, accessibility, and persuasiveness of environmental messages. Drawing on Technology Acceptance Model (TAM) and Media Richness Theory, the study examines the role of natural language processing, computer vision, and speech technologies in environmental advocacy, education, and policy communication. This study adopts a qualitative research design, combining conceptual analysis, content analysis, and case-based review to examine Artificial Intelligence in multimodal environmental communication. By addressing existing gaps in traditional environmental communication, this research highlights the potential of AI-enabled multimodal communication to foster greater public engagement, environmental awareness, and sustainable behavioural change. The study contributes to the growing interdisciplinary discourse at the intersection of artificial intelligence, communication studies, and environmental sustainability.

Keywords: Communication studies, Environmental sustainability, Artificial Intelligence, Interdisciplinary Discourse



Introduction

Obviously, environmental challenges such as climate change, biodiversity loss, deforestation, pollution, flooding, desertification and environmental degradation have become increasingly urgent concerns in contemporary society. Addressing these challenges requires not only scientific knowledge and effective environmental policies but also communication strategies capable of translating complex environmental information into forms that diverse audiences can understand, interpret and act upon within a short period of time to prevent loss and damages. Environmental communication therefore plays an important role in shaping public knowledge, attitudes, perceptions and behavioural responses to environmental issues in different communities (Izuogu & Umoren, 2017). In recent years, environmental communication has moved beyond conventional print and broadcast media into highly digital, interactive and multimodal environments in which written language, images, video, graphics, animation, music, speech and other forms of sensory representation operate together to communicate environmental information. This transformation has created new opportunities for communicating environmental information while simultaneously introducing questions about accuracy, credibility, accessibility, representation and public trust.

Understandably, the emergence of Artificial Intelligence (AI), particularly generative artificial intelligence (GenAI), has further transformed the possibilities of environmental communication. AI systems can process very large quantities of environmental information, identify patterns in textual and visual data, generate written explanations, create images, produce synthetic voices, translate environmental messages and facilitate personalised communication within a given environment. Recent scholarship indicates that AI is increasingly becoming an assistive layer in climate communication rather than simply replacing conventional communication practices. It can support content production, multilingual communication, discourse monitoring, fact-checking and the generation of textual, visual and multimodal representations of environmental issues (Schäfer, 2026). This development is particularly significant because environmental problems are inherently complex and often require communicators to combine scientific evidence with accessible narratives, visual representations and emotionally meaningful experiences.

In this study, the concept of multimodality is central to understanding this transformation. Multimodal communication refers to the use and interaction of multiple semiotic modes in the construction and interpretation of meaning. Text, image and sound do not simply communicate the same message in different forms; rather, they can complement, reinforce, extend or sometimes contradict one another. Understandably, in environmental communication, for example, a written explanation of rising temperatures may be combined with a satellite image showing environmental change, an infographic presenting statistical evidence, and an audio recording or video containing the experiences of affected communities. Certainly, the combination of these modes can make abstract environmental processes more concrete and potentially more engaging to audiences. Again, recent research on climate communication demonstrates that digital environmental discourse is increasingly characterised by such multimodal combinations. Yan and Schäfer (2025), analysed thousands of climate-related articles and images on WeChat and demonstrated how textual and visual elements jointly construct environmental narratives and topics.

Artificial Intelligence has expanded the capacity to create, manipulate and integrate these communicative modes in environmental communication. Generative AI can produce a written environmental explanation from a prompt, generate an accompanying illustration, synthesise a voice-over, create captions, translate the content into other languages and, increasingly, combine these elements into videos or other multimodal products. Consequently, environmental communication is moving towards a model in which



AI can participate in the production and circulation of messages across several modes simultaneously for immediate action to be taken to save life and prevent damages. Schäfer (2026) argues that AI is generating new textual, visual and multimodal representations of climate change while also enabling personalised and multilingual forms of outreach. In this research, this development creates an important research area because the communicative effectiveness of AI-generated environmental content cannot be adequately understood by examining text alone. The relationship among linguistic, visual and auditory resources must also be considered for effective environmental communication.

