Handbook: Biodiversity Conservation Messaging in the Fraser Estuary

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August 2023

Declaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organizations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of Garden City Conservation Society (GCCS) staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of Garden City Conservation Society (GCCS) or the University of British Columbia.

Acknowledgements

The author acknowledges that the office of this project is situated on the unceded ancestral lands of the xwməθkwəy̓əm (Musqueam), Skwxwú7mesh (Squamish), S'ólh Téméxw (Stó:lō) and Səl̓ílwətaʔ/Selilwitulh (Tsleil- Waututh) Nations. The author acknowledges this project work took place on the traditional, ancestral, and unceded territory of the Coast Salish and Musqueam Peoples, who have been stewarded in the Fraser River Estuary for millennia. The abundance of the Fraser River Basin, as evidenced by the presence of many other nations, Nlaka'pamux, Tsilhqot'in, Secwepem, Okanagan, St'át'im, Wet'Suwet'en, Sekani, and Dakel, frequenting the study area, was under the governance of Indigenous peoples for thousands of years.

The author would like to thank the project mentors, Sharon MacGougan and Bruno Vernier, for their guidance and support throughout my research. The author would like to thank Karen Taylor, Linda Nowlan, and Sam Filipenko for their kind help. The author gratefully acknowledges the funding support provided by Bullitt Foundation Grant.

Cover photo by Qingyang Li

Contents

Introduction

Biodiversity, the variability of life on Earth, is fundamental to our planet's health and resilience. It sustains natural systems and provides essential ecosystem services for humanity.[1] In the Fraser River Estuary, biodiversity is particularly rich, supporting a complex food web that links fish, birds, and marine mammals across the Pacific Ocean. However, less than 30% of intact habitat remains, posing a significant challenge to the conservation of this biodiversity.[2]

Effective conservation messaging is pivotal in advancing biodiversity conservation efforts in the Fraser Estuary. It is instrumental in educating citizens about the value of biodiversity and the importance of conservation efforts, thereby fostering a sense of responsibility towards the environment.[2] Effective communication can also help shape policy decisions and community strategies prioritizing biodiversity conservation over other competing interests, such as housing development.[3] Moreover, clear and compelling conservation messages can attract more collaborators, inspire citizens to support initiatives and promote behaviour change.[1] It is also essential for organizations to have a well-implemented communication strategy to monitor and evaluate the effectiveness of their conservation efforts.[4] Furthermore, effective communication can help build a harmonious and cooperative atmosphere, reaching a consensus among all parties involved in conservation efforts.[5]

Implementing effective conservation messaging requires a strategic and tailored approach. It should consider the local context, including the unique biodiversity of the Fraser Estuary, the threats it faces, and the cultural and socio-economic factors that influence conservation. The messaging should be clear, engaging, and accessible, using a variety of communication channels to reach a broad audience. It should also involve ongoing dialogue and collaboration with stakeholders, including local communities, conservation organizations, and policymakers.[6]

Process of Developing Conservation Messages[7,8]

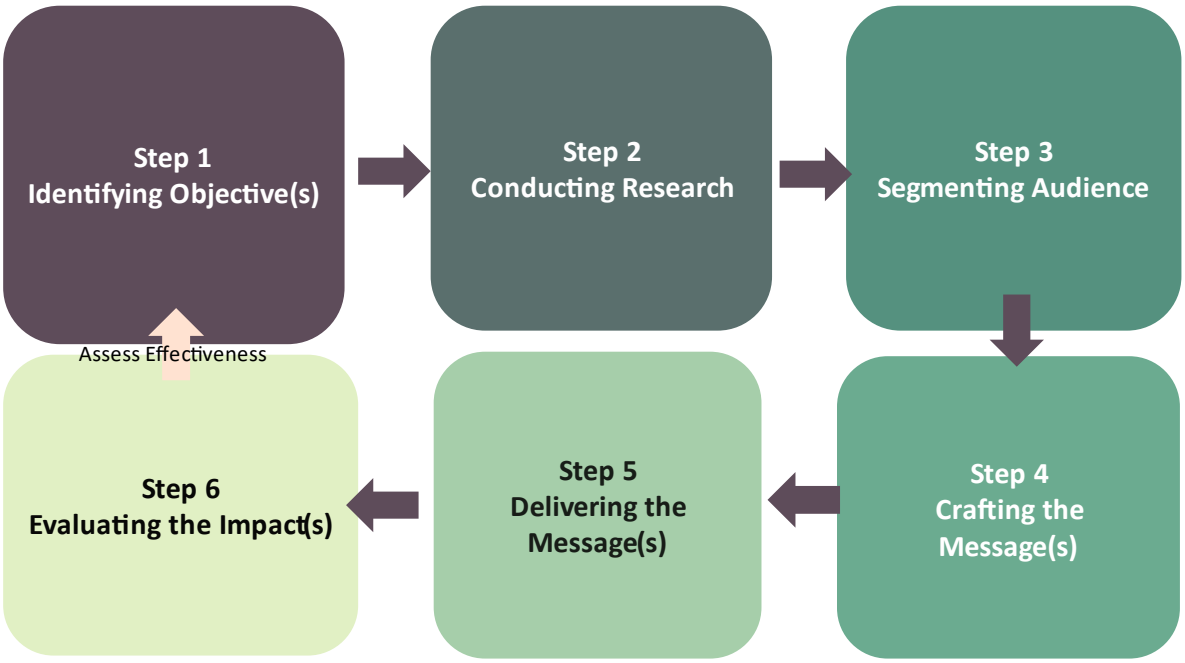

Figure 1. Step-by-step guidelines for developing conservation messages. Adapted from Noar (2006) and Kidd et al. (2019).

Step 1. Identifying Objective(s)

Why is this step needed?

Identifying objectives is the first and crucial step in the process of developing conservation messages. It helps to define the purpose of the messaging, the desired outcomes, and the direction of the subsequent steps [8]. Clear objectives guide the development of the message and ensure that it aligns with the overall goals of the biodiversity conservation efforts.

What will you do in this step?

