Exploring community preferences for managing Blueskin estuary in Aotearoa/New Zealand

Summer scholarship project conducted by:

Rachel Finlayson[1] and Alice Neilson[1]

Supervised by:

Dr. Simone D. Langhans[1,2*] and Dr. Marc Schallenberg[1]

[1]Department of Zoology, University of Otago, Dunedin, New Zealand

[2]BC3-Basque Centre for Climate Change, Leioa, Spain

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Contact: simone.langhans@bc3research.org

SUMMARY

Public participation in environmental management is increasingly recognised as crucial for the success of management practices. Multicriteria decision analysis (MCDA) has been demonstrated to be a convenient approach to achieve stakeholder participation in environmental management practices. However, stakeholder selection and categorisation for participatory management frameworks can be difficult. There are often underlying assumptions that stakeholders will primarily focus on goals directly pertaining to their particular business or background. An MCDA process is currently underway for Blueskin estuary and catchment. The present study aimed to use cluster analysis to determine whether stakeholders in the Blueskin area could be clustered based on their preference for certain management goals. Stakeholder interviews using the reverse swing method gave weights for each management goal for each stakeholder. These weights were used to perform an agglomerative hierarchical cluster analysis for the first and second-level goals identified earlier in the MCDA process. Results showed that stakeholders were divided into two clusters for both the first and second-level goals, with the majority of stakeholders clustered together in one large cluster. Unlike previous studies, our results showed that those with certain economic interests were not primarily concerned with goals directly relating to their industry, and this particular group of stakeholders shared similar management preferences for the Blueskin catchment and estuary.

INTRODUCTION

Healthy freshwater ecosystems are vital to maintaining biodiversity and providing for people's economic, social and cultural well-being (Langhans et al., 2019). However, these ecosystems are among some of the most threatened environments globally, and further impacts to these environments will lead to the loss of water-based ecosystem services upon which a large majority of society depends (Russi et al., 2013). Communities surrounding freshwater ecosystems heavily rely on these environments for a range of cultural, social, and economic benefits; therefore, it is essential to recognize society as an integral part of these ecosystems (Long et al., 2015).

Stakeholder participation in environmental decision-making has been increasingly sought and embedded into national and international policy, as it embraces a diversity of knowledge and values, resulting in flexible and transparent decision-making for complex issues (Reed, 2008). When performed effectively, stakeholder participation integrates local and scientific knowledge, providing a more comprehensive understanding of the relevant complex and dynamic social, ecological, cultural, and economic systems and processes. When project design considers the local interests, values, and concerns, it increases the likelihood that the project will successfully meet local needs and priorities, as it considers the variety of ideas and perspectives (Dougill et al., 2006).

Multicriteria decision analysis (MCDA) is a set of decision support approaches which analyse multi-objective problems (Belton and Stewart 2002). It has been demonstrated to be a convenient approach for stakeholder participation as it incorporates stakeholders' knowledge and values in the planning phases in environmental management (Marttunen et al., 2015). MCDA allows a decision-maker to evaluate alternative management systems based on different stakeholder and individual preferences and values of multiple criteria (Langhans, 2016). Decision-makers can explicitly weigh trade-offs between social, cultural, environmental, and economic factors (Kiker et al., 2005). Other positive impacts of stakeholder participation in MCDA processes include bringing structure to the planning, creating discussion frameworks, and learning among stakeholders and leaders (Marttunen et al. 2015). The approach focuses on value scores to prioritise management actions rather than asking stakeholders directly which action they prefer.

An MCDA approach is underway to inform a management plan for the Blueskin Bay catchment and estuary. Within this project, it would be beneficial to determine whether or not the participants can be clustered based on their management preferences and to identify any significant similarities and differences within the group.

The MDCA Process

Adapted from Reichert et al. (2015), Langhans et al. (2019) describe how the MCDA process can be broken down into ten discrete main steps (Figure 1). The first steps of the MCDA process are to identify the problem and identify key stakeholder groups and their values. The project's overall aim is to identify a management strategy for the Blueskin Bay catchment and estuary that considers both national environmental regulations and community input. Along with individual community members, people employed in the relevant industries, such as cockle harvesting, agriculture, forestry, tourism, urbanisation, and development, have been identified as key stakeholders. Through several community workshops, community members and stakeholders were encouraged to share their own cultural, economic, ecological, and social values. Some of these included the health of the estuary and catchment, the preservation of Maori knowledge and values, the presence of native flora and fauna, etc.

Step D (Fig. 1) involves translating the values into goals and smaller, more specific subgoals (first-level goals and second-level goals) to create a goal hierarchy. Each subgoal is paired with suitable attributes. Attributes are measurable system properties or indicators that can be used to chart progress towards achieving the goals when monitored. Some examples of this are the percentage of total shoreline length that is a vegetative buffer, the abundance of native species, percentage of dune vegetation cover, etc.

Step E (Fig. 1) involves interviewing various stakeholders and community members to gauge how important each first-level and second-level goal is for individuals. The data collected in these interviews will be used to determine whether or not individuals from the Blueskin Bay community can be clustered based on their management preferences and identify any similarities and differences between stakeholder perspectives. The MCDA process has several steps after this, which eventually aim at combining the different information to facilitate the collaborative selection of a management strategy (Steps F to J in Fig. 1).

