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Research on Public Cognition and Action Mechanism of Biodiversity Conservation in the Digital Media Environment

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Abstract. The biodiversity crisis and public participation are core factors in environmental protection, particularly in an era where digital media is widely prevalent, hence making the dissemination of environmental information more diverse. However, despite the important role digital media plays in raising public awareness, it still faces major challenges in driving actual action. In this context, this paper explores how digital media influences the public's attitude toward biodiversity conservation and exmines the relationship between information dissemination, cognitive development, and the translation of awareness into action. Through literature analysis, case studies, and theoretical deduction, it analyzes how media influences cognition, how cognition drives action, and how multi-channel integration can facilitate this transformation. The results indiecate that different media channels vary in cognitive depth. Specifically, videos enhance sensory cognition, while interactive platforms promote rational thinking. The integration of multiple channels is seen as a powerful method for overcoming the gap between cognition and action.

Keywords: Digital media, Biodiversity conservation, Social awareness, Action mechanisms, Public participation

1. Introduction

With the rapid development of digital media, it has become the primary means for people to obtain and disseminate information. In this context, the importance of biodiversity and its protection has gained widespread attention, with relevant information being extensively disseminated to the public through digital media. In particular, the Kunming-Montreal Global Biodiversity Framework, as a global policy context, outlines clear goals and tasks for biodiversity protection, particularly through digital media, which effectively communicates policy objectives. For instance, the framework calls for the protection of 30% of land and oceans by 2030, thus highlighting the need to translate these policies into public consciousness and concrete action. Through effective publicity, education, and financial support, the framework encourages global action and motivates governments and society to actively participate, boosting public interest and trust in biodiversity conservation [1]. This paper aims to explore how digital media influences the public's attitude toward biodiversity conservation, and analyze the relationship between information dissemination, cognitive construction, and action practices. Using literature analysis, case studies, and theoretical reasoning, the paper reveals the role

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of digital media in promoting public awareness and driving collective action, while also addressing the limitations of current communication models. Furthermore, by examining how the integration of multiple channels broadens reach and impact, it fosters stronger public engagement.

2. Digital media and its impact on public environmental awareness

2.1. Forms and characteristics of digital media dissemination

The core of the public information ecosystem today is digital media, which plays a pivotal role in biodiversity communication. Its effectiveness is heavily influenced by the forms of communication and their unique traits, which can be categorized into three main types, each with distinct features.

Firstly, short video platforms are defined by emotional storytelling and visual impact, which can quickly capture users' attention and promote widespread sharing of information through algorithms. However, the fast-paced and fragmented nature of short videos limits the transmission of complex knowledge, leading to user engagement often remaining superficial, making it difficult to achieve in-depth understanding and reflection. Secondly, image-text platforms boost rational cognition and knowledge dissemination through systematic articles, infographics, and data interpretation. These platforms present a more systematic communication structure and facilitate user engagement and cooperation through comment sections and forums, helping users exchange views and co-construct an understanding of knowledge, thereby promoting deep learning. Finally, interactive applications drive behavior change through gamification. For example, Ant Forest motivates offline tree planting via its "green energy" system and personalized recommendations, like the AHP-PROMETHEE II multi-criteria decision-making method, offer tailored suggestions based on user models, markedly boosting the adoption and execution of sustainable behaviors. These apps are widely accepted due to their user-friendly interfaces, instant feedback, and personalized goal-setting features [2]. As a result, the common features of these three forms are algorithmic recommendations, interactivity and social engagement, and visual dominance. To boost biodiversity communication, strategies should harness the strengths of each form by using short videos to spark emotional engagement, image-text platforms to deepen knowledge, and interactive apps to bridge cognition and action, hence fostering personalized, experiential participation.

2.2. The role of algorithm mechanisms and information limitations

Algorithmic recommendations are the core mechanism driving content personalization. By filtering and ranking information based on user preferences and interaction patterns, algorithms amplify content that generates high engagement, creating a self-reinforcing feedback loop that affects users' cognition and preferences. For example, in short videos, algorithms usually favor visually striking and well-known species, like polar bears or cats, as they drive higher click-through rates and longer watch times. However, this mechanism also leads to noticeable cognitive biases and information gaps, as species that are ecologically critical but lack visual appeal, such as insects, amphibians, or microorganisms, tend to be overlooked and seldom appear in recommended content. As a result, public exposure to these key conservation targets is limited, which in turn affects their willingness to protect these species. In light of these issues, the limitations of this algorithmic mechanism are particularly evident in biodiversity communication. Firstly, algorithms create information barriers, trapping users in a cycle of similar content and making it difficult to access knowledge outside the algorithmic loop. Secondly, the commercially-driven model typically prioritizes financial gain over ecological significance, emphasizing content that maximizes revenue instead of content that raises

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environmental awareness or supports conservation initiatives. And this approach further distorts the platform's capacity to promote insightful conversations about biodiversity. Finally, the opacity of algorithmic operations means that conservation organizations are unable to clearly understand how environmental content is distributed and displayed on platforms, limiting its outreach and impact.

