Science Communication:

Southshore Spit as a Dynamic Interface

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Executive Summary

This project, working with Justin Cope from Environment Canterbury and Deidre Hart from the University of Canterbury, researches some of the processes and systems which make up the Southshore Spit, a dynamic coastal interface sitting on the South Islands east coast in Christchurch. The research investigates both the natural influences on the system and the anthropogenic and using science communication to provide the community with information on these, improving awareness and resilience. This project aims to use short form content to positively and effectively communicate coastal processes to residents and the wider Christchurch community.

We were tasked by our community partners to make our videos digestible to the public so, as a group we brainstormed a series of video ideas and produced the final four of: dune processes, vegetation and ecology, sediment budget and management and the historical and social significance of the spit. From these ideas we storyboarded the scripts and camera shots, ensuring simple and effective language was used, acquired DSLR cameras and drone footage, and filmed. Then, using Final Cut Pro and feedback from our peers and community partners, we edited and changed the videos to create the final products.

We found that short-form content was effective at communicating science in both an accessible and engaging way. This was discovered from the reviews of our peers following our presentation and from sharing them to high school students at the Youth Innovation Hub at the Adaptation Futures 2025 conference. Simple language and captivating imagery kept the attention of viewers whilst conveying important information.

We reviewed that dune formation and stability are closely associated with the presence of vegetation, Sloss et al. (2012) & Silva et al. (2016), and that the Southshore Spit is supplied sediment from the Waimakariri River from a process called longshore drift, Hicks et al. (2018). Further review found that vegetation also plays a key role in coastal protection, Feagin et al. (2010) & van Puijenbroek et al. (2017) and highlights the cultural and historical significance of the spit to Māori, Ngāi Tahu & Ngā Rūnanga o Waitaha (2013). Carass (2021), Rugrien (2023) & Prindle et al. (2024) found that short-form content is both preferred and helpful for communicating information and engaging the viewers.

Limitations of this research included the inability to communicate more in-depth information due to the lack of time in videos and the difficulty of getting our content to reach older demographics who tend to be less online. Further research should focus on sound design improvements, longer-form content development to further develop ideas and additional short form videos to better portray the various aspects that make up the spit.

Introduction

The purpose of this research project was to explore the coastal environment of Southshore Spit and to help residents understand how coastal processes impact their local environment. Through short-form videos, we aimed to capture a target audience of the residents considering ECAN's New Brighton Hazard Adaptation Plan. The overarching theme of this project is "Southshore Spit as a dynamic interface." This topic holds particular significance because South shore Spit is characterised by constant physical transformation driven both by natural processes and human influences. Processes such as erosion, vegetation change, and climate change continuously reshape the coastline, influencing ecological and coastal systems. Understanding these processes is essential for effective coastal management and for fostering resilience among local communities. By illustrating these interactions, this project contributes to a deeper appreciation of Southshore Spit's dynamic nature and in turn helps in creating communities resilient to change.

Southshore Spit is located on the eastern end of Pegasus Bay, which encircles Christchurch, New Zealand. This spit is a dynamic environment, bordered by both the Avon-Heathcote Estuary and the open ocean coast. According to Comfort (1995), since 1972, the number of houses and population along South Brighton Spit has doubled, becoming one of the most developed environments of its type. The population has increased from 650 (in 1972) to 3,390 in 2024 (Stats NZ). This makes it an important community to communicate coastal change with.

This report provides a detailed overview of our project, which investigates the environmental systems and processes that interact to shape Southshore Spit. The project examines the complex coastal processes influencing the area and considers how effective communication of these processes can contribute to building community awareness and resilience. By combining scientific research with visual communication methods, the project aims to make coastal science more accessible to residents and to enhance understanding of the natural changes continually occurring along the spit.

This report is organised into four main sections. The literature review analyses information across the key themes mentioned above. Through our literature review, we explored sediment budget, dune and estuary systems, ecology and vegetation, science communication, and cultural and social significance of Southshore Spit. This review allowed us to develop an understanding of Southshore as a dynamic environment shaped by constant interaction of coastal systems and processes. The methods section describes the process of selecting and developing the project theme, outlining the video ideas and filming them. The results and discussion section will show two completed videos (Figure 1), as well as the context behind the project, limitations, which included reaching our age demographic through the style of content, lack of depth from short videos, and constraints such as equipment and weather, and future research avenues.