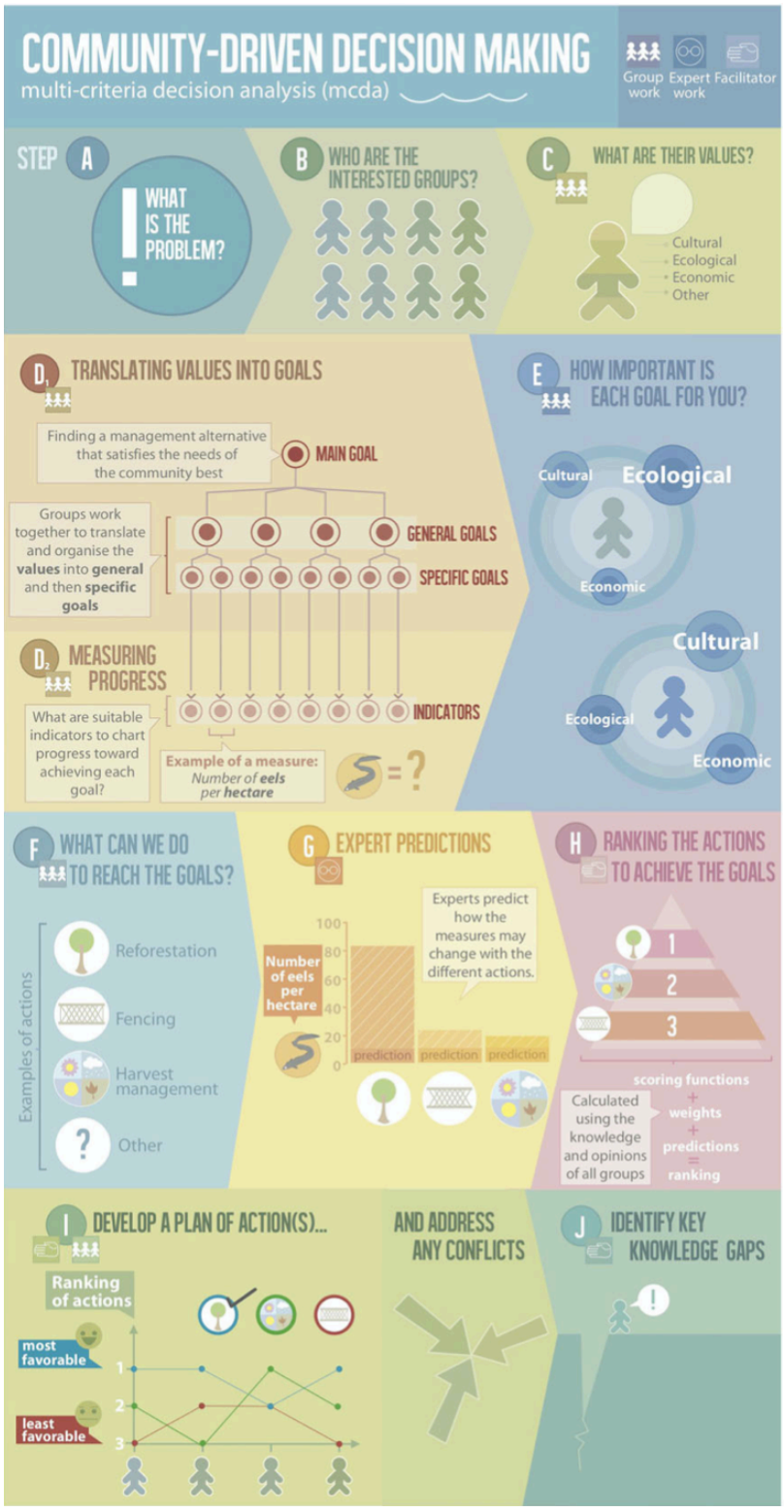

FIGURE 1. Infographic showing the ten different steps adopted in the community-driven decision making process based on multicriteria decision analysis (MCDA) [Colour figure can be viewed at wileyonlinelibrary. com] (Langhans et al. (2019)).

METHOD

The data being used to determine whether individuals and stakeholders from the Blueskin Bay community can be clustered based on their management preferences are the weightings calculated in step E of the MCDA process (Fig. 1).

Interviews conducted with residents and businesses allowed individuals from the community to evaluate and rank management alternatives based on their predicted consequences for each first-level goal and second-level goal. These were converted into weightings for each participant. It is the weightings that will be used in the investigation.

Stakeholder selection

The participants were men and women over 18 living and working in the Blueskin Bay area. The aim was to include people working in all industries relevant to Blueskin Bay (such as agriculture, cockle harvest, forestry, etc.). Participants were selected primarily from a list of names generated from community workshops held earlier in the MCDA process. Additional participants were gathered through word of mouth and an interview sign-up sheet provided in the Blueskin Public Library.

Interview protocol

Interviews followed a strict protocol to minimise biases due to framing, availability, and social context (Burgman et al., 2011). They were conducted separately to minimise bias.

A standardised method was used in the interviews to minimise interviewer error and ensure participants were asked identically worded questions without unscripted commentary that could bias answers (Fowler and Mangione 1990). This method included establishing a scoring function and using the reverse swing method (Schuwirth et al. 2012). A template of the interview questions used is provided in the appendix.

To calculate the value scores based on all attributes, the fulfillment of the management goal must be quantified as a function of the attributes. This process is done by identifying a scoring function for each attribute (Figure 2). Scoring functions have a continuous scale of 0 to 1 on the y-axis and the considered range of the attribute on the x-axis (0 = no achievement, 1 = full achievement of the subgoal) (Langhans et al, 2019). A common method for the elicitation of weights is the (reverse) swing method explained by Lienert et al. (2011). Where multiple weights

for the same goal for the same stakeholder group are identified, these can be combined using different weighting schemes to represent the group's opinion (Cooke, ElSaadany, & Huang, 2008). This method allows participants to define the relative importance of different management goals by assigning them points in a standardised way. If an individual were to assign a higher number of points to a goal, it would indicate a higher preference for this goal. The points are converted into weightings to create the dataset.

