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# Natura 2000 management plans in France and the Netherlands: Carrots, sticks, sermons and different problems

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## ABSTRACT

Many EU Member States are using management plans to ensure the sustainable conservation and management of Natura 2000 sites. The decision about whether to use management plans lies with the Member States. Although management planning systems differ, in most countries the management plan is developed at local level in close consultation with relevant stakeholders. This article explores to what extent national decisions on the management planning system have influenced the content of the local plans. The comparison of French and Dutch Natura 2000 management plans shows that the plans mostly propose conservation measures that can be implemented by individual owners or users of the site and for which funding is available. The individual measures in the French plans reflect the national decision that the management plans should work primarily as a funding tool. The individual measures in the Dutch plans however do not reflect the national decision that management plans should act as a legislative tool to regulate land use activities in and around the site. In the Netherlands, the focus has shifted towards a tool for the coordination of funding. The analysis shows that in both countries the selection of particular measures in the management plans is connected to other policies and funding mechanisms that deal with the problems perceived by involved actors, such as the Common Agricultural Policy and the Dutch National Programme for Nitrogen Deposition.

If you fail to plan, you are planning to fail  
(Benjamin Franklin 1706–1790)

## 1. Introduction

The EU Birds Directive (1979) and Habitats Directive (1992),<sup>1</sup> require Member States of the European Union to designate protected areas that jointly form the Natura 2000 network. The site selection of the Natura 2000 sites is based on scientific criteria and overseen by the European Commission. After site designation, Member States have to ensure that adequate conservation measures are taken and damaging activities do not occur (Sundseth & Roth, 2013). The Directives grant Member States considerable freedom in how to arrange the management of Natura 2000 sites. The Birds Directive only states that special conservation measures regarding the habitat of species listed are needed (Art 4.1) and that ‘Member States shall take appropriate steps’ to protect species and avoid deterioration in the designated sites (Art.

4.4). The Habitats Directive provides Member States with different options to arrange management as they can develop site specific management plans, integrate the measures into other development plans, or introduce appropriate statutory, administrative or contractual measures. The majority of the Member States prefer using management plans as the policy instrument to organise the management of Natura 2000 sites (Bouwma, Liefferink, van Apeldoorn, & Arts, 2016). In addition, the EC actively promotes management planning as a mechanism to ensure the adequate management of the site (Bouwma et al., 2016; European Commission, 2013). In 2012, 9271 management plans had been prepared for Natura 2000 sites designated under the Habitats Directive in 24 Member States, with an additional 4229 plans under preparation (European Environment Agency, 2015). These management plans are developed at local level within the confines of the different national or regional management planning systems. The Member States’ management planning systems vary in their legal status, required content, participation process, and finances available for their

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implementation. The majority of the Natura 2000 management plans are developed in a participatory manner although legal obligations for participation are often not in place. This reflects the overall ongoing trend of increased public participation in environmental management (Reed, 2008), but has also resulted from the severe criticism of many stakeholders on the limited participation during the phase of designation (Alphandéry & Fortier, 2001; Ferranti, Turnhout, Beunen, & Behagel, 2014; Laffan & O'Mahony, 2008; Unnerstall, 2008).

The formulation of management plans integrates national hierarchical forms of goal setting and regulation with local forms of planning and decision-making (Beunen & de Vries, 2011; Diez, Etxano, & Garmendia, 2015; Geitzenauer, Hogg, & Weiss, 2016; Kati et al., 2015). National governments designate sites, formulate conservation goals, and determine the status of the management plans, while regional or local governments, often in co-operation with site managers, users and other stakeholders decide on how those conservation goals relate to other land use activities and how they should be translated into specific measures. Furthermore, if goals are not achieved, the national government or the European Commission can undertake legal action (Sundseth & Roth, 2013). Local aspects of planning relate to the consultation and/or participation of stakeholders during the plan development. They have local knowledge about the site that is required to develop the plan as well as views on the problems that need to be addressed, the goals that can be achieved and their involvement is important for the acceptability of measures for local owners and users (Blondet et al., 2017; Brescancin, Dobšinská, De Meo, Šálka, & Paletto, 2017; Diez et al., 2015).