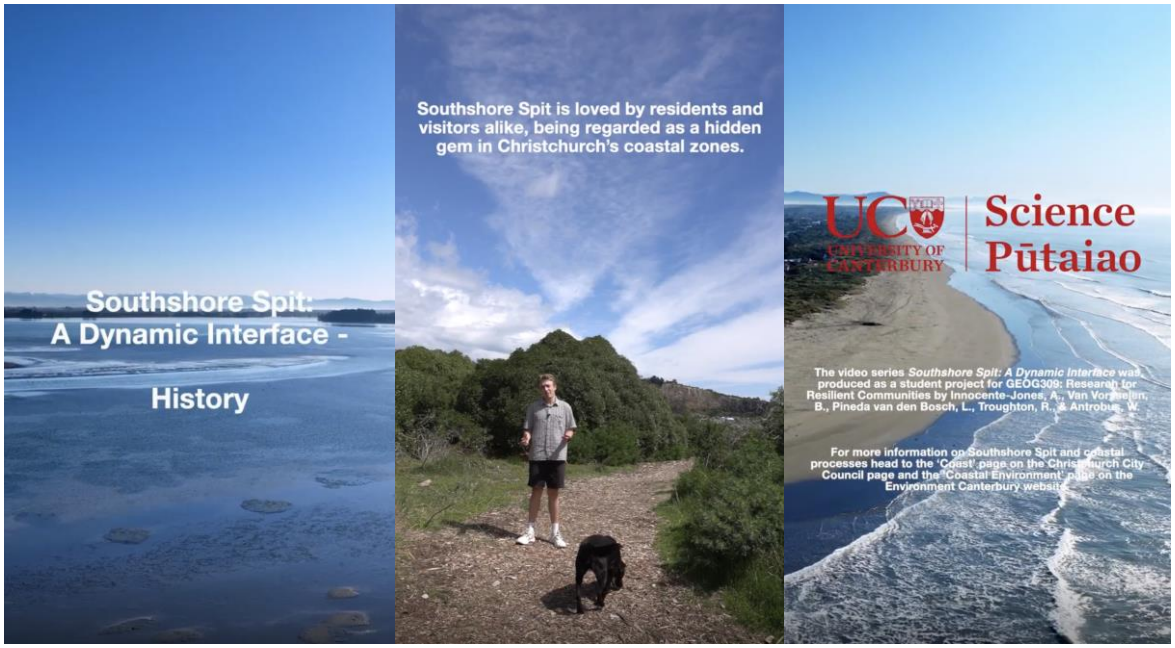

Figure 1: Image captures from "History video" a part of the video series located at Southshore Spit, New Brighton.

Literature review

Dune processes

Research by Sloss et al. (2012) shows differences in the formation of different dune types which are influenced by wind and vegetation processes. Primary dune formation is dictated largely by vegetation, preventing erosion and trapping sand. As they mature into foredunes, vegetation becomes denser and as a result, increases dune stability. Continuing inland, parabolic dunes are formed from 'blowouts,' a result of wind erosion, and flatter transgressive dunes migrate inland from aeolian processes. Adding detail to these processes, Silva et al. (2016) explored the relationship between vegetation and erosion from storms. Similarly to van Puijenbroek et al. (2017), they found that the denser the vegetation present, less sediment was lost during storm events. From experiments it was proven that dunes with the most vegetation cover experienced the lowest material losses and those with limited cover experienced the opposite. Although all dunes with varying vegetation cover, which encountered severe storm conditions faced similar amounts of erosion. This indicates that there is a limit to vegetations protective influence. Further research by van Puijenbroek et al. (2017) showed a critical threshold in dune formation. Beaches with a width less than 70m hardly showed embryonic dune development and vegetation was necessary for quicker formation. Vegetated dunes were found to grow an average of 0.42m per year compared to the 0.08m per year for unvegetated. Smaller storms were attributed to sediment contributions to dune systems where more intense ones caused severe erosion.

