Improving participatory roadside governance through bridging institutions in the province of Friesland

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Abstract

Biodiversity is an important part of the EU Green Deal. The responsibility to restore and maintain biodiversity lies with local governments. This paper will use the theory of a bridging organization as a lens to look at the state of stakeholder collaboration in governing biodiversity of roadside vegetation in the province of Friesland, the Netherlands. The theory of a bridging organization has at its core adaptive co-management and social learning. A bridging organization is an independent institution which initiates active communication between different types of stakeholders in a biodiversity resource conflict, to facilitate knowledge exchange, collaboration and understanding. Surveys will be distributed among stakeholders, which will help answer questions about the current state of knowledge exchange, stakeholder relationships and adaptive behavior regarding governance for roadside verges. Literature and survey results will be combined to answer the question: can a bridging institution improve participatory roadside governance?

Key words: Participatory governance, bridging institution, social learning, stakeholder theory, co-management.

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1 Introduction

Biodiversity is a large part of the EU Green Deal (European Union, 2011). The political responsibility to restore and maintain biodiversity, as per EU goals, rests primarily on local governments (Davies & White, 2012). For the Netherlands, the biggest factor for vegetation cover and biodiversity protection are roadside verges, which cover a total geographical area almost twice the size of the biggest official nature reserve, the Veluwe (Roelofsen & Zon, n.d.). The main function of roadside verges is safety. However, due to their size they offer great opportunities for nature and biodiversity management, according to the Wageningen University Research center (WUR) (Vergeer, 2021). The WUR is currently conducting a large-scale research project for the National government on how to manage roadside verges so that they are optimal for biodiversity (Vergeer, 2021). This shows that the Dutch government is interested in a more ecological management approach to an area whose main function is safety.

Highways are generally managed by the national government, whereas provincial roads are managed by the provinces, and most other public roads by the municipalities. The province of Friesland is responsible for 800 km of roadside verges and 850 km of ditches alongside roads (Provincie Fryslan, n.d.). Currently, roadside verges are already important for many animal and plant species (Vergeer, 2021). When it comes to natural resource governance and conservation conflicts, however, there are still political issues to be solved. In this light, the use of “bridging institutions” has been discussed as a possible solution (Leys & Vanclay, 2011). A bridging institution is a formal, independent organization that aims at ‘bridging’ gaps between stakeholders, such as gaps in knowledge, trust, and collaboration. It uses collaborative mechanisms to bring different types of stakeholders in contact with each other and provides a platform for knowledge exchange (Crona and Parker 2012; Smith, Holmes & Paavola, 2018). They support facilitation, monitor and evaluate progress, organize meetings and networking activities, create management plans at institutional, group, and the individual level (Davies & White, 2012). Accordingly, this paper aims to answer the question of whether bridging institutions can help improve roadside co-management in the Province of Fryslan.

Carlsson and Berkes (2005) have summarized 6 steps of *co-management*, which can be described as an interrelated theory aiming to aid the concrete implementation of bridging institutions in roadside management. These six steps are summarized as follows: (1) defining the social-ecological system under focus; (2) mapping the essential management tasks and problems to be solved; (3) clarifying the participants in the problem-solving processes; (4) analyzing linkages in the system, in particular across levels of organization and across geographical space; (5) evaluating capacity-building needs for enhancing the skills and capabilities of people and institutions at various levels; and (6) prescribing ways to improve policy making and problem-solving. The social-ecological systems under investigation (i.e., step 1) are publicly owned roadside verges in the province of Friesland. Step 2 to 5 will be answered through a quantitative research approach.

In addition to the six steps of co-management outlined by Carlsson and Berkes (2005), this study will also focus on investigating local roadside management practices and the potential role of bridging institutions based on the three dimensions of *stakeholder interaction* proposed by Plaza-Úbeda et al. (2010 in Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019). The three factors that make stakeholder interaction worthwhile depend on the knowledge exchange

between stakeholders, including the government itself, the level and quality of interaction with stakeholders, and the translation of their contribution to changes in policies and management. These three factors are vital for research to make a judgment about stakeholder involvement and will thus be closely examined.

Accordingly, the three (sub)research questions to evaluate whether bridging institutions would be a good fit for the Province of Fryslan, are:

(1) What is the level and quality of knowledge exchange between stakeholders and between stakeholders and the government?

(2) What is the level and quality of the interaction between stakeholders and the government?

3) How is knowledge and feedback translated into policy and management changes (a.k.a. adaptive behavior), and what is the quality of such translations?

Quantitative research will be performed to help answer these questions. A survey was sent out with 15 statements based on Butler et al. (2015) framework of precondition indicators for co-management of nature conservation. Additionally to rating the indicators, survey participants are asked to indicate their network of contacts and phrase their struggles with the current system. Spaces for improvement are identified and related to theory. Can the theory of bridging institutions offer a solution to the problems identified? Can it offer improvement for the current roadside management? By combining the literature on bridging institutions with the research results, this paper aims to provide tailored policy recommendations (step 6) for the Province of Friesland.

2 Literature review

On the website of the Dutch government it is stated that “there are agreements internationally between countries regarding sustainable use of flora, fauna and microorganisms. And for a fair distribution of costs and rewards for biodiversity” (Ministerie van Algemene Zaken, 2021). In addition to pledges at the international level, the Dutch government is also involved in fostering biodiversity protection at the European level. One key report by the European Union identifying the current situation of biodiversity and goals, titled “Biodiversity factsheet”, states that one of the best methods to protect biodiversity is to increase awareness, involvement, and collaboration of stakeholders, and to increase knowledge and knowledge sharing (European Union, 2011).

These crucial points are also reflected in a recent study by Garcés-Ayerbe et al. (2019), which concludes that organizations with greater stakeholder integration capacity also make greater efforts and strides in eco-innovation, including biodiversity protection. The literature states that stakeholder engagement is a ‘means of reforming traditional top-down decision-making to achieve more sustainable, equitable and enduring governance of environment and resources’ (Berkes, 2010 in Davies & White, 2012). Thus, a good mechanism for governments to collaborate with stakeholders needs to be established. To solve biodiversity management issues, the literature has offered a multitude of helpful theories, such as stakeholder theory, co-management, social learning, participatory governance, and the theory of “bridging institutions” (Leys & Vanclay, 2011; Nichols et al., 2007; Smith, Holmes & Paavola, 2018; Cox, Butler, Webber & Young, 2020; Davies & White, 2012; Carlsson & Berkes, 2005). The concept of bridging institutions is deemed especially interesting for the purpose of this study, since it is described as being capable of incorporating a variety of theoretical approaches to biodiversity management and participatory governance. As some of the aforementioned theories do have some overlap, a detailed discussion is offered.

2.1 Stakeholder theory

In 1984, Freeman developed the Stakeholder Theory as a new management strategy for organizations. The idea is that organizations should be concerned about the interests of stakeholders when making decisions (Mainardes, Alves & Raposo, 2011). Even though most literature on Stakeholder Theory concerns market-based businesses, the theory is also applicable to biodiversity governance. Despite that there is a lot of ambiguity surrounding the theory, the consensus is that the organization in question should take into account ‘the needs, interests and influences of peoples and groups who either impact on or may be impacted by its policies and operations’ (Frederick et al., 1992 in Mainardes, Alves & Raposo, 2011). Regarding the interest groups involved, a person, an informal group, an organization or an institution can all be considered stakeholders. Clarkson (1995 in Mainardes, Alves & Raposo, 2011) divided these stakeholder groups into two categories: (1) the primary stakeholders – those with formal or official contractual relationships with the company; and (2) the secondary stakeholders – those without such contracts. However, it should be noted here that stakeholders are not always separate entities or groups. There is a complexity in real relationships, especially since one person can identify with more stakeholder groups or might not share the perspective of the

stakeholder group they belong to (Freeman, 1984, Connely, 2010, Mas-Verdu et al., 2010 and Rowley, 1997 in Mainardes, Alves & Raposo, 2011).

