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Conservation messaging best practices for biodiversity conservation in the Fraser Estuary

Prepared by:

Qingyang Li, UBC Sustainability Scholar, 2023

Prepared for:

Sharon MacGougan, President, Garden City Conservation Society

Bruno Vernier, Director, Garden City Conservation Society

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Disclaimer

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Executive Summary

This report, conducted in collaboration with the Garden City Conservation Society (GCCS) and the Fraser Estuary Research Collaborative (FERC), aimed to investigate and enhance conservation messaging strategies in the Fraser Estuary. The Fraser River Estuary, a biodiversity hotspot, faces significant human activities and climate change threats. Despite ongoing conservation efforts, there is a need to effectively communicate these efforts to the public, highlighting the importance of conservation messaging.

The research approach combined a comprehensive literature review with stakeholder interviews. The literature review revealed that the effectiveness of conservation messaging is influenced by various factors such as cultural and societal contexts, communication channels, message framing, source credibility, and timing and frequency of messaging. The stakeholder interviews provided valuable insights into the local context of the Fraser Estuary, highlighting the importance of tailoring messages to specific audiences, engaging the next generations, and fostering partnerships.

The study found that local individuals deeply understand biodiversity and have a heightened awareness of its loss. They view biodiversity loss as a local concern and deem addressing it extremely important. The participants unanimously call for an enhancement in conservation messaging in the Fraser Estuary and Richmond, proposing a comprehensive approach that integrates policy, education, visual storytelling, and sharing success stories.

The report identifies several challenges and limitations in biodiversity conservation messaging, including the complexity of biodiversity issues, limited public understanding and interest in local biodiversity conservation contexts, overcoming information gaps and scientific complexity, addressing message fatigue and desensitization, reaching diverse and hard-to-reach audiences, and lack of evaluation and feedback.

The report concludes with best practices for biodiversity conservation messaging in Fraser Estuary. The development of conservation messages follows a six-step process: 1) Identifying objectives to define the purpose and desired outcomes, 2) Conducting research to gather evidence and theories, 3) Segmenting the audience to identify key target groups, 4) Crafting clear and compelling messages tailored to the audience, 5) Delivering the messages using appropriate channels, and 6) Evaluating the impact to measure effectiveness. Key themes for effective messaging include using credible sources, tailoring messages to specific audiences, employing simple and straightforward language, balancing positive and negative tones, resonating through

storytelling, utilizing visuals and multimedia, emphasizing local connections, engaging diverse age groups, ensuring repeated exposure, collaborating with various platforms and stakeholders, and highlighting the co-benefits of biodiversity conservation. The overarching goal is to raise awareness, encourage participation, and avoid potential alienation, ensuring that conservation messages contribute to the overall goal of biodiversity conservation in Fraser Estuary.

In conclusion, effective conservation messaging is crucial for raising awareness, shaping attitudes, and motivating action toward biodiversity conservation in the Fraser Estuary. The findings of this report provide valuable insights and recommendations for enhancing conservation messaging strategies in the Fraser Estuary, contributing to the broader goal of biodiversity conservation.

Introduction

This UBC Sustainability Scholars Summer 2023 project was conducted in partnership with the Garden City Conservation Society (GCCS) and supports the Fraser Estuary Research Collaborative (FERC) researching work contributing to a healthy, abundant, diversified, and resilient Fraser River Estuary. This report aims to investigate best practices aimed at advancing biodiversity conservation messaging strategies in the Fraser Estuary to understand how to touch hearts and minds with the message of biodiversity conservation in these urban contexts. By combining a comprehensive literature review with insights gathered from interviews with local stakeholders, this report aims to identify effective strategies and recommendations for enhancing conservation messaging efforts.

Background

The Fraser River Estuary, located in British Columbia, Canada, is a critical habitat for diverse species and plays a significant role in the livelihoods, culture, and well-being of over three million people (Corpuz-Bosshart, 2020). However, it faces substantial threats from human activities and climate change that require urgent action and comprehensive conservation strategies (Corpuz-Bosshart, 2020; Kehoe et al., 2021). Conservation messaging is crucial in raising awareness and mobilizing efforts to protect this valuable ecosystem. The need for conservation efforts in these areas is urgent and necessitates an approach that reaches people effectively and spurs them into action (Corpuz-Bosshart, 2020; Kehoe et al., 2021).

The Fraser Estuary in Richmond, BC, Canada: A Biodiversity Hotspot Facing Threats

The Fraser River Estuary in British Columbia, Canada, is a globally significant ecological region and Key Biodiversity Area (KBA) that supports a diverse array of wildlife, including 1.7 million birds annually and 102 endangered species (Birds Canada, 2021; WHSRN, 2023). It spans 31,684 hectares and is considered the most productive bird habitat in Western Canada (Birds Canada, 2021; WHSRN, 2023). The estuary is a crucial habitat for species like Western Sandpipers, Snow Geese, and Barn Owls, and it plays a vital role in the migration of waterfowl and the journey of juvenile Chinook salmon to the Pacific Ocean (Birds Canada, 2021; Ducks Unlimited Canada, n.d.).

The Fraser River Estuary is under significant threat due to various human activities and climate change. Less than 30% of the estuary's intact habitat remains, primarily due to pollution, agriculture, industrial development, extensive dredging and diking, urban sprawl, and climate change (Corpuz-Bosshart, 2020; Ducks Unlimited Canada, n.d.). In addition, the Pacific Estuary Conservation Program (PECP) has released an updated report ranking and mapping estuaries in British Columbia (BC) based on their ecological importance, where the Fraser River Estuary stands out as the largest and most threatened (Pacific Birds Habitat Joint Venture, 2021). Despite the estuary's ecological significance, there is currently no broad conservation management plan for the species at risk, including salmon and killer whales, which are at risk of extinction within the next 25 years without urgent conservation action (Corpuz-Bosshart, 2020; Kehoe et al., 2021).

Conservation Efforts & Importance of Conservation Messaging in the Fraser Estuary

However, there are ongoing efforts to conserve and restore the Fraser River Estuary. A proposed investment of \$381 million over 25 years has been recommended, focusing on strategies such as

habitat restoration, transport regulation, green infrastructure, and land management (Corpuz-Bosshart, 2020; Kehoe et al., 2021; Raincoast, n.d., 2020). Additionally, research projects focused on the restoration and protection of the Fraser Estuary are also being conducted, involving applied research, collaboration with partner organizations, and addressing challenges such as eelgrass and saltmarsh conservation, climate change indicators for Pacific salmon, and the development of Indigenous-centric frameworks (UBC Sustainability, 2022).

Despite these efforts, there is a significant gap in conveying this information to the public, and this is where the importance of conservation messaging comes into play. Effective messaging is instrumental in biodiversity protection efforts, acting as a tool to raise awareness, shape attitudes, encourage sustainable behaviours, and motivate individuals, communities, and policymakers toward conservation initiatives (Dale et al., 2021; Jones, 2014; Kidd, Garrard, et al., 2019). It bridges the gap between scientific knowledge and public comprehension, fostering a sense of stewardship and driving support for conservation (Dale et al., 2021; Jones, 2014; Kidd, Garrard, et al., 2019).

