tourism and hospitality

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Coastal Tourism Recovery amid COVID-19: Insights from a Participatory System Dynamics Approach

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Abstract: This study aimed to examine the impacts of COVID-19 on coastal tourism in Nelson Mandela Bay (NMB), South Africa, and propose effective management interventions to enable swift recovery. A participatory system dynamics modelling approach was applied through a qualitative causal mapping processes to support a quantitative model. Multiple stakeholder perspectives were incorporated to gain a holistic understanding of the local impacts. The study revealed that the effects of the pandemic on tourism in NMB were dynamic and accompanied by shifts in governance responses and traveller behaviour. Uncertainty surrounding the rate of recovery in different sectors was observed. Through collaboration with local stakeholders, recovery interventions were identified and tested according to short-to-long-term tourism needs in stages of recovery, revival and growth. The findings highlight the importance of cross-sectoral collaboration in facilitating informed decision-making for sustainable tourism recovery. Moreover, it is encouraged that participatory, multi-stakeholder approaches are adopted to explore the impacts of exogenous factors on the tourism sector, such as those arising from public health, climate, and social–political change. This inclusive and dynamic approach can be used to develop management strategies that are responsive and adaptable to complex and evolving circumstances that can impact the tourism industry.

Keywords: COVID-19; tourism recovery; system dynamics; casual mapping; participatory modelling

Citation: Vermeulen-Miltz, E.; Clifford-Holmes, J.K.; Lombard, A.T.; Snow, B. Coastal Tourism Recovery amid COVID-19: Insights from a Participatory System Dynamics Approach. *Tour. Hosp.* **2023**, *4*, 435–450. https://doi.org/10.3390/tourhosp4030027

Academic Editor: Brian Garrod

Received: 31 May 2023
Revised: 20 July 2023
Accepted: 27 July 2023
Published: 31 July 2023

1. Introduction

The COVID-19 pandemic and the associated impacts and responses have been a much-discussed topic across various research disciplines over the past few years, owing to the severe shock they caused on the global socio-economic system. The onset of the pandemic in March 2020 considerably disrupted business-as-usual operations across economic sectors. The cumulative impacts from the various regulations, which aimed to "control" transmission of the virus, affected the productivity of many sectors, including the tourism sector, which is especially susceptible to measures that reduce mobility and minimise social interaction [1]. Moreover, direct restrictions imposed on the tourism sector such as domestic and international travel bans, accommodation capacity limitations, beach closures, event cancellations, to name just a few, brought tourism operations to a standstill. As a result, global tourism decreased by ~70%, with a contraction in global GDP of ~4.5% and the loss of around 62 million jobs [2]. Within the space of a few months, the pandemic was seen to shift the problem of over-tourism in some parts of the world to the absence of tourism on a global scale [1].

Changing global trends and external shocks such as COVID-19 continuously shape tourism and influence travel behaviour [3]. The impact of COVID-19 on tourism was, however, not a static problem but a rather complex and dynamic one as was shown by the

continuous change in infections, subsequent shifts in governance responses, citizen adherence and traveller behaviour. Multiple factors led to these changes in behaviour, including trends of infection, vaccination and immunity [4], and associated media hysteria [5,6]. In other instances, changes in behaviour were attributed to adherence fatigue and increasing apathy towards COVID-19 protocols [7,8]. Altogether, these factors resulted in a general change in the situational awareness and hence changes in perceived susceptibility and perceived severity [9], in line with the theory of "risk habituation" whereby risk becomes discounted as threats decrease or become increasingly familiar [10,11]. Shifts in public behaviour subsequently resulted in changes in traveller behaviour, though to different degrees in foreign and domestic tourism. This is because domestic tourism was suggested to be more resilient as it was able to absorb foreign tourism impacts through localised effects such as resident discounts and alternative forms of travel (e.g., visiting family and relatives (VFR), private road transport) and accommodation attractions (e.g., caravan and camping) [12,13]. In contrast, foreign tourism was subject to changes in infections across destination countries and associated international travel health controls [14].

Economies gradually started to recover in 2021 owing to the relaxation of social restrictions and lapsing COVID-19 healthcare protocols. However, sectors such as tourism were seen to experience a delayed recovery to pre-pandemic levels owing to remaining travel hinderances—such as vaccination passports and testing requirements—that brought additional logistical burdens and costs. Fortunately, the tourism sector was proactive in developing recovery strategies to compensate for the losses in the sector through interventions such as price discounts and flexible cancelation policies [13,15], travel bubble strategies [16] and beach safety measures [17]. Moreover, the pandemic provided the opportunity for tourism authority to identify "weak spots" in the management of the sector, such that plans are revaluated and possibly adapted to foster more sustainable growth policies [18].

Developing strategies to recover and revive the tourism sector amid the pandemic required a comprehensive understanding of the relationship between COVID-19 and tourism dynamics [19]. The impacts of COVID-19 on tourism encompassed a wide range of stakeholders, all holding unique perspectives on the challenges experienced by the sector. The temporal nature and uncertainty surrounding tourism recovery therefore makes it amenable to the system dynamics modelling (SDM) method, which has been shown to be particularly useful to help groups gain a shared understanding through qualitative mapping. This has led to the emergence of several participatory modelling applications [20,21] including in an online setting during COVID-19 [22–24]. In this manner, participatory SDM has been applied to explore the mental models that are dynamic and subject to change [25,26]. SDM is also suited to investigate the cause and effect feedback behaviour [27], and is hence appropriate to explore the knock-on effects between COVID-19 and tourism dynamics. SDM has been adopted to explore questions related to COVID-19 and the underlying social responses and consequential impacts [28–31]. More specifically, participatory SDM was proven suitable in tourism planning as discussed in [32–34], with several applications addressing challenges in coastal tourism destinations (e.g., [35–39]). In conjunction, studies have been applied to explore tourism re-opening and recovery strategies amid COVID-19 [40,41], with focussed SDM applications on the impacts of COVID-19 on tourism and travel as reported in [16,42,43]. A participatory system dynamics approach is therefore suitable for addressing the impacts of COVID-19 on tourism due to its ability to incorporate multiple stakeholder perspectives, evaluate changing behavior and test policies to support effective recovery plans. Hence, the approach is further developed and applied to explore the mental models associated with the dynamic impacts of COVID-19 on coastal tourism in Nelson Mandela Bay (NMB), South Africa. The study contributes to the current literature on the theory and methods of participatory modelling in response to the growing need for decision support to help facilitate cross-sector collaboration to improve management in the tourism sector.