The categorization of all relevant stakeholders is performed based on three levels of stakeholder management (Mainardes, Alves & Raposo, 2011), of which the first one is the identification of stakeholders. The second level is the development of processes identifying and interpreting stakeholders' needs and interests, while the third level pertains to the construction of relationships with the entire process structured around a specific organization's respective objectives. Especially the relationship with (and between) stakeholders should be prioritized according to Mitchell et al. (1997 in Mainardes, Alves & Raposo, 2011).

2.2 Co-management

The academic literature mentions the theory of co-management to be specifically suitable for ecosystem management, and for helping to 'resolve multi-scale society-environment dilemmas' (Leys & Vanclay, 2011; Carlsson & Berkes, 2005). Co-management, short for collaborative management, can be defined as 'the sharing of power and responsibility between the government and local resource users' (Berkes et al., 1991: 12 in Carlsson & Berkes, 2005).

The theory of co-management has been around for a long time. Already in 1989 did Pinkerton write about tasks that could be easier accomplished with the help of a well-established co-management system, such as (1) data gathering, (2) logistical decisions such as who can harvest and when, (3) allocation decisions, (4) protection of resource from environmental damage, (5) enforcement of regulations, (6) enhancement of long-term planning, and (7) more inclusive decision-making (Pinkerton, 1989 in Carlsson & Berkes, 2005). The difference compared to prescriptive measures enforced in a top-down manner is that co-management offers more flexibility by actors involved contributing to and negotiating the rules (Leys & Vanclay, 2011). Though it is not merely a power sharing arrangement, it needs to be viewed as an approach to governance, since it is the network of relationships that forms a management system (Carlsson & Berkes, 2005). Co-management often operates within the broader spheres of a bridging institution (Folke et al., 2005).

2.3 Social learning

The political theory of social learning is helpful for biodiversity management in the social spheres, since biodiversity management often involves competing forms of knowledge and values (Smith, Holmes & Paavola, 2018). Social learning aims at fostering knowledge sharing between stakeholders with diverse views and experiences (Leys & Vanclays, 2011). Smith, Holmes and Paavola (2018) define social learning as 'a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks'. Thus, it is important that stakeholders, especially those with varying knowledge, communicate with one another and develop relationships, in order to transfer knowledge and perspectives (Smith, Holmes & Paavola, 2018; Leys & Vanclay, 2011).

In one case study, land managers felt disenfranchised from processes of evidence gathering They felt policy makers give primacy to scientists over experiential knowledge (Davies

& White, 2012). And who is to say that policy makers understand the science and are adequate in translating the science into policies? Often, the evidence-based approach used by natural scientists seems too 'abstract' to policy makers and non-scientists (Nichols et al., 2007). Thus, those with experiential knowledge, should be adequately involved. Even more so, to develop more practical and holistic monitoring strategies, scientific knowledge and local knowledge need to be combined. A bridging institution can facilitate these interactions.

Leys and Vanclay (2011) implemented a social learning experiment for a region of hardwood plantation forestry. The social learning experiment had a positive influence on participants' attitudes towards the plantation industry which became clear through the increased level of support. The participants indicated that this was due to the increased understanding they got from the collaboration with other stakeholders. In general, the attitudes of all stakeholders became more aligned. There is ample research that supports that social learning and co-management lead to positive attitudinal change (Connick & Innes, 2003 and Pahl-Wostl et al., 2007 in Leys & Vanclay, 2011; Davies & White, 2012).

2.4 Participatory governance

Participatory governance is about the concept of subsidiarity, it directs power from higher levels to local actors. It is about assigning managerial responsibility to the lowest level of governance. It is in principle more flexible, because it should be able to discharge and switch to new actors and implement recommendations on an ongoing basis (Marshall, 2009 and Prager & Freese, 2009 in Leys & Vanclay, 2011). Koontz defines collaborative or participatory governance as 'participants have sufficient authority within a broader legislative and political context to enact collective decisions' (Koontz, 2006). Where both co-management and participatory government have at their core bottom-up, democratic leadership, they are not the same. Management is the operation of processes under the rules of governance (Leys & Vanclay, 2011; Maderson & Wynne-Jones, 2016). Collaborative governance refers to a form of participation in which stakeholders co-produce goals and strategies and share responsibilities and resources. Literature states that it has the potential to reconcile statutory obligations (Cox et al. 2020). Cox et al. (2020) are of the opinion that many environmental systems are too complex and too prone to conflicting values to be effectively governed by a single authority. Thus, authority might best be given to lower levels of governance. Stakeholders themselves can decide on the appropriate levels of entitlement and responsibility (Carlsson & Berkes, 2005). Besides co-producing goals and strategies and sharing responsibility and resources, when it comes to nature conservation, participatory governance has at its core the inclusion of diverse expertises and views (Maderson & Wynne-jones, 2016). This relates participatory governance back to the theory of social learning.

2.5 Bridging institution

There is still room to study and develop different stakeholder engagement mechanisms for integrating environmental demands in management processes of organizations, the so-called "stakeholder integration capacity". Sharma & Vrenderburg (1998 in Garcés-Ayerbe,

Rivera-Torres, & Suárez-Perales, 2019) define stakeholder integration capacity as "the ability to establish trust-based collaborative relationships with a wide variety of stakeholders". Plaza-Úbeda et al. (2010 in Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019), state that the stakeholder integration construct comprises of three dimensions: (1) knowledge of stakeholders, (2) interactions with stakeholders, and (3) the adaptation of government behavior to stakeholders' demands. One such mechanism developed for governance is called a 'bridging institution'.

Bridging institutions are independent organizations that promote the cooperation of actors from the science, policy and management sectors (Crona & Parker, 2012). They are an organization which 'provides a facilitation and mediation role to connect local and regional collaboratives into the multi-level natural resource governance structure' (Leys & Vanclay, 2011). They can also help when participants are time restrained or when there is explicit or implicit conflict (Leys, A. J. & Vanclay, J. K., 2011). One paper quotes that a bridging institution is "characterized by the presence of a third party, which is historically separate and distinct in terms of resources and personnel from the 'island' organizations it seeks to link" (Westley & Vredenburg, 1991:68 in Crona & Parker, 2012). Thus, a bridging institution is an organization in its own right. It can receive funding from multiple sources, but most likely from the government. A bridging institution can come in many shapes and sizes, differing in their degree of formalization, scope, and the number and diversity of stakeholders it tries to connect. The goal of this type of institution, especially in adaptive environmental governance, or in our case for biodiversity conservation and resource management, is to provide a space for learning, trust building and conflict resolution in order to provide a bridge between the government and non-governmental stakeholders, such as local communities and scientists (Crona & Parker, 2012).

In sum, bridging institutions can be seen as a new organizational structure that is centered around the ideas of co-management, social learning and bottom-up, democratic, participatory governance. A bridging institution is a practical method of implementing all the abovementioned ideals. Its function and services revolve around facilitating stakeholder engagement, promoting social learning and enabling co-management (Smith, Holmes & Paavola, 2018; Berkes, 2009).

There are some factors needed for the effectiveness of a bridging institution. In order to facilitate open conversation, a bridging institution should be a formal, neutral, third party entity (Sternlieb, Bixler, Huber-Stearns, & Huayhuaca, 2013, p. 121 in Smith, Holmes & Paavola, 2018; Davies & White, 2012). In the paper of Cox, Butler, Webber & Young (2020), based on the paper of Plummer (2009), one can refer to variables that catalyze the co-management process as pre-conditions, antecedents or inputs.