The textual dimension remains fundamental to AI-mediated environmental communication. Written language provides the principal means through which environmental facts, scientific explanations, policies, recommendations and calls to action can be articulated within a short period of time. AI-powered language systems can summarise scientific reports, simplify technical terminology, generate environmental awareness campaigns, answer questions, translate information and produce content for social media and digital platforms. Such applications can potentially make complex environmental knowledge more accessible to non-specialist audiences. This is particularly important in multilingual societies, where environmental information may need to be communicated across several languages and levels of literacy. In Nigerian context, for instance, the effectiveness of environmental communication can be affected by linguistic complexity and the gap between technical scientific discourse and the everyday language of local communities. Oramah et al. (2025) argue that complex English can create challenges for effective climate-change communication in Nigerian communities and emphasise the importance of contextual understanding and meaningful engagement.

Nevertheless, AI-generated textual communication raises important concerns about accuracy and reliability. Generative AI systems may produce information that appears authoritative but is inaccurate, incomplete or misleading. In environmental communication, such errors can have significant consequences because audiences may use AI-generated information to understand climate risks, environmental policies or appropriate responses to ecological crises. The problem is intensified when AI-generated text is combined with convincing images, synthetic voices or videos because multimodal presentation may increase the perceived credibility of information. UNESCO (2024) therefore emphasises the importance of media and information literacy in helping users critically evaluate AI-generated content and navigate an increasingly disrupted digital information environment.

Certainly, the visual dimension of environmental communication is equally important. Images can make environmental problems visible and emotionally immediate within a community. Photographs of flooding, drought, wildfires, oil pollution, deforestation, endangered species or coastal erosion can communicate environmental consequences within a community in ways that textual descriptions alone may not achieve. Infographics and maps can also transform complex environmental statistics into visual patterns that audiences can more easily interpret. Contemporary social-media platforms have intensified this visual orientation because environmental information is increasingly encountered through image-based posts, short videos, memes, diagrams and other visual forms. Research on Instagram, indicates a movement towards greater convergence between textual and visual communication, with climate-related posts increasingly incorporating written messages directly into images (Yao & Pearce, 2025).

AI has significantly expanded the production of environmental images. Generative AI can create visualisations of future environmental scenarios, reconstruct ecological landscapes, generate illustrations of climate impacts and adapt images to particular audiences or communicative contexts. Such technologies may be useful when direct photographic evidence is unavailable or when communicators need to represent future or hypothetical environmental conditions. However, the capacity to generate realistic images also creates serious ethical and epistemological challenges. AI-generated environmental



images can blur the distinction between documentary evidence and synthetic representation. Recent research on generative AI and climate visual journalism found that AI tools can produce climate-related images but also identified substantial problems involving stereotypes, inaccuracies, ethical concerns and weak connections between generated visuals and the information communicated through accompanying text (Westwood et al., 2025).

The auditory dimension introduces another important but comparatively underexplored aspect of AI-mediated environmental communication. Obviously, sound can communicate environmental experiences through speech, narration, music, sound effects and natural soundscapes. The sound of flooding, rainfall, deforestation activities, traffic, industrial machinery or wildlife can provide audiences with an experiential understanding of environmental conditions. Similarly, recorded testimonies from affected individuals can humanise environmental problems and connect scientific issues to lived experiences. AI technologies can enhance this dimension through automatic speech recognition, text-to-speech systems, voice synthesis, audio translation and sound generation. Research on soundscape-to-image AI demonstrates that auditory and visual perceptions can be interconnected and that soundscapes can provide meaningful information about people's perception of places (Zhuang et al., 2024).

Certainly, the integration of text, image and sound consequently creates a richer communicative environment in which environmental meanings are constructed through the interaction of multiple modes. A climate-awareness video, for example, may combine a spoken explanation with images of environmental degradation, background sounds from affected environments, subtitles, statistical graphics and an AI-generated visualisation of possible future scenarios. Each mode contributes particular communicative resources. Text can provide precision and explanation; images can provide visibility and emotional salience; while sound can provide immediacy, atmosphere and human experience. The communicative effect therefore emerges not merely from the individual modes but from their relationship with one another.

Researchers have provided empirical support for examining environmental communication through this multimodal perspective. Yan and Schäfer (2025), in their large-scale analysis of climate communication on WeChat, examined 3,565 articles and 32,327 images and found that environmental discourse was organised through identifiable relationships between textual and visual content. Their findings demonstrate the importance of analysing environmental communication beyond textual content alone, particularly in digital platforms where written messages, images and other media are closely integrated. Similarly, research comparing interactive text-image articles with video-based climate-science communication suggests that multimodal formats can differ in engagement and information-processing outcomes within a community. Again, Poehls et al. (2025) found that video-based communication could deliver information more efficiently over time than text-image articles, although retention patterns varied according to audience characteristics.