Study Objectives

At a local scale in NMB, uncertainty regarding the rate of recovery in the tourism sector was prevalent, and tools to test recovery interventions were unexplored. To facilitate and support tourism recovery, it was necessary for stakeholders and related management authorities to understand the cause-and-effect feedback dynamics between COVID-19 and tourism. Moreover, an approach to explore the diverse perspectives or mental models around the impacts of COVID-19 on tourism was needed. To that end, this study reports on a participatory SDM process that was carried out during the time of the pandemic (2021 to early 2022) to explore the dynamic impacts of COVID-19 on coastal tourism in NMB to inform an effective recovery strategy at a local scale. By engaging with local stakeholders and incorporating their perspectives, the study provides a holistic view of the challenges that were faced by various tourism-dependent businesses and authorities. The approach offers a unique perspective on the interdependencies and feedback loops that shaped the tourism industry response during the pandemic. This paper is part of a broader SDM project; however, it particularly focuses on the qualitative, participatory process that was adopted to develop the NMB COVID-19 tourism recovery tool as reported in [44]. The paper is structured as follows. The following Section 2 introduces the study area and provides a background of the impacts of COVID-19 on tourism from a local perspective. Section 3 provides a description of the participatory modelling process. Section 4 describes the qualitative modelling results. Finally, the discussion and conclusions are documented in Section 5.

2. Case Study: Nelson Mandela Bay

The coastal city of Gqeberha (formerly Port Elizabeth) is situated in Nelson Mandela Bay (NMB) in the Eastern Cape province of South Africa and is home to approximately 1.2 million residents (Figure 1). Local COVID-19 infection trends predominantly followed those observed nationally, with four infection waves observed between March 2020 and November 2021. It was estimated that the pandemic and associated lockdowns caused a loss of 75,000 jobs in NMB [45], of which a large portion is suspected to have been lost in the tourism industry.

NMB is a popular tourism destination, with an economic contribution of ~R 14 billion in 2019 (~11% of gross domestic product) and employing a total (direct and indirect) of 98,000 persons, with the largest contribution from domestic tourism [46]. NMB receives around 80% of tourism in the Eastern Cape consisting of a mix of foreign and domestic tourism [47]. In 2019, 307,000 foreign and 2.3 million domestic overnight visitors were recorded, in addition to 1.2 million domestic day visitors [48]. As a coastal tourism destination, NMB holds several acclaimed titles including being known as the "water sports capital of Africa", as well as "the bottlenose dolphin capital of the world" and a "Marine Hope Spot", which has particularly increased coastal and marine tourism participation [49].

The onset of the pandemic caused tourism in NMB to decline significantly (Figure 2). According to the data from Nelson Mandela Bay Municipality [46], the number of foreign visitors in the metro decreased by ~72% from 307,733 in 2019 to 87,366 in 2020, and domestic visitors decreased by ~45% from 3.6 million to 2 million during 2020. Consequently, the number of bed-nights sold decreased by 61% (or 1.9 million sales), accommodation occupancy dropped by over 32%, the total economic contribution decreased by 37% and the total number of estimates job losses was recorded at ~21,000 people (Figure 2). Additional restrictions, such as restaurant and beach closures, further exacerbated the impacts on tourism that resulted in low levels of participation in beach recreational activities, both from tourists and residents. Local tourism operators particularly searched for alternative means to adapt to low levels of tourism demand. This further called for a need for a collaborative, multi-stakeholder approach to inform strategies that aim to revive and recover tourism in the Bay.

Figure 1. Map of the Nelson Mandela Bay Municipality district and the city of Gqeberha (formerly Port Elizabeth). Source: Google Maps.

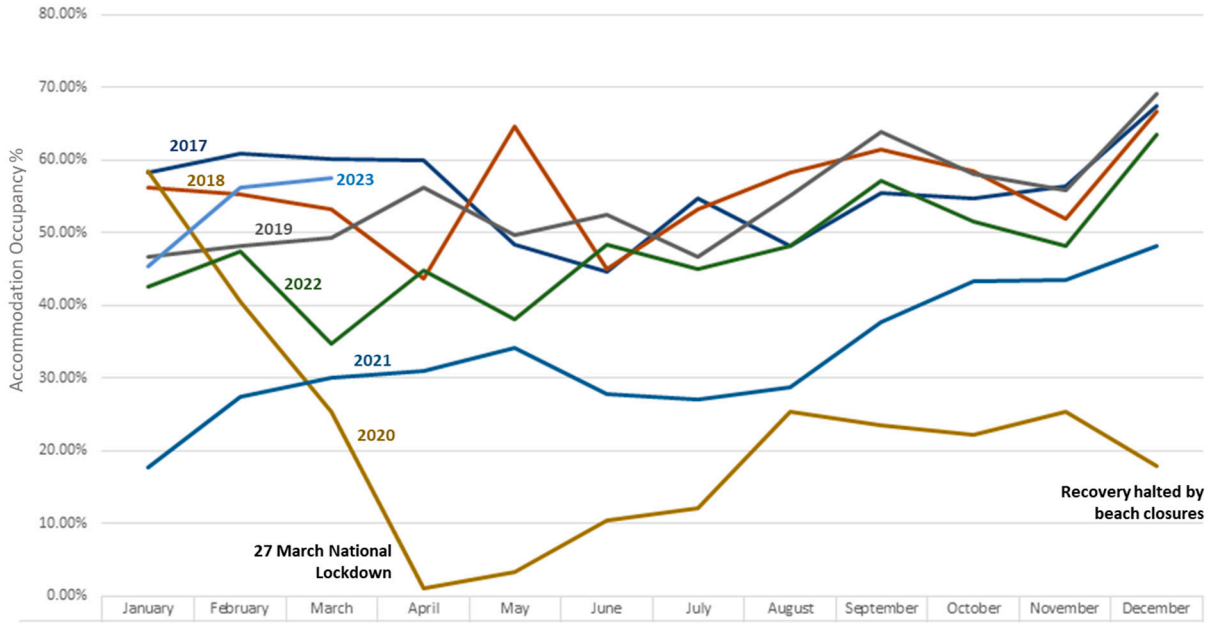

Figure 2. Accommodation occupancy levels in Nelson Mandela Bay prior, during and after the COVID-19 pandemic. Figure adapted from: [46].

