



# Struggling over shellfish: How diverging perceptions of marine nature distort deliberative governance

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## ABSTRACT

Deliberative governance is gaining increasing attention in the management of natural resources with conflicting stakes. Although disputed knowledge is known to affect deliberation, the role of perceptions is understudied. Based on a case study in the Dutch Wadden Sea, a marine protected area, we examine the social representations of shellfish fisheries and marine nature of stakeholders within one deliberative governance arrangement, the Mussel Covenant. Our results show that within this covenant there are two opposing social representations of marine nature which both are not in line with the agreed objectives. Instead, governmental policies still form the guidelines to covenant decisions. We conclude that diverging representations and state-influence decrease deliberation. Therefore, we argue that deliberative governance is not possible without explicitly considering the different cognitive, normative and expressive meanings attached to the marine area or issue at stake. To achieve deliberation, values of stakeholders should explicitly be acknowledged and discussed, and state-influence should be kept to a minimum.

## 1. Introduction

The management of both terrestrial and marine nature conservation areas in the European Union (EU) shows a trend away from state-led nature conservation policies towards devolved management arrangements (Arnouts, van der Zouwen, and Arts, 2012). Whilst EU member states have key responsibility for the application of conservation areas, in practice co-management by regional and local governments, resource users, and other stakeholders has become the prevalent governance arrangement (Beunen and de Vries, 2011). Following Tatenhove (2013, p. 238) we define a governance arrangement as “A temporary stabilization of the content and organization of a [...] policy domain. In a governance arrangement different, stable, coalitions of governmental and non-governmental actors try to influence the activities that occur in and around the sea and to design legitimate initiatives, based on shared discourses, for managing resources and defining the rules of the game (on different levels).”

Deliberative modes of governance are increasingly proposed as a way forward in the “design of legitimate initiatives, based on shared discourses” (Tatenhove, 2011; Connelly et al., 2006). We define deliberation as a dialogue that “induces reflection upon preferences in a

non-coercive fashion” (Dryzek, 2000, p.2).

This idea of creating legitimacy through deliberation, is based on Habermas’ notion of discursive democracy, where democracy is characterized by the existence of an open and power-free debate (Arts and Buizer, 2009). One example of a deliberative governance arrangement is the covenant. Covenants are voluntary consensus-based arrangements between government and private actors like non-governmental organizations (NGOs), sector associations and companies (Van Leeuwen and Van Tatenhove, 2010). Even though covenants are voluntary, they have a close-to-binding character, based on strong expectations about a common commitment to develop a shared vision. In the Netherlands, where seeking consensus through deliberation has a strong tradition, covenants are an integral part of the governance system (Korver and Oei, 2005). They are used for different purposes, such as to increase compliance, to create commitment for action, and/or to ease down tense relations and find ways out of deadlocks; especially when regular instruments are not deemed sufficient or effective to achieve these objectives (Van Hoof, 2012). Previous studies have investigated the role of knowledge uncertainties in covenants, such as the Mussel Covenant (MC) in the Dutch Wadden Sea, an internationally renowned marine conservation area (e.g. (Floor et al., 2018, 2016; Molen et al., 2015;

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Raad van de Wadden, 2004)). However, in governance research in marine conservation, the role of perceptions of social groups in governance arrangements is often overlooked or not addressed explicitly.

In this paper we examine the case of the MC in Dutch Wadden Sea from a new perspective, focusing on the role of perceptions. The covenant was initiated in 2008, as a solution to ongoing legal conflicts around the issuing of permits for mussel spat fisheries. In the covenant, the government, mussel sector and nature organizations have agreed to collaborate towards reducing ecological impacts from mussel spat fisheries by transitioning to mussel spat collectors, next to the allocation of governmental budget to nature restoration projects (Floor et al., 2016). Ten years into the covenant, the set goals have not been met yet (VROM, 2007). Currently, the MC is being renegotiated, with the prospect for renewal being uncertain. This outcome leads to questions, not just about the future of shellfish fisheries in the Wadden Sea, but also about the ways in which a common vision is (not) fostered through covenants, as voluntary tools in deliberative governance for marine conservation and resource use. Our analysis focuses on the influence of different perceptions about, and views of nature and resource use in the Dutch Wadden Sea on the deliberative interactions between the covenant partners. When describing deliberation within the covenant in general (all groups), we use the term deliberation. We refer to deliberative interactions when we zoom into deliberations between the specific groups involved. We study deliberation and deliberative interactions using Social Representation Theory (SRT), a theory which combines insights from social psychology and sociology. We chose this theory as SRT focusses on the changes in perceptions of social groups and how perceptions shape and are shaped by interactions between groups. We hypothesize that existing policies influence the deliberative interactions between the covenant partners, as these still form the framework for the potential policies established through these interactions. As such we compare the perceptions, or social representations, with key discourses within past and present Wadden Sea policies.

This article is structured as follows: the next section presents the theoretical framework, followed by a description of the methodology. We then move to introducing the case study of the Wadden Sea, and the MC. In the results section, we present the two main social representations, and the relation to the past and present policies. In our discussion, we show that the two social representations present in the covenant are hindering deliberative interaction and that policy outcomes of the covenant are not in line with stakeholders' social representations of the Wadden Sea. Therefore, we question the feasibility and legitimacy of the current covenant as a deliberative governance arrangement. We conclude with recommendations for enhancing deliberations in marine governance arrangements through the acknowledgement of different values and perceptions among stakeholders. Furthermore, we recommend studying the role of values and perceptions in deliberation more closely in other marine cases, as we do not yet have a general understanding of the perceptions of the marine environment.

## 2. Conceptual framework

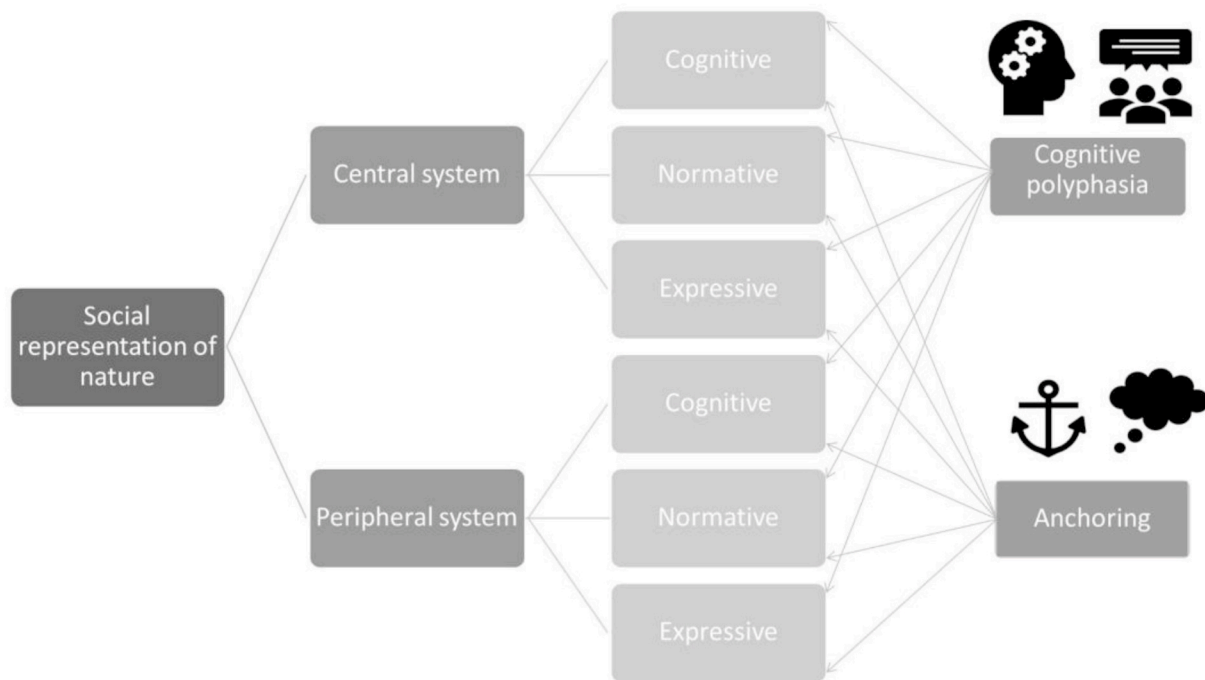
In this study, we examine a deliberative governance arrangement using Social Representation Theory (SRT). Burkhalter, Gastil, and Kelshaw (2002) portray public deliberation as "a combination of careful problem analysis and an egalitarian process in which participants have adequate speaking opportunities and engage in attentive listening or dialogue that bridges divergent ways of speaking and knowing". Hendriks (2009) describes deliberation as a communicative process, highlighting that all participants are well-informed and try to find the best solution to a proposed policy problem. Furthermore, Benhabib (1996) argues that within deliberation, actors keep an open mind to different solutions and explain their arguments in a way that other participants can relate to. Within deliberative governance arrangements, as in any governance arrangement the participants form "different, stable, coalitions of governmental and non-governmental actors". This often