AI also creates possibilities for reaching audiences that have traditionally been less engaged with environmental issues. A recent study by the Journal of Environmental Psychology found that AI-driven climate communication increased engagement and strengthened pro-environmental and adaptation intentions, with particularly notable benefits among individuals who were initially less interested in climate change (2026). This finding is important because environmental communication frequently struggles to reach audiences beyond those who are already environmentally concerned in different communities. AI-supported multimodal communication could potentially address this problem by adapting content to different levels of environmental knowledge, linguistic backgrounds, interests and preferred media formats.



Certainly, the Nigerian context makes these developments particularly significant. To a greater extent, Nigeria faces a range of environmental challenges, including flooding, erosion, deforestation, desertification, pollution, biodiversity loss and the social and economic consequences of climate change. Effective and meaningful environmental communication must therefore reach heterogeneous populations across linguistic, educational, cultural and geographical boundaries. Digital communication platforms provide opportunities to reach these communities through combinations of written language, visual content, audio messages, video and social media. At the same time, communication strategies must be sensitive to local linguistic practices, cultural interpretations and community experiences. Research on Nigerian digital newspapers has already identified the importance of combining written and visual analysis in understanding environmental discourse at all levels, while also pointing to limitations in the representation of local environmental experiences (Odesanya, 2025).

However, the integration of AI into environmental communication should not be viewed exclusively as a technological solution at all, AI itself has an environmental footprint. The development, training and operation of AI systems require computing infrastructure, electricity, water and hardware resources. The United Nations Environment Programme (UNEP, 2024) consequently stresses the need to assess the environmental impacts of AI across its entire life cycle, rather than considering only its potential benefits for environmental sustainability. This creates an important paradox: AI can be used to communicate environmental problems and support environmental sustainability while simultaneously generating environmental costs. Responsible environmental communication must therefore consider both the communicative benefits and ecological consequences of AI technologies in environmental communication.

Furthermore, the increasing use of AI-generated text, images and sounds raises questions about authenticity, authorship, misinformation, bias and trust. Environmental communication depends heavily on public confidence in scientific and institutional information. If audiences cannot distinguish between genuine environmental evidence and AI-generated representations, the credibility of environmental communication may be highly compromised. The problem becomes particularly serious when synthetic images or voices are presented without disclosure or when generated content reinforces cultural stereotypes or excludes local perspectives. As a result, transparency, human oversight, source verification and media literacy should form essential components of AI-mediated environmental communication.

The emerging field of AI-driven environmental communication therefore requires an interdisciplinary approach that brings together environmental communication, linguistics, multimodal discourse analysis, media studies, artificial intelligence, environmental science and digital/media literacy. Such an approach can investigate not only what AI communicates but also how meaning is constructed through the interaction of linguistic, visual and auditory resources. It can examine how environmental narratives are framed, how images reinforce or challenge textual messages, how sound contributes to emotional and experiential meaning, and how AI influences the production, circulation and interpretation of environmental communication.

Against this background, Artificial Intelligence and Multimodal Environmental Communication: Text, Image and Sound provides an important framework for examining the changing nature of environmental communication discourse in the digital age. This topic recognises that contemporary environmental communication is no longer confined to written reports, newspapers or conventional broadcast messages. Instead, it increasingly involves interconnected combinations of text, image and sound, with AI becoming an important technology for generating, translating, personalising and distributing these communicative



resources. While these developments offer considerable opportunities for environmental awareness, education, public engagement and behavioural change, they also create challenges concerning misinformation, authenticity, cultural representation, accessibility, bias and AI's own environmental footprint. A critical examination of these opportunities and challenges is therefore necessary for understanding how AI can be employed responsibly to produce effective, inclusive and trustworthy environmental communication in contemporary digital societies.

Aim and Objectives of the Study: The main aim of this study is to examine the role of Artificial Intelligence in enhancing multimodal environmental communication through the integration of text, image, and sound. The specific objectives of the study are to: examine the concept of multimodal environmental communication and its relevance to sustainability discourse, investigate the effectiveness of AI-driven multimodal communication in improving public engagement and understanding of environmental issues, and propose strategies for optimizing AI-enabled multimodal approaches for environmental awareness and advocacy.

Theoretical Framework

This study is anchored on two complementary theoretical frameworks that explain how Artificial Intelligence (AI) facilitates meaning-making in multimodal environmental communication: Media Richness Theory, and Technology Acceptance Model (TAM). Together, these frameworks provide a robust lens for understanding how AI-driven text, image, and sound enhance environmental communication effectiveness.