Studies in relation to management plans for Natura 2000 sites have mainly focussed on the planning process (Alphandéry & Fortier, 2010; Beunen & de Vries, 2011; Kovacs et al., 2017; Young et al., 2013), with a few exceptions that focus on financing issues (Geitzenauer et al., 2017), the plans themselves or resulting management measures (Duhalde, Levrel, & Guyader, 2017; Winter et al., 2014). This study complements the process oriented studies by reviewing the management plans, paying particular attention to the kind of measures included in the plans, the problems addressed by these measures, and the way in which implementation of these measures will be guaranteed. We are particularly interested in the extent to which national authorities can influence the type of measures that are included in the management plans. National, or regional<sup>2</sup> authorities set the boundary conditions for Natura 2000 management plans. Following these conditions the exact content of the plan is negotiated between the involved actors at the local level. As a result the policy instrument for site management is a nested instrument consisting of the management planning system, the management plans for specific areas, and the individual measures proposed in the plans.

National authorities can to some extent influence the individual measures through decisions they make regarding the management planning system. They can, for instance, decide whether the measures included in the management plans are legally binding or whether there is national funding available for plan development or specific measures. The mechanism (or mechanisms) by which the government chooses to influence the behaviour of actors sets the boundary conditions for the formulation of measures included in the management plan and is referred to as authoritative force (Salamon, 2002). Usually three main mechanisms of authoritative force are distinguished for policy instruments: motivation through financial incentives ('carrots'), motivation by using laws and regulations ('sticks') and motivation through information provision ('sermons') (Vedung, 1998).

At the local level the exact measures which are incorporated in the management plan are negotiated (Beunen & de Vries, 2011; Cent, Grodzinska-Jurczak, & Pietrzyk-Kaszynska, 2014; Duhalde et al., 2017).

<sup>2</sup> In federally organised Member States the decision on management plans is taken at the regional level.

Here the authoritative force of the management system will influence which measures are included in the plan, but also how it is ensured that those measures will actually be taken and complied with. Authoritative force thus plays a role both at the level of the management system as a whole, i.e. regarding the range of instruments that are available for inclusion in management plans, and for the individual measures determined at local level. In order to clearly distinguish between the authoritative force of the management system as a whole and that of the individual measures as included in the plans, we use the term authoritative mechanism to indicate the authoritative force behind the individual measures.

This brings us to the research question that guides this study (see also Fig. 1); To what extent does the authoritative force of the national planning system influence the types of measures included in the management plans that are developed locally?

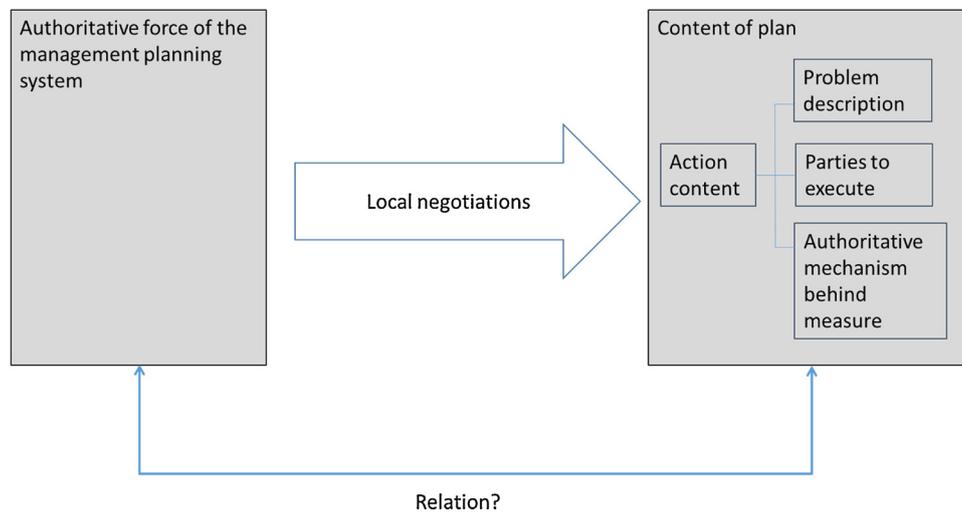
Understanding how national decisions on Natura 2000 instruments influence the selection and implementation of measures at site level is important. Many of the species and habitats for which the Natura 2000 network was created are still in an unfavourable conservation status (European Environment Agency, 2015). Measures to improve this situation are therefore required in many Natura 2000 sites. Insight in the selection and implementation of measures proposed in the first round of management plans enables an assessment of the effectiveness of different types of policy instruments. Currently, the management of the sites is an issue of considerable debate (Birdlife Europe, EEB, Friends of the Earth, & WWF, 2018; Kati et al., 2015; Young et al., 2005). Some nature conservationist call for more stringent action from the side of the government to ensure good management, whilst private land owners look sceptical towards interference of the government with management. Although much of the actual management decisions will be decided on a local level it is important to better understand how national authorities can facilitate the selection of effective and legitimate measures through the design of policy instruments available for inclusion in management plans. In the end national governments have to decide how they want to use their authoritative force for achieving the goal of improving the conservation status of Natura 2000 habitats and species.