Sediment budget & management

The Waimakariri river is the main sediment source for Southshore spit. It discharges 745,000 cubic metres of sand each year, of which roughly a quarter travels south to nourish the city's beaches, including Southshore Spit, with just enough sand to keep the sediment budget in surplus. This builds up the spit at a rate that matches past and current sea level rise needs, along with other sand sinks, such as those needed when responding to storms and everyday processes (Hicks et al., 2018a).

In the future, climate change and human activities may alter sand delivery and storage, driving a 9% increase in sediment deposited from the Waimakariri river. Modelling suggests that Southshore Spit's sediment budget could remain in surplus overall until 2100 (Hicks et al., 2018b). However, this sediment budget modelling does not include sensitivity analyses. So, if the climate and sea level rise assumptions employed are slightly off, the outcome for Southshore spit could be different in ways we are yet to understand. This discourages complacency of the future of the Spit, especially given its dynamic nature. Additionally, this estimate is based on local averages over long timeframes and thus aren't representative of spatially and temporally small changes in shoreline position, such as those caused by storms.

Storminess is expected to increase in the future due to climate change, these events promote offshore sediment transport as increased runup takes sediment from the dune foot to the surf zone, creating bars and flattening the nearshore slope (Bertin et al., 2013). Berry, et al. (2013) suggested that managing and protecting dunes may be an effective way to protect coastal infrastructure from storms and erosion. As the dunes erode during these events, they can supply sediment to the rest of the beach system and then build the dune back up post-hazard. This way beach dynamics are maintained, but erosion from sea level rise is reduced.

Science communication

A master's thesis by Carass (2021) investigated how science communication can be tailored to improve community engagement in New Brighton. This paper critiqued current methods of communication used by local government and found a preference from residents for increased online and social media presence, alongside educational initiatives. Through interviews and surveys with residents, the author found that residents struggle with existing literature and how it overlooks cultural and social aspects as well as being hard to understand and get a hold of.

A study from Prindle et al. (2024) showed that shortform videos are an effective medium for increasing public engagement with STEM, especially among younger and more diverse audiences. The authors of this paper describe ways of making videos in a way to boost performance, including beginning videos with an engaging prompt or hook.

Rugrien (2023) explored the growing prominence of shortform and longform video content across major social media platforms such as TikTok, YouTube, Instagram, and Facebook. They analysed the characteristics of both shortform and longform formats and their differences, as well as identifying factors that influence their success. This author used a mixed-methods approach on video trends and found out that shortform videos are increasingly popular among younger audiences who favour conciseness, entertainment value, and shareability, and found

that short videos thrive on general-interest pages. However, the author did state that older audiences tend to navigate towards longform videos that have depth, storytelling, and production quality, but suggested that shortform videos can be as effective as longform if the videos have effective storytelling and engaging content.

Vegetation of Dune and Estuary Systems

Southshore Spit has rich ecological value, through being close to the coast for primary productivity and history of Mahinga Kai resource this environment has high nutrients and successful vegetation growth. The literature papers reviewed within the topic of coastal vegetation in dune and estuary systems highlight the importance of three aspects those being ecological, social, management.

Estcourt (1967) examines the distribution of species in an estuary environment regarding salinity, sediment size, and exposure to harsh conditions. This study provides significant insight into understanding estuarine ecology within a local New Zealand context. Feagin et al. (2010) reviews the use of coastal vegetation as a bio shield against natural disasters. With a focus on political and management frameworks. Highlighting the importance for sustainable management of coastal ecosystems and vegetation. Something which could be considered in a Southshore Spit context. Similarly, *A global greening* (Jackson et al., 2019) talks about the pioneer species such as pīngao and spinifex which cover dune systems as well as the implications erosion and wave action has on the resilience of vegetation species. Ogden et al. (2006) examines how human activities such as settlement have negatively impacted the ecosystem. Vegetation remains resilient but how can conservation management focus on restoration when looking into the future. Finally, a study by Orchard & Schiel (2021) focuses on how to integrate natural hazard management with ecosystem adaptation strategies. Specifically with local dune conservation and what vegetation recovery looks like.