Evaluation of the process and progress needs to be done on a regular basis. Carlsson and Berkes (2005) 6 steps of co-management defines step 5 as 'evaluating capacity-building needs for enhancing the skills and capabilities of people and institutions at various levels'. Plummer and Armitage (2007) provide a useful framework to evaluate the impact of co-management processes. They mention three scales: ecological, economics for sustainable livelihoods and institutional and power processes. Based on insight observations, these scales for the case of roadside management would relate to the amount of ecologically friendly roadsides, the possible business models for ecological management and the changes made to

laws and regulations to make sustainable resource use possible. Progress can be measured more accurately by using the Butler et al.'s (2015) indicator framework outcome indicators. The case study of Cox et al. (2020) that looks into the salmon biodiversity and resource conflict, shows the importance of a feedback loop. When participants were asked to give a score for all the outcome indicators, policy makers were far more positive than local stakeholders (Cox et al. 2020). Thus, governments can sometimes overestimate their own performance and getting feedback from stakeholders is important. The literature specifically mentions evaluation to be a core part of effective social learning, co-management and participatory governance (Davies & White, 2012; Cox et al. 2020).The feedback loop should not be a singular event, but rather take place on an ongoing basis (Smith, Holmes & Paavola, 2018).

Another requirement of effective bridging institutions is having proper leadership skills. Effective leadership is needed for relationship building, facilitating roles, mediating in times of conflict, to help communication, monitor progress, divert roles, manage regular based meetings, and so on (Davies & White, 2012). A bridging institution might even fail to overcome the inertia of bottom-up governance without adequate leadership (Folke et al., 2005 and Keough & Blahna, 2006 in Davies & White, 2012). According to Hooijberg and Schneider (2000, in Schneider, 2002), when there is effective leadership that focuses on cooperative stakeholder relationships, benefits will be maximized. An effective leader is defined by their ability to assess stakeholders' respective abilities to influence and affect, in short, their power (Schneider, 2002). In the study of Leys and Vanclay (2011) up to 91% of participants felt they were able to influence the process, which they stated was due to effective facilitation that allowed for fair contribution to dialogue. Findings in literature support the notion that facilitator skills are important for the influence and interest of participants (Leys & Vanclay, 2011). In fact, Leys & Vanclay (2011) state that during meetings the facilitator should not be the leader but be able to encourage shared leadership rather than performing directive leadership.

2.6 Challenges

Establishing a bridging institution comes with its own challenges. First of all, there are likely to be power imbalances. Policy makers are one of the key stakeholder groups involved in the discussion, although they are solely responsible for translating the input into regulatory changes. As per democratic theory, policy makers should respond to normative and substantive demands (Davies & White, 2012). However, it can not be guaranteed that an objective translation into legislation is accomplished. Multiple stakeholders can provide input, but policy makers have the power to change laws and regulations. In fact, policy makers might have the strongest influence on the process of participatory governance (Davies & White, 2012). This is why reflection is important, and why adaptive behavior needs to be regularly measured (Cox, Butler, Webber & Young, 2020).

In general, the state's support is needed for effective implementation and results. For instance, one way the state can help facilitate social learning is by more flexible regulation or evidence provision (Smith, Holmes & Paavola, 2018). A resource the state has to provide is funding (Davies & White, 2012). Davies and White (2012) even go as far as to state that according to the theory of co-management and participatory governance, the government has to redirect funding more to private managers. This will be more beneficial for fair distribution and

optimal use of resources. Funding is something that has to be clearly communicated outwards to stakeholders. In previous studies, difficult and confusing funding schemes for community outreach had resulted in participants being less willing to engage (Leys & Vanclay, 2011).

Besides, one of the main questions in literature regarding bridging institutions is who should take up the role (Leys & Vanclay, 2011). Who is most suitable, what skills are needed, and how is objectivity ensured? There are currently already many initiatives to promote the role of ecological sciences in society, such as NGO's, but linking these to communities and policy makers requires a framework of cooperation, which is a lot harder to establish in bureaucracy. Because of this, Nichols et al. (2007) believe that it might be smarter to establish a bridging institution in the already relevant existing initiatives, rather than creating a new one. A bridging organization can also be a state agency, since they have jurisdiction over an area, that then develop partnerships with other relevant stakeholders, but that specifies and guarantees their respective functions, rights and responsibilities with regard to the area. However, currently state agencies that take up the role for collaborative initiatives lack active, neutral facilitation. State agencies have many statutory obligations and they might not be best suitable for a role that requires active engagement. Incorporating all knowledge and wishes of stakeholders when one is not trained to do so might prove more cost-effective. A better option for governments would be the appointment of a professional external facilitator (Davies & White, 2012). After all, a well-tailored system could reduce overall transaction costs (Carlsson & Berkes, 2005; Davies & White, 2012).

Cox et al. have summarized some challenges that come with shared influence. They mention the difficulty of ensuring that all appropriate stakeholders are involved, being able to integrate different types of knowledge and communicating this knowledge in a manner suitable for other stakeholders to use, designing policies that are adaptable to the input that will be gathered over time, redirecting authority to those most fit for the job, and all of that while representing a multitude of different interests (Cox et al. 2020). One can understand that these tasks can be quite energy and time consuming.

3 Methodology

The purpose of this study is to study the possibility to implement the theory of bridging-institutions in a case region where economic and ecological opportunities of roadside mowing and management are not always supported by the legal and government framework. As stated by Florian Landstra, advisor ecology for the Province of Friesland: “It is the task of the province to work together with stakeholders to look for the right balance of avoiding nuisance and protecting ecological values. We have to look for a policy that can unite all interests”. However, the vision still lacks a practical method to execute this plan.

In order to create place based and context sensitive biodiversity conservation policies through stakeholder involvement, governments can consider using bridging institutions.The theory of a bridging institution will be used to answer the question: for roadside governance, can a bridging institution offer guidance?

This study is a quantitative research with qualitative aspects, since respondents had a chance to elaborate on their answers. Most ideally, this study would have used a mixed methods qualitative research approach in order to understand stakeholder governance processes from the stakeholder’s perspective, to understand the interaction between different stakeholders with conflicting values and to give voice to their perspective and wishes (Hennink, Hutter & Bailey, 2011). Nonetheless, due to time and energy constraints, only a quantitative approach was used. Preferably, in the future, the qualitative part of the study can be performed additionally.

First, all relevant stakeholders will be identified and categorized by type based on literature review, personal experience and web search. For roadside management, stakeholders would be civilians living in the area, both dairy farmers and crop farmers, non-profit organizations aimed at nature and biodiversity protection (referred to in this study as representatives of nature), scientists, mowing companies (referred to as vegetation managers) and, of course, policy makers. This is a deductive to inductive approach. Surveys will be distributed via email. Surveys will be in Dutch.

The focus of the questions of the surveys are partially based on Plummer and Armitage’s (2007) evaluation framework for adaptive co-management, which is based on three main components operating at different spatial and temporal scales. These are ecological, economics for sustainable livelihoods, and institutional and power processes. Butler and colleagues (2015) developed a framework for evaluating adaptive co-management in conservation conflicts. Their framework includes outcome indicators and pre-condition indicators, and they also include propositions given to interviewees. These were included in designing the questions for the questionnaire. The framework can be found below in Figure 1.

As done in the study of Cox and colleagues (2020), questionnaire answers regarding the outcome indicator will be answered on the Likers scale: strongly disagree (-2), disagree (-1), neutral (0), agree (1) and strongly agree (2). After each question, it is optional for the interviewee to provide explanatory comments for each score.

An example of a question, as per the first pre-condition indicator would be: ‘Stakeholders have access to an adaptable portfolio of management options.’. Even though the prognosis is that the interview questions and identified problems are not of a sensitive topic, might it occur that they go into a sensitive direction, it will be handled with care and empathy.

