“Let me tell you your problems.”

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DOI
10.1016/j.geoforum.2018.11.018

Publication date
2019

Document Version
Final published version

Published in
Geoforum

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Citation for published version (APA):
“Let me tell you your problems”. Using Q methodology to elicit latent problem perceptions about invasive alien species

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ARTICLE INFO

Keywords:
Invasive alien plant species
Caribbean Netherlands
Latent problem perceptions
Stakeholder involvement
Q methodology
Participatory governance

ABSTRACT

From a participatory governance perspective, managing changes in ecosystems requires involvement of stakeholders. However, when the impacts of such changes are unclear or unknown, problem perceptions are latent and stakeholders cannot be identified. To elicit perceptions of an ecosystem change despite unknown impacts, we employed Q methodology regarding landscape values. From these perceptions we derived stakeholder stances on the ecosystem change constituted by the invasive alien plant Coralita (Antigonon leptopus) on the Caribbean Netherlands islands of St. Eustatius and Saba. Ecologists view Coralita as a clear threat, but the exact impacts of the plant are unknown and therefore locals do not have manifest problem perceptions. Nevertheless, we derived three perspectives on the value of nature per island, which in turn yielded insights into stakeholders' views on Coralita management. Our approach can be applied for other management questions regarding changes in ecosystems when the impacts on humans are unclear and hence problem perceptions latent.

1. Introduction

Biodiversity decline and ecosystem degradation are causing great worry to ecologists and environmental scientists, some of whom believe they herald the onset of the earth’s sixth mass extinction (Barnosky et al., 2011). However, the impacts on people of many of the changes to ecosystems are unclear, and therefore problem perceptions among actors are latent. An example is the decline in insect abundance, for which the impacts on people are hard to define, resulting in little priority being given to slowing the decline (Brugh, 2017; Vogel, 2017). Another example: changes to the nitrogen cycle, which affect processes like eutrophication and acidification whose impacts on people are difficult to define precisely (Galloway et al., 2014; Reis et al., 2016). The impact of an ecosystem change can be unclear due to the complexity of the phenomenon or uncertainty about its materialisation (Renn et al., 2011). It could be that if the impacts were clarified, people would be able to articulate their perception and stakeholders could be identified. But in this article, we work on the premise that these impacts cannot be clarified and that this hampers people from articulating a perception, rendering their perceptions latent. This latency makes it difficult to identify stakeholders that could be engaged in governance activities, resulting in a significant problem from a participatory governance perspective. We propose a method for identifying stakeholders despite latent problem perceptions, which we test on the case of invasive alien species (IAS) management in the Caribbean Netherlands.

Participation of stakeholders is crucial for IAS management for several reasons. One is that problem perceptions of IAS are not defined by factual knowledge but by value orientations, attitudes and underlying belief systems (Verbrugge et al., 2013; Humair et al., 2014; Stokes et al., 2006). For example, feral hogs on Hawaii are considered by scientists as an IAS that needs to be eradicated, whereas locals view the hogs as bounty and as important in cultural practices (Weeks and Packard, 2009). If these different perceptions are not represented, policy processes are hindered (Sharp et al., 2011; Shackleton and Shackleton, 2016). A second reason is that management of IAS requires unanimous cooperation given its weakest-link public good character (Niemiec et al., 2016). This becomes a challenge when impacts of species are unclear (Hulme, 2006), as is the case for coral vine (Antigonon leptopus) on the Caribbean Netherlands islands Saba and St. Eustatius. Little research exists on the impacts of the vine, but it has been documented to rapidly cover vast areas and as very tough to remove due to its tuberous roots (Burke and diTommaso, 2011). It is deemed a threat to biodiversity, including to the native iguana (van der Burg et al., 2012), and is generally considered a serious risk in the Caribbean...
Netherlands by ecologists (Smith et al., 2014; Jongman et al., 2010). But impacts are very hard to specify further, and there’s even uncertainty about which impacts might occur (Sweeney, 2018). Hence, stakeholders’ problem perceptions are latent and there are no prospects of providing them with information to enable them to articulate their perceptions.

We propose and test an approach to identify stakeholder groups despite latent problem perceptions. It consists of two main elements: Q methodology to map the range of extant perspectives, and focusing the analysis on landscape values rather than invasive species. From the resulting perspectives on landscape values, we elicited problem perceptions about IAS, as well as views on the appropriateness of conservation efforts. Thus, this article contributes to the participatory governance literature by exploring how to identify stakeholders even in cases of latent problem perceptions. This can be of value in similar cases of ecosystem changes whose impacts on people are unknown.

2. Participatory governance and invasive alien species

Participatory governance is increasingly advocated for and applied to environmental and ecological challenges (Armitage, 2009; Folke et al., 2005; Papadopoulos and Warin, 2007). Participatory governance promotes more inclusive and less top-down forms of management and stresses the involvement of actors who would normally not be engaged in decision-making, such as locals (Newig et al., 2018). Arguments for increased participation of stakeholders can be categorised as being normative, substantive or instrumental (Gluckler et al., 2013). Normative arguments include, for example, that participation has an emancipatory effect on otherwise underrepresented groups (Dietz and Stern, 2008), fosters social learning and allows those affected by a decision to influence it, increasing the democratic value of a process (Gluckler et al., 2013). Substantive arguments expect greater effectiveness of participatory governance, since stakeholders are a valuable source of local, experimental and value-based knowledge and insights (Gluckler et al., 2013; Bulkeley and Mol, 2005). Instrumental arguments hold that acceptance and compliance are higher in actors who have been involved in the decision-making process, and that the legitimacy of a participatory process is greater (Koonzt and Thomas, 2006; Dietz and Stern, 2008). These alleged strengths of participatory governance have resulted in different practices of stakeholder involvement in management of ecosystems and natural resources: for example, communities managing resources through collective institutions (Dietz et al., 2003; Ostrom, 1990), through adaptive co-management (Berkes, 2009), community-based natural resource management (Dressler et al., 2010), or as collaborative networks in ecosystem-based management ( Bodin et al., 2017).