Communication strategies, ranging from public campaigns and educational programs to advocacy efforts, can articulate the value of biodiversity, the challenges it faces, and the actionable steps for its preservation. Through various channels like traditional media, social media, and direct communication, they can effectively engage diverse audiences, appealing to their values, emotions, and motivations to inspire positive change and policy alterations favouring biodiversity protection (Kidd, Garrard, et al., 2019).

In the context of the Fraser River Estuary, conservation messaging can play a crucial role in highlighting the ecological significance of the estuary, the threats it faces, and the ongoing efforts to conserve and restore it. By effectively communicating these aspects, we can foster a sense of responsibility and urgency among the public and policymakers, driving support and action toward conserving the Fraser River Estuary.

Methodology

Research Approach

The research approach for biodiversity conservation in the Fraser Estuary incorporates two primary methods: a comprehensive literature review and in-depth stakeholder interviews.

The literature review is designed to collate and critically analyze existing knowledge on conservation messaging and potential best practices pertinent to biodiversity conservation in the Fraser Estuary. This review aims to provide a solid theoretical foundation for the research and to identify gaps in the current understanding that the study can address.

The stakeholder interviews are conducted with local individuals who have firsthand experience with conservation messaging and case studies in the Fraser Estuary. These interviews provide valuable insights into the practical aspects of conservation messaging, including the challenges faced and the strategies that have proven effective.

The analysis of challenges and best practices is based on both the literature review and the results of the stakeholder interviews. This dual approach ensures a comprehensive understanding of effective conservation messaging in the Fraser Estuary, combining theoretical knowledge with practical experience.

Stakeholder Selection and Engagement

The selection of local stakeholders for interviews is a strategic process considering their roles as message producers and receivers. **Message producers** include (1) local government officials/decision-makers, (2) local environmental or conservation organizations or groups such as NGOs or conservation activists, (3) educators or researchers from local universities or colleges focusing on conservation, ecology, environmental sciences, or sustainability, and (4) local businesses/private sectors. These entities are instrumental in creating and disseminating conservation messages. **Message receivers**, including (1) local residents and (2) Indigenous Peoples, are the targets of these conservation messages, and their actions are influenced by them.

The interview process is designed to gather comprehensive data for further analysis. It involves contacting representatives of stakeholders, providing them with a research proposal, and obtaining their consent for participation. The interview comprises a mix of structured and semi-structured questions, ensuring a balance between guided and open-ended responses.

Ethical considerations and consent procedures are strictly adhered to throughout the research process. Stakeholders are informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any point. All data collected is securely stored and shared in compliance with FIPPA and PIPEDA regulations.

This approach to stakeholder selection and engagement ensures a diverse range of perspectives and experiences, contributing to a comprehensive understanding of conservation messaging. It also fosters greater community buy-in for conservation projects and allows for the integration of local knowledge into all stages of the project (Brill et al., 2022).

Findings

Factors Influencing Messaging Effectiveness

A complex interplay of factors influences the effectiveness of biodiversity conservation messaging. Understanding these factors can help in designing and delivering more impactful conservation messages.

- **Cultural and Societal Contexts:** The cultural and societal contexts in which conservation messages are delivered play a crucial role in their effectiveness. Tailoring messages to resonate with the values, beliefs, and norms of the target audience is essential for achieving desired actions (Moorhouse et al., 2015).
- **Communication Channels and Media Platforms:** The choice of communication channels and media platforms can impact the reach and effectiveness of conservation messages. Both traditional (TV, radio, print) and digital media (social media, websites, apps) have their unique advantages and challenges. Integrating digital sources, such as digital museums and artificial intelligence, can further enhance the effectiveness of conservation messaging (Dale et al., 2021; Silvestro et al., 2022; Veríssimo, 2019).
- **Message Framing and Visual Communication:** The framing of messages, including visual elements, can significantly influence their effectiveness. Positive framing (emphasizing the benefits of action) and negative framing (highlighting the costs of inaction) can elicit different responses. Compelling visuals can enhance message engagement and recall (O'Neill & Nicholson-Cole, 2009).
- **Source Credibility and Trustworthiness:** The credibility and trustworthiness of the message source are critical for audience acceptance (Dale et al., 2021). Factors such as the source's expertise, transparency, and perceived neutrality can influence the effectiveness of biodiversity conservation messaging (Pornpitakpan, 2004).
- **Timing and Frequency of Messaging:** The timing (strategic placement of messages during relevant events) and frequency (number of times messages are repeated over time) can affect the effectiveness of biodiversity conservation messaging (Hornik, 2002; Wakefield et al., 2010). Timely messaging and repeated exposure can increase awareness, knowledge, and behaviour change, although too much might lead to fatigue (Hornik, 2002; Sheeran et al., 2015).

Techniques of Conservation Messaging

Theoretical Framework for Developing Conservation Messages

Theoretical frameworks for communicating biodiversity conservation come from various disciplines, including social psychology, sociology, and communication theory. Even if they have similarities, specific ideas do not conflict. Table 1 shows a few of the most essential theories and ideas found in the literature.

Table 1. The theoretical framework for developing conservation messages. Adapted from Kidd, Garrard, et al. (2019).

Discipline	Theory	Description
Psychological Theory	Elaboration Likelihood Model (ELM)	Proposes two distinct routes to persuasion: the central and peripheral routes (Cacioppo & Petty, 1984). Effective messaging should cater to both routes.
	Theory of Planned Behaviour	Illustrates that attitudes, subjective norms, and perceived behavioural control guide intentions and, consequently, behaviour (Ajzen, 1991; Schultz, 2011).
	Theory of Reasoned Action (TRA)	Posits that individuals' behaviour is directly influenced by their behavioural intentions, which are shaped by their attitudes towards the behaviour and subjective norms (Fishbein & Ajzen, 1977).
	Cognitive Dissonance Theory	Posits that people experience discomfort when they hold conflicting beliefs or when their behaviour conflicts with their beliefs, and they are motivated to reduce this dissonance (Festinger, 1962).
	Social Cognitive Theory (SCT)	Indicates that learning takes place in a social context with dynamic and reciprocal interactions between people, their behaviour, and their environment (Bandura, 1999).
Sociological Theory	Social Identity Theory	Posits that individuals derive part of their identity from the social groups they belong to and are motivated to improve the status and positive distinctiveness of these groups (Tajfel et al., 1979).
	Social Norms Theory	Suggests that people's behaviour is influenced by their perceptions of what is normal or typical (Cialdini et al., 1990).
	Diffusion of Innovations Theory	Postulates that a new idea or innovation spreads across society in an S-shaped curve, starting with innovators and ending with laggards (Rogers, 2010).
Communication Principles & Approaches	Framing Theory & Message Framing	Explains how an issue is presented or "framed" can influence people's perceptions and responses (Entman, 1993).
	Health Communication Approaches	Traditionally used to promote public health objectives, it can be effectively applied to conservation messaging for biodiversity protection (Kreps & Neuhauser, 2010).