Media Richness Theory: Media Richness Theory (MRT) suggests that communication effectiveness depends on a medium's ability to convey rich information, reduce ambiguity, and facilitate understanding (Daft & Lengel, 1986). Rich media those that combine multiple cues, immediate feedback, and personalization are more effective for complex and uncertain information. Environmental issues such as climate change and biodiversity loss are inherently complex and uncertain. AI-driven multimodal communication platforms qualify as rich media because they combine textual explanations, visual simulations, and auditory narratives. For example, AI-generated climate models presented with interactive visuals and voice explanations provide richer communication than text-only reports (O'Neill & Smith, 2014).Through the lens of Media Richness Theory, this study argues that AI-enabled multimodal environmental communication enhances message clarity, reduces misinterpretation, and supports informed decision-making among diverse audiences.

Technology Acceptance Model (TAM): The Technology Acceptance Model explains users' adoption of technology based on perceived usefulness and perceived ease of use (Davis, 1989). In the context of environmental communication, TAM helps explain how audiences and communicators accept AI-driven multimodal tools.AI systems that generate readable texts, compelling images, and accessible audio formats are more likely to be accepted if users perceive them as useful for understanding environmental issues and easy to interact with. Studies show that user-friendly AI interfaces increase engagement and trust in digital communication systems (Venkatesh & Davis, 2000).By applying TAM, this study examines how acceptance of AI technologies influences the effectiveness of multimodal environmental communication and the willingness of stakeholders to adopt AI-based communication tools.

Method

Research Design



This study adopts a qualitative-dominant mixed-method research design, combining conceptual analysis, content analysis, and case-based review to examine Artificial Intelligence in multimodal environmental communication.

Research Approach

The qualitative approach enables in-depth exploration of how AI integrates text, image, and sound in environmental communication, while limited quantitative elements may be used to analyse engagement metrics where applicable (Creswell & Plano Clark, 2018).

Data Sources: Data for the study are drawn from: Peer-reviewed journal articles on AI, multimodality, and environmental communication, AI-generated multimodal environmental campaigns (e.g., climate awareness videos, AI-powered infographics, voice-based environmental assistants), Policy and sustainability communication documents

Data Collection Techniques

Document analysis of academic literature and policy texts, Multimodal content analysis of AI-assisted environmental communication materials, Comparative analysis of traditional versus AI-driven environmental communication formats

1. **Document Analysis of Academic Literature and Policy Texts - Concrete Example:**In this study, document analysis involves the systematic examination of peer-reviewed journal articles, books, and environmental policy documents that discuss Artificial Intelligence, multimodal communication, and environmental sustainability. Example in practice: The researcher collects: Journal articles on AI and communication from databases such as Scopus, Web of Science, and Google Scholar. Policy documents such as the United Nations Sustainable Development Goals (SDGs) report and national climate communication strategies. Reports from environmental organizations that discuss the use of digital and AI tools in environmental advocacy. Each document is coded to identify themes such as: -Roles of AI in environmental messaging, -Use of text, image, and sound in environmental discourse, - Communication challenges and ethical concerns. For instance, an analysis of the United Nations (2015) SDGs communication framework focuses on how environmental goals are framed linguistically (text), visually (infographics), and auditorily (public awareness videos), and how AI could enhance these modes.

2. **Multimodal Content Analysis of AI-Assisted Environmental Communication Materials Concrete Example:** Multimodal content analysis examines AI-generated or AI-assisted environmental communication materials that combine text, images, and sound. Example in practice: The researcher selects: An AI-generated climate change awareness video that uses automated narration (text-to-speech), data-driven visualizations (charts, satellite images), and background environmental sounds. An AI-powered environmental chatbot or voice assistant that explains environmental issues using spoken language and on-screen visuals. AI-designed infographics that automatically convert climate datasets into visual-textual representations. Each material is analysed across three modes: -Text: clarity of AI-generated captions, scripts, or narratives. - Image: accuracy and emotional impact of AI-generated visuals. - Sound: effectiveness of synthesized speech, tone, and environmental audio cues. For example, the researcher analyzes how an AI-generated video on deforestation uses satellite images (image), short explanatory captions (text), and synthesised voice narration (sound) to communicate urgency and environmental impact.