means that participants come from different social groups – thus having different socio-economic, political and cultural backgrounds, and also different roles and interests (VROM, 2007). In our case study of the Mussel Covenant, we identify four main groups: (1) mussel farmers, (2) nature conservationists, (3) scientists and (4) policy makers. According to SRT, each social group has a different social representation: a conceptualization of the perceptions shared by the group (Buijs et al., 2012).

Social representation theorists understand perceptions to be socially constructed. Perceptions are not only based on sensory experiences, but constructed through complex interactions between someone's personal characteristics, past experiences, and social environment. These influence multiple meanings (often indicated as cognitive, normative and expressive meanings) individuals attach to a certain referent object, action, experience, individual, policy, or outcome (Bennett, 2016; Moon and Blackman, 2014; Weinstein et al., 2019; Keulartz et al., 2004; Song et al., 2013). To illustrate, in our case of the MC, the value of nature and natural resources in the Dutch Wadden Sea has thus been created through the value the four different social groups involved give to this ecosystem; this value depends on perceptions of nature and natural resources (Ayensu et al., 1999; Kennedy and Thomas, 1995). A social representation (SR) is then a meta-concept that brings together perceptions, values, ideas and practices used by individuals yet as part of a social group, to understand a phenomenon (Moscovici, 2003; Mazumdar and Mazumdar, 1997). Through an SR, people place objects, people and events into frameworks and categories, helping them to understand, and to guide their (inter)actions (Halfacree, 1993). A SR also functions as a mental environment for people to know what and how to think and interpret (Moscovici, 2003). Because SRs work at a group level, wherein individuals internalize certain aspects of this representation, one can distinguish between the SR of the group and the mental reflection of the representation by individuals (Buijs 2009b). This focus on social groups, instead of on either individuals or societies, distinguishes SRT from other approaches (Buijs et al., 2012). Perception studies are often focused on the static perceptions of people in a certain situation. A focus on the creation and transformation of perceptions within and between groups allows for a better understanding of interactions between the individual, the group and the object, bridging sociological and cognitive theories (Buijs et al., 2009b, Buijs 2012). Perceptions within groups are influenced by individuals, but also influenced by external forces (e.g. other social groups) and of course the object itself. Therefore, we use SRT to examine the interactions between and within groups.

In our application of SRT, we included the conceptualization of nature, as developed by Keulartz et al. (2004) in our theoretical framework (see Fig. 1). Their images of nature, consisting of cognitive, normative and expressive meanings, serve as our building blocks. Cognitive meanings reflect how people understand nature and its functioning. For example, what is the nature of nature: is it stable, or very dynamic? Normative meanings reflect what people think nature ought to be and how people think we should manage nature. This includes questions like should humans interfere in nature to make it "better", or leave nature be? What is the value of nature, does it have an intrinsic value, or mainly because humans can use its resources? Expressive meanings reflect the experience people have when they are in nature. For example, what nature do they appreciate and enjoy, and what nature is hideous or dangerous? And how are cultural landscapes experienced, are human influences in a landscape affecting the experience of naturalness and beauty?

In our study, interactions between SRs are a focal point, as we are interested in deliberative dialogue. We follow a so-called "structural approach" to study these interactions. This approach distinguishes between the central and peripheral system of a SR (Abric, 1993). The central system forms the stable part of the representations and consists of the commonly held values, norms and ideas. It represents the homogeneity of the group and is not very sensitive to external influences. The peripheral system is, on the contrary, very flexible, sensitive to



**Fig. 1.** A conceptual framework of social representations of nature. A social representation consists of a central and peripheral system, both consisting of cognitive, normative and expressive meanings. Cognitive polyphasia and anchoring are processes that take place within the central and peripheral system, within all those different meanings.

external influences and represents the heterogeneity of the group (Abric, 1993).

To capture the interaction dynamics between the central and the peripheral system, there are two processes that need to be considered: (1) anchoring, and (2) cognitive polyphasia. These two processes provide insights in the way an individual relates to the social group with whom a SR is shared, and thus shows how a SR is reproduced when groups encounter new, unknown or threatening phenomena (Bauer and Gaskell, 2008). The first process, anchoring, refers to the uptake or internalization of a new phenomenon into an existing social representation (Wagner, 2007). By internalizing new phenomena into existing frames, they are regarded as less threatening by the group (Moscovici, 2003). Anchoring happens for instance when there are new scientific findings, which have to be placed within the framework of the SR (Wagner, 2007; Wagner et al., 1995). The process of anchoring is often followed by objectivation, in which the new phenomenon becomes iconic, accompanied by suiting meanings, words and standard phrases (Buijs 2009b). The process of anchoring and objectivation is a form of classification, whereby the new phenomenon is compared with a prototype. This is often a normative process. Classification can be done through the creation of distance between the new phenomena and the prototype, to show how different they are, or through decreasing distance by showing the similarities between the phenomena and the prototype (Moscovici, 2003).

The second process, cognitive polyphasia, refers to contradictory elements within one SR. These contradictory elements can exist next to each other, as people often rely on different cognitive systems at the same time (Bauer and Gaskell, 2008; Staerkle, 2009). Cognitive polyphasia can also refer to individuals adhering to different SRs depending on the social context (Provencher, 2011).

### 3. Material & methods

We used an interpretative approach common to many studies on perceptions and SRT. Our research methodology is therefore qualitative in design. Data sources for our study included policy documents and

semi-structured interviews. We analyzed twelve documents, selected based on three criteria: (1) the document was published by a (semi-) governmental institution, (2) it deals with policy regarding nature conservation and shellfish fisheries in the Dutch Wadden Sea, and (3) it addresses both ecological and social-economical topics or social-economic implications of ecological oriented policies. Table 1 shows an overview of the analyzed documents (see Table 2).

For the analysis of the SRs of mussel farmers, nature conservationists, scientists and policy officers, the first author interviewed representatives of the four groups, using a semi-structured interview format. Interviews generally lasted 1–2 h and focused on the different perceptions of the Wadden Sea regarding nature conservation and sustainable co-use. In total, 18 people were interviewed. We based interviewee selection on their involvement in the covenant, aiming at interviewees who have been or are directly involved. We divided interviewees into two categories. The first includes people with direct links to the MC and which were really part of one of the four social groups (mussel farmers, nature conservationists, scientists and policy-makers). The second includes people who are involved in the covenant but not part of one of the four social groups, or people who are part of such a social group but not directly involved in the MC.