3. Materials and Methods

SDM is a structured approach to systems thinking that involves mapping and modelling complex dynamic problems [27]. Model development using SDM generally comprises several iterative steps that occur between qualitative and quantitative modelling phases (Figure 3). This study reports on the qualitative modelling phase that was undertaken to understand the impacts of COVID-19 on tourism in NMB (Figure 3). More

information on the quantitative modelling steps is available in [44], which builds off a broader SDM process to support coastal and marine management in NMB as reported in [50]. During the participatory process, a series of online meetings and workshops were held to explore the dynamics behind "the impacts of COVID-19 on coastal tourism in NMB". Stakeholders that were involved in the process consisted of "problem owners" from the tourism sector, including local government, accommodation groups, tourism consultants and tourism operators (Table 1). The stakeholder meeting process, as documented below, was divided into two stages between September 2021 and February 2022.

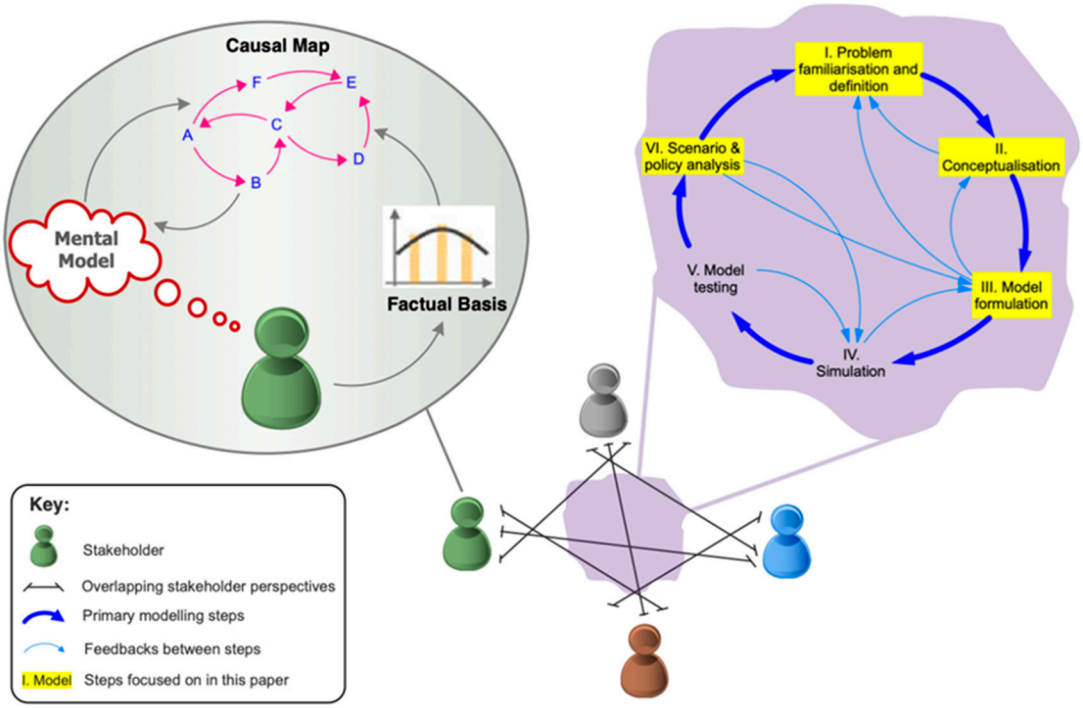

Figure 3. Steps followed during the participatory system dynamics modelling process. The modelling steps highlighted in yellow are those that fall within the qualitative modelling phase addressed in this paper. The diagram shows how the mental models held by each stakeholder are informed by their understanding of causality, which has some factual basis in their own experiences. Diagram adapted from [51].

3.1. Stage 1—Individual Stakeholder Meetings

The first stage of the process consisted of individual stakeholder meetings that aimed to capture stakeholders' "mental models" (i.e., stakeholder's perceived understanding of the problem) through causal loop diagramming. Eight individual meetings, each lasting around one hour, were held. The meetings were initiated through a brief introduction, followed by a short presentation of the project explaining the aim, the method of system dynamics modelling, stakeholder roles and the envisaged outputs of the study. Before proceeding to causal mapping, a set of pre-determined questions were put forth to facilitate variable elicitation. These included:

1. What key variables do you think are at the centre of the problem?
2. What is driving the problem?
3. What are the knock-on effects (positive and negative) of this problem on coastal tourism in the bay?
4. How do you expect coastal tourism to recover?
5. By when do you expect it to recover?
6. What interventions could assist in a rapid and sustainable recovery of the tourism sector?

Thereafter, causal mapping was conducted using the Stella® Architect software (version 3.1) [52]. Alternative online mapping platforms included Kumu, Sheetless, Mental Modeler, Loopy, Miro or Google Jamboard, each with its own functionality [23,24]. More specifically, Casual Loop Diagrams (CLDs) are qualitative SDM tools that represent variables and the relationships between them [53]. Relationships between variables can either be defined as positive or negative, which implies that changes (increases or decreases) in the corresponding variable are in the same or opposite direction, respectively. CLDs have been shown to be particularly useful to trace circular relationships, known as feedback loops which can either be reinforcing (R) or balancing (B), to assist in understanding the underlying dynamics of mental models [54]. CLDs are only one form of cognitive mapping, though other forms of cognitive mapping can also include pictograms, influence diagrams and fuzzy cognitive mapping [26,55]. To initiate causal mapping, an example of a balancing and reinforcing feedback loop was demonstrated. Thereafter, the key variables were listed on the blank map and causal links were drawn as suggested by the stakeholders. Mapping was concluded with a brief summation of the main casual links drawn in the map, followed by a description of the next steps. This process was repeated with eight stakeholders, each with distinct, but also shared understandings of the impacts of COVID-19 on tourism in the bay (Table 1 and Figure 4). The individual meeting process thus allowed for a divergence on the model problem, which was further synthesised into a model boundary to capture the holistic and common perspectives of the stakeholders (Figure 5).