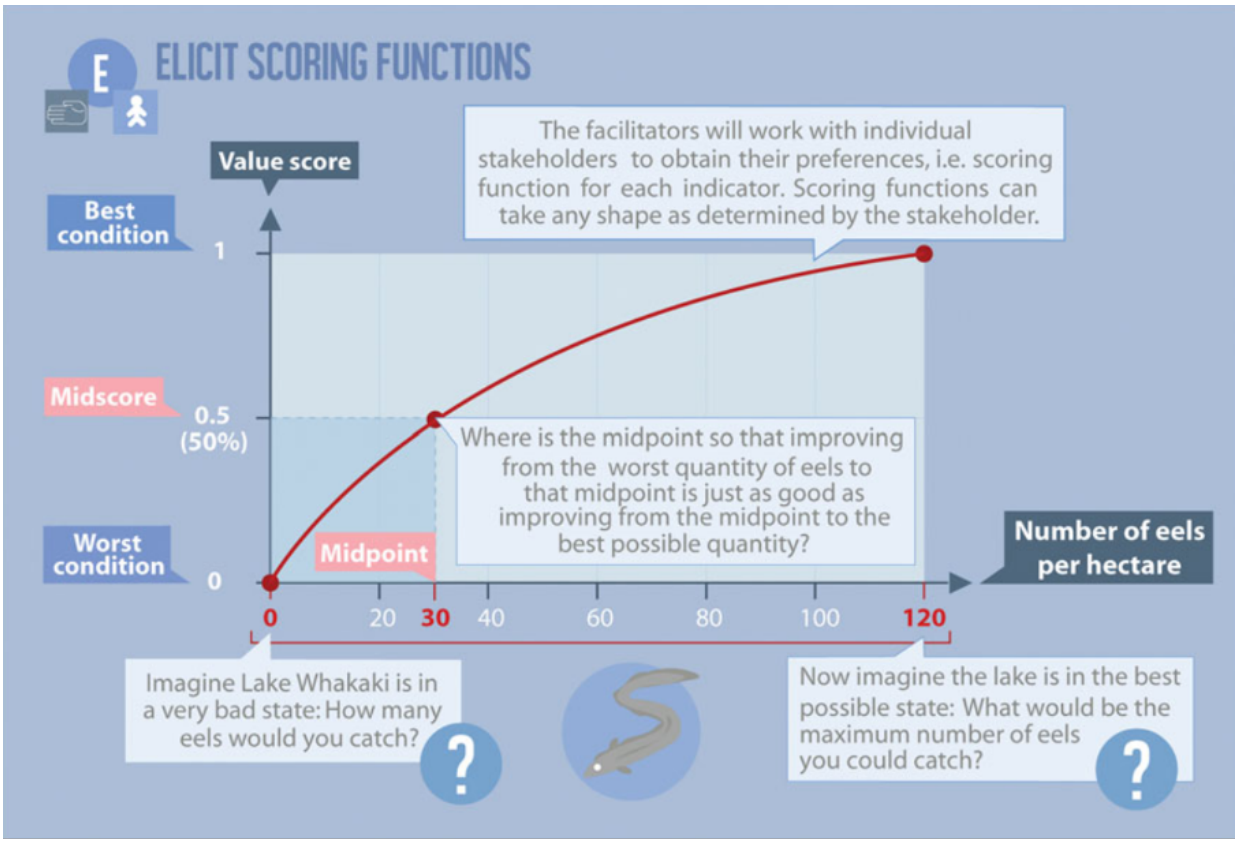

FIGURE 2. Example of the quantification of value preferences in the form of a scoring function. Scoring functions have a continuous scale from 0 to 1 on the y-axis and the considered range of the attribute in its original unit on the x-axis (0 = no achievement, 1 = full achievement of the goal). This step of the multicriteria decision analysis (MCDA) process is excluded from the main infographic, since it is the most complex one, requiring more detailed explanation [Colour figure can be viewed at wileyonlinelibrary.com] Langhans et al. (2019).

Statistical Analysis

To examine the level of importance community members assigned to certain management goals, we performed a cluster analysis of weightings for both the first and second-level goals given by the 36 interviewed community members. We performed the cluster analysis for both the first and second level goals separately using a statistical methodology derived from following a similar protocol to Harris-Lovett et al. (2019). Before performing the analysis, we removed one stakeholder from the dataset, as they did not wish to give any weightings for several management goals and clustering procedures are sensitive to missing data (Kaval, 2007).

We used 'R' software with the 'vegan,' 'cluster,' and 'indispecies' packages for the analysis. In accordance with Harris-Lovett et al. 2019, we performed an agglomerative hierarchical analysis using a Bray-Curtis distance matrix which uses dissimilarities of distances to produce stakeholder dendrograms (Figures 3A, B). To determine the optimal size of each cluster, we used a flexible-β linkage. For each of the two dendrograms produced, we selected a distance along the dendrograms' y-axis where the distance between clusters was greatest. This procedure resulted in 2 clusters for the first level goals ranging from 4-32 individuals and 2 clusters for the second level goals ranging from 1 to 35. We also calculated the Dunn index for both cluster dendrograms to validate the chosen cluster numbers, where different cluster numbers are tested and the Dunn index score between 1-infinity indicates the optimal cluster number where the Dunn index score is maximised. The Dunn index calculated for both cluster analyses revealed that 2 clusters was the optimal number of clusters for both the first and second level goals.