	Social Marketing Campaigns	Utilize marketing principles to influence social behaviours can be highly effective in conservation messaging for biodiversity protection (Andreasen, 2002).
	Community-Based Social Marketing (CBSM)	Combines psychology with social marketing to foster sustainable behaviours within community settings (McKenzie-Mohr, 2000).
	Nudging	Involves subtly steering individuals towards beneficial choices without eliminating any options (Thaler & Sunstein, 2008).
	Connectedness to Nature	Emphasizes the importance of fostering a connection to nature, known as nature connectedness, as a critical strategy for promoting pro-environmental attitudes and behaviours (Capaldi et al., 2014; Ives et al., 2017; Restall & Conrad, 2015; Richardson et al., 2020; Zylstra et al., 2014, 2014).
	Neutral Theory of Biodiversity	Proposes that the diversity and relative abundance of species in ecosystems are shaped primarily by random processes rather than deterministic factors (Hubbell, 2011).

Messaging Strategies & Effectiveness for Biodiversity Conservation

A variety of messaging strategies for effective biodiversity conservation are suggested in different literature, which is presented in Table 2.

Table 2. Messaging strategies and their effectiveness for biodiversity conservation.

Factor		Strategy	Effectiveness
Framing Tones		Positive Framing/Appeal to Intrinsic Values	Emphasizes the benefits of pro-environmental actions, fostering emotional connections with nature and inspiring participation in conservation efforts, but may lead to complacency and be less effective for behavioural change than negative framing (Kidd, Garrard, et al., 2019; Kusmanoff et al., 2020; McCunn et al., 2021).
		Negative Framing/Threat-Based Messaging	Focuses on the dire consequences of inaction, creating a sense of urgency and promoting pro-environmental behaviours and policies, but it can also lead to despair and inaction if perceived as overly negative (Clayton et al., 2013; Keesstra et al., 2016; Knight, 2008).
Message Framing	Emotional Framing	Emotional Appeals	Both positive and negative, and significantly influence public attitudes and behaviours, with effectiveness depending on the context and audience (O'Neill & Nicholson-Cole, 2009; Veríssimo, 2019).
		Storytelling	Makes complex concepts accessible and relatable, evoking emotions, stimulating imagination, and fostering empathy (Cox, 2013; Jones, 2014; Kidd, Bekessy, et al., 2019).
	Rational Framing	Loss and Gain Framing	Presents information in terms of potential losses or gains, with effectiveness depending on the target audience and the nature of the conservation issue (Clayton et al., 2009; Kidd, Bekessy, et al., 2019).
		Distance Framing	Encompasses spatial (local/distant) and temporal (current/future) aspects (Kolandai-Matchett & Armoudian, 2020). It effectively influences audience perceptions and actions toward biodiversity conservation by presenting issues in local or distant contexts and emphasizing immediate or future impacts or benefits (Kusmanoff et al., 2020).
		Economic & Utilitarian Messaging	Emphasizes the economic benefits of biodiversity conservation and highlighting ecosystem services and their value can help communicate the importance of biodiversity conservation (Naidoo et al., 2008).

		Behaviour-Focused Messaging	Encourages pro-environmental behaviours and providing actionable steps for individuals and communities are crucial aspects of behaviour-focused messaging strategies (Abrahamse et al., 2005; Schultz, 2014).
Message Contents		Informational Messages	Provide factual details about biodiversity and its significance, raising awareness and promoting pro-environmental behaviour (Clayton et al., 2013; Dale et al., 2021).
		Personal Relevance & Tailored Messaging	Messages that are personally relevant and tailored to the audience's values, beliefs, and experiences are more persuasive and impactful (Corner et al., 2014; Dale et al., 2021).
Message Formatting		Simple & Clear Language	Involves using metaphors, analogies, and references to existing social or cultural knowledge to convey complex topics in an understandable way, making the messages personally relevant and impactful (Buxton et al., 2021). It aims to create empowering and positive messages that motivate people to take action toward biodiversity conservation (Dale et al., 2019).
		Actionable Information	Actionable information in biodiversity conservation messages is essential to translate knowledge into action and bridging the knowledge-action gap (The Nature Conservancy, n.d.). This involves understanding habitats, species, ecosystems, and threats and recognizing Indigenous knowledge systems. It also includes empowering locals for lasting conservation, using financial mechanisms to support these efforts, and integrating biodiversity into policies (Environment and Climate Change Canada, 2023).
		Visual & Multimedia Approaches	Enhance engagement, comprehension, and recall of conservation messages (Dale et al., 2021; Nicoll et al., 2016; O'Neill & Nicholson-Cole, 2009).
Message Sources		Credibility & Trustworthiness of Message Source	Significantly influence how the message is received (Dale et al., 2021; O'Keefe, 2015).
		Influential Message Producers & Opinion Leaders	Influential individuals or opinion leaders can significantly impact the attitudes and behaviours of their followers (Dale et al., 2021; Rogers, 2010).
		Social Networks	Social networks can be robust in spreading messages and influencing behaviour (Valente, 2012).

Local Status of Biodiversity Conservation Messaging in Richmond

Interviewees and Their Roles in Biodiversity Conservation

A total of 16 interviewees participated in the study, comprising 10 message producers and 6 message receivers whose work influences biodiversity conservation in different aspects (Figure 1). The message producers included 3 local government officials, 3 representatives from local environmental organizations or activists, 2 educators or researchers from a local university specializing in conservation and related fields, and 2 representatives from the private sector. The message receivers were all local residents.

Unfortunately, due to the high workload and understaffing issues faced by many individuals working for Indigenous communities across Canada, coupled with the summer holidays, it was challenging to secure interviews from this group, who are also considered part of the message receivers. This limitation, along with the constraints of time and resources for this summer project, resulted in a less representative sample of message receivers, particularly local residents and Indigenous peoples, in Richmond. This is acknowledged as a limitation of the project.