3.2. Stage 2—Group Modelling Workshops

The second stage of the engagement process consisted of two group modelling workshops with the same stakeholders who participated during stage one. The aim of the first workshop was to foster collaboration through the model and focus on stakeholders' commonalities in relation to the problem. The workshop was initiated by a summary of the individual meetings and presentation of the synthesis casual map (Figure 5). Thereafter, a short discussion period was hosted in relation to the synthesis map, discussing the main causal links and identifying areas where potential interventions may be effective (Table 1 and Figure 5). Following this, the preliminary model was showcased through the model user interface that was developed to demonstrate model results and perform scenario analyses (Figure 6). The aim of the second workshop was to evaluate the model outputs under alternative governance scenarios and to discuss the strengths and weaknesses of leverage points for sustainable recovery of the tourism sector in the bay (Figure 6). The meeting was concluded with a discussion around challenges in the local governments' management strategy and potential interventions that could support sustainable tourism recovery in the bay.

4. Results

4.1. Individual Stakeholder Maps

Table 1 and Figure 4 show the results obtained during the first phase of the participatory modelling process. Eight causal maps were produced, in the form of CLDs, each containing the variables elicited from the individual stakeholders' mental models, focusing on their key perspectives and the associated areas of intervention (Table 1). For demonstration purposes, the four simplified CLDs consisting of the perspectives of each of the stakeholder groups are shown (Figure 4). Several balancing and reinforcing feedback loops were identified by stakeholders to capture these dynamics, where "B" represents a balancing (negative) loop and "R" represents a reinforcing (positive) loop (Figure 4).

Table 1. Key perspectives and areas for intervention identified by the stakeholder groups engaged with during the meeting process.

Stakeholder Group	No. of Participants	Key Perspectives	Areas of Intervention
Local Government	3	COVID-19 infections Healthcare strain COVID-19 fatalities % vaccinated Tourism revenues Tourism arrivals Tourism jobs Tourism budget	Vaccination awareness COVID-19 relief funding Public health preparedness Temporary employment grants Public infrastructure maintenance Tourist infrastructure upgrades Safety and security Beach management
Non-Profit Organisations	1	Marketing Word-of-mouth effect Tourism experience COVID "preparedness"	Destination marketing Tourism innovation Visitor services Research and development Beach accreditation programmes
Accommodation and Business Representatives	3	Bed-night sales Accommodation occupancy Tourist supply and demand Tourist COVID-19 protocols	Accommodation safety compliance Accommodation standards Tourism development Tourism investment
Tour Operators	1	Tour participation Market shifts Tour specials Marine aesthetic value	Tour marketing Conservation and awareness
	Total = 8		

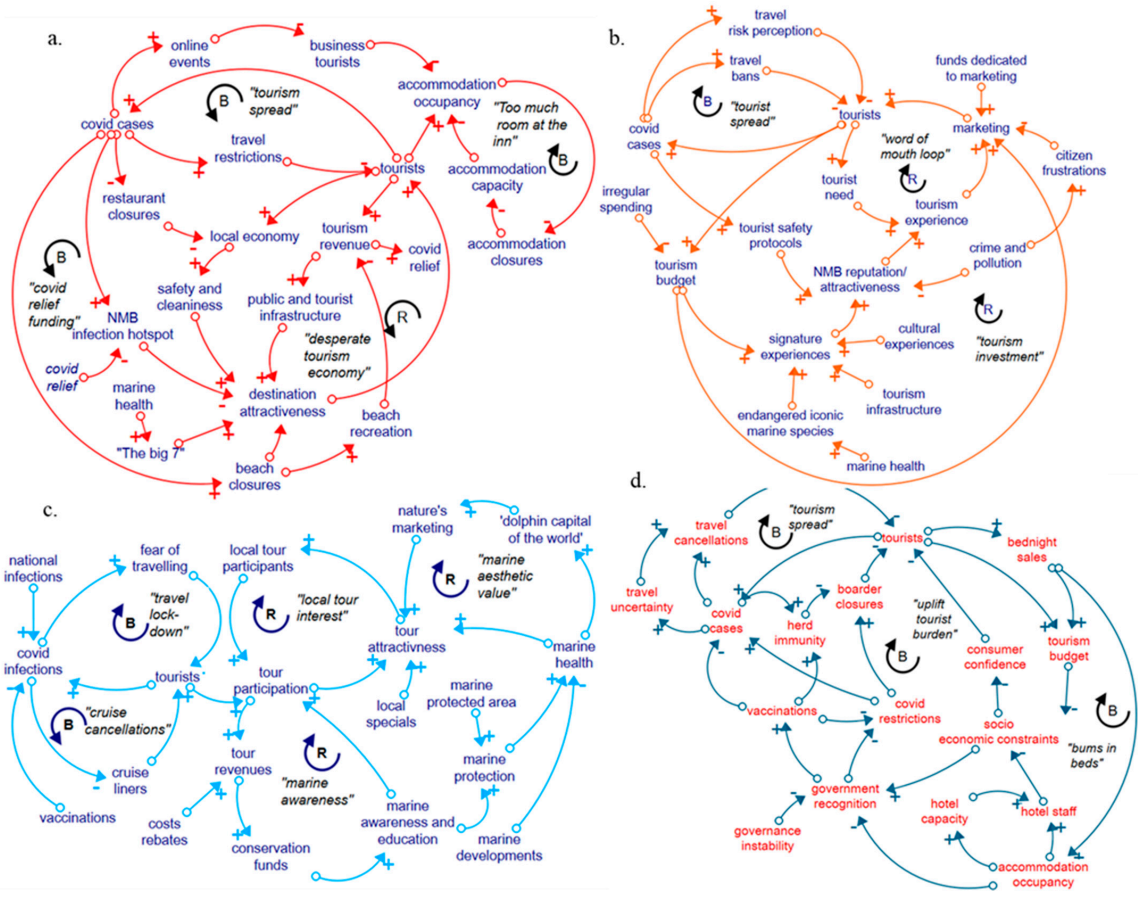

Figure 4. Stakeholder Causal Loop Diagrams collated according to institutional agendas. Perspectives from government stakeholders (**a**), non-profit organisations (**b**), tour operators (**c**) and accommodation and business representatives (**d**). Reinforcing loops (R) and balancing loops (B). Positive and negative polarity shows change in the same or opposite direction, respectively.

Based on the information drawn from the discussions and the CLDs, the understanding of the underlying problem dynamics associated with the impacts of COVID-19 on coastal tourism in NMB held by each stakeholder group can be explained in the following way, described below.