Collectively, these academic papers emphasize the importance of vegetation on dune and estuary ecosystems. As well as introducing important aspects of political contexts and conservation management. In Southshore Spit, various vegetation species support form and function of coastal features, which are being threatened when looking forward to the future. Overall, this brings about awareness for residents at Southshore Spit about the various species present in their local environment.

History of Southshore Spit

Throughout the readings by Boyd (2010) and Ngāi Tāhu and Ngā Rūnanga o Waitaha (2013), there was a key theme present of the environment and sustainability of resources. These resources were why it was used by Māori as mahinga kai and more recently for recreation. The preservation and restoration of these resources would enable the Southshore Spit community to engage with each other and with the coastal environment. It also highlights that these resources have been threatened by anthropogenic causes such as discharging into the estuary, but they will be threatened more frequently by natural hazards in a changing climate.

Southshore Spit, while valued by its residents, is also appreciated by Christchurch as a city. Boyd (2010) found that the coastal environment supported recreational activities including walking, cycling, and wind/kite surfing. Additionally, the spit is home to bar-tailed godwits and has been classified as having international importance under the International Union for the Conservation of Nature (Boyd, 2010).

Key findings drawn from literature, relevant to the inhabited history of the spit, found that Southshore Spit has been of value to many communities past and present; this also highlights the value the spit will have in the future and the need to value its resources and dynamic nature. The literature from Boyd and Ngāi Tahu and Ngā Rūnanga o Waitaha, contributed to the design and drafting of a script and drove the message of valuing the spit, from a community viewpoint, throughout this video.

When reviewing literature within the history theme for Southshore Spit, our community partner expressed an interest in exploring the geomorphological history of the spit. Literature by Tessier et al. (2024), Qi et al. (2021), and Dan et al. (2011) are effective in outlining geomorphic processes that occur in spits located by river mouths and tidal areas. They are relevant as Southshore Spit encloses an estuary fed by two rivers; however, literature of New Zealand's spits focused on Kaitorete (Barrier) Spit and Farewell Spit. Further literature on the geomorphological history of Southshore Spit should be reviewed going forward.

Methods

To determine the video topics, each of our group members came up with a variety of potential video ideas, and when deciding on video ideas with our community partners, the following criteria were considered; which ideas reoccur in multiple of our lists, which ideas are important for the community to know and which ideas would be absorbed into another idea (for example, storms could be discussed in the dunes, and vegetation videos). Our final video topics are; coastal vegetation, dune processes, past and future sediment budget and the recreational value of the spit. We linked these ideas under the umbrella theme; Southshore Spit as a Dynamic Interface, which illudes to how the spit has, and will continue to constantly change and evolve overtime.

A review of relevant literature was then undertaken where literature was investigated regarding each video topics, as well as research into the effectiveness of short form videos for science communication. Key messages and processes were extracted from the literature, before being processed to form the video scripts. Once a draft was written, the scripts were sent to our community partners who assessed the accuracy of information in the context of Southshore Spit and provided feedback as suited. This process was crucial for us to meet our purpose of producing videos with accurate scientific information that told the full story of the spit.

During filming, we used DSLR cameras with a 2:3 aspect ratio to create an image of a suitable size for short form content sites. We filmed videos of our group member speaking using lapel microphones that wirelessly transmitted their sound to the camera, instantly overlaying that

sound with the camera's video. Additional shots were taken of physical features at the spit to connect the science with real life examples from the spit. For these shots, a DSLR camera attached to a gimble was used to stabilise the video and balance the camera during any dynamic shots. We were given access to drone footage taken by Christchurch City Council to use in our videos, along with taking our own drone footage with science technician Johnathon Davidson. This footage allowed us to show larger spatial features as well as how the spit is situated within its broader environment.

The same intro and outro were used for each video and our group member Will narrated all the videos, this helped to instantly signify to our audience that the videos are linked and could help to increase engagement across the entire series (Figure 2).