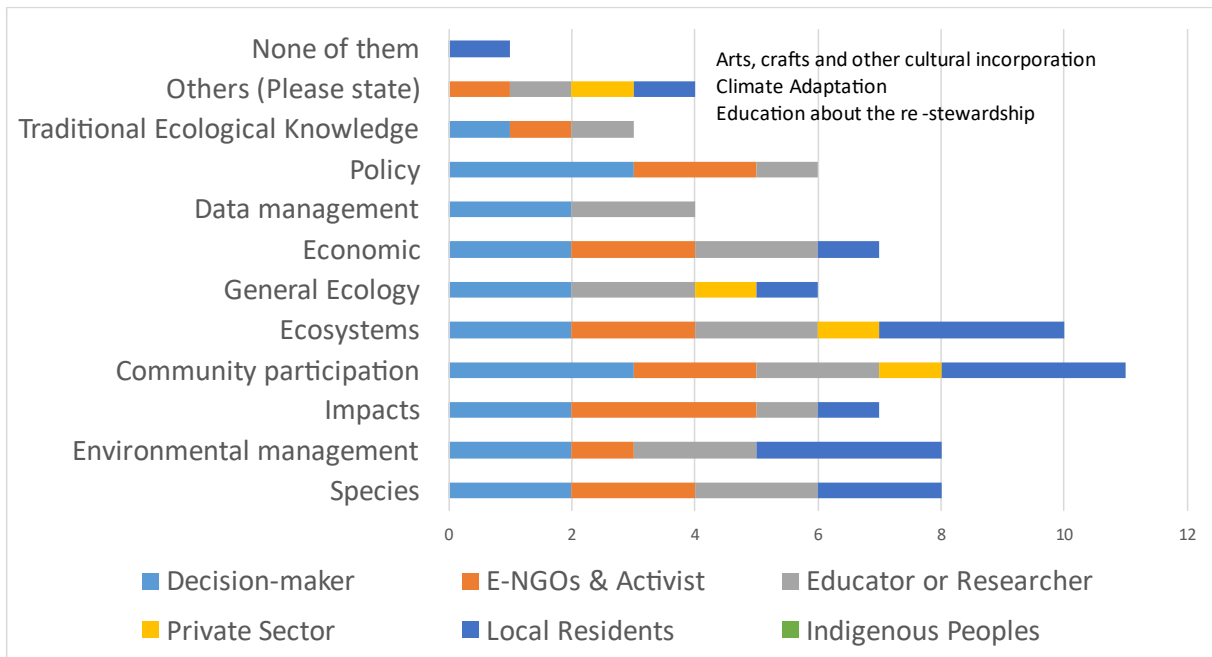


Figure 1. The influence of interviewees' work on biodiversity conservation. Question: How does your work contribute to or impact the protection or restoration of biodiversity? (Please select all that apply).

Elevated Local Understanding and Awareness of Biodiversity Loss

Local individuals generally exhibit a profound understanding of biodiversity and a heightened awareness of its loss, with negligible differences observed between those who disseminate and

those who receive the information. The interviewees' definitions of biodiversity align with the scientific understanding of the term, emphasizing the variety of life at all levels and the interconnectedness of different life forms. Additionally, they emphasize how crucial biodiversity is to the health and sustainability of ecosystems and the earth as a whole. All interviewees view the loss of biodiversity as a local concern. A similar number of respondents expressed being extremely sure (7 individuals) and very sure (8 individuals) about this issue, as depicted in Figure 2. Furthermore, most interviewees deem addressing biodiversity loss as extremely important, with 13 individuals expressing this sentiment (Figure 3).

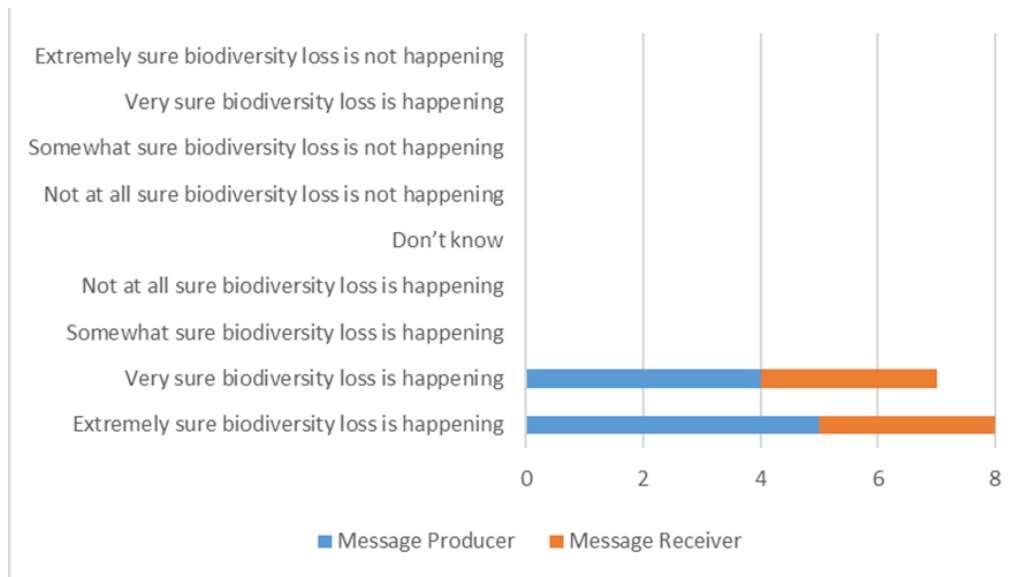


Figure 2. Certainty of belief in considering biodiversity loss as a local issue. Question: To what degree do you perceive biodiversity loss as an issue in your local area? (n=15, as one message producer cannot rate the personal degree as a representative).

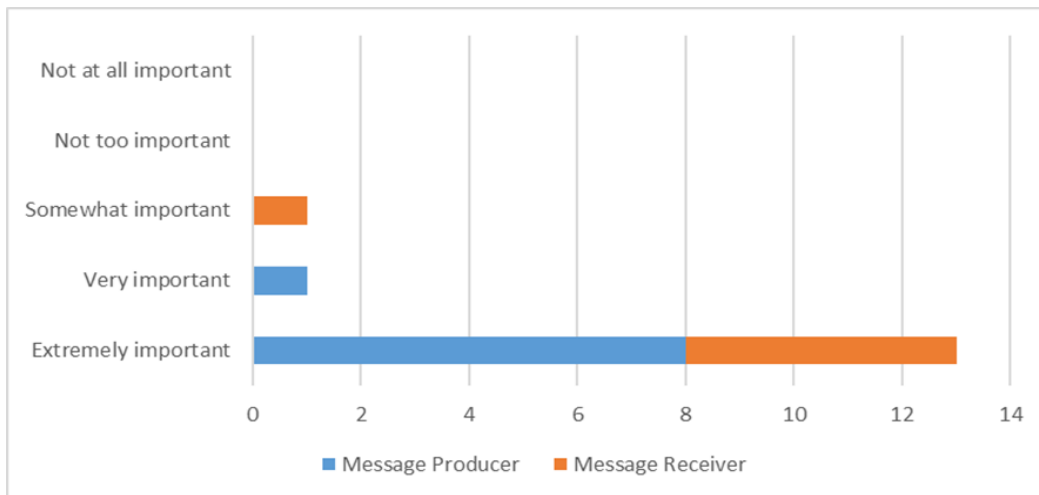


Figure 3. The personal importance of addressing biodiversity loss. Question: On a personal level, how do you rate the importance of addressing biodiversity loss? (n=15, as one message producer cannot rate the personal degree as a representative).

Shared Key Elements of Biodiversity Conservation with Diverse Information Sources

The key elements of biodiversity that message producers emphasize and convey to the public align closely with the interests of the message receivers, although the information sources that guide planning decisions for biodiversity conservation among message producers significantly differ from the trusted information sources for biodiversity conservation among message receivers.

While both message producers and receivers concentrate on and communicate similar key elements to the public, each group has its unique focus. The most prevalent key element for both message receivers and producers is the intersection of biodiversity-related policies, conservation methods, and human impacts, which collectively account for 19% of the focus for both groups. However, message receivers tend to emphasize the overall concept of biodiversity more holistically, accounting for 16% of their focus compared to 10% for message producers (Figure 4). For other key elements, while message producers emphasize the importance of stewardship, the necessity of ongoing conservation efforts, and the role of economic transformation and Indigenous-led conservation in promoting biodiversity, message receivers focus on the need for funding or grants to enhance biodiversity in local parks and green spaces, the intersection of our food system with existing natural/wild food systems, and the importance of protecting animals, often seeking information from the internet to ensure the correct identification of species.