Figure 4a represents the CLD jointly mapped with the local government representatives. They emphasised that during the pandemic, trade-offs between public health and economic well-being had to be acknowledged. On the one hand, the government had to control the transmission of the virus by implementing social restrictions; on the other hand, the government's goal was to sustain tourism and prevent socio-economic losses. From a local government lens, an increase in COVID-19 cases at a national scale increased the severity of social restrictions, which decreased the number of tourists visiting NMB and ultimately tourism revenues and budget. A portion of the tourism budget additionally had to be diverted to fund COVID-19 relief in the metro, further draining the tourism budget intended for public and tourist infrastructure, resulting in a decrease in destination attractiveness with possible long-term impacts.

Representatives from the tourism-related non-profit organisation highlighted concerns around the unprecedented travel restrictions and consequential impacts on tourism (Figure 4b). They noted that an increase in COVID-19 cases increased the likelihood of travel bans and at the same time affected travel risk perception. Together, this resulted in fewer tourists visiting the bay, but also lowered the level of travel experience due to beach closures and deteriorating public and tourist infrastructure, which ultimately decreased the effectiveness of reinforcing the word-of-mouth marketing effect.

Figure 4c reflects the perspectives of local tour operators in that an increase in infections increased the "fear of travelling", resulting in fewer tourists and lower levels of tour participation. Moreover, to absorb the shock from lower levels of tour participation, particularly from foreign tourists, operators introduced tour specials to increase domestic and local participation. Together with decreased revenues, this affected their marketing agenda, which particularly aims to create awareness of the natural marine aesthetic value of the bay.

Finally, the accommodation and business representatives were most concerned about low accommodation occupancy levels owing to travel bans and travel uncertainty, which ultimately increased travel cancellations and decreased revenues (Figure 4d). Many forms of accommodation were forced to retrench staff members, some temporarily and others permanently. Furthermore, socio-economic constraints in the metro have led to lower levels of consumer confidence, impacting travel decisions. In summary, Figure 4 shows some of the differing perspectives based on different stakeholders' mental models. The following section aims to demonstrate the holistic and shared understanding of the problem.

4.2. Synthesis Map

The final model boundary was drawn by collating the stakeholder's individual causal maps into a holistic synthesis map (Figure 5). This included identifying the common perspectives and causal links drawn by stakeholders. The dynamic behaviour underlying the impacts of COVID-19 on tourism is further described through a series of balancing and reinforcing feedback loops (Figure 5). Firstly, the balancing loops (B1—virus running out of fuel; B2—stay safe; B3—vaccination relief; and B4—vaccination immunity) demonstrate the dynamic interactions between the infected and susceptible populations and vaccination efforts. Loop B1 illustrates that as the susceptible population decreases, the number of infections decreases, limiting the spread of the virus. Loop B2 emphasises the importance of safety measures in reducing social contacts and, subsequently, the risk of infection. Loop B3 highlights the fact that an increase in infected cases drives the demand for vaccination, leading to a higher number of vaccinated individuals and reducing the susceptible population. Loop B4 captures the effects of vaccination, showing that as the vaccinated population increases, the severity of cases and hospitalisations decrease. Reinforcing loop R1 (contact spreading) highlights the dynamic process by which an increase in the number of infected

individuals amplifies the risk of infection transmission. Similarly, reinforcing loop R2 (reinfections) highlights the dynamic nature of immunity, wherein the waning of immune protection over time renders individuals vulnerable to subsequent infections. In terms of tourism dynamics, three balancing loops (B5—foreign travel lockdown; B6—domestic travel lockdown; and B7—too much room at the inn) demonstrate the impact of cases of infection on travel restrictions, accommodation occupancy, and tourism infrastructure investment. Loops B5 and B6 illustrate that increases in the number of cases of infection can lead to travel restrictions, limiting both foreign and domestic tourism activities. Loop B7 shows the relationship between low accommodation occupancy and closures, which in turn decreases tourism accommodation capacity, ultimately influencing accommodation occupancy rates. Reinforcing loops R3 (tourism infrastructure investment) and R4 (marine aesthetic beauty) highlight the positive feedback mechanisms in the tourism sector. Loop R3 illustrates that increased tourism activity can result in higher tourism budgets, leading to greater investments in public and tourism infrastructure, ultimately enhancing the attractiveness of the destination. Loop R4 demonstrates that a healthy marine environment and increased coastal tourism participation foster a greater appreciation for the marine environment, thereby creating awareness and support for marine conservation in the bay. Collectively, these interconnected feedback loops visually explain the relationship between COVID-19 dynamics and the tourism sector. Understanding these dynamics is essential to inform tourism response and recovery.