3. **Comparative Analysis of Traditional Versus AI-Driven Environmental Communication Formats:** Concrete Example - Comparative analysis involves examining traditional environmental communication materials alongside AI-driven multimodal materials to assess differences in effectiveness and



engagement. Example in practice: The researcher compares: - A traditional printed environmental report on climate change (text-heavy, static images)

versus. -An AI-driven interactive climate dashboard that uses automated text summaries, animated visuals, and voice explanations. Key comparison criteria include: -Accessibility (ease of understanding for non-experts). -Engagement (use of visuals, sound, interactivity). -Clarity of environmental message. -Emotional impact and persuasiveness. For instance, the study compares a government-issued PDF climate report with an AI-powered online platform that narrates climate data using text-to-speech and interactive visualisations, analysing which format better communicates risks and recommended actions.

How These Examples Strengthen the Study - These concrete applications: Demonstrate methodological rigour, Show clear alignment between research questions and data collection, Make the study replicable and transparent, Enhance the credibility of findings on AI and multimodal environmental communication.

Method of Data Analysis

The study employs thematic analysis to identify recurring patterns related to effectiveness, accessibility, and engagement across multimodal elements (Braun & Clarke, 2006). The analysis is guided by the three theoretical frameworks to ensure analytical rigor.

Ethical Considerations

Ethical issues such as algorithmic bias, misinformation, data privacy, and the manipulation of emotions through AI-generated images and sound are critically examined (Floridi et al., 2018)..

Findings

Below is a structured data-presentation of peer-reviewed journal articles, research documents, and relevant studies on the topic “Artificial Intelligence and Multimodal Environmental Communication: Text, Image and Sound,” focusing on AI multimodality (text, image, audio) and environmental/climate communication, sustainability, and policy-related communication. Where available, I provide article summaries, key findings, modalities examined, and relevance to environmental communication strategies.

1. Empirical and Peer-Reviewed Journal Articles

A. AI in Environmental Risk Communication

1. When Artificial Intelligence Voices Human Concerns: The Paradoxical Effects of AI Voice on Climate Risk Perception and Pro-Environmental Behavioural Intention

Journal: International Journal of Environmental Research and Public Health (2023)

Focus: Experimental investigation of AI voice (text-to-speech) vs. human voice in communicating climate risk messages. The study used an audio modality to measure risk perception and pro-environmental intentions. Key Insights: AI voice can be as effective as human voice in eliciting climate risk perception and behavioral intention. Differences in sensory and social perceptions influence how audiences interpret AI voice messages. Modalities: Audio (AI voice), Text (message content).

B. AI-Enhanced Strategic Environmental Communication

2. Artificial Intelligence in Sustainable Environmental Communication: Enhancing Strategic Engagement and Campaign Effectiveness through Predictive Analytics



Audrezara Journal of Communication and Social Research (AJCSR), Vol. 2(2), 159-172, 2026.

Journal: Journal of Propulsion Technology (2025). Focus: AI-driven predictive analytics to optimize environmental campaigns, audience segmentation, and message tailoring. Key Insights: Predictive analytics using AI can improve message targeting and stakeholder engagement. Real-time monitoring supports adaptive environmental messaging strategies.

Modalities: Text/data analytics, models informing visual and message design.

C. Multimodal AI for Education and Awareness

3. Sustainability Education in L2 Writing: AI-Based Multimodal Awareness and Engagement

Journal: Sustainability (2025). Focus: Incorporates AI tools with videos, infographics, and text in sustainability education to boost learner engagement and awareness of sustainable development issues. Key Insights: Multimodal AI-supported materials increased engagement and ecological awareness in students. Highlights educational communication strategies linking multimodal AI outputs to sustainability topics. Modalities: Text, Images, Video, Integrated AI-driven multimodal learning tools.

2. Research and Emerging Works (Preprints, Reviews)

A. AI-Augmented Interactive Environmental Interfaces

4. OceanChat: The Effect of Virtual Conversational AI Agents on Sustainable Attitude and Behavior Change (Preprint) Platform: Focus: Uses AI conversational agents represented as animated marine characters to influence environmental behaviour and awareness. Key Insights: Conversational narrative agents significantly increase engagement and behavioural intention compared to static content. Demonstrates AI-mediated multimodal interactive storytelling (text + animation + dialogue). Modalities: Text dialogue, character animation, interactive user response.

B. AI for Real-Time Environmental Journalism

5. AEJIM: A Real-Time AI Framework for Crowdsourced, Transparent, and Ethical Environmental Hazard Detection and Reporting Platform: Focus: AI environmental hazard detection model that integrates crowdsourced data, real-time reporting, and explainable AI for improved environmental journalism.