Regarding information sources, message producers utilize a broad spectrum, encompassing opinion surveys, academic research into communications and behaviour change, community working groups, and lessons learned from previous efforts. These are in addition to their top three choices: NGOs (13%), academic institutions (10%), and provincial agencies (10%) (Figure 4). On the other hand, message receivers display a more skeptical attitude. They have become disillusioned with government sources due to perceived censorship and politicization. While they may still consult these sources, their primary trust lies with NGOs and news outlets. Even though they recognize the importance of academic resources (10%), they occasionally find academic research to be too narrow or its methodology too restrictive for a comprehensive understanding (Figure 5).

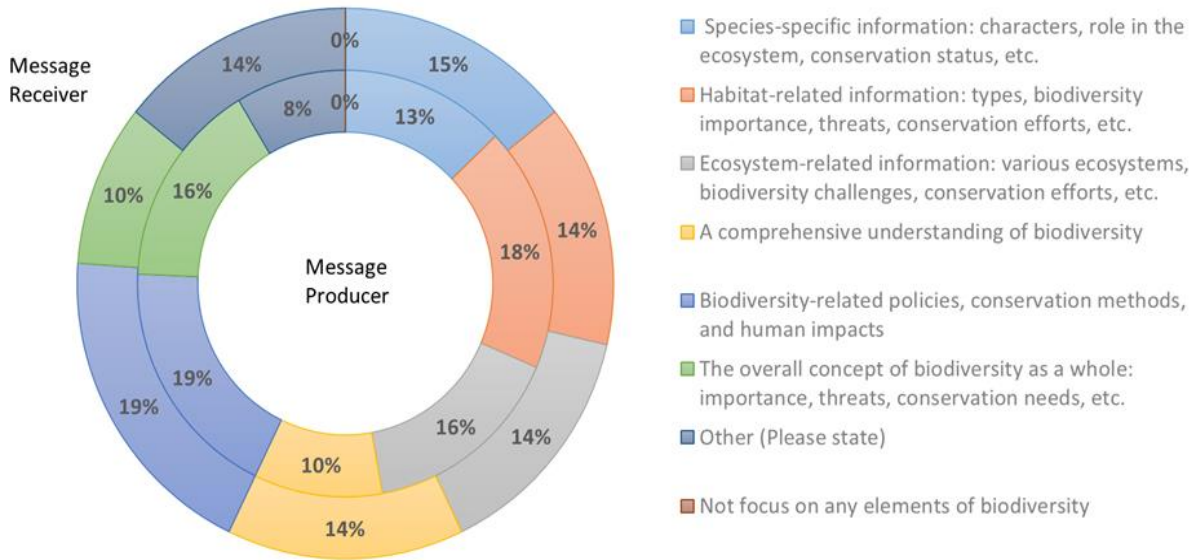


Figure 4. The key biodiversity elements message producers focus on or message receivers are interested in. Question: What are the key elements of biodiversity your organization focuses on and communicates about to the public (for message producers) or interested

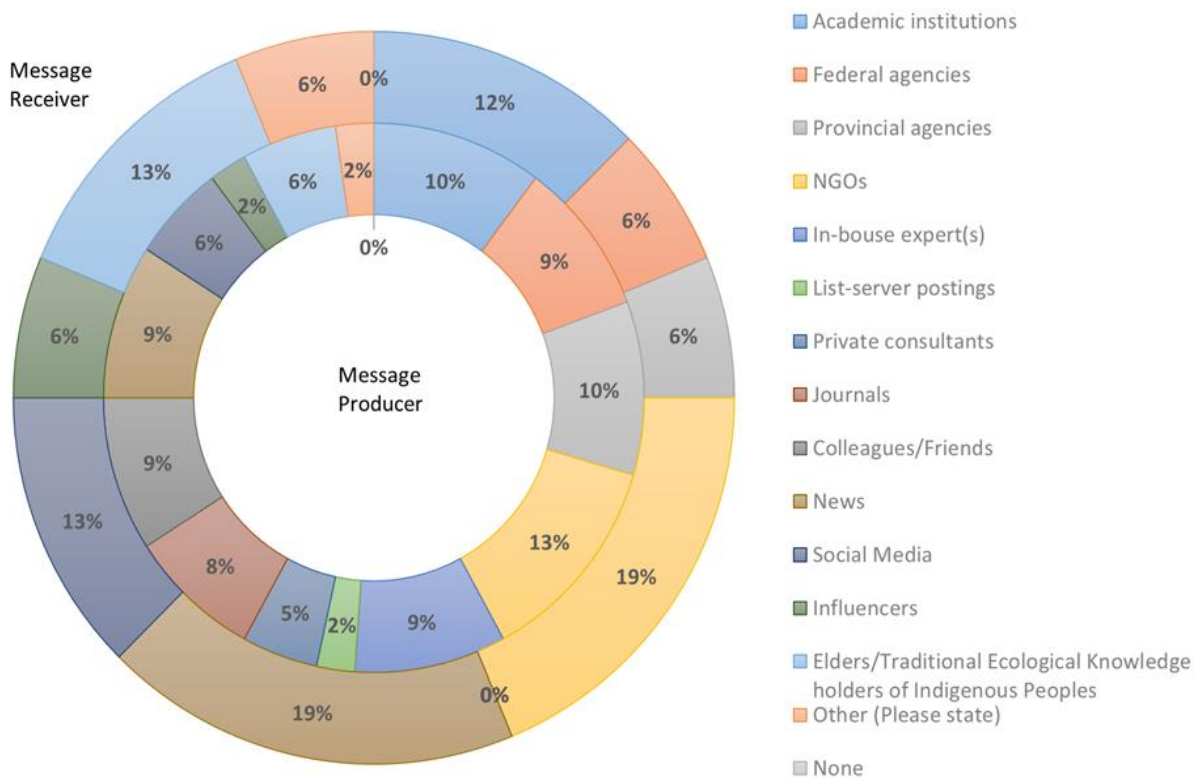


Figure 5. The sources of information guiding the planning decisions for biodiversity conservation (for message producers) or the trusted sources of information for biodiversity conservation (for message receivers). Question: Which sources of information guide your planning decisions for biodiversity conservation (for message producers), or what are your trusted sources of information for biodiversity conservation (for message receivers)? (Please select all that apply).

Exploring Communication Strategies: Successes and Challenges in Current Methods for Biodiversity Conservation from Message Producers

The message producers, who are experts in their respective fields, shared their perspectives on the existing strategies for biodiversity conservation in the Fraser Estuary and Richmond. They highlighted both the successes and challenges of these strategies, providing a comprehensive overview of the current state of biodiversity conservation in the region and suggesting ways to improve communication and engagement around this critical issue.

Several policies and strategies were mentioned, including the federal Species-At-Risk-Act, the BC Agricultural Land Reserve, and the BC list of species and ecosystems at risk. However, some interviewees expressed concerns about the effectiveness of these policies, citing issues such as the impact of land raising for flood protection on biodiversity and the choice of tree species for aesthetic purposes over native species in development sites.