Naturally, participatory governance is not a panacea and shortcomings and threats have received ample attention in the literature. For example, Dressler et al. (2010) showed for several cases of community-based natural resource management how the resource was not managed more sustainably or more equitably. When conservation was prioritised, communities sometimes ended up with less of a say in the management of their resource than before the programme (Dressler et al., 2010). Fletcher (2017) stresses the importance of analysing governance strategies and structures through which conservation is enacted, since stakeholders’ positions are grounded in different “governmentalities”. “Governmentality” is a portmanteau term coined by Foucault from “governing” and “mentality” (see Hanson, 2012); it designates strategies and structures through which power is enacted (Buseth, 2017; Fletcher, 2017). There exist multiple governmentalities (e.g. neoliberal, disciplinary, truth), and conservation practices come about through their interplay (Montes and Bhattarai, 2018; Fletcher, 2017). Participatory governance thus does not guarantee that governance will be either sustainable or equitable if the governmentalities of the actors involved lead to different positions on what is appropriate environmental management. On a more practical level, several shortcomings have been pointed out as well. Bockstael et al. (2016) provide an overview of criticisms of participation made in the development literature. Factors they mention are: local elites capturing the rights that are devolved to a decentral level; power imbalances not being taken into account; a technocratic approach to participation; too strong a focus on the local situation and neglecting the broader institutional context; assuming every local community is similar; co-opting participation to promote different interests; and devolving responsibilities without the corresponding resources (Bockstael et al., 2016). Mentioned regularly is the limited capacity of participatory approaches to solve situations with strong conflicts (Newig and Fritsch, 2009); it might increase conflicts (Walker and Hurley, 2004) or serve merely a symbolic purpose (Sotirov et al., 2015).

Thus, participation is in itself not a guarantee for making environmental governance socially and ecologically successful. But the literature does point towards a few conditions and contextual factors that can enhance the performance of participatory governance. Based on Natura2000 experiences, Blondet et al. (2017) confirm the claims made by Turnhout et al. (2010) and Van der Arend and Behagel (2011) that extant conservation practices mediate the materialisation of participation. As a result, Blondet et al. (2017) find that participation mainly affects the usual suspects but does really grant them more influence. This is what the risk of elite capture is grounded in. Crucial to prevent that are local leadership and the integration of multiple perspectives and processes to resolve conflicts (McMorran et al., 2014). Also pointed out frequently is the importance of taking the community’s livelihood into account, and how conservation efforts would affect the resources the community depends on (Gardner et al., 2016; Bluwstein, 2016). For communities to participate successfully, there must be substantial benefits for them from the proposed conservation efforts and decision-making must be well-informed (Bluwstein et al., 2016). Additionally, they should be involved in management tasks related to the area or resource (De Pourcq et al., 2015). Sometimes contradictions arise as well: for example, Bluwstein et al. (2016) assert that real power needs to be devolved to democratically elected bodies, while Ece (2017) shows how such a devolvement of responsibility can actually make an institution less capable of representing its constituents. Similarly, trust and other aspects of social capital are often mentioned as conducive to participatory governance (De Pourcq et al., 2015; Blondet et al., 2017), while strong bonds among participants can also result in coalitions that exclude others (McMorran et al., 2014). Lastly, it has been suggested we change our perspective or frame of reference when looking at participatory governance. Bouamrane et al. (2016) discuss biosphere reserves in Africa and France, arguing that when trying to reconcile developmental and conservation efforts, ecological solidarity is a more appropriate frame than human–nature interdependency. De Pourcq et al. (2015) argue that effectiveness of participatory governance should be assessed in terms of conflict prevention, and their study shows good outcomes for co-management of that issue.

Overall, while participation may have its shortcomings and pitfalls, involvement of the local community is in principle preferable over no involvement at all (Lährs et al., 2018; Turnhout et al., 2010). To that end, there is a wide range of literature available on stakeholder analysis and involvement methodology (e.g. Vasslides and Jensen, 2016; Lopes and Videira, 2016). We argue that for our case, the applicability of such approaches is limited given the unclear impacts on people of the ecosystem change at hand. This is because even when the stakeholder involvement approaches acknowledge that stakeholders’ preferences are often unarticulated, the approaches assume that stakeholders can be identified and their preferences elicited (e.g., Tompkins et al., 2008). We contend that when impacts on people are unclear, problem perceptions are latent and hence stakeholders cannot be identified. The objective of this article is therefore to develop and validate a method to ascertaining stakeholder stances in such situations, in order to allow for proper stakeholder involvement notwithstanding latent problem perceptions. Specifically, we aim to show how Q methodology can be used.
for eliciting latent problem perceptions. First, however, we discuss some details of the case.

3. Invasive alien species on Saba and St. Eustatius

Ecologists list IAS as one of the major threats to biodiversity, with cost estimates ranging from €12 billion a year for the EU to €120 billion a year for the USA (Shine et al., 2010; Pimentel et al., 2005). On islands they are generally assumed to be an even larger threat to biodiversity because island ecosystems are fragile (Reaser et al., 2007; Kairo et al., 2003), although not everyone agrees (see Vilà et al., 2011; Sax, 2008). Nonetheless, there is a lot to be lost on Caribbean islands, as one of the world’s 25 global biodiversity hotspots with about 60% of the region’s 12,000 plant species being endemic (Kairo et al., 2003; Mittermeier et al., 1998).

We conducted our study on Saba and St. Eustatius (commonly known as Statia), part of the Caribbean Netherlands: see Fig. 2 for a map. Saba measures 13 km² and as such is the smallest of the two. It is known as Statia, part of the Caribbean Netherlands: see Fig. 2 for a map. Saba measures 13 km² and as such is the smallest of the two. It is known as Statia, part of the Caribbean Netherlands: see Fig. 2 for a map. Statia is located about 30 km southeast of Saba, has a population of 3200 people and is slightly larger: 21 km². It has a dormant volcano known as The Quill, which forms the highest point of the island at 600 m. During the colonial period it accommodated about 70 plantations, mainly located on the flat areas in the centre of the island. Currently, some agriculture still takes place, but the main economic activity is the oil terminal of the US company NuStar (DLG, 2011; de Freitas et al., 2012; CBS, 2017). Statia is located about 30 km southeast of Saba, has a population of 3200 people and is slightly larger: 21 km². It has a dormant volcano known as The Quill, which forms the highest point of the island at 600 m. During the colonial period it accommodated about 70 plantations, mainly located on the flat areas in the centre of the island. Currently, some agriculture still takes place, but the main economic activity is the oil terminal of the US company NuStar (DLG, 2011; de Freitas et al., 2012; CBS, 2017).