All questionnaire questions and answers will be coded based on Plummer and Armitage's (2007) structural topics and other general themes. The questionnaires will give mean scores of answers, which will help identify main issues. Analysis of the scores will be done by writing a code in R and the additional results will be analyzed by hand. At all points in the research process, the lead author will actively try to reduce the influence of biases through personal reflection and feedback.

a) Outcome indicators

	Indicator	Proposition
1	New institutional arrangements	Changes have been made to organisations, rules or usual practices regarding seal and salmon management
2	New institutions codified in law	New institutions triggered by seal and salmon stakeholders have been established in law
3	Questioning of routines, values and governance	Stakeholders have reconsidered the underlying causes of the seal and salmon conflict, its complexity, and the way it is currently being thought about and managed
4	Legitimisation of policies and actions	Government and other policies and actions relating to the seal and salmon conflict are regarded as more legitimate by stakeholders
5	Agreed upon sanctions	Agreed sanctions have been established to address infringements of rules by stakeholders
6	*Outcome acceptable to all parties*	*Outcomes of the Moray Firth Seal Management Plan are acceptable to all relevant parties*
7	*No party asserting its interests to the detriment of others*	*No party in the seal and salmon conflict is asserting its own interests to the detriment of others*
8	Creative ideas for problem-solving	Creative and innovative ideas have been developed to solve the seal and salmon conflict
9	Engagement and learning across scales	Stakeholders from different scales and levels (e.g. national government and local communities) involved in the seal and salmon conflict have become more engaged and are exchanging information and learning from one another
10	Changes in perceptions and actions	Stakeholders in the seal and salmon conflict have changed their perceptions of the problem, and these are reflected in changes in their actions
11	Resource management plan	Resource management plans or agreements have been produced to address the conflict between seal and salmon stakeholders
12	*Acceptable conservation status of all contested species*	*Acceptable conservation status of salmon (12I) and seal species (12II) has been achieved*

b) Pre-condition indicators

	Indicator	Proposition
1	Adaptable portfolio of management resources	Stakeholders in the seal and salmon conflict have access to an adaptable portfolio of management measures to address the conflict
2	Commitment to support a long-term institution-building process	Stakeholders in the seal and salmon conflict are strongly committed to the process of establishing new management structures, rules and approaches to resolve the conflict
3	Provision of training and capacity building	Stakeholders in the seal and salmon conflict from all levels have opportunities for training, learning and skills-building
4	Leaders prepared to champion the process	Leaders have emerged amongst the stakeholders in the seal and salmon conflict and are prepared to champion the process
5	Stakeholders drawing on and sharing diverse knowledge	Stakeholders in the seal and salmon conflict are willing to exchange information and accept their different kinds of knowledge
6	National and regional policy environment supportive of collaborative management	Government policies at the national and regional level are enabling collaborative management amongst the stakeholders in the seal and salmon conflict
7	*Formal and regular evaluation of outcomes and pre-conditions as a stakeholder learning process*	*Formal and regular evaluations of outcomes and conditions take place as part of continual stakeholder learning process in the seal and salmon conflict*
8	*Quality of information and resources*	*There is a high quality of information and resources available to stakeholders in the seal and salmon conflict*
9	*Transparency of stakeholders' goals and values*	*The goals and values of each stakeholder party in the seal and salmon conflict is transparent*
10	*Trust amongst stakeholders*	*There is a high level of trust amongst stakeholder parties in the seal and salmon conflict*
11	*Presence of a bridging organisation or individual*	*There is a presence of a bridging organisation or individual between different stakeholder parties in the seal and salmon conflict*
12	*Participation of all impacted stakeholders*	*There is participation of all affected stakeholders in the resolution of the seal and salmon conflict*

Figure1. Outcome indicators and pre-condition indicators of adaptive co-management in nature conservation conflict.

4 Results

In this section, the survey results are presented. First is explained how the survey looked like and what each statement is meant to measure. Then, the mean results from the survey are discussed. Next to that, the results will be discussed in line with the literature review findings. Each of the three dimensions (information, relationships and adaptation) relate to one of the three sub research questions, and will be elaborated on separately in order to answer the question.

The survey looked as follows: the first question, numbered question zero, asks participants to fill in the category of stakeholders they most associate with, with the extra option 'something else', where they could fill in as whom they identify with if it was not one of the mentioned options. Question number 1 to 15 are statements that the participants could answer if they agreed with or not on a likert scale. These statements can be viewed in Figure 2. These statements are according to Butler and colleagues (2015) framework of outcome indicators and pre-conditions. Since this research was focused on the possible value of implementing a bridging institution for roadside management in Fryslan, and is thus not established yet, the outcome indicators were not included. These would be used to evaluate the effectiveness of a bridging institution after it has been active for a while. Thus, these statements are based only on the pre-conditions mentioned in the framework, but then adapted to roadside management. Mean answer scores of each question grouped by stakeholder category can be viewed in Figure 3.

The research question will be answered by answering the three sub-research questions: (1) What is the level and quality of knowledge exchange between stakeholders and between stakeholders and the government? (2) What is the level and quality of the interaction between stakeholders and the government? And (3) what is the quality of the translation of the knowledge exchange and interaction to policy and management changes (a.k.a adaptational behavior)? These are based on the three dimensions of Plaza-Úbeda et al. (2010 in Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019): knowledge exchange between stakeholders, including the government itself, the level and quality of interaction with stakeholders and the translation of their contribution to changes in policies and management. However, categorizing the statements of the survey by these three dimensions, leaves room for interpretation. To clarify further, each category will be explained as to how the author interpreted the meaning of these categories. Therefore, these categories are not exactly based on Plaza-Ubeda et al. but merely inspired by.

For the first category, named 'information', the questions are meant to provide insight into the level and quality of the knowledge exchange. The statements that measure this are: '(Q1) Stakeholders have access to an adaptable portfolio of management options', '(Q4) stakeholders have the possibility to participate in workshops, information sessions and discussions', '(Q6) the leader is willing to listen to all stakeholders' and '(Q11) there is sufficient and clear information available regarding roadside management laws and regulations'. However, many of the statements dealing with the category 'Relationship', also deal with knowledge exchange. Such statements are '(Q7) stakeholders are willing to share their knowledge and experiences with other stakeholders' and '(Q8) stakeholders are willing to listen to and learn from other stakeholders'. That is because the category 'relationship' aims to reflect the presence of structural and institutional gateways for interaction, of which willingness to

share and listen seems one of those institutions needed for knowledge sharing. The statement '(Q5) there is a clear leader' can help answer the question if there is someone guiding the knowledge exchange. Q12, Q13 and Q15 deal with awareness of the standpoint of other stakeholders, the presence of trust and the presence of all relevant stakeholders in the process of knowledge exchange, which are important relationship features for effective knowledge exchange. And as discussed previously, a good relationship is needed to have a good exchange of knowledge and to understand each other's viewpoints (Smith, Holmes & Paavola, 2018; Leys & Vanclay, 2011) The third category is named 'adaptation' and deals with the third sub-research question, which is the translation of knowledge, knowledge exchange and feedback into change in behavior and policies. Although, this section can only be properly evaluated if there is at least some form of interaction between stakeholders. Progress can be measured and confirmed, if the overall score of these questions increases over time. Thus, only the current level of participation and feedback-giving can be measured to answer the question if input and participation leads to positive changes, which is a limitation of this section. Leys and Vanclay (2011) argue that one main problem with the theory of social learning, is that there is a lack of frameworks that can evaluate the quality of these institutions, nor the progress they enable, which is an argument also applicable to bridging institutions. The questions that aim to give an insight into the level of progress being made and if progress can be made, are Q2 'Stakeholders are willing to participate in developing new management options', Q3 'Stakeholders are dedicated to solving conflicts resulting from different', Q9 'The national and local laws and regulations make cooperation between different stakeholders possible and optimal' and, of course, Q10 'When there is cooperation between stakeholders, regular evaluation of results takes place'. Cox, Butler, Webber and Young (2020) say that regular evaluation should form the core of the learning component of adaptive co-management.

Q14 'There is an independent, overarching organization that guides the cooperation between stakeholders' is categorized under all of the above mentioned categories, since this statement deals most with the presence of a bridging institution. As discussed in the literature section, a bridging institution gathers and shares information, connects stakeholders, which is important for 'relationship' and thus for effective knowledge sharing, but is also responsible to see if the knowledge is used and if the feedback is translated into changes in behavior and policies.

Additionally, the open ended question 'With who (of the other stakeholders) do you have most contact with or work most together with?' was added at the end. This can help give more insight into the second sub-research question 'What is the level and quality of the interaction between stakeholders and the government?'. This survey question is part of step 4 of Carlsson and Berkes (2005) 6 steps of co-management 'Analyzing linkages in the system, in particular across levels of organization and across geographical space'. This allows the creation of a network map of roadside management stakeholders.