Activity 1: Define the Purpose of the Messaging

In this activity, you will define the purpose of the conservation messaging. This could be to raise awareness about the importance of biodiversity in the Fraser Estuary, to promote specific conservation actions, or to influence policy decisions.

Activity 2: Identify Desired Outcomes

Here, you will identify the desired outcomes of the messaging. These could be changes in public attitudes towards biodiversity conservation, increased participation in conservation activities, or policy changes that favour biodiversity conservation.

Activity 3: Align with Overall Conservation Goal

In this activity, you will ensure that the objectives of the messaging align with the overall goals of the biodiversity conservation efforts in the Fraser Estuary. This could involve reviewing existing conservation strategies and plans to ensure consistency.

Activity 4: Set Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) Objectives

SMART objectives provide a clear and tangible path to achieving the purpose of the message. For example, an objective could be to increase the local community's knowledge of the importance of biodiversity in the Fraser Estuary by 50% within a year.[9]

What tips do we have for this step?

- Be specific and clear when defining the purpose and desired outcomes of the messaging. This will help to guide the development of the message and ensure that it is effective.[9]
- Consider the context in which the messaging will be delivered. The objectives should be relevant to the target audience, the conservation issues, and the cultural and ecosystem services in the Fraser Estuary.[3]
- Align the messaging objectives with the overall conservation goals. This will ensure that the messaging supports the broader conservation efforts and does not conflict with them.
    - Review existing conservation strategies and management plans to ensure your objectives align with them.
- Make sure the objectives are SMART to ensure they are clear and achievable.

Step 2. Conducting Research

Why is this step needed?

Conducting research is a crucial step in the process of biodiversity conservation messaging. It provides the necessary evidence and theories to guide the development of effective conservation messages. Research helps to understand the current state of biodiversity, its challenges, and potential solutions. It also provides insights into the most effective messaging theories and frameworks for achieving the desired objectives and outcomes.[10,11]

What will you do in this step?

Activity 1: Review Existing Literature

Review existing literature on biodiversity conservation in Fraser Estuary and other similar ecosystems. This includes academic articles, reports, and other relevant publications. The aim is to understand the current state of biodiversity, its challenges, and the potential solutions.[11,12]

Activity 2: Field Research

You will conduct field research in the Fraser River estuary to understand the current state of the ecosystem and the presence and migration patterns of different species. This could involve observations, surveys, and data collection.[13]

Activity 3: Review of Conservation Strategies

You will review existing conservation strategies and their effectiveness. This could involve studying case studies, reviewing management plans, and analyzing the impact of different conservation efforts.[14,15]

Activity 4: Understand Conservation Messaging Theories and Frameworks

Study various conservation messaging theories and frameworks. This will help us understand the most effective ways to communicate biodiversity conservation messages and achieve the desired objectives and outcomes.[10]

What tips do we have for this step?

- Make sure to use various sources for your research, including academic articles, reports, case studies, and management plans.[10,14]
- Use a systematic approach to literature review. This will ensure that all relevant literature is considered and the findings are reliable.[11]
- When conducting field research, ensure to follow ethical guidelines and respect the ecosystem and its inhabitants.[13]
- Consider both traditional laws and Western science in your research. This will provide a more comprehensive understanding of biodiversity conservation.[15]
- Collaborate with other researchers and organizations. This will provide access to more resources and expertise and can lead to more effective conservation messaging.
- Keep in mind that the goal of your research is not just to gather information but to use this information to develop effective conservation messages.

Step 3. Segmenting Audience

Why is this step needed?

Segmenting the audience is a critical step in the process of biodiversity conservation messaging. It allows for identifying key target audiences and gathering relevant information about them, such as their current attitudes, expectations, and behaviours. This step is necessary because different audience segments may respond differently to conservation messages. By understanding the audience, messages can be tailored to be more effective and impactful.[8]

What will you do in this step?

Activity 1: Identify Key Target Audiences

Identify the key target audiences for the conservation messages. This could include local communities, policymakers, conservation organizations, and the general public. The audience's identification can be based on demographic factors, their relationship with the Fraser Estuary, and their potential influence on biodiversity conservation.[8]

Activity 2: Gather Relevant Information About the Audiences

Gather relevant information about the identified audiences. This could include their current attitudes towards biodiversity conservation, expectations from conservation efforts, and behaviours that might impact biodiversity.[8,16] This information can be gathered through surveys, interviews, and a review of existing literature.

What tips do we have for this step?

- Use a systematic approach to audience segmentation. This will ensure that all relevant audience segments are considered and that the findings are reliable.[8,17]
- Consider both quantitative and qualitative methods for gathering information about the audiences. This will provide a more comprehensive understanding of the audience.[18]
- Collaborate with other researchers and organizations. This will provide access to more resources and expertise and lead to more effective audience segmentation.[3]

Step 4. Crafting the Message(s)

Why is this step needed?

Crafting the messaging is a crucial step in biodiversity conservation messaging. This step involves creating clear, compelling, actionable messages that align with the identified objectives and resonate with the segmented audience. The messages should inspire and motivate the audience to take actions that contribute to biodiversity conservation in the Fraser Estuary.

What will you do in this step?

Activity 1: Develop Key Messages

Develop key messages that align with the conservation objectives and resonate with the segmented audience. The messages should be clear, concise, and actionable. They should highlight the importance of biodiversity conservation and the audience's role in it.[19]

Activity 2: Tailor Messages to Different Audiences

Tailor the messages to different audience segments. Different audiences may have different attitudes, expectations, and behaviours, so the messages should be tailored to resonate with each segment. This could involve using different language, tone, or communication channels for different audiences.[8,20]

What tips do we have for this step?

- Use clear and straightforward language. Avoid jargon and technical terms that the audience may not understand.[21]
- Present in different languages for the target audience.
- Use arts as a boundary tool. Use visualized messages and sounds to deliver messages.
- Carefully framing the messages depends on the objectives.
- Use a story-telling approach to connect the audience to the place.
- Make the messages actionable. The audience should know exactly what actions they can take to contribute to biodiversity conservation.
- Test the messages before rolling them out. This could involve conducting focus groups or surveys to get feedback on the messages from a sample audience.