On both islands the invasive alien plant Coralita (Antigonon leptopus) is known to smother native vegetation and overgrow the nesting sites of the already endangered native Iguana delicatissima (van der Burg et al., 2012). On Statia the plant is estimated to cover 15–20% of the island (van der Burg et al., 2012), predominantly former agricultural land but also land on the borders of the national parks. On Saba, Coralita is starting to creep up the mountain that is crowned with a unique elfin forest which attracts many tourists (van de Kerkhof et al., 2014a, 2014b). Reports written to support Coralita management so far have not taken stakeholders’ perspectives into account (e.g., Smith et al., 2014; van der Burg et al., 2012), perhaps because there are no identifiable stakeholder groups.

Although the Coralita invasion is a very visible phenomenon, during previous fieldwork we were repeatedly confronted with the absence of clear stakeholder groups. Locals all know the plant: some regard it as a nuisance in their garden, while others find the flower beautiful. But a lack of knowledge about the vine’s impacts was often mentioned as obstructing decision-making. Given the limited scientific understanding and knowledge of impacts of IAS, this gap cannot easily be filled (Barney et al., 2013). Thus, people are hampered in articulating their perceptions of the change to the ecosystem, and these latent problem perceptions make it impossible to identify stakeholders to involve in Coralita management. In this article we aim to elicit problem perceptions so that stakeholder groups can be identified and involved in the decision-making process regarding Coralita.

4. Methodology

4.1. Q methodology and landscape values

Q methodology was introduced by William Stephenson in the 1930s (Stephenson, 1953), applying ideas from quantum physics to the study of subjectivity. Wanting to diminish the influence of the researcher on data gathered from respondents, Stephenson proposed a method to collect self-referent expressions and find order across them. The underlying assumption is that such self-referent expressions can be understood as a form of behaviour and are an adequate representation of subjective meanings (McKeown and Thomas, 2013). This is considered an improvement over approximating respondents’ subjectivity through objective traits and characteristics, which is at the centre of conventional R analysis, (Steelman and Maguire, 1999). More concretely, this means that while covariation between variables across participants is usually the object of interest, what is of interest for Q is covariation between persons’ perspectives (i.e. their Q sorts) across statements (Webler et al., 2009). Though initially applied in psychology, Q methodology is increasingly being applied in environmental research to understand human perspectives regarding, for example, conservation issues: topics range from the necessity of conservation (Sandbrook et al., 2011) to the why and how of climate adaptation (Uittenbroek et al., 2014). A recent review of 52 articles applying Q methodology on nature conservation discerned four general aims of Q methodology: addressing conflict, devising management alternatives, gauging policy acceptability, and reflecting on values implicit in research and practice (Zabala et al., 2018). Such different aims can be realised because of the structured and in-depth representation of people’s thoughts generated through Q methodology. Structured, since the methodology forces people to order each thought in relation to every other thought; and in-depth, because it queries people’s thinking about a topic through a variety of statements (Webler et al., 2009). Q can be applied for understanding human perspectives on three analytical levels. One, to simply map perspectives in a qualitative manner, revealing perspectives on a certain topic (Uittenbroek et al., 2014), is frequently used as a proxy for discourses (Webler et al., 2009). Two, because of the structured and in-depth approach, Q is used to uncover value patterns underlying people’s attitudes, explaining why people hold certain perspectives (Ellis et al., 2007). Three, building on that, a shared value system can be developed among stakeholders, which is considered crucial for community-based governance (Gruber, 2011). Q has, for example, been used to find common ground between contradictory problem narratives about the much contested issue of large carnivore conservation (Mattson et al., 2006). We aim to employ the capacity to uncover underlying value patterns for eliciting stakeholders’ latent problem perceptions.

This is a new use of Q methodology, and different from the application by Mazur and Asah (2013) to reveal latent agendas fuelling conflict about the recovery of the grey wolf in Washington State. Their Q study showed that people asserting that wolves and society are incompatible in fact express discontent about the conditions under which wolf recovery projects would be executed. By also acknowledging marginalised or hidden views (Zabala et al., 2018), Q methodology has brought to the fore beliefs that a regular survey might have missed. Based on their finding, Mazur and Asah (2013) assert that addressing the seemingly peripheral apprehension about legal arrangements of the project will ameliorate people’s stance on incompatibility. The latency addressed in that article differs from ours, in that their topic in itself is much contested and one about which actors have strong opinions. We, however, are interested in a topic on which views are not strong, which brings us to the second innovative aspect of our approach. Q has been applied sporadically in invasive species research (e.g. Falk-Petersen, 2014; Hamadou et al., 2016), but never regarding what Zengeya et al. (2017) refer to as “inconsequential species”. We assume that although perceptions about Coralita are latent, people are capable of articulating their opinion about nature’s value, and this can be linked to potential impacts of Coralita. We therefore used the landscape services typology proposed by Van Riper and Kyle (2014) as the basis for our Q statements, which has not been applied this way before.

Before explaining how we designed our study, we would like to draw attention to some important limitations of Q methodology. The most important is that it reveals the diversity of opinions present across
participants, but not their relative prominence. That is to say, at the end of a Q study you know the ways in which people think, but not how many people think in a certain way (Sandbrook et al., 2013). This could be remedied by combining it with a large-scale survey, for which Danielson (2009) offers several approaches. Moreover, the method is cognitively rather demanding for participants, and the researcher needs to construct a set of statements that is comprehensive, yet for respondents is possible to grasp and sort in a reasonable time span (Mukherjee et al., 2018). In the following we will explain how we dealt with these concerns in the design of our Q study, followed by its application.

4.2. Designing the Q study

The ability of Q to uncover underlying values in a relational manner is due to the structured way in which participants are asked to relay their opinion. Each participant receives a set of statements on cards and is asked to place them on a normal-curve-shaped grid according to their own views on the topic, as depicted in Fig. 1. Allowing more cards to be placed in the middle than towards the extremes forces the participant to articulate their opinion. The result is called a Q sort (McKeown and Thomas, 2013; Webler et al., 2009). The statements can be gathered in two ways: structured or unstructured. Unstructured approaches aim to collect an all-encompassing “concourse” (Q-terminology for corpus) of statements from which a representative sample is taken. Structured approaches are appropriate when the research is based on a theory that entails certain concepts and views, for example, or when it is not feasible to collect an all-encompassing concourse (Watts and Stenner, 2012). Because there has been scant public debate in the Caribbean Netherlands about invasive species, there was no extant concourse to draw from and so we constructed the sample. As mentioned earlier, we used the landscape services typology, which has been promoted as being appropriate for assuring stakeholder involvement, since it reflects local relevance and centres around values to humans (Fagerholm et al., 2012). We used the values discerned by Van Riper and Kyle (2014), based on Raymond and Brown (2006). We adapted the values to make them applicable for Saba and St. Eustatius: see Table 1. Overlap between the values as seen by participants is discussed in Section 5. We take the concern raised by Mukherjee et al. (2018) regarding bias in the selection of statements to heart, and therefore included every landscape value, irrespective of our expectations regarding its relevance.