We recorded all interviews in the first category and transcribed verbatim. This enabled us to analyze the interviews in detail. We analyzed transcripts using iterative coding. Our final set of codes consisted of codes related to the nature of the sentence or statement, whether it was either cognitive, normative or expressive, and the theme of the sentence or statement (e.g. related to fisheries, nature conservation etc.). We recorded the interviews in the second category but not transcribed them verbatim; we made summaries of these interviews and used them as a background for our understanding of the MC and the policy arena of the Dutch Wadden Sea. The interviews with the second group confirmed most of our conclusions based on the analysis of the transcripts of the first group. When asking respondents for other interview candidates, suggestions for people who were already interviewed or scheduled for an interview often came up. Considering the above, we decided we had reached stakeholder saturation after conducting 18

**Table 1**  
Overview of the analyzed documents.

Period	Year	Title	Institution	Subject
Before the covenant	1993	Vissen naar evenwicht: Structuurnota Zee- en kustvisserij	Ministerie van Landbouw Natuurbeheer en Visserij	Dutch policy for fisheries at sea and in coastal areas
	1999	Beleidsbesluit Schelpdiervisserij Kustwateren 1999–2003	Ministerie van Landbouw Natuurbeheer en <a href="#">VROM, 2007</a>	Dutch policy for shellfish fisheries in coastal areas
	2004	Ruimte voor een zilte oogst: Naar een omslag in de Nederlandse schelpdiercultuur. Beleidsbesluit Schelpdiervisserij 2005–2020	Ministerie van Landbouw Natuur en <a href="#">VROM, 2007</a>	Dutch policy for shellfish fisheries
	2007	Ontwikkeling van de Wadden voor natuur en mens	Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, 2007	General Dutch policy for the Wadden Sea region
The covenant	2008	Convenant transitie mosselsector en natuurherstel Waddenzee	Ministerie van Landbouw Natuur en <a href="#">VROM, 2007</a>	Covenant for mussel fisheries and nature restoration
After the covenant	2010	Brede visie op duurzame visserij in de Waddenzee	Regionaal College Waddengebied	Vision for sustainable fisheries in the Wadden Sea
	2010	Wadden Sea Plan 2010	Common Wadden Sea Secretariat	Agreements between the Dutch, German and Danish government concerning the whole Wadden Sea area
	2014	Natuurambitie Grote Wateren 2050 <i>en verder</i>	Ministerie van Economische Zaken, 2014	Dutch nature policy concerning marine and freshwater areas
	2016	Natura 2000 beheerplan Waddenzee	Ministerie van Infrastructuur en Milieu and Rijkswaterstaat Noord-Nederland	Natura 2000 management plan of the Dutch Wadden Sea
	2016	Report on the State of Conservation of the World Heritage property “The Wadden Sea	Common Wadden Sea Secretariat	Dutch, German and Danish management plan for the Wadden Sea
	2018	Visie Landbouw, Natuur en Voedsel: Waardevol en Verbonden	C. Schouten, Ministerie van Landbouw, Natuur en Voedselkwaliteit	Vision of the Dutch minister for agriculture, nature and food quality on nature conservation and food production in the Netherlands
	2018	Programmaplan 2019–2022: Wad Veerkrachtig	Programma naar een Rijke Waddenzee	Plan for nature restoration and sustainable economic development in the Dutch Wadden Sea

**Table 2**  
Overview of the number of interviewees per category and social group.

Social groups	First category	Second category
Mussel farmers	2	1
Nature conservationists	3	0
Scientists	3	2
Policy makers	3	1
Informants (not part of one the groups)	0	3
<b>Total</b>	<b>11</b>	<b>7</b>

interviews. We agreed with all interviewees we would not refer to individuals or specific organizations. All interviewees received a comprehensive technical report of the study (De Koning and Steins, 2019). We presented the results to the current partners to the covenant, to validate and discuss our findings. No concerns or disagreements with results were expressed.

Before presenting our case, we emphasize that the particular governance arrangement of the MC is part of a wider trend of using deliberative approaches in nature conservation, including in the Wadden Sea (Walsh, 2020; Arnouts, van der Zouwen, and Arts, 2012; Phillips, 2003; Holley et al., 2012). There is, for example, a fisheries covenant between shrimp fisheries, nature organizations and the government in the Dutch Wadden Sea. We decided to focus our study on the MC, to be able to understand a specific situation. Furthermore, in the policy analysis, we only focused on official policy documents published by (semi-) governmental institutions, because we wanted to understand the role of official policies in a deliberative governance arrangement. Nonetheless, we do acknowledge possible influences of non-governmental parties on the SRs within the covenant, such as the present Marine Stewardship Council certification of mussel spat fisheries and bottom cultivation in the Dutch Wadden Sea and its definition of sustainable and well-managed fisheries.

#### 4. Case study: mussel fisheries in the Dutch Wadden Sea

In the Dutch Wadden Sea, nature is internationally protected and acknowledged as a Ramsar site, an EU Natura 2000 area and a UNESCO World Heritage Site (CWSS, 2010; I&M and RWS, 2016). The Wadden

Sea is a shallow sea, characterized by the presence of tidal mudflats (Fig. 2). Within the different designations of the Wadden Sea, sustainable co-use is allowed within set boundaries. In the Netherlands, Natura 2000 regulations are implemented through the Nature Conservation Act (1998, revised in 2017). The Act stipulates that co-use of protected nature should be assessed based on the absence of “significant effects”. In the Wadden Sea, this led to severe conflicts between shellfish farmers and nature organizations around the significant effects of mussel spat fisheries on natural mussel beds (Floor et al., 2016). Mussel farmers traditionally fish mussel spat from natural beds in spring and autumn and relay them on special cultivation parcels with better conditions for on-growth to consumption-sized mussels. Before the 1990s, the spat fishery was not regulated by governmental policies. In the 1990s, mass mortality of eider ducks (*Somateria mollissima*), a marine bird which feeds on mussel beds, took place in the Wadden Sea area. This mass mortality was the result of food shortage due to the almost complete disappearance of littoral mussel beds in the Wadden Sea. The latter was caused by consecutive years of low spatfall combined with intensive fishing for the remaining spat for mussel farming. This led to the first policies, initially through voluntary measures by the industry aimed at preventing overharvesting and recovery of littoral beds. Policy measures included closing areas for fisheries and setting annual quota for the mussel spat (Steins, 1999).

Under the Dutch Nature Conservation Act, farmers must apply for permits for each spat fishery season (spring and autumn). These permits were regularly challenged by nature organizations. The permit for the spring fishery of 2006 was nullified in court as, according to the judges, it could not be sufficiently proven that “no significant effects” occurred. As a result, the future of the mussel sector was in jeopardy, and conflicts between mussel farmers and nature organizations escalated. To resolve this conflict, the government initiated a deliberative governance arrangement including the mussel sector and nature organizations, the Mussel Covenant. In this arrangement, the different parties agreed on a transition whereby the traditional spat fishery on mussel beds is eventually fully replaced by spat collection from floating mussel spat collectors (MZIs) (Floor et al., 2018). MZIs were regarded as a more sustainable option than bottom fisheries, as bottom dredging is reduced and therefore also the impact on natural mussel beds. Furthermore, MZIs were expected to provide a more steady supply of spat in comparison