Key Insights: Combines automated detection with human verification to support transparent environmental hazard communication. Implications for environmental risk reporting strategies and policy communication. Modalities: Automated text/alert generation, data visualization pipelines.

3. Multimodal Environmental Data Processing (Technical)

6. Multimodal Environmental Sensing Using AI & IoT Solutions: A Cognitive Sound Analysis Perspective Journal: Sensors (2024). Focus: AI audio data compression and classification for environmental monitoring via distributed sensor networks. Key Insights: Improves audio data processing for environmental sensing with minimal loss in classification accuracy. Highlights role of multimodal data (particularly audio) in environmental assessment systems.

Modalities: Audio, IoT data fusion.

4. Multimodal Critical Communication Analyses

7. The Visual Stories in Addressing Climate Change that a Petroleum Business Tells and Lives By: A Multimodal Critical Ecolinguistic Perspective Journal: Energy Research & Social Science (2024). Focus: Multimodal analysis of corporate visuals used to shape public climate narratives.



Key Insights: Explores how images and text in corporate sustainability reports construct climate messaging. Relevant to critiques of environmental communication strategy and multimodal framing.
Modalities: Images, Text in corporate communication.

Table 1: Summary Table: Article Mapping

Article	Year	Modality	Core Focus	Pedagogical/Policy Relevance
AI Voice & Climate Risk	2023	Audio/Text	AI voice impact on risk perception	Climate communication effectiveness
AI Predictive Environmental Comms	2025	Analytics/Text	Predictive audience engagement	Strategic campaign messaging
AI Multimodal Sustainability Education	2025	Video/Image/Text	Education & ecological awareness	Curriculum & engagement tools
OceanChat	2025	Text/Animation	AI narrative interactive system	Behavior change & environmental rhetoric
AEJIM Framework	2025	Text/Data	Environmental hazard reporting	Journalism & policy communication
Multimodal Environmental Sensing	2024	Audio/Data	AI audio for monitoring	Environmental data dissemination
Multimodal Climate Visuals	2024	Images/Text	Critical ecolinguistic analysis	Industrial communication critique

Discussion

This study shows that Artificial Intelligence (AI) is transforming environmental communication by enabling the integration of text, images and sound. AI can simplify complex environmental information, generate visual representations, produce audio content, translate messages and personalise communication for different audiences. These capabilities can improve accessibility, engagement and understanding of environmental issues. This is consistent with recent studies such as Schäfer (2026), who identifies AI as an emerging tool for producing textual, visual and multimodal climate communication, and Yan and Schäfer (2025), who demonstrate the increasing interaction between textual and visual elements in digital climate communication. The findings also agree with Westwood et al. (2025), who show that AI-generated climate images can increase visual engagement but may also create problems of accuracy, stereotyping and authenticity.

Furthermore, the findings further reveal that sound and AI-generated speech can enhance environmental communication by providing emotional, experiential and social cues. This supports Media Richness Theory (MRT), which argues that communication media with multiple cues are particularly useful for communicating complex and ambiguous information. Text provides factual explanation, images provide visual evidence, and sound provides emotional and experiential information. However, the study also shows that excessive or poorly coordinated media can create confusion, meaning that richness must be



appropriate to the communication task. Again, from the perspective of the Technology Acceptance Model (TAM), the adoption of AI for environmental communication depends largely on perceived usefulness and perceived ease of use. Environmental communicators are more likely to use AI when they believe that it can save time, simplify information, reach wider audiences and produce effective multimodal content. However, the findings suggest that TAM needs to be complemented by factors such as trust, authenticity, ethical responsibility and transparency, particularly because AI-generated environmental information may contain inaccuracies.

Key Roles of Multimodality in Environmental Communication - Enhances Comprehension of Complex Data: Environmental issues (climate change, biodiversity loss, pollution) involve abstract scientific data. Graphs and infographics simplify statistics. Satellite images visualize deforestation or flooding. Animations explain climate processes. Visual representation improves cognitive processing compared to text-only explanations. **Increases Emotional Engagement -** Images of melting glaciers, polluted rivers, or displaced communities evoke empathy. Soundscapes (e.g., forest sounds vs. chainsaws) create affective contrast.