Pertaining to each substantive value, we formulated four statements following Dryzek and Holmes’ (2002) typology of discursive claims that

Table 1
Landscape values for Saba and St. Eustatius, contextualised based on Van Riper and Kyle (2014).

<table>
<thead>
<tr>
<th>Landscape values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetics</td>
<td>Attractive scenery, sounds and smells</td>
</tr>
<tr>
<td>Agriculture and livestock</td>
<td>Agriculture1 and livestock providing income and food</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>The variety of plants, wildlife, marine life and other living beings</td>
</tr>
<tr>
<td>Future value</td>
<td>Allowing future generations to experience Saba/Statia the way I experience it</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>The importance of nature in and of itself</td>
</tr>
<tr>
<td>Medicine</td>
<td>Plants or animals with medicinal and therapeutic powers</td>
</tr>
<tr>
<td>Recreation and relaxation</td>
<td>Undertaking outdoor activities to recreate and unwind</td>
</tr>
<tr>
<td>Science and learning</td>
<td>Scientific activities and learning about Saba’s/Statia’s nature and culture</td>
</tr>
<tr>
<td>Spiritual and religious</td>
<td>The spiritual or religious meaning of Saba’s/Statia’s nature</td>
</tr>
<tr>
<td>Supporting cycles</td>
<td>The cycles that produce clean air, soil and water</td>
</tr>
<tr>
<td>Tourism</td>
<td>Attracting tourism which provides employment and income</td>
</tr>
<tr>
<td>Utilities</td>
<td>Clean drinking water and electricity generation through solar and wind power</td>
</tr>
</tbody>
</table>

1 By agriculture, we mean the growing of crops and fruit.
common stakeholder analyses. One is that since the purpose is to relay
sample of participants, which differs in two important ways from other
4.3. Conducting Q sorts
The differences in perspectives are important to ensure management
course, emphasizing the landscape values of tourism, aesthetics, relax-
Aesthetics; agriculture and livestock; recreation and relaxation; utilities
Aesthetics; biodiversity; recreation and relaxation; spiritual and religious; tourism
Aesthetics; agriculture and livestock; utilities
Aesthetics; biodiversity; tourism
Agri-ruralist
Utilitarian
Hedonist
Community sustainability
Nature conservation
Taking close to an hour) and their cognitive capacities (sorting 48 cards
4.2.1. Discourse typology
To have some handles for interpreting the perspectives yielded by
the Q sort, we link them to five discourses identified for rural land-
scape in Europe (Hermans et al., 2010; Elands and Wiersum, 2001).
Table 3 shows which landscape values we consider to be connected to
each discourse, given the description of the discourse in the literature.
We do not aim to link each perspective we identified to one of the
discusses below but have characterised them heuristically by
Agri-ruralist
Utilitarian
Hedonist
Community sustainability
Nature conservation
During the ordering of abstract thinking).
Participants were instructed to sort the cards by placing each
statement in a column ranging from \(-5\) (“least in line with my
thinking”) to \(+5\) (“most in line with my thinking”) as shown in Fig. 1.
This entails selecting participants whose opinions
the earlier-mentioned cognitively demanding sorting process for the
statements, we collected sorts from 16 participants on Saba, and 32 on
Statia from which we randomly selected 16. The larger number of in-
terviews on Statia reflects the island’s larger population and our wish to
represent all their perspectives. We selected participants whom we
expected to have a range of very different thoughts about the value of
nature, to make sure we would elicit the breadth of opinion regarding
the value of nature. Hence our participants were as much as possible
evenly distributed across nature management organisations, the agri-
cultural sector, government, education and tourism, and we also in-
cluded citizens with no clear stakes regarding nature. Two other im-
portant selection criteria were their availability (since the interview
took close to an hour) and their cognitive capacities (sorting 48 cards
with hypothetical statements in a relative manner requires a high level
of abstract thinking).
Participants were instructed to sort the cards by placing each
statement in a column ranging from \(-5\) (“least in line with my
thinking”) to \(+5\) (“most in line with my thinking”) as shown in Fig. 1.
We explained which statements to expect beforehand and suggested the
participants first divide them in two stacks: agree or disagree. Some of
them did so. We gave no specific information regarding Coralita or the
state of nature on the islands, since we were interested in extant per-
ceptions. If a participant asked us, for example, about Coralita’s impact
on biodiversity, we shared our knowledge on that. During the ordering
process we engaged in conversation about the participant’s thoughts, to
clarify interpretations of the statements. We have integrated our notes
in the result section, along with the factor analyses of the Q sorts.
4.4. Analysing the Q sorts
We conducted a Principal Component Analysis (PCA) with Varimax
rotation on the sorts, using PQmethod (Schmolck, 2014). PCA is applied
frequently in environmental research to extract uncorrelated axes of
make up a perception, as described in Table 2. We thus had 48 cards
with statements regarding the value of nature on the respective islands,
which we think is still within the limits of what respondents are able to
grasp in one interview.

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How do you value your island’s nature?

<table>
<thead>
<tr>
<th>Least like how I think</th>
<th>Most like how I think</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td></td>
</tr>
<tr>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>+2</td>
<td></td>
</tr>
<tr>
<td>+3</td>
<td></td>
</tr>
<tr>
<td>+4</td>
<td></td>
</tr>
<tr>
<td>+5</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 2. Board used for Q sorts.

variation (Spruijt et al., 2016; Falk-Petersen, 2014; Cheng and Mattor, 2006). Concerning factor extraction, Kaiser’s criterion of including all factors with an Eigenvalue > 1.00 and looking at the scree plot of the Eigenvalue of the factors resulted in big differences in the factors included. As suggested by Peter Schmolck via e-mail (p.c. Schmolck, 30 April 2017), we therefore adhered to a more iterative selection method, by looking at the resulting factor loadings and the amount of significant sorts for different factor solutions. Significant loading is established with help of the formula 

$$\text{ABS SE ABS}(2.58)(\frac{1}{\sqrt{N}})$$

where $N$ is the amount of statements, i.e. 48. Thus, every loading greater than ABS(0.37), i.e. loading $> 0.37$ or loading $< −0.37$ is significant ($p < 0.01$) (McKeown and Thomas, 2013, 53). Following Schmolck, during the flagging procedure, the correlation between factor scores was kept as low as possible, confounding sorts were not flagged and a minimum of three significantly loading sorts per factor was pursued. This resulted in three factors for each island, which we regard as proxies for perspectives, representing views held about a certain topic. They are discussed below.