We also conducted an indicator species analysis to determine which management goals within each cluster most differentiated the cluster from the others based on that goal's weightings. These results are shown in Tables 1 and 2.

RESULTS

The weights stakeholders assigned to each first-level goal are shown in Table 1. The hierarchical cluster analysis of the stakeholder weightings given for the first-level goals resulted in two clusters (Figure 3A, Table 3). The Dunn Index for this analysis was maximised at 2 clusters with the value 0.32(2dp), indicating two clusters were the optimal cluster number for this analysis. Cluster 1 contained 32 stakeholders, with the cost-effective management plan being the main goal

characterising this cluster. Stakeholders in this cluster, therefore, gave high ratings to the goal of cost-effective management.

Cluster 2 contained four stakeholders. The indicator species analysis revealed that all members of this cluster gave sustainable economic activities and catchment and estuary health high weightings, and these are therefore the goals characterising cluster two.

The weights stakeholders assigned to each second-level goal are shown in Table 2. The hierarchical cluster analysis of the stakeholder weightings given for the second-level goals also resulted in two clusters (Figure 3B, Table 4). The Dunn Index for this analysis was maximised at 2 clusters with the value 0.91(2dp), indicating two clusters were also the optimal cluster number for this analysis. Cluster 1 contained 35 stakeholders, and the indicator species analysis showed that recreational activities, sustainable agriculture, and sustainable forestry were the management goals characterising cluster 1. Stakeholders in this cluster, therefore, gave high weight values to these three management goals.

Cluster 2 for this analysis contained only one stakeholder. The indicator species analysis showed that sustainable tourism was given a higher weighting by this cluster member than other stakeholders, and is therefore the goal characterising cluster 2 for this analysis.

TABLE 1. Weights for each of the first-level goals given by each stakeholder during the interview process using the reverse swing method.

Stakeholder	Catchment and Estuary Health	Sense of Place	Local Culture	Sustainable Economic Activities	Cost-effective Management Plan
1	32	13	19	19	26
2	22	20	20	20	20
3	22	22	20	18	18
4	28	19	22	28	3
5	25	25	5	20	25
6	29	29	17	11	14
7	22	18	18	22	20
8	27	22	22	27	3
9	22	20	22	17	20
10	20	22	21	18	19
11	33	23	23	10	10
12	20	20	22	20	18
13	30	24	24	13	9
14	25	19	19	20	19
15	26	15	19	19	21
16	25	20	23	18	15
17	25	17	25	12	21
18	20	20	20	20	20
19	20	24	24	17	15
20	26	23	21	15	15
21	31	25	19	6	19
22	23	23	23	18	14
23	24	15	15	30	15
24	27	14	14	22	24
25	18	20	16	23	23
26	24	19	19	19	19
27	29	3	9	57	3
28	26	20	29	17	9
29	23	18	18	23	18
30	25	20	20	20	15
31	22	20	20	20	20
32	19	21	19	21	19
33	30	18	12	22	18
34	27	7	7	33	27
35	26	18	21	13	21
36	36	18	7	36	2

TABLE 2. Weights for each of the second-level goals given by each stakeholder during the interview process using the reverse swing method.

Stakeholder	Catchment Health	Estuary Health	Native Birds	Invasive Species	Riparian Vegetation	Spit Vegetation	Indigenous Knowledge	Harvest Mahinga Kai	Recreational Activities	Sustainable Cockle Harvest	Sustainable Urbanisation	Sustainable Agriculture	Sustainable Tourism	Sustainable Forestry	Cost-effect Monitoring	Cost-effective Action
1	41	59	24	21	30	24	42	33	25	26	32	10	16	16	44	56
2	47	53	25	22	28	25	32	32	36	20	18	18	23	20	50	50
3	44	56	29	23	23	24	42	33	25	15	15	20	25	25	50	50
4	56	44	26	24	24	26	33	33	33	30	3	9	30	30	33	67
5	44	56	29	36	21	14	45	18	36	33	27	20	13	7	50	50
6	50	50	32	23	23	23	31	31	38	48	24	14	14	0	56	44
7	49	51	23	25	27	25	34	31	34	20	18	19	20	22	49	51
8	50	50	32	16	26	26	50	25	25	8	42	8	8	33	67	33
9	50	50	25	25	25	25	34	34	31	20	19	19	20	20	51	49
10	50	50	29	15	31	25	35	35	30	22	22	21	13	21	50	50
11	44	56	21	21	29	29	40	28	32	16	16	16	26	26	50	50
12	50	50	29	21	24	26	33	33	33	21	21	19	19	19	53	47
13	50	50	25	23	31	22	26	37	37	0	25	26	16	33	33	67
14	47	53	25	25	28	21	37	30	33	24	19	19	18	19	47	53
15	50	50	24	24	29	24	34	38	28	14	20	17	29	20	53	47
16	54	46	21	29	21	29	32	36	32	26	22	13	16	22	50	50
17	49	51	25	25	25	25	35	35	30	29	11	14	26	20	47	53
18	50	50	27	22	27	24	35	34	31	34	34	9	7	17	50	50
19	47	53	24	24	27	24	36	36	29	31	28	3	34	3	50	50
20	53	47	25	25	25	25	33	33	33	22	31	16	13	19	38	63
21	44	56	10	40	10	30	32	53	16	0	0	0	100	0	50	50
22	50	50	25	25	25	25	33	33	33	20	20	20	20	20	63	38
23	44	56	29	24	24	24	37	33	30	26	26	26	11	11	50	50
24	50	50	24	21	30	24	32	36	32	29	26	24	9	12	50	50
25	47	53	26	29	23	23	40	28	32	20	20	20	20	22	53	47
26	50	50	25	25	25	25	36	32	32	22	18	20	20	20	50	50
27	47	53	22	13	43	22	23	45	32	15	21	29	12	24	44	56
28	44	56	20	17	29	34	37	37	26	32	19	19	10	19	53	47
29	50	50	25	25	25	25	33	33	33	20	22	20	20	20	50	50
30	50	50	25	19	31	25	31	31	38	20	25	15	20	20	50	50
31	47	53	32	32	19	16	45	27	27	13	25	25	19	19	50	50
32	50	50	25	25	25	25	33	34	33	3	31	25	25	16	44	56
33	59	41	26	11	37	26	16	53	32	24	16	13	32	16	41	59
34	47	53	49	2	49	0	33	33	33	27	14	22	16	22	50	50
35	50	50	36	18	18	29	31	38	31	11	23	29	17	20	41	59
36	50	50	32	16	26	26	50	25	25	18	18	18	18	26	50	50