Step 5. Delivering the Message(s)

Why is this step needed?

Delivering the messaging is a critical step in biodiversity conservation messaging. This step involves disseminating the crafted messages to the segmented audience using appropriate channels and methods. Effective delivery ensures that the messages reach the intended audience and have the desired impact, contributing to the overall goal of biodiversity conservation in the Fraser Estuary.

What will you do in this step?

Activity 1: Select Appropriate Channels

Identify and select the most effective channels for delivering the messages to the segmented audience. The channels could include social media, websites, newsletters, community meetings, or public events. The choice of channels should be based on the preferences and habits of the audience segments.

Activity 2: Implement the Delivery Plan

Implement the plan for delivering the messages. This could involve scheduling social media posts, organizing community events, or distributing newsletters. Monitor the delivery process to ensure that the messages reach the intended audience and are received as intended.

What tips do we have for this step?

- Use a mix of channels to reach a wider audience. Different audience segments may prefer different channels, so using a mix of channels can help ensure that the messages reach all audience segments.
- Time the delivery of messages to coincide with relevant events or times when the audience is most receptive. This can help increase the impact of the messages.
- Monitor and adjust the delivery plan as needed. If the messages are not reaching the intended audience or are not having the desired impact, adjust the delivery plan accordingly.

Step 6. Evaluating the Impact(s)

Why is this step needed?

Evaluating the impact is a crucial step in the biodiversity conservation messaging process. It allows us to measure the effectiveness of the conservation messages delivered and assess whether the objectives have been met. This step provides valuable feedback that can be used to refine future messaging strategies and ensure that they are as effective as possible in promoting biodiversity conservation in the Fraser Estuary.[22]

What will you do in this step?

Activity 1: Measure Effectiveness

Measure the effectiveness of the conservation messages. This could involve surveying the audience to gauge their response to the messages, tracking changes in behaviour related to biodiversity conservation, or using scientific methods such as environmental DNA methods for ecological monitoring.[23]

Activity 2: Assess Achievement of Objectives

Assess whether the objectives identified in Step 1 have been achieved. This could involve comparing the current state of biodiversity in the Fraser Estuary with the desired state outlined in the objectives.

What tips do we have for this step?

- Use a variety of methods to evaluate the impact. Different methods can provide different types of information, and using a variety can give a more complete picture of the impact of the conservation messages.[22]
- Involve stakeholders in the evaluation process. Stakeholders can provide valuable insights and perspectives that can help assess the conservation messages' impact.
- Use the results of the evaluation to refine future conservation messaging strategies. The evaluation can provide valuable feedback that can be used to make future strategies more effective.

Checklists for Conservation Messaging

Checklist for Message Development

- ☐ Identify the Objective: Define the purpose of the message. Is it to inform, persuade, or call to action?
- ☐ Research: Understand the conservation issues in the Fraser Estuary thoroughly, such as the impacts of the Terminal 2 expansion on biodiversity and local species like the Fraser Chinook salmon and the endangered Southern Resident killer whales.
- ☐ Audience Segmentation: Identify the target audience for the message. This could be the general public, specific communities, policymakers, or other stakeholders. Tailor the message to suit the audience's needs, interests, and level of understanding.
- ☐ Craft the Message: Develop the content of the message. Ensure it is clear, concise, and compelling. The message should be fact-based and provide an accurate estimate of the situation.

Checklist for Crafting Message

- ☐ Language: Use simple, clear, and concise language.[24]
- ☐ Sources: Use credible sources of information or evoke social norms.[25]
- ☐ Message Frames
    - ☐ Choose message frames with selected tones according to your objectives.
    - ☐ Use narrative or storytelling methods.[25]
- ☐ Contents
    - ☐ Connect to a specific context (local or distant).[26]
    - ☐ Provide actionable information.[27]
    - ☐ Use visual and/or multimedia approaches.[28]

Checklist for Message Delivery

- ☐ Delivery Channels: Decide the channels through which the message will be delivered. This could be through social media, print media, events, or other forms of communication.
- ☐ Timing: Determine the best time to deliver the message for maximum impact. Consider factors like the timing of related events or news cycles.
- ☐ Partnerships: Identify potential partners who can help amplify the message. This could include other conservation organizations, local communities, or influential individuals.
- ☐ Feedback Mechanisms: Establish ways to receive feedback on the message. This could be through social media comments, surveys, or direct feedback from stakeholders.

Checklist for Impact Evaluation

- ☐ Monitor and Evaluate: After delivering the message, monitor its impact. This could involve tracking engagement metrics, conducting surveys, or getting feedback.
- ☐ Impact Assessment: Conduct an impact assessment to understand the effect of the conservation message on the Fraser Estuary's environment and communities.
- ☐ Review and Adapt: Revise and adapt the message as necessary based on the evaluation. This could involve changing the content, delivery method, or target audience to increase the effectiveness of the message.
- ☐ Legacy Summaries: Create summaries of the impact that the conservation messaging has had on the Fraser Estuary, to illustrate the campaign's effectiveness and inform future efforts.

Case Studies

Successful Examples

Stewardship - The *Miyawaki* Forest Program

The *Miyawaki* Forest program conducted by the Garden City Conservation Society in Richmond is an excellent case study of successful conservation messaging.

The *Miyawaki* Forest program involves the creation of dense formations of native species known as "Pocket Forests." These forests boast 10 times faster growth, 30 times more density, and 100 times more biodiversity than conventional forests.[29] The Garden City Conservation Society, in collaboration with Richmond Senior Secondary School, planted the first *Miyawaki* "Pocket Forest" in Western Canada on November 19. This forest comprised 100 native trees and 200 other plants.[30]

The success of the *Miyawaki* Forest program is mainly due to the effective conservation messaging by the Garden City Conservation Society. The society received a $10,000 grant from Tree Canada to plant the forest, demonstrating the effectiveness of its messaging in securing funding and support.[31]

The society's messaging emphasizes the importance of biodiversity and the role of native species in maintaining healthy ecosystems. They also highlight the rapid growth and high density of the Miyawaki Forests, making them an efficient and effective solution for reforestation and habitat restoration.