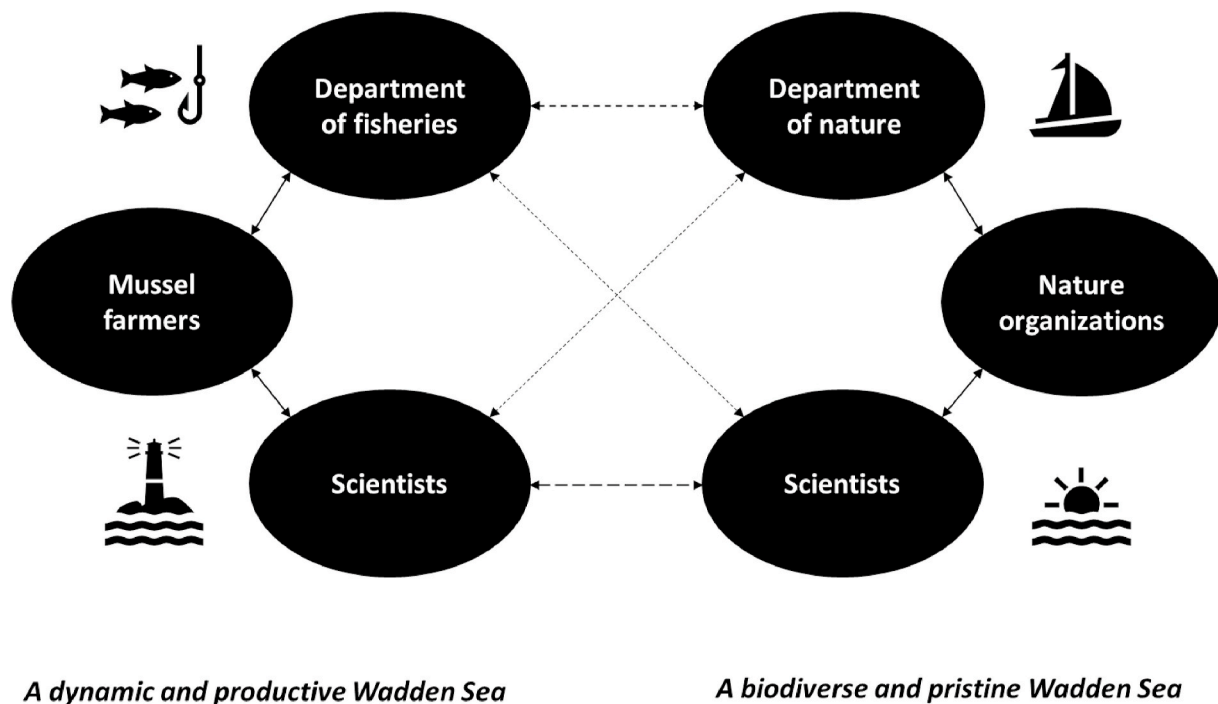


**Fig. 2.** The Dutch Wadden Sea and Wadden Islands ( $53^{\circ} 28' 0''$  N,  $5^{\circ} 6' 0''$  E). The Wadden Sea is a shallow sea which lies between the Wadden Islands and the Dutch mainland. Littoral mussel- and oyster beds are depicted in pink. Subtidal mussel- and oyster beds are depicted in purple. Based on a survey in 2019 carried out by Wageningen Marine Research and Marinx (Stralen and Van den Ende, 2019; Ende et al., 2020; VROM, 2007). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

with bottom fisheries (Smaal et al., 2018).

Another part of the MC is the development of a nature restoration program, aimed at creating a “Rich Wadden Sea” (LNV, 2008). In 2020, the agreed time-span of the transition ends, but the transition is not yet completed; only 40% of the total mussel spat harvest is collected through MZIs (Oostenbrugge et al., 2018). While the nature organizations want to stick to the agreed transition, the mussel sector regards a further transition as economically not feasible. The transition to MZIs has resulted in a significant increase of production costs and increasing

competition from German mussel farms, which benefited from the MZI development. This, together with low auction prices and external factors, has resulted in a dire economic situation in the Dutch mussel sector. Most mussel farmers have insufficient financial means to invest in more MZIs. Furthermore, those companies who are willing to invest in more MZIs require new cultivation parcels with better growth conditions for mussels and access to funding to invest in new MZIs (VROM, 2007).



**Fig. 3.** The two groups of the mussel covenant. On the left the subgroups which regard the Wadden Sea as dynamic and productive and therefore already as rich. On the right the subgroups which regard a Rich Wadden Sea as biodiverse and pristine, which is not yet accomplished. Arrows represent deliberative interactions between subgroups. Dotted arrows represent moderate deliberative interactions.

## 5. Results

### 5.1. Dynamic and productive versus biodiverse and pristine

Our results show that there are two main social representations: (1) 'a dynamic and productive Wadden Sea', and (2) 'a biodiverse and pristine Wadden Sea' (Fig. 3). These representations are shared by a group, in which most people adhere to the meanings described as belonging to the central part of the systems. The meanings described as belonging to the peripheral system are sometimes different or diverging, and represent different subgroups of people. The first SR is shared by mussel farmers, some scientists and representatives from the fisheries department of the Dutch Ministry of Agriculture, Nature and Food Quality. This SR can be summarized as follows, based on quotes from the interviews: *The Wadden Sea is dynamic, periods of high productivity are therefore followed by periods with low food abundance, for instance for birds. In periods with high food abundance, the Wadden Sea supports numerous birds. These numbers, the dynamics of high and low abundances of shellfish and birds, this is what makes the Wadden Sea special*. The central part of this 'dynamic and productive' SR consists of several cognitive, normative and expressive meanings. The cognitive meanings attached to the Wadden Sea are for instance that it is very dynamic and productive, but also that it is very unpredictable. Because of that, people within this SR do not believe in simple cause-effect relations regarding the presence of mussel spat fisheries in this area. Thus, they also question the sustainability transition from traditional spat fisheries to MZIs, as they do not regard traditional spat fisheries as unsustainable when properly regulated. This reasoning, in which MZIs are not seen as a step forward, is also influenced by expressive meanings. Within this SR, mussel vessels are part of the cultural heritage of the Wadden Sea. MZIs, on the contrary, are unnatural and disturbing the view and landscape. A normative meaning also present in the central part of this SR, is that humans can use nature when this is done in a sustainable manner. Sustainability in the 'dynamic and productive' SR is perceived as not changing the future availability of the resource that is harvested. The peripheral part of this SR mainly consists of different cognitive and normative meanings. Some people within this SR do believe that traditional spat fisheries can be harmful on beds in the littoral zone, while others believe that this is not the case. Furthermore, some people value the absence of human activity in some parts of the Wadden Sea, i.e., to have undisturbed nature, while others do not value pristine nature over nature which is used and therefore influenced by humans.

The second SR is that of 'a biodiverse and pristine Wadden Sea' and is shared by nature conservationists, some scientists and representatives from the nature department of the Dutch Ministry of Agriculture, Nature and Food Quality. This SR can be summarized by the following definition of what the area could look like, based on quotes from the interviews: *"The Wadden Sea is bursting with life. Its building blocks are undisturbed mussel beds, oyster reefs and seagrass fields. The Wadden Sea is biodiverse, where each species fulfils its own function. Due to this richness, it is a robust ecosystem"*. The main difference with the 'dynamic and productive' SR is that this 'biodiverse and pristine' SR focusses on the ecological potential of the Wadden Sea, instead of the current state. This is connected to very different cognitive, normative and expressive meanings. In the 'biodiverse and pristine' SR, the Wadden Sea is perceived as poor and malfunctioning, in comparison with its potential and its past. The ecosystem is perceived as disturbed, due to human influences like fisheries. Therefore, it does not function anymore, and species have disappeared. This perception is shared by all people in this SR, just like all other meanings. The 'biodiverse and pristine' SR thus has a very strong central part; a clear peripheral part is lacking. Normative meanings within this SR are mainly focused on the debt of humans to nature, because humans have impacted the Wadden Sea since its existence. Therefore, humankind should repay its debt by restoring nature. Activities that involve harvesting resources, are therefore not seen as appropriate. Non-extracting activities, like tourism or recreational

sailing, are regarded appropriate when regulated.