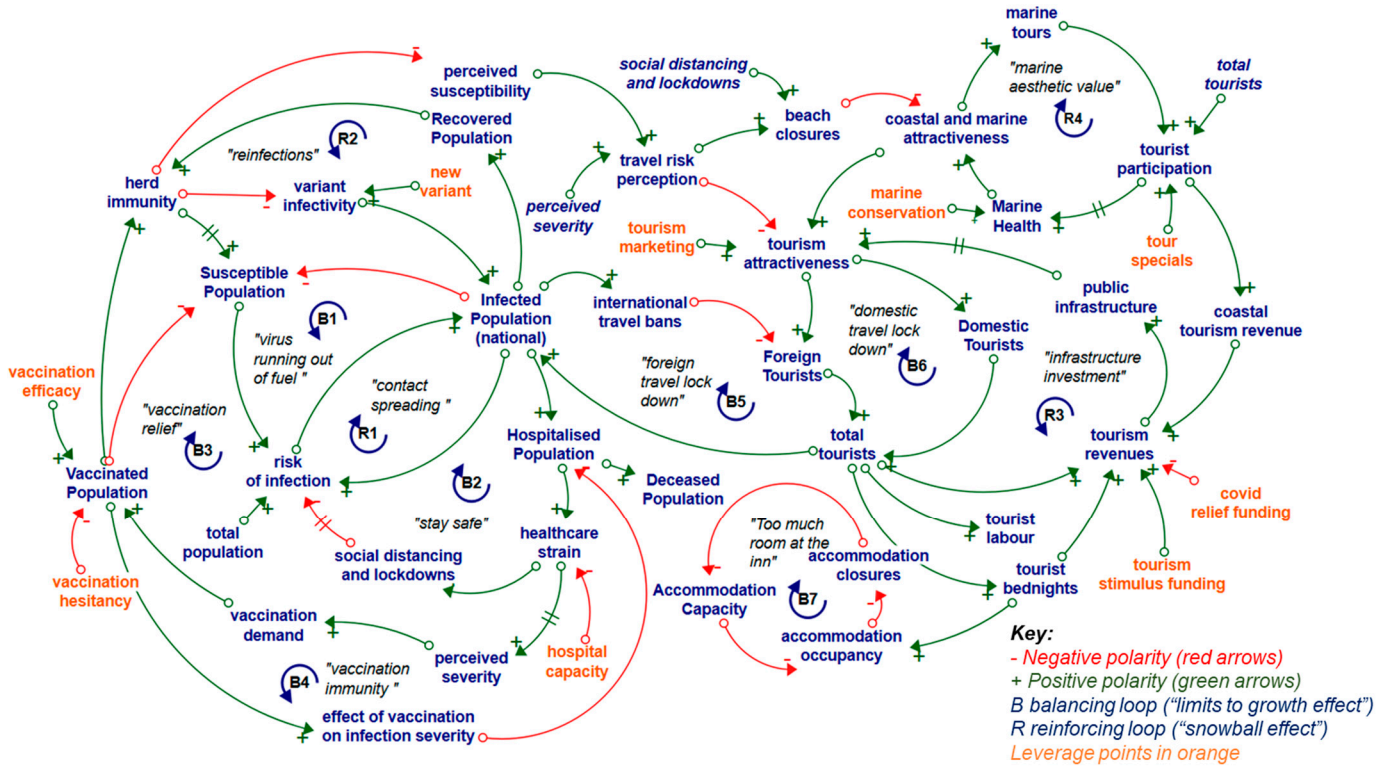

Figure 5. Synthesis Casual Loop Diagram illustrating the key model variables and feedback loops making up the model structure. Figure adapted from [44].

4.3. Scenario Planning with Stakeholders

Scenario analysis was performed with the stakeholders during the first and second group model workshops, the first with the intention to demonstrate that the qualitative CLD was translated into a quantitative simulation model, and the second to explore and discuss three COVID-19 recovery scenarios. The scenarios were tested using the model visual user interface, which was specifically developed as a "user-friendly" portal to the model (Figure 6). Further information on the quantitative design behind the model scenarios

is reported in [44]. The variables and associated parameter values that were adjusted during the scenarios were those identified by stakeholders during model conceptualisation (Figure 5) and are shown on the interface control panel (Figure 6). The policies that were explored were categorised as either "COVID-19 interventions" or "tourism interventions". COVID-19 interventions were mainly focussed on the policy of vaccination that could indirectly affect tourism recovery projections, whereas tourism interventions included policies that could support tourism directly, such as decreasing the stringency on foreign travel and redirecting funding towards marketing and tourism infrastructure (Figure 6). Three governance response scenarios were explored:

1. A business-as-usual or baseline scenario, which demonstrated the results under current governance decision-making strategies.
2. A hypothetical governance control scenario, which specifically aimed to investigate a desirable tourism recovery strategy, assuming that authorities have control of the situation, through enabling protective COVID-19 measures and ensuring effective tourism management.
3. A hypothetical governance instability scenario, which aimed to portray a situation where the uncertain progression of the pandemic, combined with lax tourism response interventions, leads to a less desirable recovery trajectory.

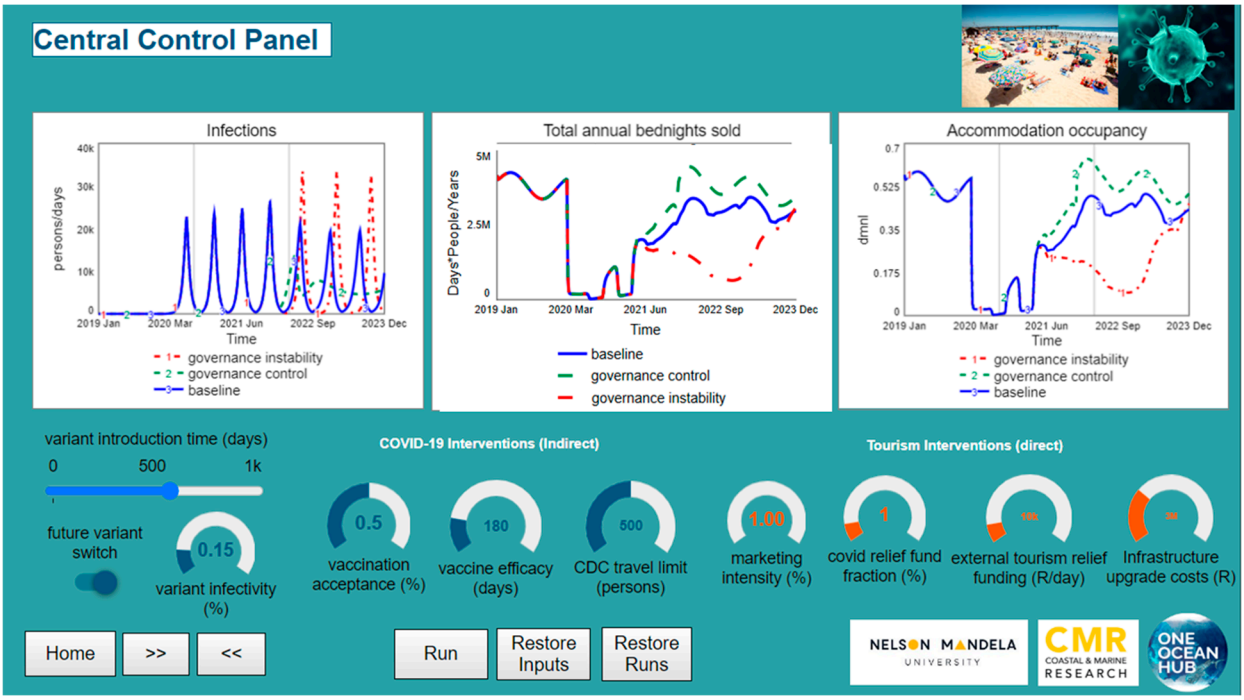

Figure 6. Central control panel in the visual user interface that enabled additional scenario analyses. The model interface is accessible online: https://exchange.iseesystems.com/public/esteevermeulen/nelson-mandela-bay-covid-19{-}{-}coastal-and-marine-tourism-recovery-tool, accessed on 25 July 2023. For details on the model structure behind the interface, see [44].