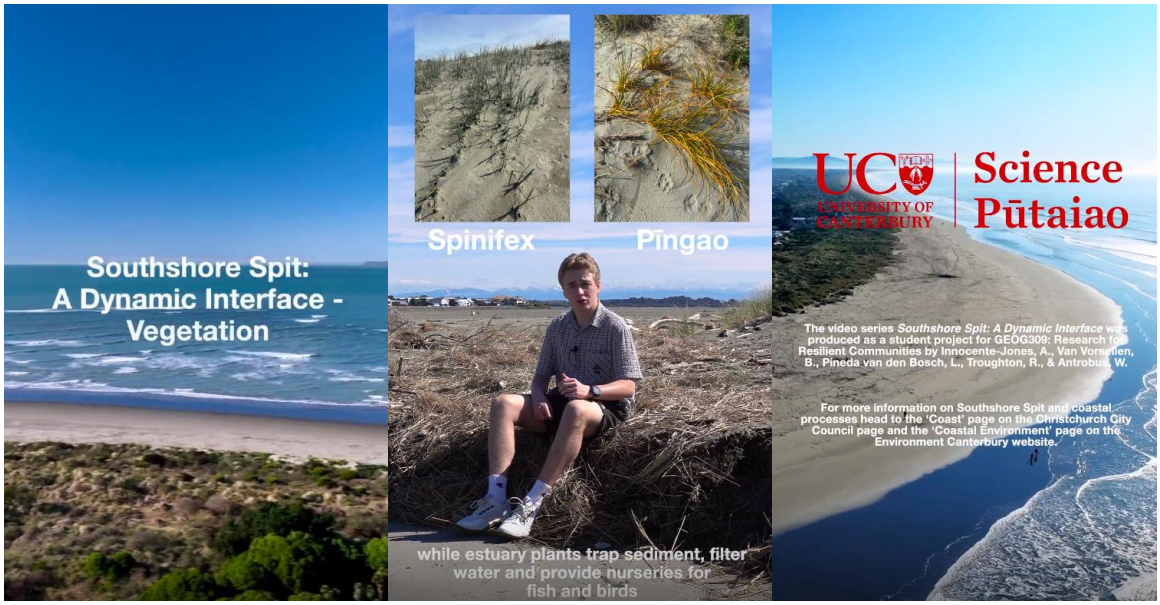

Figure 2. Snapshots of introduction, scientific content and final clip of the vegetation video

Our rationale for using short form videos is supported by Carass (2021) who investigated New Brighton residents' preferred method of science communication through an online questionnaire. New Brighton's community said they would prefer to receive science communication through either social media or education. This research supports our methods as our videos are made to be educational and easily understood, while also being uploaded to social media, thus achieving both preferred methods of communication.

Results

Four short-form videos were produced by drawing on key themes from the literature review which shaped the content and format of our science communication. The videos focus on coastal features of vegetation, dune processes, and the sediment budget of Southshore Spit. The fourth video covers the human history of Southshore Spit, with the aim of highlighting how

valuable the spit has been to communities from a social context. After primary filming, *Final Cut Pro* was used to edit the videos, which enabled us to adjust audio, add subtitles and logos, and insert relevant photographs. An initial review of the draft videos led to a reworking of the script to add sections which we thought would be appropriate in conveying our key themes. Secondary filming was then carried out to record these extra shots. The four videos are embedded below with the links taking the viewer to an unlisted YouTube Shorts video. In collaboration with UC Science, the videos are intended to be published on their social media channels.

The four videos are:

Vegetation

Dune Processes

Sediment Budget

History

With the videos being unlisted, and only being available by following the links attached, we aim to publish the videos formally through various social media channels. UC Science has expressed interest in publishing our videos via Instagram and other social platforms. The 'Vegetation' video was presented to Ōtautahi Christchurch high school students at the Youth Innovation Hub as part of the Adaptation Futures 2025 conference.

Discussion

The success of the video results can be analysed under characteristics of clarity and accessibility, relevance, emotional engagement and connection, platform suitability and audience reach, and overall effectiveness. In this discussion and reflection, we conclude that our research process developed beyond expectations. Through the refinement of our methodology and critically assessing our videos, we focused on creating impact through engagement and connection. So far, when we've presented our videos at the course conference or for friends and family, we've received great enthusiasm and engagement with our videos from the public and from staff at the University of Canterbury.