2.3. Biological conservation goals and dissemination needs

The concept of biodiversity is highly complex, with conservation objectives focusing on three main aspects, namely species diversity, genetic diversity, and ecosystem diversity. In particular, species diversity prevents the extinction of species, while genetic diversity emphasizes preserving genetic variation within populations. At the same time, ecosystem diversity concerns the diversification of habitats and ecological processes. However, there is a significant gap between these macro-level conservation goals and the public's understanding. Therefore, communication plays a crucial role in bridging this cognitive gap and imposes clear requirements on the methods of dissemination. Firstly, communication must undertake the core task of "translation" in the process of popularizing science, which involves the transformation of intricate scientific constructs into comprehensible narratives and experiential formats accessible to the general populace. For example, by likening gene editing technology to molecular scissors and using vivid metaphors and vivid animations to demonstrate its principles and applications, the public can quickly grasp its key points. Secondly, communication should be intricately intertwined with the public. Effective strategies, such as digital collectibles and interactive mini-programs can effectively combine species that need protection with local culture and daily life. In this way, they can significantly enhance public awareness and engagement. This renders environmental protection an intrinsically motivated endeavor rather than a duty enforced from external sources. Finally, the thrust of communication should pivot towards "actionability," integrating enhanced awareness with tangible actions. By designing immersive digital projects, such as online exhibitions and virtual classrooms, the public can engage in activities like virtual species monitoring. In addition, the provision of clear action guidelines, such as the Resident Waste Sorting Guide, can transform macro-level protection goals into specific, actionable steps, facilitating the effective transition from awareness to practice.

3. Public cognitive patterns and their formation and development mechanisms

3.1. Emotional cognitive styles and formation characteristics

The conservation of biodiversity is significantly influenced by emotional cognition. Specifically, it simplifies complex concepts via strong visual impact and the stimulation of empathy, while also compensating for the limitations of purely rational knowledge. Through social media and short video platforms, emotional content is widely shared using vivid visuals and abstract ideas, evoking emotional resonance in the public, particularly when depicting details such as animal wounds that trigger a protective instinct. Besides, emotional resonance drives action via cognitive restructuring. When visual impact enhances empathy, people develop a sense of urgency toward ecological crises, hence prompting them to take action. The guilt felt upon seeing affected organisms stems from the visualization of ecological destruction presented by the media, as well as the moral, social, and legal pressures. As a result, this reinforces public responsibility for environmental protection, thereby supporting environmental laws and promoting eco-friendly behaviors. Furthermore, the positive emotions derived from alleviating guilt serve to sustain these environmental actions [3].

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3.2. Knowledge cognitive patterns and formation characteristics

In contrast to emotional cognition, which governed by emotions and reactive in nature, knowledge cognition involves the active and rational process of constructing understanding via the analysis and learning of information. Digital media platforms, such as WeChat Official Accounts and Zhihu in China, facilitate the construction of biodiversity knowledge. By providing content like articles and expert Q&A, these platforms enable users to actively search for and analyze relevant information. Importantly, these platforms embody constructivist principles, in which learning involves the active reconstruction of knowledge via social interaction and collaborative sharing, rather than passive absorption [4]. Users discuss, comment, and share insights, building understanding and deepening their grasp of complex concepts. This social knowledge construction turns abstract information into actionable knowledge. Through digital media, constructivism fosters a positive cycle of knowledge cognition, enabling users to continuously build knowledge and interactions, thereby enhancing their understanding of biodiversity. Collaborative knowledge construction and group discussions allow users to decode complex concepts by sharing field observations and case studies, transforming theory into meaningful insights.

3.3. Cognitive transformation disorders and influencing factors

Digital media has played an important role in raising awareness about biodiversity conservation, but it often fails to translate effectively into actual environmental actions. Despite the public's relatively broad environmental knowledge, real-world actions are still hindered. Existing studies show that the public has a weak understanding of environmental impact assessments and low participation rates, mainly influenced by internal psychological factors, lack of emotional engagement, and insufficient sense of responsibility, as well as external factors such as difficulties in accessing information and a lack of trust in government [5].

In particular, barriers to cognitive change often arise from the interaction of external factors, like economic, social, and cultural backgrounds, and internal factors, such as knowledge, awareness, and responsibility. The public's access to environmental information or effective communication may be restricted by external factors, whereas internal factors, such as a lack of environmental awareness and responsibility, obstruct the translation of knowledge into action. These factors together result in the failure of environmental knowledge to be effectively translated into real-world actions, which in turn impacts biodiversity conservation [6]. Besides, theories like altruism and empathy help explain the motivations behind public behavior when overcoming cognitive barriers. Altruism suggests that individuals are more inclined to take environmental actions when they care about others' well-being, while empathy theory highlights that emotional connection with the environment or affected species can drive individuals to take protective measures. This suggests that individuals with strong social responsibility and empathy are more likely to turn environmental knowledge into action.