5. Results

5.1. Saban perspectives on the value of nature

The data from the Saban participants yielded three main perspectives on the value of nature: future-oriented nature conservation, modern utilitarian and optimistic agri-ruralist. These titles are inspired by the discourses presented in Table 3. We discuss them one by one below and conclude by assessing their implications for reaching agreement on Coralita management. The ranks the participants attributed to the statements are shown in Table 4, organised by landscape value. In Table 4 we have abbreviated the statements as follows: “Important Saba: X” means “X is an important value of Saba’s nature”; “Pressure Saba: X” means “X is under pressure on Saba”; “Coralita Saba: X” means “If Coralita would impact X, I would be worried”; “Protect Saba: X” means “We need to protect X on Saba”. Tables 1–6 in the Supplementary material show the ranks per discursive element and per factor, and Table 7 the consensus statements.

5.1.1. Future-oriented nature conservation

This perspective contends that nature has an intrinsic value and should be safeguarded for the future; hence it is strongly protection-oriented, while having an optimistic view of the state of nature. In this perspective, nature’s intrinsic value and value for future generations are considered to be very important and worthy of protection (scored +5 and +4). Concerns about a brain drain of young and talented Sabans surfaced in some of the interviews. The perspective strongly rejects any pressure, including Coralita’s, on nature’s medicinal and spiritual or religious value (both −5). The spiritual and religious value of nature is mostly seen as finding peace of mind. In general, this perspective does not believe that much pressure is being exerted on nature – not even on the aspects that it strongly feels should be protected, namely its intrinsic value and value for future generations. In line with this, Coralita does not raise much concern either, except slightly in relation to aesthetics and biodiversity (both +2). Given the perception that neither pressure nor threats are problematic, it is interesting that this is the most protection-oriented factor, with the highest ranks for protection overall. The values specifically deemed to need protecting are tourism, nature’s intrinsic value and nature’s value for future generations; they are considered important values, but not really under pressure. During the interviews, respondents often mentioned tourism as necessary, but only in a certain way. Large-scale formats with zip lines etcetera are deemed inappropriate for Saba. Values found to be unimportant, such as medicinal value or spiritual value, do not need to be protected. An explanation for the protection focus despite the optimistic view on the condition of nature could be that participants believe that the protection of intrinsic value and values for future generations requires the preventive protection of other values as well. And a protection focus may be inherent to the focus on future generations.
This perspective stands out from the others in its articulaterejection of the spiritual or religious value of nature: it is not important, does not need to be protected. Coralita does not affect it, and it is not under pressure. Any spiritual or religious value is strongly rejected by this perspective. This perspective is the least concerned with pressure on nature, placing all pressure statements at the negative end of the continuum, particularly those concerned with aesthetics (−5), tourism (−4) and future generations (−3). However, in the interviews, the burning of garbage and diesel generators were mentioned as detrimental for the environment. Coralita is explicitly not considered to be a threat to recreational (−3) and scientific (−2) values of nature, since these values are not considered to be important. These are almost the only two values considered to be unimportant. This perspective is rather optimistic: nature is very important in many ways and under little pressure. Yet its adherents do have a clear view on the potential impacts of Coralita and feel quite strongly about protecting important values in a preventive way, whether or not they are under pressure.

5.2. Statian perspectives on the value of nature

In Statia we obtained 32 Q sorts, from which we drew a random sample, as discussed in Section 4.3. This sample yielded three perspectives: nature conservation for tourism, utilitarian scientists and bright future for community sustainability. The titles are again based on the discourses presented in Table 3. The ranks the participants attributed to the statements are shown in Table 5, organised by landscape value. In Table 5 we have abbreviated the statements as follows: “Important Statia: X” means “X is an important value of Statia’s nature”; “Protect Statia: X” means “If Coralita would impact X, I would be worried”; “Pressure Statia: X” means “X is an important value of Statia’s nature”; “Pressure Statia: X” means “If Coralita would impact X, I would be worried”; “Protect Statia: X” means “If Coralita would impact X, I would be worried”; “Protect Statia: X” means “We need to protect X on Statia”. Tables 8–13 in the Supplementary material show the ranks per discursive element and per factor, and Table 14 the consensus statements.

5.2.1. Nature conservation for tourism

This factor sees the intrinsic value of nature, as well as biodiversity, as being under pressure and therefore requiring protection. Coralita’s potential impact on biodiversity and supporting services is worrisome. This perspective scores the importance of tourism conspicuously high (+5) and contends that it warrants protection. Nature thus seems to serve as a tourist attraction, and as neither recreation nor aesthetics score high, tourism for outsiders as a source of income seems most important. The titles are again based on the discourses presented in Table 3. The ranks the participants attributed to the statements are shown in Table 5, organised by landscape value. In Table 5 we have abbreviated the statements as follows: “Important Statia: X” means “X is an important value of Statia’s nature”; “Protect Statia: X” means “If Coralita would impact X, I would be worried”; “Protect Statia: X” means “We need to protect X on Statia”. Tables 8–13 in the Supplementary material show the ranks per discursive element and per factor, and Table 14 the consensus statements.

5.1.3. Optimistic agri-ruralism

This perspective is explicitly worried about Coralita’s impact on agriculture (+5) and on biodiversity (+4), which are considered very important values of nature (both +4), although again a distinction is drawn between keeping livestock and growing crops. Utilities and supporting cycles need to be protected even though they are not under pressure. They are, however, important; a combination that also applies to intrinsic and touristic value. This perspective is the least concerned with pressure on nature, placing all pressure statements at the negative end of the continuum, particularly those concerned with aesthetics (−5), tourism (−4) and future generations (−3). However, in the interviews, the burning of garbage and diesel generators were mentioned as detrimental for the environment. Coralita is explicitly not considered to be a threat to recreational (−3) and scientific (−2) values of nature, since these values are not considered to be important. These are almost the only two values considered to be unimportant. This perspective is rather optimistic: nature is very important in many ways and under little pressure. Yet its adherents do have a clear view on the potential impacts of Coralita and feel quite strongly about protecting important values in a preventive way, whether or not they are under pressure.