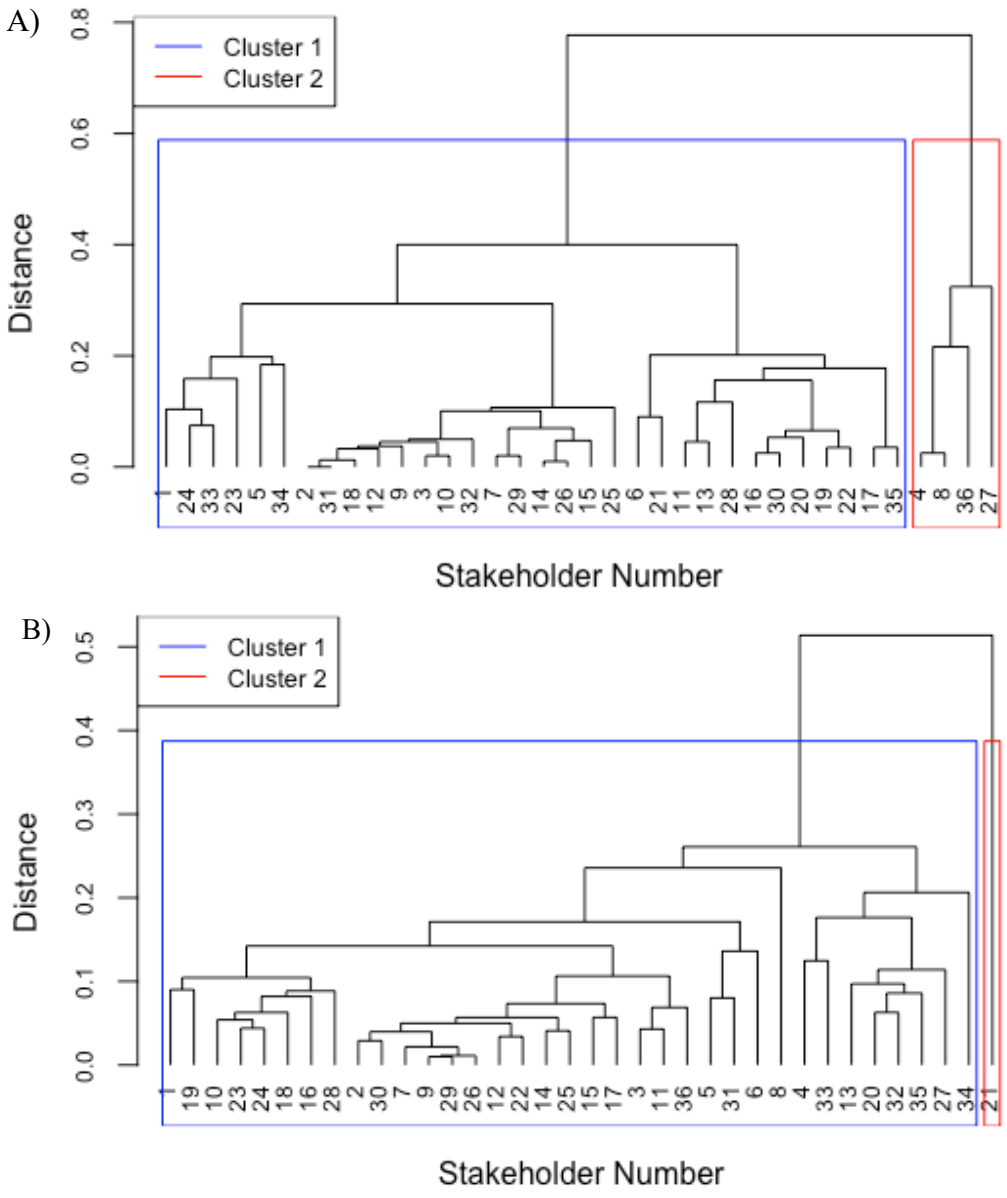

FIGURE 3. Dendrograms of stakeholders for A) first level goals and B) second level goals, created using hierarchical clustering with the two resulting clusters in each dendrogram highlighted with red and blue boxes. The dendrograms are based on Bray-Curtis distance with flexible-β to form the clusters.