When internal and external factors work together, their combined effect can greatly drive the change in environmental behavior [7]. Through digital media interaction and educational outreach, public environmental knowledge and sense of responsibility can be enhanced, along with emotional empathy. Meanwhile, government support and media platforms help spread information effectively, further encouraging the shift in environmental behavior. For example, measures such as providing financial rewards, boosting government trust, and supporting community initiatives can effectively motivate public environmental actions. The interaction of internal and external factors helps convert environmental knowledge into behavior, advancing biodiversity conservation.

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4. The cognition-to-action transformation and strategic approaches

4.1. Comparison of online and offline action barriers

There is a significant difference between online and offline environmental actions. On digital media, environmental interactions are visible, with promises and content quickly spreading in comments, yet real conservation actions remain almost invisible. Online actions like liking and sharing content, are popular due to their low threshold, minimal investment, and algorithmic rewards. Additionally, personal interests, such as social identity and the pursuit of an ideal personal image, drive online engagement. However, offline environmental actions face more obstacles, such as high personal costs, delayed feedback, and little emphasis on responsibility. Many individuals remain bystanders, shifting responsibility to the government, which leads to a dispersion of responsibility and a lack of action. And this gap stems from formalistic participation. Online environmental actions are mostly symbolic, with minimal practical impact. As such, online, emotion-driven actions can be connected to offline, tangible efforts through interactive mechanisms such as games. For example, Ant Forest encourages users to accumulate energy in the game daily, and through mechanisms like virtual trees wilting due to insufficient energy and ranking systems, individuals are urged to take further action, fostering sustainable behavior change.

4.2. Cognitive factors hindering the transformation to action

The conversion of public environmental awareness into real action is often blocked by cognitive barriers. These barriers stem from a lack of understanding or misconceptions about environmental issues, which prevent people from taking effective action, despite recognizing the importance of environmental protection and having the willingness to act. From different perspectives, they can be divided into three levels: individual, group, and institutional. At the individual level, barriers mainly include concerns about the economic costs of environmental actions, the pursuit of convenience and comfort, and a lack of understanding and trust in relevant knowledge. At the group level, barriers include competing interests between different groups that prevent collaboration, a tendency to shift responsibility, fear of being sidelined, and societal resistance to change. At the institutional level, the main barriers are poor infrastructure and weak political support [8]. For instance, studies show that the people often think protecting biodiversity is up to governments and environmental groups, or that their own contributions are deemed insignificant, hence they are less inclined to participate. Despite substantial human-induced environmental changes, there is limited understanding of how affected species respond. In Madagascar, surveys revealed that, compared to the conservation of reptiles, people seldom recognize the key role of hedgerows in farmlands in sustaining biodiversity. Hedgerows provide habitats and corridors for organisms, boost ecosystem value, increase landscape heterogeneity, and offer ecosystem services and economic benefits [9]. This cognitive gap further leads to a lack of practical motivation for public participation.

4.3. Multi-channel integration and implementation strategies

The shift from awareness to action in biodiversity conservation remains challenging. In recent years, however, the integration of multi - channel digital media communication has proven effective. For instance, the Jinhua “Two End Black Ranch” integrates a 5G smart farming center, social media, and community cooperation to involve the public in conservation via online-offline interactions [8]. This has boosted local employment and enhanced public environmental awareness and action. As public

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participation mechanisms improve, digital media is increasingly spreading and implementing environmental protection measures, thus expanding engagement channels. Through social platforms, online discussions, and digital tools, the public can access environmental knowledge, participate in conservation actions, and get more involved in environmental assessment and supervision [10].

From a strategic standpoint, digital technology should merge with public engagement. Existing studies show that AI can adopt the CAPTAIN framework to optimize protection policies, develop plans, and prioritize measures according to public data. Despite the potential uncertainty of citizen monitoring, dynamic monitoring is reliable and can optimize strategies via AI, especially for rare species [11]. Environmental protection can be enhanced via the integration of dynamic monitoring and public participation. In environmental assessments and ecology management, prioritizing public involvement to gather data, monitor, and give feedback can boost public responsibility and spur environmental action. By reducing monitoring barriers, advanced technologies enable real-time access to environmental data and boost public communication and self-regulation in environmental management [12]. Besides, using both positive and negative imagery can spur public environmental action. Negative images can trigger emotions like guilt and prompt action, while positive ones can reduce urgency. However, the overuse of negative images can cause emotional fatigue. The balance of both types and the use of multi-channel communication sustain long-term public engagement in environmental actions [13].

5. Conclusion

This study examines how digital media shapes public attitudes toward biodiversity conservation through two cognitive pathways. Specifically, video media boosts emotional, intuitive cognition, while interactive platforms promote rational thinking. However, algorithm-driven recommendations may lead to information cocoons, limiting the depth of public understanding, while individual and group factors, both internal and external, further limit cognition and behavior. Integrating various media forms helps close the gap between cognition and action, particularly by connecting public engagement with platforms, technologies, and real-time monitoring. Accordingly, it offers a flexible framework that explains the links between media, cognition, and behavior, providing new insights for biodiversity communication. The study has limitations, including a small geographic scope, a short duration, and no systematic assessment of behavioral change. Future research should explore long-term effects, measure the impact of different media, broaden information channels, and create standardized metrics to track the shift from online awareness to offline action.

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