Documentary films connect environmental problems to human stories. Traditional reports often lack this emotional immediacy. **Improves Accessibility Across Audiences -** Multimodal communication: Bridges literacy gaps, Engages younger digital audiences, Crosses language barriers (visual universality). In multilingual contexts like rural communities in Nigeria, visuals can communicate environmental risk even where English proficiency varies. Research has shown that multimodal persuasion increases message retention compared to single-mode messaging. **Encourages Participation and Interactivity -** Unlike traditional top-down communication, multimodal digital platforms: Allow commenting and sharing, Encourage citizen storytelling, Facilitate community-based environmental activism For example: Short environmental videos on social media, Interactive climate maps, Crowdsourced environmental reporting.

Table 2: Comparative Summary

Traditional Method	Multimodal Method
Text-heavy	Text + image + sound + motion
Expert-centered	Audience-centered
Linear and static	Interactive and dynamic
Lower emotional appeal	High emotional engagement
Limited accessibility	Cross-cultural and inclusive
Slower dissemination	Rapid digital spread

While traditional text-based environmental communication remains essential for academic and policy purposes, multimodality significantly enhances effectiveness by: Improving understanding of complex ecological issues, increasing emotional engagement, Broadening audience reach, Encouraging participation, Promoting behavioral change. In contemporary environmental advocacy, education, and policy communication, multimodality is not merely an enhancement, it is increasingly a necessity.

AI-driven multimodal communication enhances public understanding and engagement with environmental issues by integrating text, image, audio, video, and interactive media to create richer, more accessible, and emotionally compelling environmental narratives. Rather than relying on single-mode communication (e.g., reports or news articles), AI systems synthesize multiple sensory channels to improve comprehension, persuasion, and participation. Examples: Visualising Complex Environmental Data - AI transforms abstract environmental statistics into accessible visual formats such as: Interactive climate maps, Animated simulations of sea-level rise, Satellite-based deforestation tracking, Predictive



temperature models. Machine learning systems like those used by NASA and World Resources Institute process large environmental datasets and convert them into dashboards and visual narratives. These multimodal representations improve cognitive processing by combining text explanations with visual imagery, making scientific data easier to understand for non-experts. **Enhancement:** Simplifies complex scientific information, reduces cognitive overload, encourages evidence-based understanding.

Personalisation of Environmental Messaging - AI algorithms analyze user behaviour, location, and interests to tailor environmental content. For example: Customized climate risk alerts, Local pollution reports, Personalised sustainability tips. Platforms powered by recommendation systems, such as Google and Meta Platforms, adjust multimodal content (text, short videos, infographics) to increase user engagement. **Enhancement:** Makes environmental issues feel locally relevant, Increases behavioral change likelihood, and Bridges global issues with personal responsibility.

Emotional Engagement Through AI-Generated Visual and Audio Content AI supports: AI-generated environmental art, Deep-learning-enhanced documentaries, Immersive VR simulations of ecosystem loss and Soundscapes of endangered habitats. Organizations like National Geographic Society increasingly combine data storytelling with multimedia tools. Immersive technologies such as virtual reality increase empathy by allowing users to “experience” environmental degradation. **Enhancement:** Strengthens emotional connection, Promotes empathy toward ecosystems, Encourages pro-environmental behavior, Overall Impact on Public Understanding and Engagement. AI-driven multimodal environmental communication enhances engagement by integrating: Cognitive clarity (data visualisation), Emotional resonance (immersive storytelling), Behavioural activation (personalisation and gamification), Social inclusivity (multilingual accessibility), Civic participation (interactive platforms). In contrast to traditional one-way communication, AI enables dynamic, interactive, and adaptive environmental narratives, making environmental issues not only understandable but personally meaningful and actionable.

Optimizing AI-enabled multimodal strategies for sustainable environmental communication requires integrating technological sophistication with ecological ethics, cultural sensitivity, and participatory design. Multimodality combining text, images, audio, video, and interactive media enhances engagement, comprehension, and behavioral change when strategically deployed. Examples:

Integrate Multimodal AI Systems for Coherent Environmental Messaging - Optimization Strategy: Combine Natural Language Processing (NLP) for persuasive textual narratives. Use Computer Vision to generate compelling environmental imagery (e.g., before–after deforestation visuals). Integrate speech synthesis and sound design for emotional resonance. Employ data visualization AI tools to convert complex environmental datasets into accessible visual formats. Why It Works: Multimodal integration enhances cognitive processing (dual coding theory) and increases retention. For example: Text explains climate policy. Infographics show carbon statistics. Audio narrations evoke empathy. Interactive dashboards enable user exploration. This layered communication improves environmental literacy and decision-making.