The Garden City Conservation Society also uses various platforms to deliver its conservation message. They maintain an active presence on social media and have a dedicated website where they share updates about their projects and initiatives. They also engage with local schools and community groups to involve them in their conservation efforts, fostering a sense of community ownership and stewardship over the local environment.

In conclusion, the *Miyawaki* Forest program is a successful example of conservation messaging in action. Through clear, compelling messaging and active community engagement, the Garden City Conservation Society has been able to implement a highly effective conservation initiative that is making a significant contribution to the preservation and restoration of the Fraser Estuary's natural environment.

Scientific Data – Raincoast Conservation Foundation

The Raincoast Conservation Foundation has been instrumental in conservation efforts in the Fraser Estuary and Richmond, providing a successful example of conservation messaging. The foundation's work is centred around scientific research, mainly focusing on understanding the presence, migration timing, and habitat usage of juvenile salmon in the Fraser River estuary.[13]

The foundation has conducted extensive research on the Fraser River estuary's habitats, emphasizing estuaries' critical role in supporting fish populations.[32] This research has been used to inform conservation strategies to preserve biodiversity in this heavily urbanized yet biodiverse region.[33]

One of the significant contributions of the Raincoast Conservation Foundation is the development of a Conservation Prospectus for the Fraser River Estuary. This document is designed to guide decision-making across various organizations, promoting investment in the conservation and recovery of at-risk species in the estuary.[2,34]

The foundation has also proactively addressed infrastructure faults that impact the Fraser River estuary. For instance, they have been involved in efforts to modify structures that alter the flow of water, thereby improving conditions for salmon migration.[35]

In addition to their research and conservation initiatives, the Raincoast Conservation Foundation has also been involved in funding efforts for Lower Fraser salmon, outlining a path for more sustainable and coordinated funding for this critical species.[36]

In conclusion, the Raincoast Conservation Foundation's work in the Fraser Estuary and Richmond exemplifies successful conservation messaging. Their research-driven approach, efforts to correct past infrastructure faults, and focus on sustainable funding have significantly contributed to the conservation of this biodiverse region.

Visuals & Multimedia Approach - The Documentary: “The Soul of The Fraser”

The documentary "The Soul of the Fraser" is a successful example of conservation messaging in the Fraser Estuary and Richmond. Produced by NERV Productions, this local documentary takes viewers on a journey through the Fraser Estuary.[37] The film explores the original river delta beneath the urban sprawl of Vancouver, showcasing the unique interplay of the ocean's saltwater and the river's freshwater in this critical intertidal habitat.[38,39]

The documentary features a diverse cast, including a former government fisheries biologist turned activist and a boat captain, and representation from the Musqueam Indian Band[40], among

others. This approach helps to present a comprehensive view of the Fraser Estuary's ecological importance from various perspectives.[37]

The film's conservation message is further amplified by its storytelling approach. It highlights the Fraser Estuary's rich biodiversity and the environmental challenges it faces due to urban development and other human activities. Doing so raises awareness about the need for conservation efforts in this region.

In conclusion, "The Soul of the Fraser" is a compelling case study of effective conservation messaging. Its vivid portrayal of the Fraser Estuary's natural beauty and ecological importance encourages viewers to value and protect this unique environment.

Campaign – Sturgeon Bank Sediment Enhancement Project

The Sturgeon Bank Sediment Enhancement Pilot Project, in collaboration with Ducks Unlimited, is a successful example of conservation messaging in the Fraser Estuary and Richmond. This innovative project is designed to deliver new sediments to the Fraser River estuary foreshore, restore tidal marsh fish habitat and build marsh resilience to keep pace with rising seas.[41]

The project employs a sizeable temporary sediment delivery pipeline to distribute recycled sediment to key areas on Sturgeon Bank. This approach not only addresses large-scale tidal marsh loss but also tests and evaluates a local, customized approach to this environmental challenge. Each year, approximately 1.6 million cubic meters of sediment are delivered to the estuary, contributing to the restoration of this vital habitat.[41]

The project's success is not only measured in terms of habitat restoration but also in its potential to improve the capacity of tidal marshes along Sturgeon Bank to act as a buffer against sea-level rise and flooding. This dual benefit underscores the project's importance in both ecological conservation and climate change adaptation.[42,43]

In conclusion, the Sturgeon Bank Sediment Enhancement Pilot Project exemplifies successful conservation messaging in the Fraser Estuary and Richmond. These initiatives highlight the importance of local, innovative solutions in addressing environmental challenges and promoting sustainable practices.

Policy - Fraser River Estuary Management Plan (FREMP) (when it was in effect)

The Fraser River Estuary Management Program (FREMP) serves as a successful example of conservation messaging in the Fraser Estuary and Richmond. Established as an intergovernmental partnership among federal, provincial, and regional governments and port

authorities, FREMP provided a coordinated approach to decision-making on environmental conservation and development in the estuary.[6,12]

The primary goal of FREMP was to develop a management plan that recognized the importance of the estuary for both human activities, such as urban-industrial and port operations, and ecological conservation.[14] The program was innovative in its approach to estuarine governance, fostering collaboration among various stakeholders to ensure the sustainability of the Fraser River Estuary.[44]

FREMP's initiatives led to significant improvements in the Fraser River's water quality, particularly after wastewater treatment plants were upgraded in 1998. This improvement had a direct positive impact on the Richmond area, enhancing the quality of drinking water and the overall health of the local ecosystem.[45]

Despite its eventual discontinuation, FREMP's legacy continues to influence current conservation efforts in the Fraser River Estuary. The program's approach to integrated resource management and its focus on biodiversity conservation have set a precedent for subsequent environmental initiatives in the region.[46]

In conclusion, the Fraser River Estuary Management Program (FREMP) stands as a successful case study of conservation messaging in the Fraser Estuary and Richmond. Its coordinated, multi-stakeholder approach to environmental management and its tangible impacts on water quality and biodiversity conservation underscores its success and enduring influence.