### 5.2. Interactions and changing representations

When looking at the different meanings attached to the Wadden Sea, we see two distinct SRs. In the case of the Wadden Sea, the absence of a shared central SR may be explained from the historic and geographical context. Two social groups have already been established since the early 90s, when mussel fisheries were criticized and became regulated. These groups have been interacting mainly within their own circle. Moreover, the two groups come from different regions. Whereas most NGOs and ecological research institutions involved are situated in the middle or North of the Netherlands, the mussel industry is based in the South of the Netherlands. Mussel consumption is also much less popular in the Northern and middle parts of the countries, in comparison to the Southern provinces. However, as part of the covenant, the different social groups meet regularly to exchange ideas and proposals. It is, however, questionable whether we could call the exchanges during these meeting deliberative interactions. To achieve deliberation, a shared goal or problem statement is needed, which seem absent when comparing the different SRs. Furthermore, within deliberation it is important that all parties are treated equally, and that different perspectives and different types of knowledge are taken into account (Burkhalter et al., 2002). In our case, the interviews showed that people in one social group do not seem to take the perspective of the other SR seriously, both on a cognitive as normative level. Some people are not even certain that the other party believes its own SR, they reason that the other SR is just constructed to serve that party's interests. This latter belief is most strongly present in mussel farmers and nature conservationists. The mutual distrust between mussel farmers and nature conservationists has historical roots but has also grown stronger in the recent years due to a lack of a shared problem understanding. With the start of the covenant, mussel farmers needed to work together with nature conservationists to continue fishing, and nature conservation organizations preferred cooperation towards more sustainable fishing methods over law suites. Therefore, both groups were willing to cooperate. However, over the years, this sense of urgency has declined, as the situation regarding MZIs has changed. Among scientists and policy makers the questioning of sincerity of the other perspective is not so strongly present. Deliberation does take place between groups within each of the two SRs. It is based on the same perspective, background, interests and language, and, in some cases, there is room for discussing the SR itself.

### 5.3. Anchoring and cognitive polyphasia

Anchoring and objectification takes place in both SRs, mainly within the group of nature conservationists and the group of mussel farmers. Mussel farming is referred to as "agriculture at sea" by both groups, showing their perspective on mussel farming. For nature organizations, this label is a negative one, as they position agriculture as opposite to nature, as something not belonging in a nature area. For the mussel farmers it is a positive label, as it shows that they are not harming nature or plundering the mussel beds but working together with nature and creating nature (i.e., mussel beds, food for eider ducks) at their cultivation parcels. Using this label, they want to distinguish themselves from shrimp fishers in the Wadden Sea and trawl fisheries in the North Sea, which, in their view, have a negative public image.

Within the SR of 'a biodiverse and pristine Wadden Sea', there is one clear example of cognitive polyphasia related to the use of the term *sustainable*. Nature organizations aim at a more sustainable mussel spat fishery, including the development of new innovative methods. Several interviewees from nature organizations stated that mussel farmers must continue to innovate to remain legitimate. At the same time, they stated that small-scale traditional fisheries can be part of the Wadden Sea, but large-scale commercial fisheries not. Furthermore, some even stated that

there is no room for fisheries at all in the Wadden Sea. Thus, they use(d) the term sustainable to stress the need for new and innovative techniques in mussel farming, while at the same time arguing that only traditional and small-scale types of fisheries and aquaculture are sustainable. These are clearly two different ‘approaches’ to and ‘types’ of sustainability within the group of NGOs and within the perspectives of individual employees. Thus, the ‘biodiverse and pristine’ SR seems to entail different, sometimes contrasting ideas and statements around the sustainability and legitimacy of Wadden Sea fisheries.

#### 5.4. Social representations and Wadden Sea policy

Wadden Sea policy has become more and more nature oriented since the 1990s. In the beginning of the 1990s, there were separate policies on fisheries and nature conservation (LNV, 1993, 1999), which became more integrated in early 2000 (LNV, 2004; VROM, 2007; Raad van de Wadden, 2004). Maintaining a healthy fisheries sector was no longer a specific goal in the Wadden Sea, but fisheries were allowed as a form of sustainable co-use of the area. While the Wadden Sea is “*primarily a nature area*”, all policies guarantee sustainable co-use, also in the designation as a UNESCO World Heritage Site (CWSS, 2010, 2016). The current policy regarding fisheries in the Wadden Sea is the development of methods that are more sustainable, stimulated by covenants with the government, nature organizations and fisheries producers’ organizations.

When looking at the two SRs, current fisheries and nature policy fits in neither perspective. From the perspective of “*a dynamic and productive Wadden Sea*”, traditional spat fisheries on natural beds are not unsustainable, if they are regulated. MZIs are even seen as more unsustainable, as they bring plastics into the sea and spoil the view. From this point of view, the MC does not benefit the Wadden Sea, neither the nature in the area nor the people living around or working in the area. From the perspective of ‘*a biodiverse and pristine Wadden Sea*’, the new method, like the spat fishery, is still harming nature and therefore not appropriate to conduct in a nature area and UNESCO World Heritage Site. The only way to restore nature and to let the Wadden Sea develop to its full potential is to close areas for fisheries and other forms of co-use, according to this perspective. Even better is to ban all forms of co-use involving harvesting from nature, like fisheries, salt and gas extraction. Thus, the current policies of transitioning towards more sustainable fisheries also do not fit into this SR, as fisheries are regarded as intrinsically damaging because they always involve harvesting from nature.

## 6. Discussion

To understand and assess the functioning of deliberation in marine governance arrangements, we used SRT in combination with a policy analysis. Looking at two important conditions for deliberative interactions, finding common ground among participants and having a conversation in which all participants treat each other equally (Burkhalter et al., 2002), we conclude that in the case of the MC there is limited deliberative interaction. We argue that sharing a central SR is creating common ground, thereby enhancing deliberation. That said, a central SR does not imply there is no disagreement - differences in the peripheral system can cause tensions and fuel conflicts, as show in the only other study using SRT in nature conservation conflicts (Figari and Skogen, 2011). But, a central SR at least creates a basis for a debate based on a shared understanding of the topic or issue at stake. Within such debate, appreciation of differences could still aid in cooperation, and could be regarded as a “positive learning outcome” (Brewer, 2013). In the MC case we found no central SR, but two different SRs, differing at all three levels: the cognitive, the normative and the expressive level. Within the two SRs, there seems to be commitment to find common ground and to treat each other equally. However, deliberative interaction within groups is not enough for a covenant to work: agreements

must be made between all groups, not within sub-coalitions of groups.

In current covenant meetings, there is, and has been, much emphasis on cognitive meanings. Discussions focused on the absence of or ambiguity about scientific studies into the effects of mussel spat fisheries on mussel beds and nature in the Wadden Sea (Floor et al., 2016; Floor et al., 2018). In these meetings, no attention is paid to the different normative and expressive meanings of those involved; yet, making these meanings visible is important to understand why opinions diverge and lead to certain outcomes in discussions and agreements. Other studies also showed that divergent values often form the base of coastal conflicts. Thompson (2007) for example showed that different and conflicting coastal values of different users in Australia, which were related to normative and expressive meanings, lead to conflicts within coastal management. Within his research, there was a clear difference between people who had mainly cultural and economic values and people who had solely nature conservation values regarding coastal nature. Similarly, in the German part of the Wadden Sea, different perceptions of the Wadden Sea landscape, a natural landscape versus a cultural landscape, has caused tensions between nature conservationists and residents. The framing of the Wadden Sea as a natural area, made residents feel that the cultural heritage of the region was denied and the relation between nature and humans overlooked. Moreover, the author recognized a clear distinction between a universal view of nature by conservationists, and a locally situated view of nature, also referred to by locals as “their nature” (Walsh, 2018, 2020). We observed a similar divide in our study, since one SR incorporates cultural, economic and to a lesser extent also nature conservation values, while the other SR only incorporates nature conservation values. Without understanding and discussing the normative and expressive differences, it will be difficult to have deliberative interaction and to continue with the covenant without internal conflicts. A fruitful discussion requires mutual understanding of each other’s cognitive, normative and expressive meanings.