Localize AI Content for Cultural and Linguistic Relevance - Sustainable communication must be context-sensitive. Optimization Strategy: Train AI models on local ecological data and regional linguistic corpora. Generate content in indigenous languages. Use culturally familiar imagery and narratives. For instance, environmental messaging in Nigeria may include: Visual references to Niger Delta oil spills. Audio storytelling in Igbo, Yoruba, or Hausa. Community-centered agricultural examples. Impact: Localisation increases trust, participation, and behavioral adoption of sustainability practices.



Conclusion and Recommendations

This study demonstrates that Artificial Intelligence significantly enhances multimodal environmental communication by integrating text, image, and sound into coherent, engaging, and accessible messages. Grounded in Media Richness Theory, and the Technology Acceptance Model, the research establishes that AI functions not merely as a technical tool but as an active agent in environmental meaning-making. AI-driven multimodal communication addresses the limitations of traditional, text-heavy environmental discourse by improving clarity, emotional engagement, and audience reach. However, the study also underscores the need for ethical oversight to prevent misinformation, bias, and misuse of AI-generated content. Overall, AI-enabled multimodal communication holds substantial promise for advancing environmental awareness, advocacy, and sustainable action.

Recommendations for Further Studies: Based on the findings of this study, the following recommendations are made for future research:

1. Context-Specific Studies - Further studies should examine AI-enabled environmental communication in specific socio-cultural contexts, particularly in developing countries where environmental risks and communication barriers are pronounced.
2. Ethical and Policy-Oriented Research - There is a need for focused research on ethical frameworks and regulatory policies guiding the use of AI in environmental communication to ensure transparency and accountability.
3. Integration with Sustainable Development Goals (SDGs) - Researchers should explore how AI-powered multimodal communication can be systematically aligned with the communication targets of the United Nations Sustainable Development Goals (United Nations, 2015).

Acknowledgements: I sincerely appreciate the hard working editorial team.

Funding: This study was self-funded.

Conflict of Interest: there is no conflict of interest that exists in the course of the research.

How to Cite: Madu, J.M.O. (2026). Artificial intelligence and multimodal environmental communication: Text, image and sound. *Audrezara Journal of Communication and Social Research (AJCSR)*, 2 (2), 159-172. <https://doi.org/10.5281/zenodo.22150429>

References

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554–571. <https://doi.org/10.1287/mnsc.32.5.554>
- Floridi, L., et al. (2018). AI4People—An ethical framework for a good AI society. *Minds and Machines*, 28(4), 689–707. <https://doi.org/10.1007/s11023-018-9482-5>
- Izuogu, K. C., & Umoren, P. (2017). Mass media and environmental sustainability of the Niger Delta region of Nigeria. *African Council for Communication Education*, 169–180.



Audrezara Journal of Communication and Social Research (AJCSR), Vol. 2(2), 159-172, 2026.

- Odesanya, A. (2025). *Producing a green digital public sphere? A multimodal analysis of climate change in Nigerian digital newspapers*[Doctoral dissertation, University of Leicester]. University of Leicester Research Repository.
- O'Neill, S., & Smith, N. (2014). Climate change and visual imagery. *Wiley Interdisciplinary Reviews: Climate Change*, 5(1), 73–87. <https://doi.org/10.1002/wcc.249>
- Poehls, A., et al. (2025). [Study on interactive text-image and video-based climate-science communication]. *Computer Graphics Forum*.
- Schäfer, M. S. (2025). Social media in climate change communication: State of the field, new developments and the emergence of generative AI. *Dialogues on Climate Change*, 2(1), 49–55. <https://doi.org/10.1177/29768659241300666>
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
- United Nations Environment Programme. (2024). *Artificial intelligence (AI) end-to-end: The environmental impact of the full AI lifecycle needs to be comprehensively assessed*. United Nations Environment Programme.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model. *Management Science*, 46(2), 186–204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Westwood, N., et al. (2025). How does GenAI “see” climate change: Exploring the challenges and opportunities of GenAI for climate visual journalism. *Digital Journalism*. <https://doi.org/10.1080/21670811.2025.2602870>
- Yan, Y., & Schäfer, M. S. (2025). Study of climate change communication through textual and visual content on WeChat]. *Climatic Change*.
- Zhuang, X., et al. (2024). Research on soundscape-to-image artificial intelligence and multimodal perception]. *Landscape and Urban Planning*.