The final question of the survey had as a purpose to summarize for the participants what their main view was on how the roadside management system could be improved or what is needed to improve it. The question was phrased as follows: 'What is most a barrier to you to improve roadside management? Possibly mention what you would like to see improved.'

There have been a total of 19 answers to the survey. There were 3 vegetation managers, 3 farmers, 6 policymakers, 4 representatives of nature and 3 ‘other’. The ‘other’ people have indicated to be from the municipality, from an advisory firm or an asset manager. There have been no local residents and no scientists who filled in the survey.

Q	Statement	Section
1	Stakeholders have access to an adaptable portfolio of management options.	Information
2	Stakeholders are willing to participate in developing new management options.	Adaptation
3	Stakeholders are dedicated to solving conflicts resulting from different values and wishes.	Adaptation
4	Stakeholders have the possibility to participate in workshops, information sessions and discussions.	Information
5	There is a clear leader (individual or organization) for roadside management.	Relationship
6	The leader is willing to listen to all stakeholders.	Information
7	Stakeholders are willing to share their knowledge and experiences with other stakeholders.	Relationship
8	Stakeholders are willing to listen to and learn from other stakeholders.	Relationship
9	The national and local laws and regulations make cooperation between different stakeholders possible and optimal.	Adaptation
10	When there is cooperation between stakeholders, regular evaluation of results takes place.	Adaptation
11	There is sufficient and clear information available regarding roadside management laws and regulations.	Information
12	The stakeholders are aware of the goals, values and wishes of other stakeholders.	Relationship
13	There is trust among the stakeholders.	Relationship
14	There is an independent, overarching organization that guides the cooperation between stakeholders.	All
15	All stakeholders are actively involved in roadside management.	Relationship

Figure 2. The question number, the statement that measures the condition that will be rated and the category it will be used for to answer the research questions.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Everyone	0,375	1,056	0,5625	0,824	0,75	1,176	1,313	1,278	-0,067	0,353	0,353	0,467	0,267	0,176	0,286
Agrarier	-1,5	0	0,5	-0,5	-0,5	0,666	0	0,666	-2	0,5	0	0	-1	-0,666	0,333
Anders	0,666	1	1	1	1,333	1,333	1,333	1,333	0	0,666	-0,333	0	–0,333	1	0,666
Beleidsmaker	0,666	1	0,5	0,833	0,8333	1,333	1,8	1,166	0,5	-0,166	1,333	0,75	0,8	-0,166	0,6
Groenbeheerder	1,333	1,333	0,5	1,333	0,5	2	2	2	0	1	0,333	1	0	0,666	NA
Vertegenwoordiger van natuurbelangen	-0,5	1,75	0,5	1	1	0,666	1,333	1,333	-0,5	0,333	-0,666	0,5	1	0,5	-0,666

Figure 3. The general results from the survey.

4.1.1 Information

This section regards the availability of information and the exchange of it between the stakeholders. As per the social learning theory, knowledge sharing and creation between stakeholders with diverse experiences and views will help reduce conflict because of a convergence in views and attitudes (Leys & Vanclay, 2011).

For the first statement, regarding the availability of a flexible portfolio for management possibilities, the average result is a positive number. The vegetation managers are very agreeable with this statement and the farmers are not. One representative of nature has further explained that they '[..] manage the roadside verges based on our own insights and goals.' One vegetation manager stated that one can '[...] actively look for information when motivated'. Thus, in the future, especially management options need to be made clearer for the farmers. A lack of knowledge about new approaches can be a barrier to collaborative natural resource management (e.g. Jacobson et al., 2006 in Davies & White, 2012).

The fourth statement regards the availability of insightful events. One vegetation manager mentioned a recent meeting at the provincial house regarding the management of the toxic plant Sint Janskruiskruid, which is a prominent issue for roadside management. Amongst the people present during that meeting, the majority were local policymakers, and only a few were other types of stakeholders, like representatives of nature and vegetation managers. One farmer explained that he had never heard of any such meeting. Indeed, there are no farmers registered on the presence list. The average for this statement is 0,84 which means most people agree that there are informative meetings held. Since meetings are the main mechanism of collaboration for bridging institutions, frequent and regular meetings tend to lead to higher productivity and levels of trust (Hampton & Parker, 2011).

When it comes to having stakeholder discussions, all relevant stakeholders should be identified and invited. A relevant stakeholder is someone who 'either [has an] impact on or may be impacted by the policies and operations' (Frederick et al., 1992 in Mainardes, Alves & Raposo, 2011). 3 out of 19 survey participants identified themselves as farmers. This shows that they are interested in giving their opinion on the current roadside management situation. They have a right to participate in future discussions. Currently, farmers are one of the main resource users of roadside managers, since they benefit from the ecosystem services it provides, such as providing a habitat for pollinators and being the source of hay that is given to livestock or being the source of compost to fertilize the land (Spijker et al., 2013). On top of the current prominent issue of Sint Janskruiskruid, they have interest and needs regarding roadside management that should be considered. A vital aspect of co-management is that not only government and those that manage the resource talk to each other, but that the resource users are in communication with them too (Berkes et al., 1991: 12 in Carlsson & Berkes, 2005).

The sixth statement follows up on the fifth and asks if the leader is willing to listen. Here all categories have a positive number, especially the vegetation managers believe so, with an average number of 2 for their category. One participant validly mentioned that listening is not enough, but that something has to be done with the input. In general, there does not seem to be a consensus on any of the statements. Every question had at least one person who filled in 'strongly agree' and almost every question had at least one person who filled in 'strongly disagree'. However, the only two questions that had no disagree answers were the two

regarding the willingness to listen to other stakeholders and the leader being willing to listen. Consideration for the views of others seems to be there.

The question about enough information being available about the laws and regulations scores the same as the previous question: 0,35. The farmers are on average neutral, possibly due to mixed beliefs, though the representatives of nature are on average not happy about the current availability of information regarding laws and regulations for roadside management. This could indicate that laws and regulations are not fit for nature area's or do not take nature values enough into account. Literature has stated multiple times that scientists of nature and biodiversity often feel like their information and research results are not adequately translated into policies, and that that is most likely due to policymakers not properly understanding the science (Nichols, Baron, Dirzo, Sarukhan, Persic, & Arico, 2007; Maderson & Wynne-Jones, 2016; Davies & White, 2012).

4.1.2 Relationships

The fifth question asks if there is a clear leader. Even though the average answer is 0,75, some indicated additionally that 'unfortunately, this is lacking', 'ambition to establish this this year' (answered by a policy maker, so someone from the province or a municipality) and '[...] it would be preferable when there is a clear directive voor roadside management.' Even when most believe there is clear leadership, if some don't, then there is still no clear leadership. Plus, as a follow up question it would be certainly valuable to know who those that filled in 'strongly agree' actually perceive as the leader. Unfortunately, this can not be established from their answers in this survey. As stated earlier, a requirement for effective participatory governance through bridging institutions is adequate leadership (Folke et al., 2005 and Keough & Blahna, 2006 in Davies & White, 2012). A leader can act as a facilitator to ensure everyone is listened to and to encourage shared leadership, both during meetings as outside (Leys & Vanclay 2011).

The seventh statement is about the stakeholders willingness to share information with others. The farmers are on average neutral, though every other category comes close to strongly agreeing. One commented that 'there is willingness, but not a (good enough) platform for it'. Again a very valid point. A platform for information exchange also relates to the availability of an adaptable portfolio, which is Q1. A platform for exchanging information can come in many forms. As mentioned in Q1, one person stated that when information is needed, one can actively look for it. Most information is already available, as is the willingness to share information. Thus, all that is needed is a structural way for exchanging information. One key way to exchange information and to find out where to find the information one is looking for, is through active engagement and communication between the stakeholders (Garcés-Ayerbe, Rivera-Torres & Suárez-Perales, 2019). As per one example of a bridging institution in Mexico named CONABIO, they collect all sorts of information and redirect it to those interested or for whom it could be valuable (Nichols, Baron, Dirzo, Sarukhan, Persic & Arico, 2007). Thus, as per the literature, a possible future bridging institution could be the platform or create the platform that some are missing.