Positive examples of conservation efforts were also shared. The Garden City Lands in Richmond was highlighted as a successful case where community action led to preserving lands for ecological conservation, agriculture, and open land park recreation. Other successful initiatives include the Riparian Response Strategy, which has generated over 2.5 hectares of native plant enhancements within riparian areas, and the Invasive Species Action Plan, recognized as a leader in invasive species management due to its proactive and trial-based approach.

Regarding communication strategies, various methods are employed to engage the public and students in discussions about conservation and biodiversity. These include educational programs, social media channels, public events, workshops, and citizen science initiatives like the City Nature Challenge. Some organizations also engage their customers or clients in these discussions using tools like newsletters, workshops, tours, and event participation.

The interviewees also identified several threats to biodiversity in the Fraser Estuary, including a lack of awareness among people about the importance of the area, the impacts of international trade on the function of the estuary, and the loss of ecological function due to urban infrastructure. They suggested various communication strategies to address these threats, ranging from broad-reaching social media content and thematic videos to more specialized content and traditional expert knowledge/peer-reviewed science approach.

Motivations and Engagement Strategies for Message Receivers: Community-Driven Biodiversity Conservation

The message receivers have taken various personal actions to protect or restore biodiversity in their areas. These actions range from invasive species removal, participating in community events, adopting sustainable practices in daily life, organic farming, and helping injured animals. The motivations behind these actions are personal connections to the spaces, a sense of responsibility, and a desire to make a difference.

The respondents would be motivated to participate in conservation actions and engage with their community if they had access to well-organized and advertised city-sponsored events, educational events, workshops, and information that reaches people in their homes. They also expressed interest in regular weekend treks and conservation events organized by local environmental groups and communities.

Some respondents were motivated to take action by conservation messages or campaigns. These include news coverage of environmental issues, personal ethical choices, and disillusionment with the influence of funders on non-profit work. They believe that emotional engagement, coupled with information, is necessary for people to care, act, and sustain their actions.

Effective Biodiversity Conservation Messaging

Effective conservation messaging requires a multifaceted approach that includes various communication channels, memorable and resonating messages, and best practices that engage and motivate the community toward conservation efforts.

Communication Channels and Messaging Frameworks

Richmond residents and businesses have found various communication channels and messaging frameworks effective. These include annual community grants for environmental enhancement projects, social media campaigns, in-person events, and newspaper articles. The messaging is often more effective when it is positive and resonates with the community, making conservation "cool" and trendy.

Memorable Conservation Messages

Conservation messages that are personal, actionable, and visually striking tend to be more memorable. These messages often evoke emotions and highlight the impact of environmental issues on humans and their surroundings. Storytelling and the portrayal of real stories can also make a conservation message unforgettable.

Messages that resonate most with the audience often connect directly to them and evoke emotions. Big, charismatic animals, for example, are memorable and can serve as umbrella species to protect broader ecosystems. Messages that relate to someone's personal life, evoke emotion, and access a creative part of their brain/body are also impactful.

Best Practices in Conservation Messaging

The best practices in conservation messaging include providing land for habitat compensation, financial incentives for private landowners to support local biodiversity, and clear, simple, and relevant messaging with a clear call to action. Messages that recognize the power of the community and articulate relationships between conservation and human needs are also effective.

Stakeholder Recommendations for Enhancing Conservation Messaging: A Multifaceted Approach

The participants unanimously call for an enhancement in conservation messaging in the Fraser Estuary and Richmond, proposing a comprehensive approach that integrates policy, education, visual storytelling, and the sharing of success stories (Appendix 1). They emphasize the importance of tailoring messages to specific audiences, engaging children, and fostering partnerships. They also highlight the need to reach decision-makers, restore and legislate for conservation, make conservation relatable to individuals, and involve the community. Overcoming language and cultural barriers, promoting conservation through various media platforms and events, incorporating indigenous perspectives, and fostering a sense of home and connection to the local environment is also deemed crucial.

Lessons from Successful and Unsuccessful Examples of Local Conservation Messaging

Several successful conservation messaging examples have positively influenced biodiversity in the Fraser Estuary and Richmond. These include the Garden City Conservation Society's stewardship efforts, the Raincoast Conservation Foundation's scientific data provision, and the Sturgeon Bank Sediment Enhancement project. These initiatives have been successful due to their focus on place-based knowledge, passionate spokespersons, and engaging media like drone footage. Other successful examples include the *Miyawaki* Forest projects, which have increased public awareness about biodiversity, and the North Arm Jetty breach, which improved understanding of salmon migration patterns.

Despite these successes, there have been instances where conservation messaging did not achieve its desired impact. For example, the opposition to the Roberts Bank Terminal 2 (RBT2) project failed to garner enough public attention, primarily due to the inability to create an

emotive story about the estuary that resonates with the urban community. Other unsuccessful cases include pipelines, industrial development, and lack of honest consultation with Indigenous Peoples. These failures are often due to a lack of awareness or thought about biodiversity impacts, and in some cases, conservation messaging has alienated the public or decision-makers.

The analysis underscores the pivotal role of effective communication, community engagement, and a comprehensive understanding of biodiversity conservation in successful conservation messaging. Key elements include place-based knowledge, passionate mid-level decision-makers, and a robust local network of experts, advocates, and decision-makers. Conversely, unsuccessful messaging often stems from a lack of awareness about biodiversity impacts, sometimes leading to alienation from the public or decision-makers. Thus, future conservation messaging should prioritize raising awareness, crafting emotive and community-resonating narratives, and circumventing potential alienation of the public or decision-makers.

Challenges & Limitations in Biodiversity Conservation Messaging

While several challenges and limitations are identified for biodiversity conservation in Fraser Estuary, addressing these challenges and limitations is crucial for effective biodiversity conservation messaging in the Fraser Estuary.

- **The complexity of biodiversity issues, influenced by socio-political factors:** Biodiversity conservation involves intricate ecological, social, and economic issues, making it difficult to communicate these complexities to the public (Newbold et al., 2015). The broader socio-political contexts, including political ideologies, cultural values, and social norms, can shape how messages are interpreted and whether they lead to behaviour change (Knight, 2008).
- **Limited public understanding and interest in local biodiversity conservation contexts:** While many in Richmond may recognize the global importance of biodiversity, there is a distinct gap in understanding its significance within local contexts. Coastal systems, for instance, despite their vast importance, primarily appeal to a specific segment of the Canadian population. This narrow focus sometimes impedes nationwide conservation support. A prime example is the opposition to the RBT2 project, where the narrative about the estuary's importance failed to resonate emotionally with nearby urban communities, highlighting the need for more relatable storytelling (Rozema & Nowak, 2021). Additionally, conservation messages are often disseminated through channels that cater mainly to those already informed about biodiversity, potentially limiting their

broader reach (Dale et al., 2021; Knight, 2008). Addressing this knowledge gap is essential to foster a more inclusive and effective conservation strategy.