5.1.2. Modern utilitarian

This perspective stands out from the others in its articulate rejection of the spiritual or religious value of nature: it is not important, does not need to be protected, Coralita does not affect it, and it is not under pressure. Medicinal and recreational values are neither under pressure nor need to be protected. Instead, this perspective has a modern view of nature, emphasising the utility value of nature: drinking water and renewable energy provision are important (+5), under pressure (+4) and need to be protected (+3). Agriculture is also important (+4), and under pressure from, among others, Coralita, but interestingly enough is seen as not needing to be protected (0). All interviewees stressed the need for Statia to take up agriculture again to supply themselves. They regard growing crops differently from keeping livestock; whereas crop growing is applauded, livestock are considered a menace, because free roaming goats damage nature and gardens. All interviewees also mentioned the need to involve future generations, expressing both disappointment in current youth and concern about the future available for them. Aesthetics is seen as important (+5) and the potential impact of Coralita is considered to be worrisome (+4). However, the interviews show that Coralita is seen both as enhancing and decreasing aesthetics. Next to aesthetics, Coralita raises worry regarding the supporting cycles of nature (+3). Yet despite acknowledging pressure on agriculture and aesthetics, interviewees with this perspective do not see protection as being a very important concern. This suggests they have a somewhat exploitative view of nature in which nature serves several purposes that are recognised as exerting pressure, but without resulting in interviewees being inclined to protect nature.
protection is a prevention-oriented approach. Yet, supporting cycles and future generation are seen as only minimally important, not under pressure and scarcely worthy of protection. So, for these values the worry about Coralita is not accompanied by a desire to take preventive measures. In sum, this factor seems to have a rather optimistic view about the state of nature, and sees nature as a major tourist attraction and hence requiring protection.

### Table 5

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Important Statia: scenery, sounds and plants</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Pressure Statia: scenery, sounds and plants</td>
<td>0</td>
<td>1</td>
<td>–3</td>
</tr>
<tr>
<td>Coralita Statia: scenery, sounds and plants</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Protect Statia: scenery, sounds and plants</td>
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<td>1</td>
<td>1</td>
</tr>
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<td>–2</td>
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<td>4</td>
</tr>
<tr>
<td>Pressure Statia: agriculture and livestock</td>
<td>–3</td>
<td>–2</td>
<td>0</td>
</tr>
<tr>
<td>Coralita Statia: agriculture and livestock</td>
<td>–1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Protect Statia: agriculture and livestock</td>
<td>–2</td>
<td>–1</td>
<td>3</td>
</tr>
<tr>
<td>Important Statia: variety of animals and plants</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Pressure Statia: variety of animals and plants</td>
<td>2</td>
<td>–1</td>
<td>–2</td>
</tr>
<tr>
<td>Coralita Statia: variety of animals and plants</td>
<td>4</td>
<td>3</td>
<td>–1</td>
</tr>
<tr>
<td>Protect Statia: variety of animals and plants</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
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<td>–2</td>
<td>4</td>
</tr>
<tr>
<td>Pressure Statia: future generations experiencing Statia</td>
<td>–1</td>
<td>–1</td>
<td>–2</td>
</tr>
<tr>
<td>Coralita Statia: future generations experiencing Statia</td>
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<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Protect Statia: future generations experiencing Statia</td>
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<td>1</td>
<td>3</td>
</tr>
<tr>
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<td>2</td>
</tr>
<tr>
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<td>–5</td>
<td>0</td>
</tr>
<tr>
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<td>2</td>
<td>–2</td>
<td>–1</td>
</tr>
<tr>
<td>Protect Statia: nature intrinsically</td>
<td>5</td>
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<td>1</td>
</tr>
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<td>0</td>
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<tr>
<td>Protect Statia: medicine</td>
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<td>2</td>
<td>–3</td>
</tr>
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<td>Important Statia: recreation and unwinding</td>
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<td>2</td>
<td>1</td>
</tr>
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<td>–3</td>
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<td>0</td>
<td>–5</td>
</tr>
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<td>1</td>
<td>–2</td>
</tr>
<tr>
<td>Important Statia: science and learning</td>
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<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Pressure Statia: science and learning</td>
<td>–5</td>
<td>3</td>
<td>–3</td>
</tr>
<tr>
<td>Coralita Statia: science and learning</td>
<td>–2</td>
<td>1</td>
<td>–3</td>
</tr>
<tr>
<td>Protect Statia: science and learning</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Important Statia: spiritual and religious</td>
<td>–4</td>
<td>–1</td>
<td>3</td>
</tr>
<tr>
<td>Pressure Statia: spiritual and religious</td>
<td>–4</td>
<td>–3</td>
<td>–2</td>
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<td>Coralita Statia: spiritual and religious</td>
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<td>–4</td>
<td>–4</td>
</tr>
<tr>
<td>Protect Statia: spiritual and religious</td>
<td>–3</td>
<td>–5</td>
<td>3</td>
</tr>
<tr>
<td>Important Statia: clean air, water and soil</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Pressure Statia: clean air, water and soil</td>
<td>–2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Coralita Statia: clean air, water and soil</td>
<td>3</td>
<td>0</td>
<td>–1</td>
</tr>
<tr>
<td>Protect Statia: clean air, water and soil</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Important Statia: tourism opportunities</td>
<td>5</td>
<td>–4</td>
<td>2</td>
</tr>
<tr>
<td>Pressure Statia: tourism opportunities</td>
<td>–1</td>
<td>–3</td>
<td>–2</td>
</tr>
<tr>
<td>Coralita Statia: tourism opportunities</td>
<td>0</td>
<td>–4</td>
<td>–1</td>
</tr>
<tr>
<td>Protect Statia: tourism opportunities</td>
<td>3</td>
<td>–1</td>
<td>–1</td>
</tr>
<tr>
<td>Important Statia: drinking water and renewable energy</td>
<td>1</td>
<td>–2</td>
<td>4</td>
</tr>
<tr>
<td>Pressure Statia: drinking water and renewable energy</td>
<td>–3</td>
<td>–1</td>
<td>–4</td>
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<tr>
<td>Coralita Statia: drinking water and renewable energy</td>
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<td>–3</td>
<td>–1</td>
</tr>
<tr>
<td>Protect Statia: drinking water and renewable energy</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