Statement 8 is about the willingness of stakeholders to listen to other stakeholders. With an average of 1,27, it seems to be the case that most are willing to listen to the input of others.

As mentioned in the previous section ‘information’, a willingness to listen is not one of the problems of the roadside management case.

The twelfth statement asks if stakeholders are aware of the goals and values of other stakeholders. The average score for this question, 0,47, indicates that this is not a clear yes, and thus still has lots of room for improvement. Two comments stated that there are regular conversations between the stakeholders and the municipality. Even though this seems positive, it does indicate that stakeholder interaction depends on the individual municipality and can thus also differ per municipality. Before one can work on converging values and goals, one needs to understand and know about the values and goals of the other stakeholders. When there are different values and goals amongst the stakeholders, this can be addressed via ‘equitable participation, collaborative decision-making and appropriate government policy’ according to the paper of Cox, Butler, Webber and Young (Treves et al., 2009; Butler et al., 2015; Young et al., 2012; Bellanger et al., 2020 all in Cox, Butler, Webber & Young, 2012). Whenever there is shared responsibility and resources, collaboration can help not only understand each other's goals, but go beyond that by co-creating and aligning goals (Davies & White, 2012). This can only happen when there is active communication, collaboration and trust.

Question 13 is about trust. Farmers feel there is a lack of trust, though the policymakers and representatives of nature have a positive average value. One person explains that in general farmers and governments lack trust as do citizens and governments. This question leaves us with more questions than that it answers and would be interesting to research further. For instance, if the lack of trust in this matter stems from a general lack of trust in the government, and what is needed to improve the overall trust. In general, according to the stakeholder theory, the government can increase trust by interacting with other stakeholders more (Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019). Trust is essential for change. When stakeholders feel changes in regulations are imposed on them, they can resist the change, if there is no trust built over time (Davies & White, 2012). A bridging institution is known to offer a site for trust building. In one example of forestry management, dialogue offered by a neutral third party was thought to be the reason trust had increased over time between the stakeholders (Smith, Holmes & Paavola, 2018). Regarding question 13, one can expect this number to be higher in cases where adequate social learning is present. In the study of Smith, Holmes & Paavola (2018), where they researched social learning in a business context, it appeared that after the experiment was over, participants reported higher levels of trust with peripheral stakeholders such as conservation NGO’s and the local community. Thus, the level of trust can also tell something about the quality of social learning amongst the stakeholders.

The last statement, statement 15, asks if all stakeholders are involved. The overall average answer is 0,29 and the nature representatives feel this is not the case with an average of -0,67. This relates back to what was mentioned earlier. It is important for resource and biodiversity management conflict, or any stakeholder conflict, that all relevant stakeholders are involved.

Based on the answers given to Q16, a stakeholder network has been graphed and can be seen in Figure 4. One farmer has said the management of agricultural naturemanagement (‘bestuur agrarisch natuurbeheer’), one said ‘circulair terreinbeheer’ which is a company trying to process vegetation more sustainably and the third one mentioned municipalities and the province. Thus, curiously, only one farmer has contact with the policymakers. The four

representatives of nature had diverse answers too. Two said ‘none’, the third one said municipalities and the fourth one said municipalities and vegetation managers (‘terreinbeherende instanties’). The three vegetation managers filled in ‘municipalities and farmers’, ‘policymakers’ and ‘citizens and contractors’. ‘Contractors’ can be perceived as multiple types of people. The author’s interpretation is that executors of vegetation management are meant here. A follow up would be needed in order to find out the exact meaning of this. None of the vegetation managers filled in recycling facilities. It leaves one to wonder what the vegetation managers do with the mowings. Possibly, these are managed and processed inhouse. Since the mowings are a resource (Spijker et al., 2013), regarding sustainable management of a system under focus, resource management is a large part of that (Spijker et al., 2013), and need not to be overlooked. Our fifth category of stakeholders was policymakers, which was the largest part of our survey. These mostly mentioned the vegetation managers, but also nature representatives, farmers and other policymakers of other governance levels or geographical areas. The three ‘other’s need to be discussed as well. The person who identified as being from an advisory firm said to have contact with the waterboard, educational facilities and farmers. Municipalities and the province share responsibility for roadside verges with the waterboard when there is a waterway next to the road (Waterschap Rivierenland, 2020). The asset manager indicated in this question to have contact with municipalities and the board of other provinces. The third ‘other’ indicated to be from the municipality, thus this person falls under the category of policymakers and is grouped under this name in Figure 4. This person mentioned citizens to have the most contact with. The advisory firm and the asset manager are separately indicated in the map. To sum up, every stakeholder has only indicated one, two or three other types of stakeholders they have contact with or work together with, even though there are at least 6 types of categories, depending on how one interprets the definition of the categories. Contact with a recycling facility was only mentioned once, by a farmer. Contact with citizens was only mentioned two times. Contact with scientists or researchers wasn’t mentioned by anyone.

This question and its visualized answers in Figure 4 can tell us that policymakers play a dominant role in stakeholder interaction. Davies and White (2012) warn us to be careful of power disbalances. The scale can easily tip into the direction of policymakers, since besides being an equally important stakeholder in the discussion, they are also responsible for translating the input into changes in policy and executing change in management (Cox, Butler, Webber & Young, 2020). However, it needs to be noted that one cause for the policymakers being more prominently visible in the network map could be them being more represented in the survey than the other types of stakeholders. Thus, as mentioned earlier, one can only use this graph as visualization and not to draw any conclusions on. A bridging institution can connect different stakeholders from different governance and geographical levels. Sometimes, without the help of an external, formal institution whose role it is to identify all relevant stakeholders, some stakeholders might otherwise never know about each other, learn from each other, work together or communicate (Crona & Parker 2012; Rathwell & Peterson 2012).