Campaign Survey Tool – Let's Talk Richmond

The Let's Talk Richmond Campaign survey tool is a practical example of conservation messaging in Fraser Estuary and Richmond. This online platform allows the city's residents to learn about and contribute to various projects to advance the city's sustainability strategies, community, culture, safety, and more.[47]

The survey tool is designed to gather public feedback on various strategic initiatives. For instance, the Draft Youth Strategy and Draft Strategic Priorities were open for public review and feedback through the survey tool. This inclusive approach ensures that the community's voice is heard and considered in the city's strategic planning processes.[47]

In addition to strategic planning, the survey tool has been used to gather information on community attitudes and activities around wildlife and nature. This data is crucial for understanding the community's knowledge of local wildlife and their use of parks and other natural spaces.[48]

The Community Gardens in Richmond project also utilized the Let's Talk Richmond Campaign survey tool. The tool was used to gather community feedback, demonstrating its effectiveness in engaging the public in sustainability initiatives.[49]

In conclusion, the Let's Talk Richmond Campaign survey tool has been a successful instrument for conservation messaging in Fraser Estuary and Richmond. By facilitating public engagement and feedback, the tool ensures that the community is actively involved in the city's sustainability and conservation efforts.

Citizen Science - City Nature Challenge

The City Nature Challenge serves as a successful example of conservation messaging in Fraser Estuary and Richmond. This global citizen science initiative encourages individuals to explore their local environment and document the biodiversity they encounter.[50]

In 2023, the City Nature Challenge was embraced by the community of Surrey, BC, which is located near Fraser Estuary and Richmond. The event was seen as an opportunity to contribute to the city's Biodiversity Conservation efforts and was eagerly anticipated for the following year.[51]

The Fraser River Delta, which includes the Fraser Estuary and is part of Metro Vancouver, is recognized as one of the best places in British Columbia to observe wildlife. This makes it an ideal location for the City Nature Challenge, which encourages participants to document local wildlife and contribute to citizen science.[52]

The City Nature Challenge aligns with the City of Richmond's commitment to environmental protection and natural resource conservation, as evidenced by its implementation of various waste prevention and recycling programs since 1990.[49]

The City Nature Challenge also complements the work of Ducks Unlimited Canada (DUC) in the Fraser River Estuary. DUC is dedicated to conserving, protecting, and managing wetlands, which are vital habitats for a diverse range of species.[5]

In conclusion, the City Nature Challenge is a successful example of conservation messaging in Fraser Estuary and Richmond. By engaging the public in citizen science, the initiative fosters a greater appreciation for local biodiversity and encourages active participation in conservation efforts.

Stewardship – Priority Threat Management (PTM)

The Priority Threat Management (PTM) framework has been successfully applied in the Fraser Estuary and Richmond as a conservation messaging tool. This approach identifies strategies

necessary to save species at risk of extinction and has been instrumental in the conservation efforts in these regions.[53]

In 2021, a paper by 23 prominent B.C. conservation specialists outlined the PTM plan to save the Fraser River Estuary, one of the most important ecological areas in the region.[54] The study emphasized that biodiversity conservation in heavily urbanized areas, such as Fraser Estuary and Richmond, is achievable with strategic planning.[34]

The Fraser River Estuary Management Program (FREMP) was a successful initiative to overcome the disjointed and inadequate protection of the Fraser River estuary.[6] The PTM approach aligns with the goals of FREMP, focusing on improving habitat inventory and classification systems using an "ecological features and functions approach".[12]

The PTM framework is currently being used to identify the management actions required to reduce key threats to the Fraser River Estuary, further demonstrating its effectiveness as a conservation tool.[55]

In Richmond, the Ecological Network Management Strategy shows the varying jurisdictional ownership over ecological assets, including Environmentally Sensitive Areas, riparian management areas, and more.[33] The PTM approach can be integrated into this strategy to prioritize conservation efforts.

In conclusion, the Priority Threat Management framework serves as a successful example of conservation messaging in Fraser Estuary and Richmond. Identifying key threats and prioritizing management strategies provides a clear and effective approach to biodiversity conservation in these heavily urbanized and biodiverse regions.

Unsuccessful Examples

Opposition to the Roberts Bank Terminal 2 (RBT2) Project

The Roberts Bank Terminal 2 (RBT2) project in the Fraser Estuary has been a topic of significant debate and concern, particularly in relation to its potential impact on biodiversity. The project's opposition has faced challenges in effectively conveying its message to a broader audience, leading to limited success in achieving its desired outcomes.

The Fraser Estuary is recognized for its ecological significance, particularly as a critical area for wildlife and biodiversity. It serves as an essential stopover for migratory birds on the Pacific Flyway.[56] However, the proposed RBT2 project has raised concerns about potential adverse effects on the environment. These concerns include increased pollution, underwater noise, and potential impacts on fish and marine life.[57]

While the opposition to the RBT2 project has emphasized the potential negative impacts on biodiversity, it is essential to recognize the broader context. The project is seen by some as a means to boost economic growth and job creation. This perspective was highlighted in a press conference, which underscored the government's rationale for prioritizing economic benefits over potential environmental costs.[58]

The challenge lies in balancing the trade-offs between biodiversity conservation and economic or other social development. While coastal systems like the Fraser Estuary hold significance for a segment of the Canadian population, the broader narrative needs to resonate with a more extensive audience. The messaging should emphasize the interconnectedness of ecosystems. Additionally, it should highlight the potential long-term consequences of compromising biodiversity for short-term economic gains. Alternative solutions should also be presented to address these concerns.

It is also worth noting that while the federal government has given its approval for the project, the debate is far from over. Various conservation groups have legally challenged the decision, citing significant potential adverse effects on endangered species and ecosystems.[59] Additionally, there has been an Open Letter from the First Nations against RBT2, further emphasizing the widespread concerns related to the project.[60]

In conclusion, the opposition to the Roberts Bank Terminal 2 project underscores the complexities of balancing biodiversity conservation with economic development. While the desired outcomes have not yet been achieved, the ongoing efforts reflect a broader societal

debate about the values we prioritize and the future we envision for the Fraser Estuary and beyond.