### 5.2.2. Utilitarian scientists

This is the only factor on both islands for which science and learning scores very high in importance and is considered to be under pressure (both +5). Interviewees stressed the importance of science for understanding nature and knowing how to take care of it or use it properly. Local knowledge is seen as a kind of science as well. In addition, supporting cycles are seen as very important and under pressure (which the other factors do not think is the case), but do not score very high on protection (+2). More conspicuously, the intrinsic value of nature is very high (+4), but does not require protection (0), presumably due to the pressure on this value and potential impact of Coralita being perceived as low. Biodiversity does require protection, potential impact of Coralita on biodiversity raises worry, and this value is seen as somewhat important (+2). More important is aesthetics (+3), but given low pressure and Coralita-induced worry, no protection of this value is required. This perspective thus clearly sees protection as a measure for abating rather than preventing pressure. Tourism scores very low within this perspective, as do the spiritual and religious values. Interviewees indeed expressed a dislike of tourism as an economic sector for Statia, and a preference for science as a source of income. There is a scientific research station on the island, and some of the interviewees expressed the hope that this would attract an increasing influx of researchers, which would boost the economy. Coralita does not pose much worry in this perspective, except for its impact on biodiversity (+4). This perspective sees two clear uses for nature, one through the supporting cycles that enable life, and the other to contribute to science and learning.

### 5.2.3. Bright future for community sustainability

This is a perspective of extremes: it is the perspective that scores highest on importance and protection and lowest on pressure and Coralita-induced worry. The perspective appears to be very optimistic; nature is seen as important because of its supporting cycles, its significance for future generations, utilities and agriculture, and even for its spiritual dimension. Like their Saba counterparts, the Statian participants viewed free-ranging cattle as making livestock husbandry undesirable, as opposed to growing crops. This is the only perspective to attach importance to the spiritual and religious value and want it protected (both +3). This factor scores all the important values also high on protection, which suggests a preventive view of protection. Protection is seen as needed most to secure nature’s value for utilities, future generations and agriculture and to ensure nature retains its spiritual value. The interviews reveal that the impact of Coralita on aesthetics is not clear-cut and elicited urgent calls to make Statia self-sufficient (again). No value is considered to be under pressure (all scores 0 or lower), and Coralita induces only slight worry for future generations’ experience of Statia (+2), which is very important (+4). Conspicuously, this factor is the only factor that thinks the utility value of nature requires protection (+5), while rejecting the idea that the value is under pressure (−4). Thus, this factor sees nature as being of great use to society in every way; utilitarian, via supporting cycles, utilities and agriculture, but also metaphorically for future generations, and spiritually.

### 6. Discussion

#### 6.1. Comparison of Statia and Saba

From the Q analysis we expected to find hedonistic and natural conservation perspectives on Saba, emphasising the landscape values of tourism, aesthetics, relaxation and recreation, and biodiversity. On Statia we expected agri-ruralist and utilitarian perspectives, with agriculture and livestock, utilities and medicinal values of the landscape featuring most prominently. In Table 6 you find an overview of what we actually found.

Before going into our findings, we would like to stress that our
Table 6
Overview of perspectives with their most conspicuous ranks (positive ranks underlined). We only show the scores of +/−5 and +/−4. E.g. no pressure = −5/−4; pressure = +5/+4.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Saba</th>
<th>Statia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land-scape</td>
<td>Future-oriented nature conservation</td>
<td>Modern utilitarian</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Important; Coralita worry</td>
<td>Important; Coralita worry</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Important; Coralita worry</td>
<td>Coralita worry; Protect</td>
</tr>
<tr>
<td>Future</td>
<td>Important; Protect</td>
<td>No pressure</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>Important; Protect</td>
<td>Important; Protect</td>
</tr>
<tr>
<td>Medicine</td>
<td>Protection</td>
<td>No pressure</td>
</tr>
<tr>
<td>Recreation</td>
<td>Protection</td>
<td>Important; Protect</td>
</tr>
<tr>
<td>Science</td>
<td>No pressure</td>
<td>Important; pressure</td>
</tr>
<tr>
<td>Spiritual</td>
<td>Important; Protect</td>
<td>Important; pressure</td>
</tr>
<tr>
<td>Supporting</td>
<td>No pressure</td>
<td>Important; No pressure</td>
</tr>
<tr>
<td>Utilities</td>
<td>Important; Protect</td>
<td>Important; Protect</td>
</tr>
</tbody>
</table>

method did indeed bring differences between the islands to the fore. This is an important achievement, showing that the approach is capable of picking up nuances. What we found differed slightly from what we expected, though. Aesthetics do indeed feature prominently in one of the Saban perspectives, but not on Statia. Supporting cycles are important to two of the Statian factors, which fits with the utilitarian perspectives. Contrary to our expectations though, agriculture and livestock features prominently in two of Saba’s perspectives but in only one of Statia’s perspectives. Also unexpectedly, tourism does not feature prominently in any of the Saban perspectives, but does in one of the Statian perspectives. The unfavourable conditions for agriculture on Saba (steep slopes and land scarcity) could make people more aware of its importance. Or, Statians might see agriculture not as a value provided by nature, since the national parks and farms are at quite far apart. Lastly, the negative sentiments regarding livestock may have prompted participants to score the agriculture cards low, which they indeed commented on frequently. Do these insights help us with participatory governance of IAS?

6.2. Eliciting latent problem perceptions with Q

The aim of this research was to develop and validate a method to ascertain stakeholder stances and thus deployed Q methodology to elicit latent problem perceptions, making stakeholders identifiable. We accrued four types of insights.

One type comprises very straightforward insights into views on hypothetical Coralita impacts, as elaborated in Table 7. One Statian factor rated all Coralita-worry statements very low, while another factor would be very worried if Coralita were to impact biodiversity. This is however not where Q’s strength lies, since other methods (e.g. a Likert-scale survey) could yield this data too.