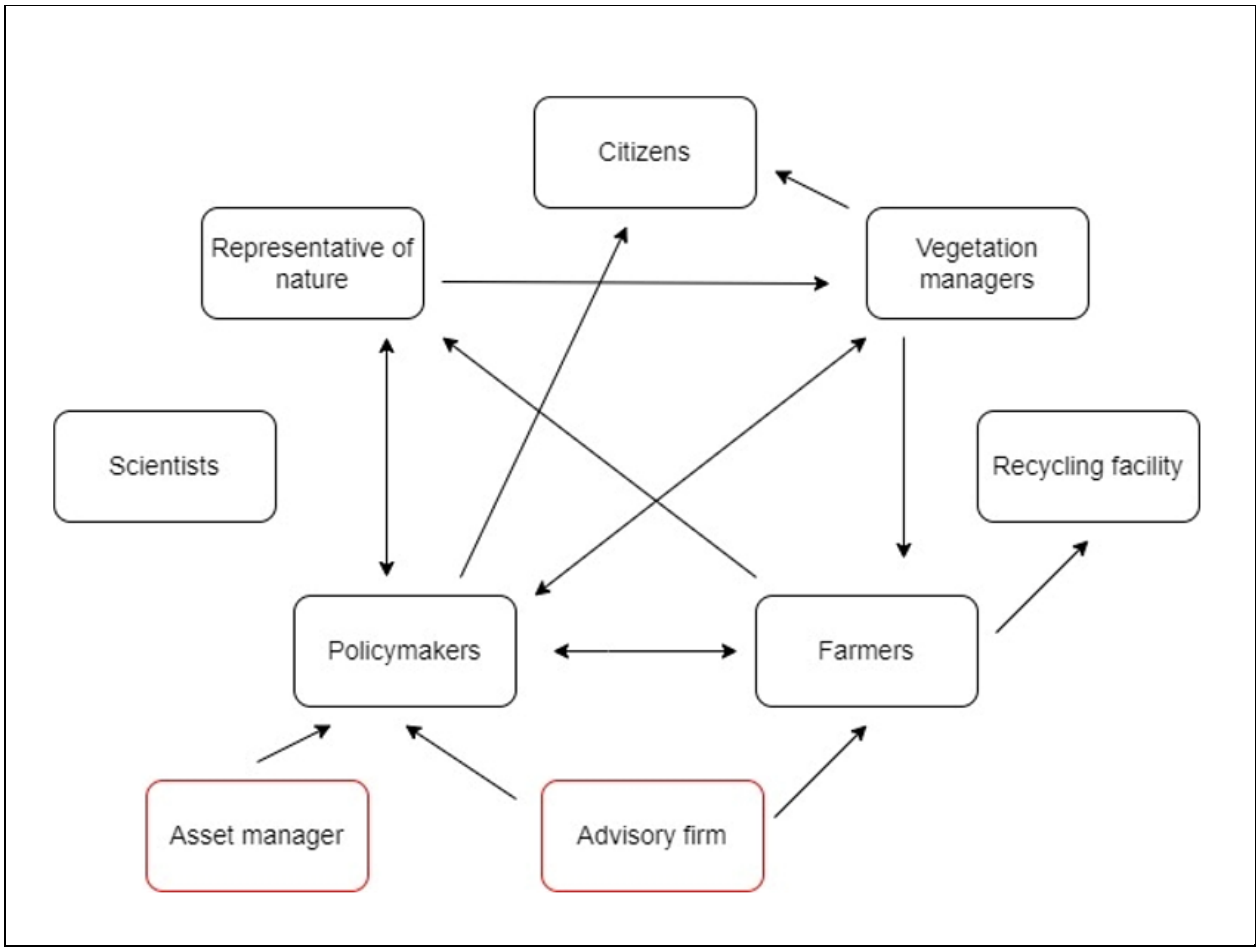

Figure4. Visualization of the stakeholder network based on Q16 of the survey. An arrow goes two ways if the connection is mentioned by both.

4.1.3 Adaptation

The second statement, regarding the stakeholders willingness to participate in developing management options, is rather positive, with an average answer of higher than 1. One participant mentioned in the optional clarification section that 'Sometimes the right knowledge and awareness is lacking. Other things that play an important role are time and costs.' Regarding time, it is important that stakeholders realize the value of participating in participatory governance. When stakeholders do not participate in the collaboration process, such as going to meetings, this can affect the overall outcome of the process negatively (Hampton & Parker, 2011). The paper of Davies and White (2012) says that one should consider the costs of stakeholders to participate not only in participating in social learning schemes, but more precisely the costs they make when taking up more management responsibilities. Negative legislation can create higher costs. Davies and white offer as a solution that active participation in management should come with public benefits and personal financial benefits to make participation more attractive (Davies and White, 2012). In general, a better participatory

governance system, such as with a bridging institution, could save money compared to a fractured, bureaucratic system (Carlsson & Berkes, 2005; Davies & White, 2012).

The third statement, 'stakeholders are dedicated to solving conflicts resulting from different values and wishes', scores almost the same for everyone, with an average score between neutral and partially agree. There were a multitude of insightful comments given on this question. Comments given said that 'it depends on the level of the organization', 'Most cannot be made satisfied, especially citizens', 'Municipal policies are leading', that 'existing preferences are of big financial value' and one said 'farmers are, but the government isn't.' From these answers it becomes clear that conflicting wishes and values are present, and that not everyone believes there is a management option that satisfies everyone. However, literature says that a higher level of interaction has proven to lead to more alignment of attitudes (Connick & Innes, 2003 and Pahl-Wostl et al., 2007 in Leys & Vanclay, 2011).

The ninth statement asks about the local laws and regulations. The average is a negative number, with all farmers strongly agreeing that the current laws and regulations only hinder cooperation. Representatives of nature seem to slightly agree with this. One participant filled in that 'it doesn't seem laws make [cooperation] possible. It is preferable that an optimal management directive could do so.'

Then Q10 asks if the cooperation is regularly evaluated. The average comes close to zero and it seems that especially the policy makers feel that cooperation is not enough evaluated. However, one person stated in the comment section that this is currently not relevant. Possibly this person refers to cooperation being needed first, before evaluation is a question at all. One cannot evaluate progress or the level of cooperation without a good framework to do so (Leys & Vanclay, 2011; Mainardes, Alves, & Raposo, 2011).

Question 14 regards if there is an independent organization guiding cooperation between stakeholders. The average is 0,18 which is close to zero. Some people answered 'strongly agree' and some 'strongly disagree'. If one such organization exists, it is not clear to all that it does. The comments here were an interesting addition. One person said that they are 'trying to set this up under the provincial agenda of biodiversity' and another one said 'The province tries but doesn't offer anything concrete yet'. Thus, it seems there are some plans to make an overarching organization more concrete. Two people commented about an agricultural cooperation. For farmers with an interest in roadside management, it seems they can join a farmers initiative.

The last question asked to the survey participants was: 'What is most a barrier to you to improve roadside management? Possibly mention what you would like to see improved.' This question, as stated before, is meant to summarize the problems in roadside management, both content as structural. If one would like to see certain things improved or feels they cannot improve something for a reason, this fits the category of adaptive behavior and can help answer the question: what is the quality of the translation of the knowledge exchange and interaction to policy and management changes (a.k.a adaptive behavior)? This section gives feedback as to the current way of roadside management. Flexible management was mentioned multiple times. The exact answers were: 'flexible management' and 'laws and regulations'(3x). One added that the current laws and regulations still stem from the time that organic material wasn't viewed as a natural fertilizer yet, but as waste. Literature supports the notion that a bridging institution could

facilitate the creation of new laws, regulation and management options and implement these in a more flexible manner than top-down governance (Berdej & Armitage, 2016).

Differences in preferences were also mentioned as a barrier to improvement multiple times. One representative of nature added that they also have to take into account road safety and the wishes of the farmers in the area or other landowners. A policymaker stated shortly as a barrier 'wishes of farmers regarding weeds that blowover'.

There was also a multitude of comments related to finances, such as 'budgets' and 'higher financial resources'. As mentioned in the literature review, difficult and confusing funding schemes for community outreach had resulted in participants being less willing to engage (Leys & Vanclay, 2011). In this case, the lack of finances is found to be a barrier to improvement. Though we can assume that it might even have a higher negative impact on stakeholders' willingness to engage than confusing funding. Costs were mentioned in the survey to be a barrier to participation.

Regarding knowledge, people say there needs to be more information on how to manage exotic species and unwanted species (3x), on how to combine management of waterway verges with roadside verges (2x), better information sessions to those that manage roadside verges, or just the general 'Gaining more knowledge!'. One also said there is still not enough information regarding new machinery and ecofriendly management. Machinery was also mentioned by another farmer. One policymaker stated that regarding the vegetation in the roadside verges that a lot of farmers give comments or have questions about this, which highlights a need for better knowledge exchange. Question 1 of the survey asked about management possibilities and if people had access to information about that. Here, one comment mentioned 'possibilities'. Thus, either this person is unsatisfied about the possibilities, finds that there needs to be more or better possibilities, or is unaware of them. Anyway, this person finds 'possibilities' a barrier or wants to see it improved. These comments are in line with the mean answer to Q1, which was close to zero and -1.5 for the farmers. According to the social learning theory, a lack of knowledge about new management options can be a barrier to collaborative natural resource management (Davies & White, 2012). Thus, it is important that the average number to this statement goes up in the next few years if better natural resource management is a goal.

Some other comments regarding the structural and institutional design of roadside management were 'higher ambition' and 'collaboration of regulations'. A wish for a higher ambition is related to statement 2 and 3 that evaluate the willingness of stakeholders to improve management. Collaboration of regulations relates to the theories of co-management and participatory governance, that both state that power should be shared and that regulations should be created more flexible and together with other stakeholders (Carlsson and Berkes, 2005; Leys & Vanclay, 2011; Koontz, 2006; Cox et al. 2020).