Terminated Fraser River Estuary Management Program (FREMP)

The Fraser River Estuary Management Program (FREMP) was a significant collaborative initiative that involved multiple partners, such as Environment Canada, Fisheries and Oceans Canada, the Greater Vancouver Regional District, and the BC government. Its primary objective was to manage the resources and environment of the Fraser River Estuary. However, the program was terminated during the Harper's administration, which led to concerns about the conservation efforts in the region.[6]

The termination of FREMP has been viewed by some as an example of unsuccessful conservation messaging in the Fraser Estuary and Richmond. The decision to end this program, which was a collaborative environmental management initiative, has raised questions about the commitment to conservation and sustainable development in the area. Since the discontinuation of FREMP, there have been calls for its revival, with many expressing the need for a new program of a similar nature to address the environmental challenges in the Fraser River Estuary. However, as of now, there have been no steps taken by the current government to reinstate FREMP or introduce a comparable program.[6]

In conclusion, the discontinuation of the Fraser River Estuary Management Program serves as a reminder of the importance of collaborative efforts in conservation and the potential consequences when such initiatives are halted.

Other Examples

Several conservation efforts have encountered challenges in the Fraser Estuary due to ineffective messaging and lack of prioritization. One such issue is the management of invasive species. Despite identifying these species, our strategies, such as pesticide use and trapping, have inadvertently led to ecosystem pollution and trophic level disruption. Moreover, attempts to eradicate species like the Himalayan blackberry have proven counterproductive, with the plant regrowing even denser the following year.[61]

Another concern is the encroachment of invasive species into our remaining bog habitats. These issues persist largely because decision-makers and staff often lack formal education in Conservation Biology. Consequently, conservation is not prioritized, leading to ineffective strategies and outcomes.

Engaging the local Asian population, which comprises a significant portion of the Fraser Estuary community, has also been challenging. Successful conservation efforts require positive, engaging, and satisfying group initiatives with clear, achievable goals that foster community celebration and involvement.

Large industrial projects like pipelines and the Roberts Bank Terminal often overshadow conservation efforts. The Impact Assessment process tends to frame these politically charged decisions as technical issues, providing cover for politicians and diverting attention from conservation concerns. This institutional strategy needs to be considered in conservation communication efforts.

The threats to biodiversity in the Fraser Estuary are more due to a lack of awareness or consideration of biodiversity impacts than ineffective conservation messaging. Infrastructure projects, such as diking, draining, farming, and road building, have dramatically altered and destroyed locally adapted organisms' habitats. Many project planners were likely unaware of the biodiversity impacts or chose to ignore them.

The regional loss of biodiversity, unbalanced nutrient flows, changing seawater pH, increasing plastic waste, nutrient contamination of groundwater and surface waters, excessive regional livestock populations, loss of wetlands, and decline of fish stocks all indicate failures in conservation messaging.[6] Despite awareness of these issues, conservationists have struggled to raise sufficient concern among decision-makers or the public to reverse these trends. In some cases, conservation messaging has even alienated the public or decision-makers.

Despite organized opposition and media attention, projects such as the tank farm and aviation fuel line have proceeded. This highlights the need for more effective conservation messaging and strategies to protect the Fraser Estuary's biodiversity and ecosystems.

Conclusion

In the face of increasing environmental challenges and the need for sustainable management of natural resources, the Fraser Estuary has emerged as a critical area of focus. The estuary is a vibrant ecosystem that supports diverse species, including migratory birds and Pacific Salmon and provides essential ecosystem services.[53] Furthermore, the Fraser Estuary holds deep cultural and historical significance. First Nations have lived in the Fraser River basin for over 10,000 years, relying on the river for its abundant resources.[62] The fertile delta of the estuary has been recognized and utilized as farmland since early settlement, and its importance to the First Nations cannot be overstated; serving as a bridge between nations and a source of life that has always connected First Nations to the land.[63,64]

The Conservation Messaging Handbook for the Fraser Estuary provides a comprehensive framework for managing threats to biodiversity and ecosystem services in the region. It emphasizes the importance of collaboration with stakeholders and using evidence-based strategies to guide decision-making processes. The handbook serves as a tool for securing ongoing funds for conservation efforts and for fostering a shared vision for the future of the estuary among key stakeholders.[3,6]

References

1. Galloway L. Strategic Directions for Biodiversity Conservation in the Metro Vancouver Region. Published online 2008.

2. Raincoast. A Conservation Prospectus for the Fraser River Estuary. Raincoast Conservation Foundation. Accessed July 12, 2023. https://www.raincoast.org/reports/conservation-prospectus/

3. UBC Strategic Plan. Protecting biodiversity, culture, and ecosystem services in the Fraser River Estuary. People and Places | Strategy 3: ThrivingCommunities. Published August 26, 2022. Accessed July 12, 2023. https://strategicplan.ubc.ca/protecting-biodiversity-culture-and-ecosystem-services-in-the-fraser-river-estuary/

4. Government of Delta. *Delta's Birds and Biodiversity Conservation Strategy*.; 2018. https://www.delta.ca/sites/default/files/2021-06/Delta%27s%20Birds%20and%20Biodiversity%20Conservation%20Strategy%20CAE.pdf

5. Ducks Unlimited Canada. Bringing conservation to life in the Fraser River Estuary. British Columbia | Projects & Initiatives. Accessed July 12, 2023. https://www.ducks.ca/places/british-columbia/fraser-river-estuary/

6. Langer O. History and Outcomes of the Fraser River Estuary Management Program (FREMP) and the Burrard Inlet Environmental Action Plan (BIEAP). Published online 2019.