The second type of insight is a clear merit of Q: the relative importance of values, both those that are substantive and those that are discursive. Regarding the discursive values, those that scored highest overall were about values being important, the lowest-scoring statements concerned values being under pressure; worry about Coralita scored moderately. Remembering that Q sorts reveal thoughts in a relative manner, this does not necessarily mean that stakeholders do not think nature is under pressure, only that it features less prominently in their thinking than nature’s importance. When promoting Coralita management, an argument in terms of the importance of nature might resonate better with stakeholders than arguing that pressure on nature needs to be abated. In addition to the discursive aspects of thought, our approach also elicited substantive aspects that offer handles for Coralita management. For example, within the nature conservation for tourism perspective on Statia, protection of biodiversity and the intrinsic value of nature are called for, both of which are considered to be under pressure. Thus, if impact of Coralita on biodiversity can be demonstrated, these stakeholders would presumably support management. However, spiritual and religious statements all scored very low, so arguments linking Coralita to such considerations will not resonate with many.

As mentioned before, our approach proved capable of reflecting differences between contexts of the elicited perspectives, in this case revealing differences between Statia and Saba attributable to environmental and socio-economic differences between the islands. This makes it valuable for designing locally appropriate management approaches. However, all this assumes a rather straightforward way of thinking about people’s perspectives on nature and their susceptibility to certain arguments regarding to management measures. The exact relation between such concepts as perceptions, attitude and behaviour is still a heavily debated topic in environmental science and invasive species literature alike. See for example Estévez et al. (2015), who present a tiered system of values, attitudes, risk perceptions and behaviour. Shackleton et al. (2018) point out that we do not even really understand how perceptions come about, and make a first effort to remedy this. The relation between the stakeholder perceptions elicited and behaviour or willingness to manage is outside the scope of this article, but any management effort should definitely take these findings into account.

The third type of insight is into the structure of perspectives by
look at links between values. For example, within one perspective a high score for the importance of biodiversity is combined with attaching high importance to tourism, while in another perspective it is combined with attaching high importance to nature’s intrinsic values. Two very different pictures emerge from that: one of biodiversity serving a tourism purpose and one of biodiversity being important per se. For the former, Coralita management would gain strength when somehow involving tourism, while for the latter, arguments around Coralita threatening biodiversity would resonate most. Also insightful is relating discursive values, especially regarding protection. When an important value is not considered to be under pressure but is considered to need protection, it seems that protection is interpreted to mean preventing. This is very different from when an important value is considered to be under pressure but not to need protection.

Lastly, taking the deep understanding of the valuation of nature yielded by Q method combined with the different discursive elements revealed potential (dis)agreement between perspectives. In Table 7 we indicate where overlap and dissonance can be found for both islands.

Our approach certainly resulted in a lot of data, yet some questions arise that merit further investigation. For example, are some landscape values linked to others, such as aesthetics to recreation or tourism? And what use are supporting cycles if not to support other values? They were sometimes nevertheless rated highly without any other value being linked to them. By contrast, intrinsic value of nature was frequently scored highly, but together with other values. So, what does “intrinsic” mean in this case? These paradoxes might have to do with the landscape value typology, or with Q method itself, which assumes that participants have opinions that are arranged in a sequence that can be elicited through the Q sort. The forced nature of Q sorting might, however, also assume a thought-through arrangement where there is none. Prudence should therefore be exercised when interpreting a Q sort, so as not to “see” more than there is. Moreover, the understanding of perspectives as static identities is increasingly challenged, the argument being that it results in entrenched stakeholders (Turnhout et al., 2010) and perspectives should rather be understood as performative practices (Gonzalo-Turpin et al., 2008).

Another question still to be answered is who holds which perspective. The small number of participants and the statistics involved make it difficult to assess for Coralita on Saba and Statia to see if participation has resulted in insights into problem perceptions that have so far been latent – particularly insights into the structure of people’s perceptions. Understanding structures of thought is very important for stakeholder engagement in participatory governance; it has spawned interesting methods such as cognitive mapping (e.g., Moon and Adams, 2016; Santo et al., 2017). However, such an approach would not work for the case where actors cannot articulate their perceptions because impacts of an ecosystem change are unknown. By combining Q methodology with a landscape value typology as we have done, stakeholder perceptions can nevertheless be elicited, and stakeholder engagement be worked towards.

7. Conclusion

Although participation is no guarantee for socially and ecologically successful environmental governance, it is often applied and a large body of literature addresses its optimisation. We found a gap in that literature when it comes to cases where problem perceptions are latent and stakeholders are therefore difficult to identify, which we worked on in this article. As such, we have reported on how we deployed Q methodology to elicit the latent problem perceptions of the inhabitants of Saba and Statia about the invasive alien plant Coralita. To enable participatory governance of ecosystem changes, stakeholders need to be identified, but that is hampered when no clear impacts on people’s livelihoods are known. Our approach offers a way around that limitation by combining Q methodology with landscape values and allowed us to identify three perspectives per island of which Table 6 gives an overview. On both islands, some of the perspectives are very nature-
conservation oriented, seeing an intrinsic value in nature, wanting to protect biodiversity and worrying about the impact of Coralita. In addition, there are perspectives which see nature as providing economic services, such as drinking water, electricity or agriculture. Some of the perspectives see protection as a means of abating extant pressure, while others regard protection as a preventive measure. These are all valuable insights for facilitating participatory governance of this issue.

Quite comprehensive impressions are obtained thanks to Q methodology forcing participants to disclose the relative importance of aspects of their views. This is much more insightful than, for example, a Likert-scale survey in which a participant can assign every statement equal weight. Moreover, our approach proved capable of eliciting comprehensive insights into people’s thinking about a topic that they have trouble articulating their views on. This is the merit of combining Q methodology, which forces people to express their views in a relative manner, with the landscape value typology. By addressing Coralita via potential impacts on nature, we circumvented the gap in knowledge on the vine’s impact. Thus, we identified stakeholders’ perceptions regarding Coralita management. This enables their participation in decision-making, and these insights can be taken into account in future research and policy exercises.

We think our approach is also applicable in similar cases where the articulation of perceptions about a change in an ecosystem is hampered because the impacts are not clear but participation of stakeholders is nevertheless required. Future research can build on our insights by furthering our understanding of how to identify stakeholders in such cases, which in turn facilitates participatory governance of complex environmental challenges for which stakeholder involvement is key.

Acknowledgements

This research was funded through the Netherlands Organisation of Scientific Research (NWO) Caribbean program, for which we are very grateful. We are highly indebted to the interviewees who have helped us improve this article significantly by their detailed feedback. We are very grateful to the two anonymous reviewers who have helped us improve this article significantly by their detailed feedback.

Funding

This work was supported by the Dutch organisation for scientific research NWO (grant number 858.14.052).

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.geoforum.2018.11.018.

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