TABLE 3. Stakeholder clusters based on weightings given for first level goals from the management goal hierarchy for Blueskin estuary and catchment. P-values indicate certain goals by which groups were significantly clustered due to weightings from the indicator species analysis, with significance level set at $p < 0.05$

Cluster Group	Group Objective	p-value	Stakeholder	Location	Background
1	Cost Effective Management Plan	0.0001	1	Waitati	Farming Background
			24	Waitati	Farming Background
			33	Waitati	Farming Background
			23	Waitati	Community Board
			5	Warrington	Community Member
			34	Blueskin Bay area	Cockle Harvest
			2	Waitati	Community Member
			31	Warrington	Commercial Fishing
			18	Purakanui	Community Member
			12	Waitati	Community Member
			9	Warrington	Community Board
			3	Waitati	Community Member
			10	Seacliff	Community Member
			32	Warrington	Farming Background
			7	Waitati	Community Member
			29	Seacliff	Community Member
			14	Waitati	Community Member
			26	Waitati	Community Member
			15	Dunedin	ORC
			25	Waitati	Community Member
			6	Warrington	Community Member
			21	Waitati	Community Member
			11	Waitati	Community Member
			13	Waitati	Local Business
			28	Karitane	East Otago Taiapure
			16	Portchalmers	Local Teachers
			30	Osborne	Halo Project
			20	Waitati	Community Member
			19	Purakanui	Community Member
			22	Karitane	Community Board
			17	Purakanui	Community Member
			35	Warrington	Otago Fish and Game
2	Sustainable Economic Activities	0.0001	4	Warrington	Community Member
	Catchment and Estuary Health	0.0219	8	Waitati	Community Board
			36	Warrington	Community Member
			27	Blueskin Bay Area	Forestry

TABLE 4. Stakeholder clusters based on weightings given for second level goals from the management goal hierarchy for Blueskin estuary and catchment. P-values indicate certain goals by which groups were significantly clustered due to weightings from the indicator species analysis, with significance level set at $p < 0.05$.

Cluster Group	Group Objective	p-value	Stakeholder	Location	Background
1	Recreational Activities	0.0279	1	Waitati	Farming Background
	Sustainable Agriculture	0.0279	19	Purakanui	Community Member
	Sustainable Forestry	0.0279	10	Seacliff	Community Member
			23	Waitati	Community Board
			24	Waitati	Farming Background
			18	Purakanui	Community Member
			16	Portchalmers	Local Teachers
			28	Karitane	East Otago Taiapure
			2	Waitati	Community Member
			30	Osborne	Halo Project
			7	Waitati	Community Member
			9	Warrington	Community Board
			29	Seacliff	Community Member
			26	Waitati	Community Member
			12	Waitati	Community Member
			22	Karitane	Community Board
			14	Waitati	Community Member
			25	Waitati	Community Member
			15	Dunedin	ORC
			17	Purakanui	Community Member
			3	Waitati	Community Member
			11	Waitati	Community Member
			36	Warrington	Community Member
			5	Warrington	Community Member
			31	Warrington	Commercial Fishing
			6	Warrington	Community Member
			8	Waitati	Community Board
			4	Warrington	Community Member
			33	Waitati	Farming Background
			13	Waitati	Local Business
			20	Waitati	Community Member
			32	Warrington	Farming Background
			35	Warrington	Otago Fish and Game
			27	Blueskin Bay Area	Forestry
			34	Blueskin Bay area	Cockle Harvest
2	Sustainable Tourism	0.0279	21	Waitati	Community Member

DISCUSSION

Public participation in environmental management is increasingly recognised as crucial for the success of management practices, as stakeholders are increasingly recognised as those affected by decisions and who may also influence the outcome of those decisions (Reed et al., 2009). However, stakeholder selection and categorisation for participatory management frameworks can be difficult (Harris-Lovett et al., 2019). This difficulty often arises due to underlying assumptions when selecting stakeholders for management participation, as it is often assumed that they will be primarily focused on goals directly pertaining to their particular business or background (Duggan et al., 2013). These assumptions can marginalise certain groups, bias results, and limit public

support for the process (Reed et al., 2009). For this reason, methods to help inform stakeholder analysis are becoming increasingly popular to include in participatory management frameworks to obtain more objective understandings of stakeholder values and management preferences (Reed et al. 2009).

The present study aimed to investigate whether the 36 selected stakeholders within and surrounding the Blueskin Bay community could be clustered based on their preferences for certain management goals with weightings assigned during interviews of step E of the MCDA process. The selected group of stakeholders was intended to represent a range of backgrounds and opinions. The 36 interviewed stakeholders consisted of agricultural, fisheries, forestry backgrounds, local government, NGOs, and general community members.

Results showed a large similarity among stakeholders for weightings of management goals. The majority of stakeholders were clustered together in one large cluster for both the first and second-level goals analyses. The analysis shows a large similarity among selected stakeholders for preferences of management goals. However, as indicated by the two smaller clusters of both the first and second level goals, there is some variation. The main priorities identified for the first-level goals were a cost-effective management plan, around which the majority of stakeholders were clustered, and sustainable economic activities and catchment-estuary health for the smaller cluster. For the second-level goals, all but one stakeholder was clustered around recreational activities, sustainable agriculture, and sustainable forestry, with the one stakeholder showing a preference for sustainable tourism. Stakeholders with backgrounds in farming, fisheries, and cockle harvest were clustered with a large proportion of other stakeholders around cost-effective management for the first-level goals and clustered with most stakeholders and other stakeholders from different economic backgrounds for the second-level goals. These results indicate it would be inaccurate to assume that those with certain economic interests would be primarily concerned with goals directly relating to their industry when they show similar preferences to other stakeholders.