7. Noar SM. A 10-Year Retrospective of Research in Health Mass Media Campaigns: Where Do We Go From Here? *J Health Commun*. 2006;11(1):21-42. doi:10.1080/10810730500461059

8. Kidd LR, Garrard GE, Bekessy SA, et al. Messaging matters: A systematic review of the conservation messaging literature. *Biol Conserv*. 2019;236:92-99. doi:10.1016/j.biocon.2019.05.020

9. Parks Canada Agency G of C. Principles and Guidelines for Ecological Restoration - Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas. Published November 21, 2022. Accessed July 25, 2023. https://parks.canada.ca/nature/science/conservation/ie-ei/re-er/pag-pel

10. Schneider RR. *Biodiversity Conservation in Canada: From Theory to Practice*. University of Alberta Library; 2023. doi:10.29173/oer36

11. Xiao Y, Watson M. Guidance on Conducting a Systematic Literature Review. *J Plan Educ Res*. 2019;39(1):93-112. doi:10.1177/0739456X17723971

12. World Wildlife Fund. *Living Planet Report 2022*. World Wildlife Fund; 2022. Accessed May 25, 2023. https://livingplanet.panda.org/

13. Raincoast. Fraser Estuary Research. Raincoast Conservation Foundation. Accessed July 25, 2023. https://www.raincoast.org/fraser-river-estuary-project/

14. Government of Canada. *Fraser River Estuary Study: Summary*.; 2005.

15. Reid M, Collins ML, Hall SRJ, Mason E, McGee G, Frid A. Protecting our coast for everyone's future: Indigenous and scientific knowledge support marine spatial protections proposed by Central Coast First Nations in Pacific Canada. *People Nat*. 2022;4(5):1052-1070. doi:10.1002/pan3.10380

16. Veríssimo D, Vieira S, Monteiro D, Hancock J, Nuno A. Audience research as a cornerstone of demand management interventions for illegal wildlife products: Demarketing sea turtle meat and eggs. *Conserv Sci Pract*. 2020;2(3):e164. doi:10.1111/csp2.164

17. Hine DW, Reser JP, Morrison M, Phillips WJ, Nunn P, Cooksey R. Audience segmentation and climate change communication: conceptual and methodological considerations. *WIREs Clim Change*. 2014;5(4):441-459. doi:10.1002/wcc.279

18. Jacobson SK, McDuff MD, Monroe MC. Designing successful conservation education and outreach. In: Jacobson SK, McDuff MD, Monroe MC, eds. *Conservation Education and Outreach Techniques*. Oxford University Press; 2006:0. doi:10.1093/acprof:oso/9780198567714.003.0002

19. Government of British Columbia. *A Coastal Marine Strategy for British Columbia*.; 2022.

20. Government of Canada. *Community Stewardship: A Guide To Establish Your Own Group*. Fraser Barin Management Program; 1995.

21. Wuerthner G, Crist E, Butler T. *Protecting the Wild*.; 2015. Accessed July 25, 2023. https://islandpress.org/books/protecting-wild

22. Hockings M, Stolton S, Leverington F. *Evaluating Effectiveness : A Framework for Assessing Management Effectiveness of Protected Areas, 2nd Edition*. 2nd ed. IUCN, International Union for Conservation of Nature; 2006. doi:10.2305/IUCN.CH.2006.PAG.14.en

23. Nagarajan RP, Bedwell M, Holmes AE, et al. Environmental DNA Methods for Ecological Monitoring and Biodiversity Assessment in Estuaries. *Estuaries Coasts*. 2022;45(7):2254-2273. doi:10.1007/s12237-022-01080-y

24. Ontario Biodiversity Council. *Communicating Biodiversity & Climate Change: A Guide for Crafting Effective Messaging*.; 2017. https://ontariobiodiversitycouncil.ca/wp-content/uploads/Biodiversity-and-ClimateChange-August2017.pdf

25. Kusmanoff AM, Fidler F, Gordon A, Garrard GE, Bekessy SA. Five lessons to guide more effective biodiversity conservation message framing. *Conserv Biol*. 2020;34(5):1131-1141. doi:10.1111/cobi.13482

26. Kolandai-Matchett K, Armoudian M. Message framing strategies for effective marine conservation communication. *Aquat Conserv Mar Freshw Ecosyst*. 2020;30(12):2441-2463. doi:10.1002/aqc.3349

27. Buxton RT, Bennett JR, Reid AJ, et al. Key information needs to move from knowledge to action for biodiversity conservation in Canada. *Biol Conserv*. 2021;256:108983. doi:10.1016/j.biocon.2021.108983

28. Dale A, Clifton-Ross J, Jost F, Hodson J, Leighton H, Bernard M. Communicating environmental research: Harnessing the power of curation. *Community Engagem Scholarsh JournalCommunity Engagem Scholarsh*. 2021;13:77-95. doi:10/gr88r2

29. Garden City Conservation Society. Accessed July 31, 2023. https://gardencitylands.ca/GCCS/

30. Facebook. Garden City Conservation Society- Richmond BC. Accessed July 31, 2023. https://www.facebook.com/profile.php?id=100064711355275

31. Richmond News. Students create “pocket forest.” Published April 21, 2022. Accessed July 31, 2023. https://issuu.com/richmond-news/docs/rmdthu20220421

32. Raincoast. How new research on habitats within the Fraser River estuary implicates conservation strategy. Raincoast Conservation Foundation. Published September 17, 2019. Accessed July 31, 2023. https://www.raincoast.org/2019/09/how-new-research-on-habitats-within-the-fraser-river-estuary-implicates-conservation-strategy/

33. Raincoast. Research: Conservation in heavily urbanized biodiverse regions requires urgent management action and attention to governance. Raincoast Conservation Foundation. Published December 15, 2020. Accessed July 12, 2023. https://www.raincoast.org/2020/12/research-conservation-urbanized-biodiverse-regions-requires-urgent-management-governance/

34. Kehoe LJ, Lund J, Chalifour L, et al. Conservation in heavily urbanized biodiverse regions requires urgent management action and attention to governance. *Conserv Sci Pract*. 2021;3(2):e310. doi:10.1111/csp2.310

35. Raincoast. The Fraser River estuary is fragmented by structures that alter the flow of water. Raincoast Conservation Foundation. Published June 22, 2019. Accessed July 31, 2023. https://www.raincoast.org/2019/06/the-fraser-river-estuary-is-fragmented-by-structures-that-alter-the-flow-of-water/

36. Raincoast. Funding landscape report. Raincoast Conservation Foundation. Accessed July 31, 2023. https://www.raincoast.org/reports/funding-landscape/

37. Nature Vancouver. The Soul of the Fraser – A Documentary. Published July 18, 2022. Accessed July 31, 2023. https://naturevancouver.ca/the-soul-of-the-fraser-a-documentary/