Our study also shows that while governmental policies are aimed at maintaining co-use of nature through sustainability transitions, neither of the SRs regard these policies as fitting into their image of either a *richer, biodiverse* Wadden Sea, or a *well-managed* Wadden Sea. Thus, both SRs are not in line with the main discourse in governmental policies, even though the outcomes of past covenant agreements are. The outcomes of the MC seem to reflect the governmental strategy, instead of the outcomes of deliberation among stakeholders. Wadden Sea policies state that while nature has priority, co-use is, and should be, still guaranteed. This can be read as the state’s attempt to maneuver between the different stakeholders or different views about the Wadden Sea. This ambiguous positioning is particularly interesting because the two SRs are present within one ministry, yet each is represented by a different department. The only clear guidelines regarding the requirements for sustainable co-use is the Natura 2000 framework, under which co-use must be assessed according to the absence of a significant effect on nature. Previous research showed, however, that using the Natura 2000 framework as a guideline led to conflicts between the government, nature organizations, the fishing industry and scientists (Floor et al., 2016). The MC was set up to end such conflicts. Whilst within the covenant, the lack of clear prioritization by the government seems to have worked so far, or at least did not hamper the process, the lack of clear prioritization is unsatisfying for both groups, and could lead to deepening existing conflicts, or fuel new ones (Thompson, 2007). As for now, the covenant is still intact and discussions for renewal are even taking place. The main question that remains for is therefore what decisions will be taken by the government, when it turns out that the differences between the SRs cannot be overcome, and a continuation of the covenant becomes impossible.

If the government decides to keep investing in the current participative approach, possibly towards a more deliberative mode, one option is to put less emphasis on the sector at stake, going beyond a sectoral approach. The current covenant is only focused on mussel spat fisheries, while the Wadden Sea comprises a complex arena of stakeholder groups



and policies. A more integrated approach has already been recommended in 2010, in an explorative study on the future of Wadden Sea fisheries (Regionaal College Waddengebied, 2010), but the two fisheries covenants still focus on particular types of fisheries, and do not include values and interests of less articulate stakeholders, like tourists and the Dutch public. Since the Wadden Sea is a UNESCO World Heritage Site, one could argue that the area is heritage of all people, not only traditional stakeholder groups, like resource users and nature organizations. From this perspective, it would be appropriate to take other views into account. Studies on the perception of terrestrial nature in the Netherlands show that the general public not only adheres to anthropocentric (human-focused) and ecocentric (nature-focused) values, but also to biocentric values (focused on plant and animal welfare) (Buijs, 2009a), but such a perspective seems to be absent in the two SRs within the covenant. In that sense, if the government wants to enhance deliberation, they should engage more people with different backgrounds, values and interests within policies related to nature conservation and co-use of nature.

For this specific case, we recommend that policy makers and scientists take up a more facilitative role and start bridging between the two SRs. Scientists and policy makers are positioned within the two SRs, and they have more opportunities and incentives to start deliberative interactions: although policy makers who feel connected to different SRs might work at different departments, they do work at the same ministry. Scientists are already inclined to seek academic discourse and could for instance work together on the development of research proposals and conduct joint research. Also, we suggest that a better understanding and inclusion of public perception of the Wadden Sea and marine nature could force the existing SRs to be reconsidered. The inclusion of “the public” would imply that a difficult-to-define group would enter the field. This introduction might result in a repositioning and even breaking through the current stalemate. Though, at least, we expect it would force the current parties involved, including the government, to open up, since the public is a very diverse group but often with a quite explicit normative and expressive stance on nature.

From a more theoretical lens, our study shows the usefulness of combining SRT with images of nature. However, typologies such as images of nature are based on studies on terrestrial nature. When comparing our findings to such typologies, like the ones described by Keulartz et al. (2004) and Buijs (2009), we find different ‘sets’ of perceptions. While there are parallels, these turn out to be opposites: nature organizations, for instance, work together closely with Dutch farmers to protect meadow bird populations (Runhaar et al., 2017); but the same organizations do not seek active cooperation with mussel farmers, since farming at sea is not appropriate, as it does not fit in with their idea of “marine nature” (cf. Shafer and Benzaken, 1998; Barr and Kliskey, 2014). Therefore, we propose that people’s perceptions of marine nature may differ in comparison to terrestrial nature. Nowadays, studies about perceptions of marine nature are still quite unique (Jefferson et al., 2015; Fletcher et al., 2012), or focusing on a specific marine area (Ankamah-Yeboah et al., 2020). Thus, this is a promising field for research: understanding public perceptions of marine nature could lead to an increase in public engagement in marine conservation and planning, but also feed into stronger participatory marine policies and marine management (Jefferson et al., 2015).

## 7. Conclusions

Deliberative governance is gaining increasing attention as a way forward in the management of natural resources with conflicting stakes. Although disputed knowledge is known to affect deliberation, the role of perceptions is understudied. Our study shows that within marine governance arrangements, deliberative interaction is not possible without considering the different cognitive, normative and expressive meanings attached to the marine area or issue at stake. We used SRT in combination with the building blocks of images of nature and argue that

this provides a valuable analysis of natural resource conflicts: it helps to enhance understanding of deeper values and norms related to the human-nature relationship and allows to investigate interactions between groups with the same or divergent images of nature. To assist policy makers and other organizations involved in marine resource management and conservation, we recommend further studies into typologies of images of marine nature. Images of marine nature could be used to spark deliberation in governance arrangements and could aid in understanding different stakeholder groups.

Our study highlighted a voluntary policy instrument, a covenant, which is in design aimed at finding common ground, and where participants are expected to treat each other equally. However, in this case of mussel fisheries in the Wadden Sea, governmental policies seem to have a large influence on the MC outcomes, even if they are not in line with the SRs within the covenant and the government departments. Together with the fact that the covenant is restricted in terms of participants, we conclude that the covenant cannot be regarded as deliberative and, in that sense, the democratic legitimacy of the arrangement can be questioned. For the MC to become a more deliberate governance arrangement, policy makers and scientists should take up a more facilitative role and start bridging between the two SRs. Furthermore, the working of and agreements made within the covenant could take on a more adaptive manner. As our study shows, changes in the situation can bring deliberative governance in a deadlock, if there is no room to change or reconsider past decisions. If a new situation changes the SRs within governance arrangements, deliberation might become more difficult to achieve. In such cases, states should reconsider the deliberative approach and could turn to a more authority-based policy making process.