5. Discussion and Conclusions

The COVID-19 pandemic bought devastating impacts on tourism owing to the susceptibility of the sector to restrictions associated with the movement of people [1]. These impacts were felt across the tourism value chain [43], with direct and indirect knock-on effects evident on coastal tourism in NMB. Trends in tourism indicators have since improved (Figure 2), though the rate of recovery was subject to changes in multiple interrelated variables that shaped consumer behaviour and travel demand [5,56]. Supporting tourism recovery therefore required a multi-stakeholder approach to understand the cause-and-effect dynamics as perceived by different stakeholders, which included identifying

potential areas for management interventions. This study hence adopted a participatory SDM approach to investigate the impacts of COVID-19 on coastal tourism in NMB to devise potential recovery interventions with stakeholders. By analysing the data collected through a participatory mapping process, the authors identified the key drivers of change, highlighted successful initiatives, and shed light on the factors that may facilitate adaptation within the sector.

5.1. Discussion of Main Results

From the obtained results, it was observed that many stakeholders shared an understanding of the cause-and-effect dynamics underlying the impacts of COVID-19 on tourism in the bay (Figures 4 and 5). This was possibly owing to the pertinence of the problem during the time of the study, though unique perspectives were highlighted regarding the outlook on future recovery scenarios. The results also highlight the dynamic nature of the problem, where changes in the severity of infections, shifting governance responses and traveller behaviour continuously changed our baseline understanding of the problem (Figures 5 and 6). Similarly, management interventions shifted as the dynamics of the pandemic evolved. Initially, management interventions of the public health directorate were focussed on minimising transmission of the virus through protective measures and safety campaigns, although, as the pandemic evolved, these interventions shifted towards recovery and vaccination (Figure 6). Similarly, the tourism directorate was required to make trade-offs between tourism marketing when there were minimal prospects of tourists visiting versus tourism grants that were more necessary to avoid business insolvency and to maintain longer-term prospects once tourists would return. This is supported by the authors of [57] who suggested that during times of tourism crises, governments should opt to provide support to prevent lasting damage. Tourism support provided by the government to registered local businesses in NMB included relief on commercial rates, temporary employment grants and external relief funds, similar to mitigation strategies elsewhere [15,16]. Finally, as tourists started returning, and with less of the budget diverted towards COVID-19 mitigation, it was expected that the tourism budget would recover such that interventions could be directed towards reviving and growing tourism initiatives (Figure 7).

The scenario analysis further showed that changes in various management interventions could affect the rate of tourism recovery; therefore, a combined effort across management directorates (i.e., public health and tourism) is shown to result in a faster rate of recovery (Figure 6). While a business-as-usual governance scenario may prioritize returning to pre-pandemic operations, a controlled governance scenario aims to adapt and mitigate the impacts of the pandemic with proactive measures to assist both short-term tourism recovery and long-term sustainable growth (Figure 7). By contrast, a government instability scenario can undermine the effectiveness of management interventions, potentially leading to challenges in attracting visitors, ensuring safety, and implementing vital measures like vaccination rollout and promotion of natural coastal assets.

As such, management interventions should be prioritised according to short- versus longer-term goals, where short-term goals are focussed on reviving tourism and long-term goals prioritise sustainable growth (Figure 7) [46]. At the same time, implementation should align with budget availability, ensuring that short-term interventions align with the current funding capacity. As budgets return to pre-pandemic levels, it becomes crucial to reallocate resources to address the city's most pressing needs. As a matter of urgency, short-term interventions should focus on small changes with the potential for large impacts (i.e., points of high leverage), such as maintaining and upgrading the existing public and tourism assets (Figure 7). This can include promoting domestic tourism and diversifying tourism products, including coastal tourism and rural tourism activities [58]. Alternative initiatives could include revisiting tourism route planning, enhancing signage, improving road infrastructure and implementing measures to increase tourist safety [59]. Moreover, tourism planning can be strengthened by adopting "bottom-up" decision-making tactics through public par-

ticipation and cross-sector collaboration among tourism stakeholders, acknowledging that benefits from tourism can benefit the city. While collaborative decision-making can lead to reduced unintended consequences for various stakeholders, it is important to acknowledge that during time-sensitive events such as the pandemic, capacity and resource constraints may hinder the ability of the authorities to engage in extensive collaboration. Nonetheless, recognizing the potential benefits of collaborative approaches, managers should strive to incorporate multiple stakeholder perspectives to ensure more inclusive decision-making. It is also advisable for tourism authorities and decision-makers to embrace a "learning destination approach" to enable longer-term tourism resilience, such that impacts from future shocks are minimised or mitigated [60].