- **Overcoming information gaps and scientific complexity:** Bridging these gaps and translating scientific knowledge into accessible language and visuals is essential for effective messaging (Dale et al., 2021; Kusmanoff et al., 2020).
- **Addressing message fatigue and desensitization:** In an increasingly connected world, individuals are exposed to a multitude of messages, leading to message fatigue and desensitization. Messaging strategies should focus on novelty, personal relevance, and emotional appeal (Dale et al., 2021; Kidd, Garrard, et al., 2019).
- **Reaching diverse and hard-to-reach audiences:** Different demographics, socio-economic backgrounds, and cultural groups may have varying levels of exposure to and interest in biodiversity issues. It is crucial to employ inclusive and culturally sensitive messaging strategies that consider the specific needs, values, and communication preferences of different audience segments (Kusmanoff et al., 2020; Mayer & Frantz, 2004).
- **Lack of evaluation and feedback:** Measuring the impact of biodiversity conservation messaging requires robust evaluation frameworks and methodologies (Kidd, Bekessy, et al., 2019). However, conservation messaging faces limitations due to a lack of resources, including financial resources and staff expertise. Insufficient resources hinder the developing and implementation of effective messaging strategies (Addison et al., 2015).

Best Practices for Biodiversity Conservation Messaging

Process of Developing Conservation Messages

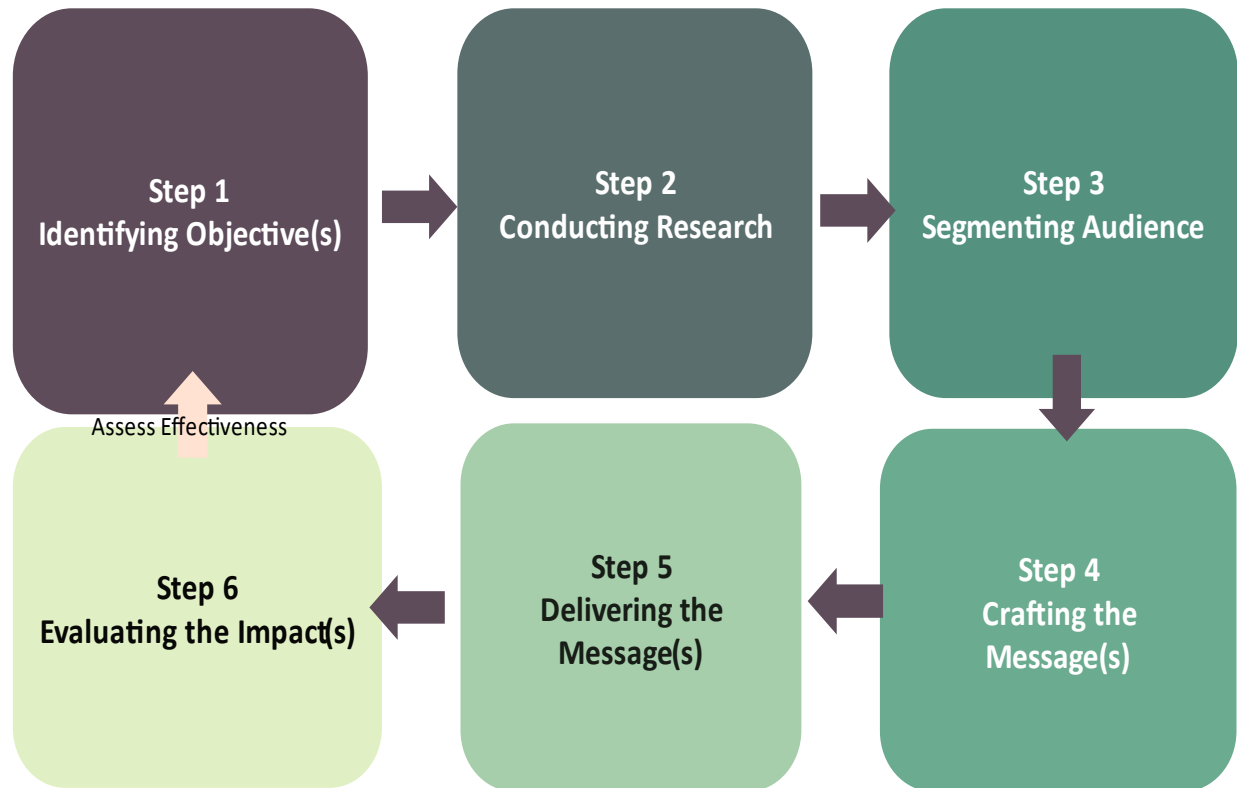


Figure 6. Step-by-step guidelines for developing conservation messages. Adapted from Noar (2006) and Kidd, Garrard, et al. (2019).

The process of developing conservation messages can be summarized in six main steps (Figure 6):

1. **Identifying Objective(s):** This step is crucial as it defines the purpose of the messaging, the desired outcomes, and the direction of the subsequent steps (Kidd, Garrard, et al., 2019). Activities in this step include defining the purpose of the messaging, identifying desired outcomes, aligning with the overall conservation goal, and setting Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) objectives (Kidd, Garrard, et al., 2019).
2. **Conducting Research:** This step provides the necessary evidence and theories to guide the development of effective conservation messages (Kidd, Garrard, et al., 2019). Activities include reviewing existing literature, conducting field research, reviewing

conservation strategies, and understanding conservation messaging theories and frameworks.

3. **Segmenting Audience:** This step allows for identifying key target audiences and gathering relevant information about them. Activities include identifying key target audiences and gathering relevant information about the audiences (Kidd, Garrard, et al., 2019).
4. **Crafting the Message(s):** This step involves creating clear, compelling, and actionable messages that align with the identified objectives and resonate with the segmented audience. Activities include developing key messages and tailoring messages to different audiences.
5. **Delivering the Message(s):** This step involves disseminating the crafted messages to the segmented audience using appropriate channels and methods. Activities include selecting appropriate channels and implementing the delivery plan.
6. **Evaluating the Impact(s):** This step allows us to measure the effectiveness of the conservation messages delivered and assess whether the objectives have been met (Kidd, Garrard, et al., 2019). Activities include measuring effectiveness and assessing the achievement of objectives.

Each step is crucial and builds upon the previous one, ensuring that the conservation messages are effective and contribute to the overall goal of biodiversity conservation.

Common Themes and Patterns

The interview results aligned with the best practices summarized in the literature review. Based on the literature review and interview results, the following best practices for biodiversity conservation in Fraser Estuary can be summarized:

- **Credible Sources for Messaging:** Messages should be delivered by trusted and credible sources to ensure acceptance and prompt action (Clayton et al., 2013; Dale et al., 2021; Pornpitakpan, 2004). In the Fraser Estuary, NGOs, news outlets, social media, elders/Traditional Ecological Knowledge holders, and academic institutions are the most trusted sources. Collaborating with these entities can enhance the reach and impact of conservation messages.
- **Audience-Specific Messaging:** Tailor messages to cater to the values, beliefs, and preferences of different audience segments (Clayton et al., 2013; Kenter et al., 2011). This ensures relevance and increases the likelihood of message acceptance (Clayton et al., 2013).
- **Simple, clear, and actionable language:** Use simple, clear, and actionable language, considering cultural and demographic factors to make the message accessible to a diverse audience and inspire behavioural change (de Lange et al., 2022).
- **Balancing Messaging Tones:** Employ both positive and negative emotional appeals, although the number of positive messages should slightly exceed negative ones to maintain a balanced communication strategy. In Richmond and the Fraser Estuary, although positive messages can resonate with more people and be more effective in general, positive messages inspire hope and a sense of efficacy. However, overly positive ones may downplay the seriousness of biodiversity loss (O'Neill & Nicholson-Cole, 2009). Urgent short-term action might be best achieved through negative messaging on social media, while longer-term behaviour change might require positive messaging through peer networks.
- **Personal Resonation with Narrative & Storytelling:** Utilize storytelling and narratives to captivate audiences, elicit emotions, and forge connections (Vigliano Relva & Jung, 2021). Highlighting success stories and local champions can effectively communicate the importance of biodiversity (Louder & Wyborn, 2020).
- **Arts, Visuals, and Multimedia Communication:** Use arts, visuals, and multimedia to make abstract concepts more tangible and evoke emotions (Dale et al., 2021; Kusmanoff et al., 2020). However, they should be used judiciously to prevent misinterpretation (Clayton et al., 2013).