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## Declaration of competing interest

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## References

- Abric, J.C., 1993. Central system peripheral system. *Pap. Soc. Representations* 2 (2), 75–78.
- Ankamah-Yeboah, Isaac, Xuan, Bui Bich, Hynes, Stephen, Armstrong, Claire W., 2020. Public perceptions of deep-sea environment: evidence from Scotland and Norway. *Front. Mar. Sci.* 7, 137. <https://doi.org/10.3389/fmars.2020.00137>.
- Arnouts, Rikke, van der Zouwen, Mariëlle, Arts, Bas, 2012. Analysing governance modes and shifts - governance arrangements in Dutch nature policy. *For. Pol. Econ.* 16, 43–50. <https://doi.org/10.1016/j.forpol.2011.04.001>.
- Arts, Bas, Buizer, Marleen, 2009. Forests, discourses, institutions. A discursive-institutional analysis of global forest governance. *For. Pol. Econ.* 11 (5–6), 340–347. <https://doi.org/10.1016/j.forpol.2008.10.004>.
- Ayensu, Edward, Van Claassen, Daniel R., Collins, Mark, Dearing, Andrew, Fresco, Louise, Gadgil, Madhav, Gitay, Habiba, et al., 1999. International ecosystem Assessment. *Science* 286 (5440), 685–686. <https://doi.org/10.1126/science.286.5440.685>.
- Barr, Bradley W., Kliskey, Andrew D., 2014. “I know it when I see it”: identifying ocean wilderness using a photo-based survey approach. *Global Ecol. Conserv.* 2, 72–80. <https://doi.org/10.1016/j.gecco.2014.08.002>.