Previous studies on grouping stakeholders based on shared interests have highlighted issues around assigning stakeholders to groups in relation to their backgrounds or expertise, as this grouping method could be misleading (Duggan et al., 2013). The consequences of such categorisation may lead to stereotyping and do a disservice to interested parties (Duggan et al., 2013). Since a substantial majority of stakeholders formed a single cluster in both the first and second-level goals, the notion that members of certain businesses and organisations may only be

interested in goals directly relating to their business or organisation may be unhelpful. This result is encouraging for further management discussions seeking to enhance dialogue, consensus forming, and social learning among stakeholders. Cluster analysis for stakeholder preferences may be beneficial to enhance collaborative management approaches in the future, as stakeholders from differing backgrounds could view themselves clustered with other stakeholders previously assumed to have differing preferences. This knowledge could then provide a basis for understanding and facilitate discussion around other management preferences (Duggan et al., 2013).

Our stakeholder selection process aimed to gather a diversity of backgrounds and opinions. However, most participants were from a general "community member" background, and many opinions from business and organisation backgrounds had only one participant representing their perspective. It may be beneficial to include multiple people from relevant businesses and organisations to gather a more extensive range of perspectives in future analyses. As stakeholders within the same professional role may have different environmental management preferences, they may not cluster together (Harris-Lovett et al., 2019).

Scope also remains for further categorising smaller clusters, as, although the indicator species analysis revealed no significant preferences for many other management goals, it is possible to look for more similarities between groupings through continuing with partitioning clustering techniques to reveal any finer details of cluster differentiation (Tuma et al. 2011).

CONCLUSION

Data collected during a multicriteria decision analysis on the Blueskin Bay community has revealed that the community management preferences and values are very similar, despite the community consisting of people from a number of different backgrounds. From the 36 individuals, we learned that establishing a cost-effective management plan was of high importance to the sampled group, as well as achieving good catchment and estuary health and establishing sustainable economic activity practices within the community. The second level goals analysis revealed again very similar responses from participants, with all but one person being clustered together and giving a high preference to recreational activities, sustainable agriculture, and sustainable forestry. Overall, the investigation revealed that much of the community has similar values and prioritises similar objectives. The results, unlike previous studies (Duggan et al., 2013), did not show that those with

certain economic interests would be primarily concerned with goals directly relating to their industry. A larger, more diverse group of participants may have resulted in a greater number of clusters and greater difference between these clusters, but this particular group of stakeholders and community members had very similar aspirations for the Blueskin Bay catchment and estuary.

CONSENT

Written informed consent for publication of the participants' preferences was obtained from the participants. The interviews were conducted according to the requirements of ethics and integrity in Article 34 of the H2020 Programme Multi-Beneficiary Model Grant Agreement, i.e. ethic's approval to interview stakeholders was granted by the Human Ethics Committee of the University of Otago.

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APPENDIX

Identifying weights for first-level goals:

First, imagine a hypothetical worst-case scenario in which none of the first-level goals are achieved; this scenario gets 0 points. Now, select which of the first-level goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.

Identifying weights for second-level goals under "Catchment and Estuary Health"

First, imagine a hypothetical worst-case scenario in which none of the second-level goals for catchment and estuary health are achieved; this scenario gets 0 points. Now, select which of the goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.

Identifying weights for second-level goals under "Sense of Place"

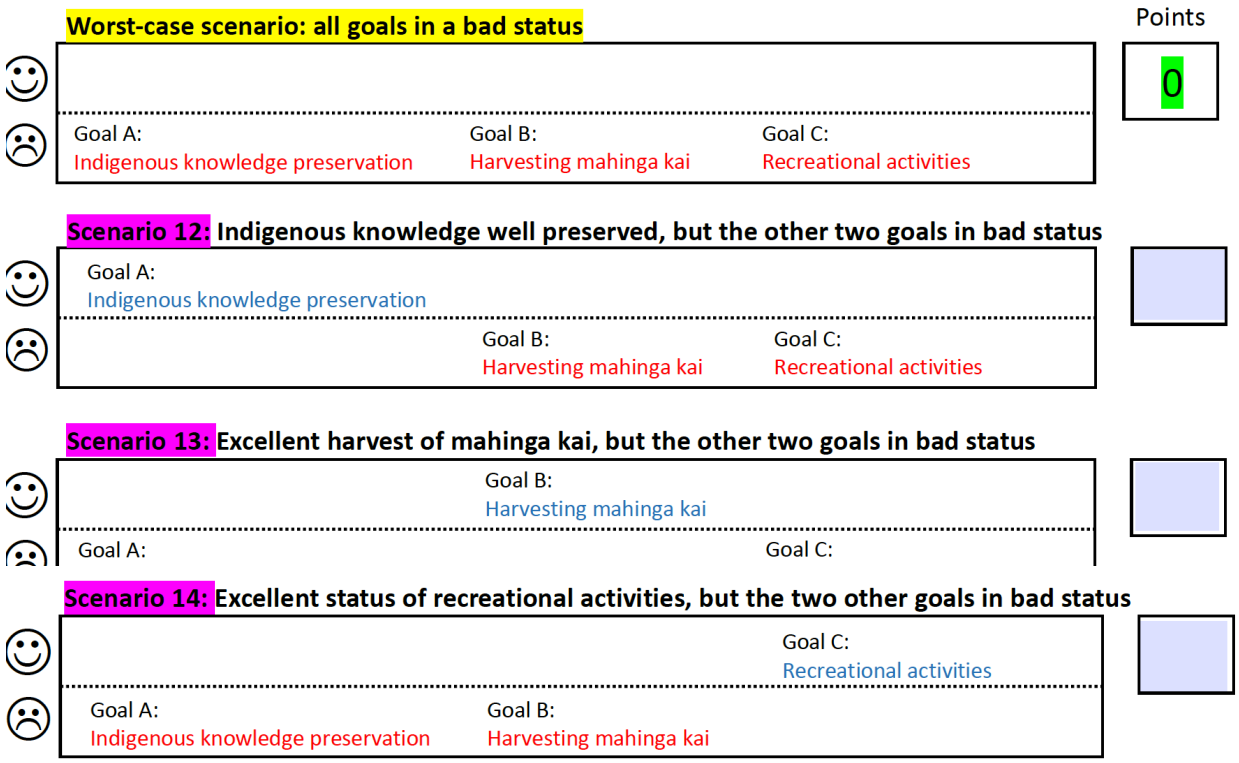
First, imagine a hypothetical worst-case scenario in which none of the second-level goals for sense of place are achieved; this scenario gets 0 points. Now, select which of the goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.