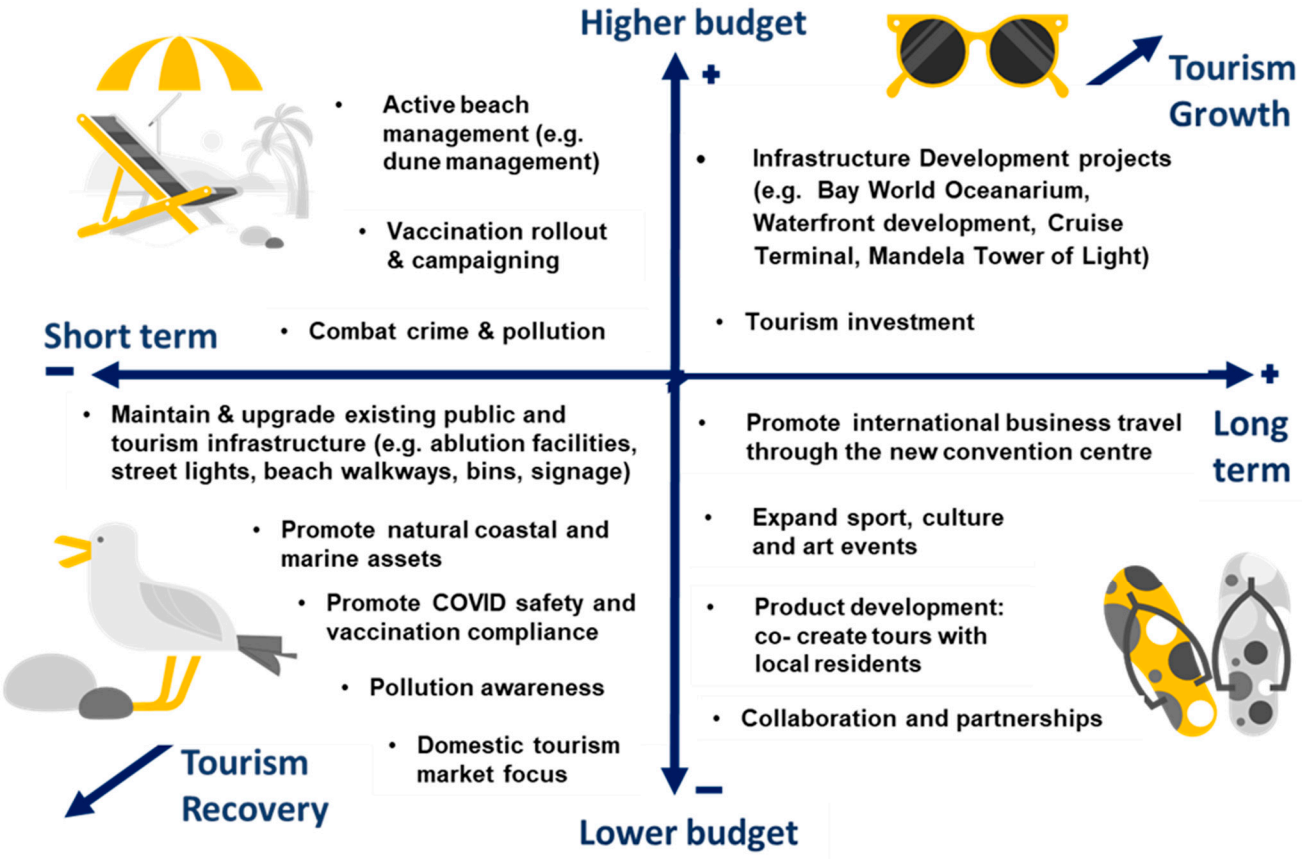

Figure 7. Suggested management interventions that can support tourism recovery and growth in Nelson Mandela Bay, diversified according to budgetary costs and temporal priority. Icons were sourced from stock images.

Figure 7 further summarises the necessary interventions that were identified among stakeholders during the final model workshop. Overall, stakeholders were optimistic about tourism recovery in the Bay, as exemplified in a quote from one stakeholder: "Looking back, we saw devastation in COVID-19's path, but now is the time to draw a line in the sand and fix the problems that we have in order to work towards a desirable destination going forward" (see Table A1 for stakeholder feedback on the participatory SD approach Table A1).

5.2. Concluding Remarks

Through participatory SDM, this study investigated the impacts of COVID-19 on coastal tourism to inform tourism recovery strategies in NMB. The participatory SDM mapping approach, prior to the quantitative modelling stage, provided a valuable tool to elicit information and map the mental models that formed the basis for the COVID-19 tourism recovery tool. Trade-offs in omitting stakeholders during the quantitative mod-

elling phase, such as the lack of a sense of ownership of the tool, were considered [20], though it was not within the capacity of the study, nor the aim of the study, to teach SDM to tourism stakeholders. The study adopted a co-learning approach [20,61] in which implications regarding the dynamics associated with COVID-19 and tourism were used to inform tourism recovery. Moreover, while online participatory SDM processes held advantages over in-person meetings [22,23], particularly when in-person meetings were restricted, the remaining challenges included online stakeholder fatigue, which decreased levels of commitment to the study [21,24]. Nevertheless, stakeholders were exposed to the method of casual mapping to better understand interlinkages and feedback effects among system variables, and to scenario planning via the model interface, thus allowing them to explore and discuss the effects of different management interventions on recovery projections. This provided the stakeholders with a broad perspective of the problem and demonstrated trade-offs between management interventions, allowing them to evaluate outcomes against short- vs long-term goals (Figure 7). Participatory modelling is encouraged to support capacity building, facilitate dialogue and foster acquisition and use of new decision support tools for tourism recovery and improved management of the sector [38,62]. Though the model boundary is limited to the NMB region, the dynamics associated with the impacts of COVID-19 on tourism are relevant in other regions, thus providing potential to adapt the process and the model to different contexts. This approach can further be adopted by authorities to inform tourism management plans, such as the NMB tourism master plan (2021–2030) [46] or even national plans (e.g., The Road to Recovery Report: South African Tourism) [14]. This study contributes to a more comprehensive understanding of the tourism system to inform effective decision-making and policy formulation. The study also presents insights into the adaptive strategies that were employed by different tourism stakeholders to navigate the uncertainties brought about by the global health crises. These findings are relevant to tourism authorities, stakeholders and researchers seeking to understand and explore the impacts of exogenous factors on the tourism sector, as was shown for COVID-19, but also in relation to climate and social–political change.

Author Contributions: E.V.-M. was the lead researcher, author and stakeholder facilitator in this study. J.K.C.-H. assisted in stakeholder facilitation, conceptual mapping and writing. A.T.L. and B.S. contributed to writing, editing and providing financial support. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the One Ocean Hub GCRF UKRI grant NE/S008950/1. Additional support and APC was provided by the South African Research Chairs Initiative through the South African National Department of Science and Innovation/National Research Foundation by a Community of Practice grant (UID: 110612).

Institutional Review Board Statement: The study was conducted in accordance with the declaration of Helsinki and approved by the Ethics Committee of Nelson Mandela University (H20-BES-DEV-003) for studies involving stakeholder engagement.

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: Qualitative data collected during stakeholder meetings may be extracted from the figures and tables in the study and referenced accordingly. The model interface link is available at https://exchange.iseesystems.com/public/esteevermeulen/nelson-mandela-bay-covid-19{-}{-}coastal-and-marine-tourism-recovery-tool, accessed on 25 July 2023.

Acknowledgments: The authors wish to thank all involved stakeholder institutions for their participation in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Stakeholder feedback on the participatory system dynamics approach applied in this study.

"We don't often get a helicopter view such as this. It has provided stakeholders to see their roles and how everyone should collaborate"
"The causal map gives us an orientation of the variables and how we can change and make the biggest impacts through different actions"
"The model elaborates on different interventions from different role-players and how these interventions can influence the behaviour in a positive manner"
"It is difficult to predict the future, but we see the value in how this tool provides an indication of what can happen and for planning purposes this is very important"
"We hope the tool is implemented and used to inform tourism recovery"

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