The effectiveness of our video as science communication can be refined into five areas:

- clarity and accessibility
- relevance
- emotional engagement and connection
- platform suitability and audience reach
- overall effectiveness summary

Clarity and accessibility can be defined as concise messages and topics that encourage involvement. Online media typically convey a message in less than one minute, an effective method of storytelling (Finkler & León., 2019). Our videos are 1 - 2 minutes long to capture the attention of viewers, as they are unlikely to watch a video longer than 2 minutes (León & Bourk., 2018). Therefore, the message we wanted to share needed to be concise and direct, avoiding technical jargon. As often scientific stories become complex and hard to understand (Finkler & León., 2019). We refined our videos to include key information in a conversational way.

Relevance is defined as the ability of the target audience to engage with video content and how it impacts their everyday lives. We targeted our videos to communicate specifically with the residents at Southshore Spit, with local scenes used in our videos to create recognition and relatability. For example, a regular dog walker would recognise the dunes we filmed, creating intimacy and relevance. Through using academically accurate information from our literature reviews, we aimed to positively inform viewers about environmental changes. Our videos also reduce eco-anxiety by providing information and practical solutions for the local community to use (Thoral et al., 2025).

Emotional engagement and connectedness refer to entertainment value. Science communication videos should include visually appealing and digestible information (León & Bourk., 2018). Visually engaging, short videos encourage connection and help focus behaviour on change (Finkler & León., 2019). Our aim was to connect emotionally with the community and share science communication in an accessible way.

Platform suitability and audience reach refer to the best way to deliver content. In 2017, 62% of internet users viewed online videos daily (León & Bourk., 2018). In 2025, this percentage is likely to have drastically increased; therefore, to capture our target audience, having our short-form videos online and accessible through the internet was the most effective and successful method. Posting on the University of Canterbury Science social media page was chosen for accessibility, with potential expansion to Facebook for increased community engagement. We also considered video-sharing platforms such as TikTok, which focus on “call to action” and emotive content; however, decided upon one successful platform for now (McCashin & Murphy., 2022).

Therefore, overall, as an effectiveness summary, our videos were very effective. Although we couldn’t quantify statistical reach, by following these key aspects of science communication: clarity and accessibility, relevance, emotional engagement and connection, platform suitability, and audience reach, we ensured a successful outcome.

Limitations

One limitation we recognised was reaching a certain age demographic. Residents of Southshore Spit include older people (beyond 65 yr) who likely struggle to access social media content; therefore, future work could focus on reaching this group through alternative communication methods. Another limitation was the lack of depth. We planned many video ideas, but due to limited resources, we created four short videos that we were most passionate about.

Furthermore, the videos we chose had to be simplified to ensure they remained concise, which meant scenes were cut; this restricted the content's academic depth. Future continuation of this project could cover other video ideas we brainstormed and find ways to expand the content for more comprehensive videos. The final limitation was logistical. Equipment constraints, weather, and divided creative direction limited filming quality and consistency. Some ideas had to be sacrificed to meet the group and community partner expectations.

Future Research

For this project future research could focus on various key areas. First, researching and implementing better skills in sound production would add a further level of professionalism to the videos. Second, creating longer form videos which build detail upon the short form content enables viewers interested in learning more to experience similar forms of content at a greater depth. Finally, the Southshore Spit is built up of seemingly infinite video topics so creating new short form content is another option. Key video ideas we thought would be useful include: The influence of storms and earthquakes, the cultural importance of the spit to Māori, estuary system processes and the geological history of the Spit.

Conclusions

Overall, the purpose of our project was to explore Southshore Spit's coastal environment to help residents understand how the coastal system affects the Spit using short-form videos, which will in turn help in creating resilient communities. As a group, we met project demands through research, methodological development, and production. With effective communication, teamwork, and diligence, we reflect on this project and the excitement we had working together, as well as with our community partners. Our video results display the elements used to communicate science on Southshore Spit. Looking ahead, we aim for our videos to continue to educate Southshore Spit residents and beyond. We also encourage future GEOG309 students will continue this project and create a wide repertoire of environmental videos. As a summary, our results highlight the importance of science communication and what it means to tailor information specifically for a target audience. With our videos posted on the University of Science social media platforms, we intend for these to continue to be a valuable resource for science communication. We also hope the videos continue to serve the Southshore Spit community beyond the duration of our project, reflecting on what it means to live in a dynamic interface.

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