5 Limitations

Research goes with trial and error too. The survey was created with a Likert scale that went from -2 to 2. However, the default setting of the system places the scroll bar at the beginning on the left, which is -2. After the first responses were analyzed, it became clear that in a few instances there was no answer given, even though their answer was clarified in the optional text box after each question, and that this was most likely due to the default setting already at -2 (totally disagree) and participants not moving the scroll bar. Unfortunately, the system registered this as 'no answer given'. When the code was being developed for analyzing the survey results, all these NA's made analyzing the results at that point difficult. After realizing this, at the top of the survey, a warning was added, saying that when their preferred answer was 'totally disagree', that the scroll bar still had to be put manually on -2. Hopefully, this helped prevent this error for the responses after that. However, we can not assume that every 'no answer given', or empty vector in the data, was meant to be a -2. The code removes the empty vectors and takes them out of the equation to calculate the mean answer. Thus, possibly, some of the mean answers were meant to be lower. This error does influence the quality of results negatively.

Another error that became apparent from the additional comments after survey questions, was that some people struggled with understanding the meaning of the statements. The statements were based on Plummer et al. (2015) preconditions indicators. However, the study group is Frysian and Dutch speaking and the statements had to be translated to Dutch. Additionally, the statements were meant to be abstract, since they needed to be applicable and answerable by all stakeholder categories. An example is the first statement: 'Stakeholders have access to an adaptable portfolio of management options.' This was translated into: 'Belanghebbenden voor het bermbeheerbeleid hebben toegang tot een actueel portfolio van management mogelijkheden.' After consideration, for clarification was added: 'Het gaat hier om de voor en nadelen van verschillende soorten bermbeheer mogelijkheden, zoals maaitechnieken en wat er met het maaisel gebeuren kan, binnen de huidige wetten en regelingen. Dit is openbaar in te zien.' Regardless, two people said that they did not understand the question. They had to fill in if they agreed with the statement or not. To some, this can be experienced as an inadequate way of measuring an opinion. Opinions can be abstract, difficult to explain or even change over time. Unfortunately, these are one of the realized limitations to measuring the opinion of a large group through a survey.

A third limitation to the validity of the results has to do with who filled in the survey. No citizens or scientists were reached. Even though local residents are important stakeholders for local roadside management, and often have an opinion on it too, they might be too local to have been included in the survey outreach. It is difficult to evaluate which local residents want to be included in the policy making and stakeholder discussions. Possibly, for future reference, one has to take note of residents who have voiced their concerns regarding roadside management in the past. It should be the role of a bridging institution to identify and invite the relevant stakeholders (Leys & Vanclay, 2011). Luckily, some participants indicated to have contact or work together with citizens. As per democratic theory, policy makers should respond to demands of those that they govern, citizens included (Davies & White, 2012). The absence of scientists can be explained as well. Those who research ecology, and know most of it, are

categorized as ecologists. According to the websites of frisian ecological advisory firms, ecological research can be done when commissioned by a nature organization or by local governments. Since ecologists are often advocates for nature, they might identify as a representative of nature and categorize themselves in that category. However, we cannot be sure, since we do not know who answered what. Additionally, one 'other' has clarified themself to be working for an ecological advisory firm. Whether one can categorize them as scientists or not, is a subjective matter. Thus, whether scientists were included or not in this study depends on nuances and perception of the definition.

On the same topic, it needs to be mentioned that even though the preferred and expected amount of survey answers was achieved, it is still not enough to conclude statistical significance. Especially since participants were categorized into groups, these groups need to have a higher number of participants to be able to compare the mean answers with each other and to be able to conclude if the answer of one type of stakeholder is significantly different than another group. Studying the stakeholders for roadside verges in the province of Friesland is a narrow niche. To increase validity of the results, follow up interviews can be performed with participants and an even more thorough survey distribution can be performed, with a longer time window to fill it in. An additional qualitative study would allow us to get a better understanding of the stakeholder interaction. Statements can be vague, participants can be unsure about their answers or they would want to explain their answers. Even though a comment section was offered after each statement to further explain themselves if they felt they needed to, this is only a small box that also does not allow for interaction.

Lastly, the limited amount of currently available studies need to be mentioned as a limitation to this study. During the literature review, it became apparent that even though 'bridging institutions' are a recognised theoretical approach to solving stakeholder interaction challenges and improve nature conservation, only a few case studies were found. A lack of implementation, and a lack for evaluating the quality and progress of implemented bridging institutions, can hinder the overall willingness of institutions to implement this. Regardless of the one evaluation framework offered by Butler et al. (2015 in Cox, Butler, Webber & Young, 2020), there are not many established ways of evaluating the work of a bridging institution, even though evaluation is a key component for co-management of contested landscapes, as the literature adamantly states (Cox, Butler, Webber & Young, 2020; Niemela et al., 2005l; Plummer et al., 2017; Carlsson & Berkes, 2005; Leys & Vanclay, 2011).

6 Conclusion

Overall, the survey has allowed a conclusion to be drawn about the current state of roadside governance in the Province of Friesland. The survey results in combination with the literature has given the information needed to answer the main research question, if a bridging institution would be helpful for roadside management, and the three sub-research questions regarding knowledge exchange, stakeholder relationships and adaptive behavior. The differences in answers for the specific statements Q1 to Q15 made analyzing and drawing conclusions difficult. It is safe to say that there was no consensus for most of the statements. However, especially the answers to Q17, where they were asked about what they generally struggle with, gave valuable insights. The needs indicated by the mean survey results, the added comments and the answers given on Q17, support the implementation of a bridging institution. It needs to be mentioned that there are also many positive findings, such as a high willingness to listen to other stakeholders and plans to establish a better directive, and other individual or collective attempts at improving roadside governance.

The main challenges identified are:

1) *Farmers should be recognised as a relevant stakeholder.* The management options are not clear to farmers, they feel there are no insightful events they can take part in and they do not trust the government, even though they are interested in roadside governance and want to be included. Resource users of contested landscapes are one of the main stakeholders for co-management of nature. Plus, when there is trust lacking amongst one of the primary actors in the co-management of an area, it can hinder collaboration, and thus negatively impact the results.

2) *Representatives of nature should be recognised as a relevant stakeholder.* They feel there is a lack of adequate information, feel that the current laws and regulations are not satisfactory to their wishes and that they are not adequately involved in the debate nor have a proper relationship with any of the other stakeholders.

3) *Reflexive and adaptive behavior is needed from the government.* Many respondents indicated at least one form of ‘stiffness’ from the government. They feel that the government's wishes are leading, that they are not willing to solve conflicts stemming from conflicting values, and that current laws and regulations only hinder collaboration, progress and sustainable land use.

4) *A good, structural way for exchanging knowledge is lacking.* The relevant information is often there, though cannot be shared. This is partly due to the lack of interaction between stakeholders or because an adequate platform for information is missing. Stakeholders have indicated they require more information on specific topics.

As per the theory, a bridging institution can help solve these challenges. Even though ‘bridging’ can be accomplished using different strategies and platforms for collaboration and social learning (Bardej & Armitage, 2016), a bridging institution is offered as a method of comprising all three dimensions of stakeholder integration (Smith, Holmes & Paavola, 2018; Berkes, 2009). I advise the Province of Fryslan to work on establishing some form of a bridging organization. More frequent contact with all types of stakeholders needs to be established in

order to attain higher levels of trust and better knowledge exchange. Policymakers and government bodies should not view themselves as the directive or leader, but as an equal stakeholder in the discussion of roadside governance, and redirect leadership to a neutral, third party that can identify all relevant stakeholders, invite them for discussion and guarantee everyone to be considered and listened to fairly. On top of that, they can facilitate reflexive management and evaluation of the process. Stakeholder integration is a gradual process that will take time. Relationships and trust have to be built and a structural method for feedback needs to be established (Plaza-Úbeda et al. 2010 in Garcés-Ayerbe, Rivera-Torres, & Suárez-Perales, 2019). Willingness to collaborate and ambition to improve roadside governance should be present and shown.

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