Identifying weights for second-level goals under "Local Culture"

First, imagine a hypothetical worst-case scenario in which none of the second-level goals for local culture are achieved; this scenario gets 0 points. Now, select which of the goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

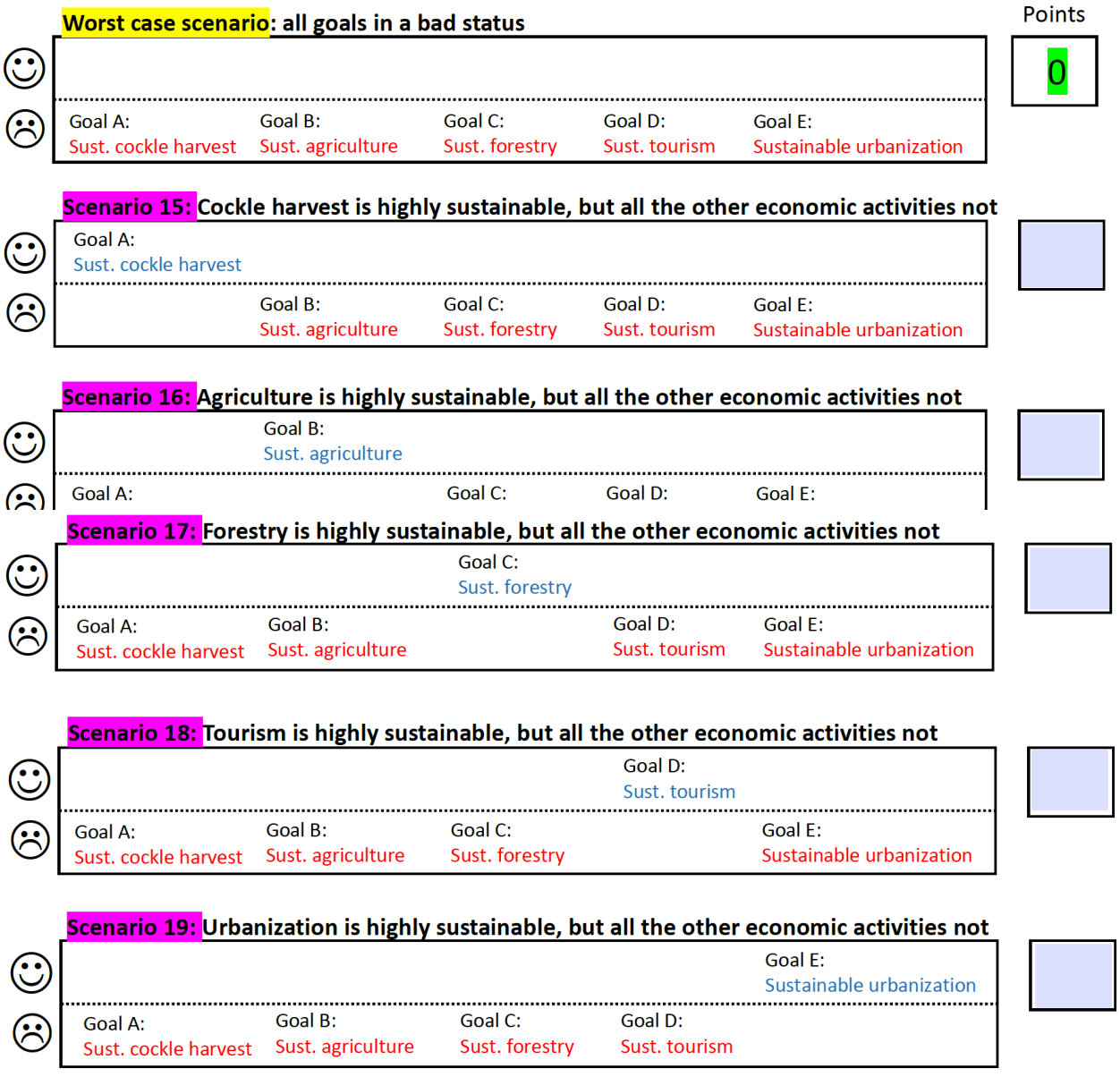
Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.



Identifying weights for second-level goals under "Sustainable Economy"

First, imagine a hypothetical worst-case scenario in which none of the second-level goals for sustainable economy are achieved; this scenario gets 0 points. Now, select which of the goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.



Identifying weights for second-level goals under "Cost-effective Management Plan"

First, imagine a hypothetical worst-case scenario in which none of the second-level goals for a cost-effective management plan are achieved; this scenario gets 0 points. Now, select which of the goals is the most important for you. Assign 100 points to the scenario in which your most important goal is achieved, but all other goals are not reached.

Now assign points from 0-100 to all other management goals in each scenario, comparing the worst-case scenario and the 100-point scenario. You can assign the same number of points more than once to each goal/scenario.