- **Local Connection and Understanding:** Create a sense of home and connection to the local environment, comparing the region to other well-known places to help residents relate to its significance. Emphasize local messaging and small-scale efforts, such as community-driven initiatives and habitat restoration projects, to raise awareness and spur community involvement (UBC Sustainability, 2022).
- **Multiply Engagement Groups:** Harnessing children's innate curiosity can significantly boost interest in biodiversity and conservation (Adom, 2022; Chawla, 2020). It is essential to engage various age groups, emphasizing community-driven involvement and fostering connections with schools and local communities. Additionally, seeking insights from indigenous elders is crucial, recognizing their deep-rooted bond with the land and their pivotal role in promoting sustainable living practices.
- **Repeated Exposure:** Ensure repeated exposure to conservation messages to enhance effectiveness, but avoid causing annoyance or desensitization (Clayton et al., 2013; Hornik, 2002).
- **Collaboration with Platforms & Stakeholders:** Incorporate social media and digital platforms with two-way communication for broader reach and engagement (Bergman et al., 2022; Dale et al., 2021). Collaboration and partnerships with local communities, NGOs, government agencies, and other relevant organizations can enhance the reach and impact of messaging campaigns (Bergman et al., 2022; Dale et al., 2021; Kidd, Garrard, et al., 2019; Kusmanoff et al., 2020).
- **Identification of Beneficiaries at Different Scales & Emphasizing Co-benefits:** Messages that emphasize the co-benefits of biodiversity conservation, such as improved health, economic advantages, and enhanced well-being, to make the benefits more tangible and relevant to the audience (Clayton et al., 2013; Hein et al., 2006; TEEB, 2010).

Effective biodiversity conservation in Fraser Estuary requires a multifaceted approach that integrates various communication channels, memorable and resonating messages, and best practices that engage and motivate the community toward conservation efforts. Future conservation messaging should prioritize raising awareness, encouraging participation, crafting emotive and community-resonating narratives, and avoiding potential alienation of the public or decision-makers.

Conclusion

This joint study by the Garden City Conservation Society (GCCS) and the Fraser Estuary Research Collaborative (FERC) has provided a comprehensive analysis of conservation messaging in the Fraser Estuary, a region known for its rich biodiversity and current threats from human activities and climate change. The research methodology combined a literature review and stakeholder interviews to understand the complex nature of effective conservation messaging. Key factors identified include societal and cultural contexts, communication medium, message framing, source credibility, and timing and frequency of messages. The need for audience-specific messages, child engagement, and partnerships was also emphasized.

The study revealed a strong local understanding of biodiversity loss, highlighting the need for enhanced conservation messaging in the Fraser Estuary and Richmond. Several challenges were identified, such as the complexity of biodiversity issues, limited public understanding, information gaps, message fatigue, reaching diverse audiences, and lack of evaluation and feedback.

The report concludes with recommendations for best practices in biodiversity conservation messaging. It emphasizes a structured six-step process that includes clear objectives, thorough research, audience segmentation, crafting compelling messages, appropriate delivery channels, and impact evaluation. The significance of utilizing credible sources, tailoring messages, employing clear language, balancing message tones, leveraging storytelling and visuals, connecting local contexts, engaging multiple groups, exposing messages repeatedly, collaborating with platforms and stakeholders, and identifying co-benefits was also underscored.

In conclusion, effective conservation messaging in Fraser Estuary must be multifaceted, integrating various communication channels and best practices to engage and motivate the community. The findings of this report contribute valuable insights and recommendations for enhancing conservation messaging strategies in the Fraser Estuary, aligning with the broader goal of biodiversity conservation and reflecting the need for strategic planning in heavily urbanized areas.

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Appendix

Appendix 1. Stakeholder Recommendations for Enhancing Conservation Messaging

- **Policy and Local Messaging:** The importance of local and common messaging that encourages biodiversity enhancement is emphasized. This includes celebrating small-scale efforts in backyards, walkways, farm fields, green roofs, and under-retained trees.
- **Educational Infrastructure:** The idea of a museum dedicated to the Pacific Flyway, Fraser Estuary, and Richmond's role in climate change is proposed. This would serve as a platform to showcase the region's biodiversity, the challenges of population growth and flood protection, and the potential consequences of current environmental practices.
- **Visual Connections and Storytelling:** The use of visual aids, such as videos and animations, to illustrate the connection between species and their habitats is suggested. The use of diverse spokespeople and storytelling with compelling characters is also proposed to make the messages more relatable.
- **Success Stories:** Highlighting successful conservation efforts, such as the *Miyawaki* Forest project, is seen as a key factor in promoting conservation messaging.
- **Targeted Messaging:** The need for specific objectives and audience targeting is emphasized. This includes monitoring and discussing implementation strategies with partners to improve effectiveness.
- **Engaging Children:** The potential of children's curiosity is recognized as a powerful tool for fostering interest in conservation and biodiversity.
- **Partnerships:** The importance of partnerships, as outlined in SDG 17, is highlighted.
- **Reaching Decision-Makers:** The challenge of ensuring that conservation messages reach decision-makers is acknowledged. Tactics such as advertising and lobbying are suggested, despite their potential cost.
- **Restoration and Legislation:** The restoration of the Fraser River Estuary Management Program (FREMP) is proposed, with the inclusion of First Nations and NGOs. The need for legislation to ensure long-term funding is also emphasized.
- **Making it Real:** The need for conservation messaging to feel real and relevant to people's lives is highlighted. This includes showing how individual actions can make a difference.
- **Community Involvement:** Partnering with the city and involving youth in projects is emphasized. This includes organizing clean-up projects in the estuary to raise awareness.

- **Overcoming Language and Cultural Barriers:** The need to address language and cultural barriers, particularly among the Asian population, is recognized. This includes establishing connections with schools and community partners.
- **Publicity and Events:** The need for broader publicity of conservation messages across multiple media platforms is suggested. This includes organizing more conservation events for residents to attend.
- **Indigenous Involvement:** The importance of seeking advice and involvement from Musqueam elders is emphasized. This recognizes their intrinsic connection to the land and their role in guiding sustainable living practices.
- **Home Connection:** The need to create a sense of home and connection to the local environment is highlighted. This includes comparing the region to other well-known places worldwide to help residents relate to its significance.