38. BCIT. Soul of the Fraser. Published October 29, 2021. Accessed July 31, 2023. https://www.bcit.ca/rivers-institute/initiatives/soul-of-the-fraser/

39. NERV Productions. The Soul of the Fraser. NERV Productions. Accessed July 31, 2023. https://www.nervproductions.com/soul-of-the-fraser

40. Musqueam Indian Band. Musqueam Community Newsletter. Published November 19, 2021. https://www.musqueam.bc.ca/wp-content/uploads/2021/11/MusqueamNewsletter-11-19-2021.pdf

41. Ducks Unlimited Canada. Sturgeon Bank Sediment Enhancement Pilot Project. Accessed July 31, 2023. https://www.ducks.ca/places/british-columbia/sturgeon-bank-pilot-project/

42. Maxwell L. *2020-070 Vision For A Restored Lower Fraser*. UBC Sustainability Hub; 2020. https://sustain.ubc.ca/sites/default/files/2020-070_Vision%20For%20A%20Restored%20Lower%20Fraser_Maxwell.pdf

43. The Runner. The Runner | Sturgeon Bank project aims to restore ecosystems and prevent flooding. Published May 12, 2021. Accessed July 31, 2023. https://runnermag.ca/2021/05/sturgeon-bank-project-aims-to-restore-ecosystems-and-prevent-flooding/

44. Dorcey AH. Evolution of estuarine governance in a metropolitan region: Collaborating for sustainability in the Fraser River estuary. *Bull Geol Surv Can*. 2004;567:247-263.

45. Innes R. City of Richmond State of the Environment 2001 Update Report December 200. Published online 2001.

46. Brown G. *Biodiversity Conservation in Metro Vancouver Region: Forum Proceedings - Key Points and Potential Action Steps*. Burrard Inlet Environmental Action Program, Fraser River Estuary Management Program; 2010. http://www.sccp.ca/sites/default/files/species-habitat/documents/Regional%20Biodiversity%20Conservation%20Forum%20Proceedings_0.pdf

47. Lets Talk Richmond. Lets Talk Richmond. Accessed July 31, 2023. https://letstalkrichmond.ca.engagementhq.com//projects

48. Love L. Knowledge, attitudes and activities around wildlife and nature A case study of Richmond, BC.

49. City of Richmond. *Sustainability Progress Report - 2015-2020.*; 2014. https://www.richmond.ca/__shared/assets/sustainabilityprogress59212.pdf

50. iNaturalist. City Nature Challenge 2023: Surrey BC. iNaturalist. Accessed July 31, 2023. https://www.inaturalist.org/projects/city-nature-challenge-2023-surrey-bc/journal

51. Palma E, Mata L, Cohen K, et al. The City Nature Challenge-A global citizen science phenomenon contributing to biodiversity knowledge and informing local government practices. *bioRxiv*. Published online 2022:2022-11.

52. Casey J. Nature Notes: City Nature Challenge across the Fraser Delta. Delta Optimist. Published April 27, 2022. Accessed July 31, 2023. https://www.delta-optimist.com/in-the-community/nature-notes-city-nature-challenge-across-the-fraser-delta-5298147

53. Martin Conservation Decisions Lab. Fraser River Estuary. Martin Conservation Decisions Lab. Accessed July 31, 2023. https://www.taramartin.org/research/fraser-river-estuary-priority-threat-management/

54. Ducks Unlimited Canada. Saving The Fraser River Estuary: A Priority. Ducks Unlimited Canada. Accessed July 31, 2023. https://www.ducks.ca/stories/pacific-coast/saving-the-fraser-river-estuary-a-priority/

55. Modular Ocean Research Infrastructure. Prioritizing threat management strategies to ensure long-term resilience of the Fraser River Estuary. MEOPAR. Published January 10, 2021. Accessed July 31, 2023. https://meopar.ca/prioritizing-threat-management-strategies-to-ensure-long-term-resilience-of-the-fraser-river-estuary/

56. Against Port Expansion in the Fraser Estuary, BC. Against Port Expansion in the Fraser Estuary, BC- News. https://www.againstportexpansion.org/news

57. West Coast Environmental Law. What's next for the Fraser Estuary after the Roberts Bank Terminal 2 decision? Published July 19, 2023. Accessed August 12, 2023. https://www.wcel.org/blog/whats-next-fraser-estuary-after-roberts-bank-terminal-2-decision

58. Wilderness Committee. Conservation groups legally challenge federal decision to approve Roberts Bank Terminal 2 Project. Published June 14, 2023. Accessed July 31, 2023. https://www.wildernesscommittee.org/news/conservation-groups-legally-challenge-federal-decision-approve-roberts-bank-terminal-2-project

59. Attia Y. Federal Government fails to protect birds and biodiversity in Fraser River Delta with approval of Roberts Bank Terminal 2. Birds Canada | Oiseaux Canada. Published April 21, 2023. Accessed August 12, 2023. https://www.birdscanada.org/federal-government-fails-to-protect-birds-and-biodiversity-with-rbt2

60. Union of BC Indian Chiefs. Open Letter: Roberts Bank Terminal 2 Development Approval Disregards Cumulative Impacts and First Nations Title and Rights. UBCIC. Accessed August 10, 2023. https://www.ubcic.bc.ca/ol_roberts_bank_terminal_2_development_approval

61. Patterson L. Shoring up the resilience of key habitats in B.C.'s Fraser River Estuary. Ducks Unlimited Canada. Published June 23, 2022. Accessed July 31, 2023. https://www.ducks.ca/stories/conservator/fraser-river-estuary-resilience/

62. Robinson JL, Newton B. Fraser River. The Canadian Encyclopedia. Published January 31, 2017. Accessed August 10, 2023. https://www.thecanadianencyclopedia.ca/en/article/fraser-river

63. Environment Canada. *The Wetlandkeepers Handbook: A Practical Guide to Wetland Care*.; 1996.

64. Fraser Basin Council. Bridge Between Nations: A History of First Nations in the Fraser River Basin. https://www.fraserbasin.bc.ca/_Library/Ab_NonAb_Relations/bridge_between_nations.pdf