- Bauer, Martin W., Gaskell, George, 2008. Social representations theory: a progressive research programme for social psychology. *J. Theor. Soc. Behav.* 38 (4), 335–353. <https://doi.org/10.1111/j.1468-5914.2008.00374.x>.
- Benhabib, Seyla, 1996. *Democracy and Difference: Contesting the Boundaries of the Political*. Princeton University Press.
- Bennett, Nathan James, 2016. Using perceptions as evidence to improve conservation and environmental management. *Conserv. Biol.* 30 (3), 582–592. <https://doi.org/10.1111/cobi.12681>.
- Beunen, Raoul, de Vries, Jasper R., 2011. The governance of Natura 2000 sites: the importance of initial choices in the organisation of planning processes. *J. Environ. Plann. Manag.* 54 (8), 1041–1059. <https://doi.org/10.1080/09640568.2010.549034>.
- Brewer, Jennifer F., 2013. From experiential knowledge to public participation: social learning at the community fisheries action roundtable. *Environ. Manag.* 52 (2), 321–334. <https://doi.org/10.1007/s00267-013-0059-z>.
- Buijs, Arjen, 2009a. "Public nature: social representations of nature and local practices." Public Natures: Social Representations of Nature and Local Practices. Wageningen University & Research. <http://silkl.library.umass.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lah&AN=20093271040&site=ehost-live&scope=site>.
- Buijs, Arjen, 2009b. "Lay people's images of nature: comprehensive frameworks of values, beliefs, and value orientations. *Soc. Nat. Resour.* 22 (5), 417–432. <https://doi.org/10.1080/08941920801901335>.
- Buijs, Arjen, Hovardas, Tasos, Helene, Figari, Castro, Paula, Devine-Wright, Patrick, Fischer, Anke, Mouro, Carla, Selge, Sebastian, 2012. "Understanding people's ideas on natural resource management: research on social representations of nature. *Soc. Nat. Resour.* 25 (11), 1167–1181. <https://doi.org/10.1080/08941920.2012.670369>.
- Burkhalter, Stephanie, Gastil, John, Todd, Kelshaw, 2002. A conceptual definition and theoretical model of public deliberation in small face-to-face groups. *Commun. Theor.* 12 (4), 398–422. <https://doi.org/10.1111/j.1468-2885.2002.tb00276.x>.
- Connelly, Steve, Richardson, Tim, Miles, Tim, 2006. Situated legitimacy: deliberative arenas and the new rural governance. *J. Rural Stud.* 22 (3), 267–277. <https://doi.org/10.1016/j.jrurstud.2005.11.008>.
- CWSS, 2010. Wadden Sea Plan 2010. Eleventh Trilateral Governmental Conference on the Protection of the Wadden Sea. Common Wadden Sea Secretariat, Wilhelmshaven, Germany no. March: 104.
- CWSS, 2016. Report on the state of conservation of the World heritage property 'the Wadden Sea (N1314). Trilateral Wadden Sea Cooperation.
- Dryzek, J., 2000. *Deliberative Democracy and beyond: Liberals, Critics, Contestations*. Oxford University Press, Oxford.
- Ende, D Van den, Troost, K., Van Asch, M., Perdon, J., Van Zweeden, C., 2020. "Mosselbanken En Oesterbanken Op Droogvallende Platen van de Nederlandse Zoute Getijdenwateren in 2019 : Bestand En Arealen. ".
- Figari, Helene, Skogen, Ketil, 2011. Social representations of the wolf. *Acta Sociol.* 54 (4), 317–332. <https://doi.org/10.1177/0001699311422090>.
- Fletcher, Stephen, Jefferson, Rebecca, McKinley, Emma, 2012. "Exploring the shallows: a response to 'saving the shallows: focusing marine conservation where people might care. *Aquat. Conserv. Mar. Freshw. Ecosyst.* 22 (1), 7–10. <https://doi.org/10.1002/aqc.2220>.
- Floor, Judith R., Van Koppen, C.S.A., Van Tatenhove, Jan P.M., 2016. "Uncertainties in the assessment of 'significant effect' on the Dutch Natura 2000 Wadden Sea site - the mussel seed fishery and powerboat race controversies. *Environ. Sci. Pol.* 55, 380–392. <https://doi.org/10.1016/j.envsci.2015.03.008>.
- Floor, Judith R., Kris, C.S.A., Van Koppen, Van Tatenhove, Jan P.M., 2018. Knowledge uncertainties in environmental conflicts: how the mussel fishery controversy in the Dutch Wadden Sea became depoliticised. *Environ. Polit.* 1–23. <https://doi.org/10.1080/09644016.2018.1546561>.
- Halfacree, K.H., 1993. Locality and social representation: space, discourse and alternative definitions of the rural. *J. Rural Stud.* 9 (1), 23–37. [https://doi.org/10.1016/0743-0167\(93\)90003-3](https://doi.org/10.1016/0743-0167(93)90003-3).
- Hendriks, Carolyn M., 2009. Deliberative governance in the context of power. *Pol. Soc.* 28 (3), 173–184. <https://doi.org/10.1016/j.polsoc.2009.08.004>.
- Holley, C., Gunningham, N., Shearing, C., 2012. Participatory and deliberative. In: *The New Environmental Governance*, vols. 69–99. Routledge, London.
- Hoof, Luc Van, 2012. "If you can't beat them: joint problem solving in Dutch fisheries management. *Marit. Stud.* 11 (12), 1–16. <https://doi.org/10.1186/2212-9790-11-12>.
- I&M, RWS, 2016. *Natura 2000-Beheerplan Waddenzee*.
- Jefferson, Rebecca, McKinley, Emma, Capstick, Stuart, Fletcher, Stephen, Griffin, Holly, Milanese, Martina, 2015. Understanding audiences: making public perceptions research matter to marine conservation. *Ocean Coast Manag.* 115, 61–70. <https://doi.org/10.1016/j.ocecoaman.2015.06.014>.
- Kennedy, James J., Thomas, Jack Ward, 1995. Managing natural resources as social value. In: Knight, R.L., Bates, S.F. (Eds.), *A New Century for Natural Resources Management*. In *A New Century for Natural Resources Management*. Island Press, Washington DC.
- Keulartz, Jozef, Van Der Windt, Henny, Swart, Jacques, 2004. Concepts of nature as communicative devices: the case of Dutch nature policy. *Environ. Val.* 13 (1), 81–99. <https://doi.org/10.1319/096327104772444785>.
- Koning, Susan De, Steins, Nathalie A., 2019. Perceptions van een Rijke Waddenzee. Wageningen Marine Research Yerseke. No. C071/19.
- Korver, Ton, Oei, Peter R.A., 2005. The soft law of the covenant: making governance instrumental. *Eur. J. Ind. Relat.* 11 (3), 367–384. <https://doi.org/10.1177/0959680105057216>.
- Leeuwen, Judith Van, Van Tatenhove, Jan, 2010. The triangle of marine governance in the environmental governance of Dutch offshore platforms. *Mar. Pol.* 34 (3), 590–597. <https://doi.org/10.1016/j.marpol.2009.11.006>.
- LVN, 1993. Vissen naar evenwicht (fishing towards an equilibrium - in Dutch), structuurnota zee- en kustvisserij.
- LVN, 1999. Beleidsbesluit Schelpdiervisserij Kustwateren 1999-2003. Dutch Government.
- LVN, 2004. Ruimte Voor Een Zilte Oogst Naar Een Omslag in de Nederlandse Schelpdiercultuur: Beleidsbesluit Schelpdiervisserij 2005 - 2020. Dutch Government.
- LVN, 2008. Convenant Transitie Mosselsector En Natuurherstel Waddenzee. Dutch Government.
- Mazumdar, Sanjoy, Mazumdar, Shampa, 1997. Intergroup social relations and architecture: vernacular architecture and issues of status, power, and conflict. *Environ. Behav.* 29 (3), 374–421. <https://doi.org/10.1177/001391659702900304>.
- Molen, Franke Van der, Puente-Rodríguez, Daniel, Swart, Jac A.A., Windt Van der, Henny J., 2015. The coproduction of knowledge and policy in coastal governance: integrating mussel fisheries and nature restoration. *Ocean Coast Manag.* 106, 49–60. <https://doi.org/10.1016/j.ocecoaman.2015.01.012>.
- Moon, Katie, Blackman, Deborah, 2014. A guide to understanding social science research for natural scientists. *Conserv. Biol.* 28 (5), 1167–1177. <https://doi.org/10.1111/cobi.12326>.
- Moscovici, S., 2003. *Social Representations: Explorations in Social Psychology* (Trad. Pedrinho A. Guareschi). Blackwell Publishers Ltd, Oxford.
- Oostenbrugge, J.A.E. Van, Steins, N.A., Mol, Arie, Smith, S.R., Turenhout, M.N.W., et al., 2018. Mosseltransitie En Natuurherstel: sociaal-economische draagkracht en ontwikkelingen Nederlandse mosselsector. ".
- Phillips, Adrian, 2003. Turning ideas on their head: the new paradigm for protected areas. *George Wright Forum* 20 (2), 8–32. <http://www.jstor.org/stable/43599027>.
- Provencher, Claudine, 2011. Towards a better understanding of cognitive polyphasia. *J. Theor. Soc. Behav.* 41 (4), 377–395. <https://doi.org/10.1111/j.1468-5914.2011.00468.x>.
- Raad van de Wadden, 2004. "Duurzaam Duurt Het Langst - II' Naar Een Nieuw Schelpdiervisserijbeleid Voor de Waddenzee. Dutch Government.
- Regionaal College Waddengebied, 2010. Brede Visie Op Duurzame Visserij in de Waddenzee.
- Runhaar, H.A.C., Melman, Th C.P., Boonstra, F.G., Erisman, J.W., Horlings, L.G., Snoo, G. R. de, Termeer, C.J.A.M., Wassen, M.J., Westerink, J., Arts, B.J.M., 2017. "Promoting nature conservation by Dutch farmers: a governance perspective. *Int. J. Agric. Sustain.* 15 (3), 264–281. <https://doi.org/10.1080/14735903.2016.1232015>.
- Shafer, C. Scott, Benzaken, Dominique, 1998. "User perceptions about marine wilderness on Australia's great barrier reef. *Coast. Manag.* 26 (2), 79–91. <https://doi.org/10.1080/08920759809362345>.
- Smaal, Aad C., Ferreira, Joao G., Jon Grant, Petersen, Jens K., Øivind Strand, 2018. Goods and Services of Marine Bivalves. Goods and Services of Marine Bivalves. <https://doi.org/10.1007/978-3-319-96776-9>.
- Song, Andrew M., Chuenpagdee, Ratana, Jentoft, Svein, 2013. Values, images, and principles: what they represent and how they may improve fisheries governance. *Mar. Pol.* 40 (1), 167–175. <https://doi.org/10.1016/j.marpol.2013.01.018>.
- Staerkle, Christian, 2009. Policy attitudes, ideological values and social representations. *Soc. Pers. Psychol. Compass* 3 (6), 1096–1112. <https://doi.org/10.1111/j.1751-9004.2009.00237.x>.
- Steins, Nathalie, 1999. All hands on deck: an interactive perspective on complex common-pool resource management based on case studies in the coastal waters of the Isle of Wight (UK), Connemara (Ireland) and the Dutch Wadden Sea. Wageningen University and Research.
- Stralen, M Van K Troost, Van den Ende, D., 2019. Inventarisatie van Het Sublitorale Wilde Mosselbestand in de Westelijke Waddenzee in Voorjaar van 2019.
- Tatenhove, Jan Van, 2011. Integrated marine governance: questions of legitimacy. *Marit. Stud.* 10 (1), 87–113. [http://www.marecentre.nl/mast/documents/PagesfromMAS\\_T10.1\\_Tatenhove.pdf](http://www.marecentre.nl/mast/documents/PagesfromMAS_T10.1_Tatenhove.pdf).
- Tatenhove, Jan P.M. Van, 2013. How to turn the tide: developing legitimate marine governance arrangements at the level of the regional seas. *Ocean Coast Manag.* 71, 296–304. <https://doi.org/10.1016/j.ocecoaman.2012.11.004>.
- Thompson, Robert, 2007. Cultural models and shoreline social conflict. *Coast. Manag.* 35 (2–3), 211–237. <https://doi.org/10.1080/08920750601042294>.
- VROM, 2007. "Ontwikkeling van de Wadden voor natuur en mens." *deel 4 van de Planologische kernbeslissing*. Derde Nota Waddenzee 1–50. [http://www.waddenzee.nl/fileadmin/content/Dossiers/Overheid/pdf/Derde\\_Nota\\_Waddenzee\\_deel\\_4.pdf](http://www.waddenzee.nl/fileadmin/content/Dossiers/Overheid/pdf/Derde_Nota_Waddenzee_deel_4.pdf).
- Wagner, Wolfgang, 2007. Vernacular science knowledge: its role in everyday life communication. *Publ. Understand. Sci.* 16 (1), 7–22. <https://doi.org/10.1177/0963662506071785>.
- Wagner, Wolfgang, Elejabarrieta, Fran, Lahnsteiner, Ingrid, 1995. "How the sperm dominates the ovum — objectification by metaphor in the social representation of conception. *Eur. J. Soc. Psychol.* 25 (6), 671–688. <https://doi.org/10.1002/ejsp.2420250606>.
- Walsh, Cormac, 2018. "Metageographies of coastal Management : negotiating spaces of nature and culture at the Wadden Sea. *Area* 50, 177–185. <https://doi.org/10.1111/area.12404>.
- Walsh, Cormac, 2020. Landscape imaginaries and the protection of dynamic nature at the Wadden Sea. *Rural Landscapes Soc. Environ. Hist.* 7 (1), 1–20. <https://doi.org/10.16993/rl.55>.
- Weinstein, Michael P., Ronald C Baird, David O Conover, Gross, Matthias, Loomis, David K., Naveh, Zev, Peterson, Susan B., et al., 2019. Managing coastal resources in the 21 St century. *Front. Ecol. Environ.* 5 (1), 43–48.