To answer the research question, the individual measures incorporated in thirty management plans from two Member States with a different authoritative force were reviewed. For the analysis of the plans an analytical framework was developed based on instrument choice literature (see Section 2). In Section 3 the selection of countries and sites is explained, Section 4 describes the results. In Section 5 the results are discussed and in Section 6 conclusions are drawn. The article does not assess the effectiveness of measures, i.e. whether measures are adequate to ensure the conservation of the species and habitats in the site.

## 2. Analytical framework

### 2.1. Policy instrument theory and Natura 2000 management plans

For our analysis of the management plans we considered them as a policy instrument with a nested character. Policy instruments are defined as the tools at the disposal of the government to implement its policy objectives (Bemelmans-Videc & Rist, 1998; Howlett, 1991). In policy instrument literature, much attention has been given to the authoritative force of instruments ('carrot', 'sticks', 'sermons') and how this influences the behaviour of involved actors. The behaviour required by policy instruments is usually referred to as action content, for example actions that should or should not be undertaken by a certain actor (Vedung, 1998). Instruments with a high authoritative force (sticks) force actors to comply to set rules, even in cases where they rather would not. Instruments with a lower authoritative force, such as financial (carrots) or communicative instruments (sermons), leave more freedom to actors. A carrot stimulates actors to act in a certain way by



**Fig. 1.** Multilevel process of development of management plans. The article reviews the relationship between the grey boxes in the figure by analysing the content of the local plan. The local negotiation process is not analysed.

**Table 1**  
Action content of the plan.

Type of measure	Description	Examples of measure
Conservation measure	Positive and pro-active intervention to ensure the conservation status or to improve it	Grazing or mowing of grasslands. Development of natural banks
Restrictive measure	Intervention that should not occur to ensure the conservation status or to improve it	No use of fertilizer No clearcutting
General measure	Intervention of a more generic kind that can both lead to a positive intervention or describe an intervention that should not occur	Maintain the diversity of the area Develop a programme of measures to manage the area

(financially) rewarding or discouraging certain behaviour. A communicative instrument (sermon) tries to influence behaviour by disseminating information to actors with the intention to entice them to change their behaviour.

Reviewing the authoritative force of a particular instrument is not always clear-cut. In practice, many policy instruments have a mixed character and do not always neatly fit the theoretical distinctions made (Salamon, 2002). The nested character of Natura 2000 management planning system amplifies this problem. The management plans are developed in a multilevel setting, where national authorities set boundary conditions and local actors decide on specific measures. Local actors have significant freedom to ensure that conservation goals are met, to discuss problems, and to decide which measures are needed to solve these problems, and who will be responsible for undertaking action. Yet the actual choices should meet the conditions set by the legal framework of the EU Birds and Habitats Directives and a particular management planning system that is decided on at a national level. The discussions about measures thus take place in a setting in which the actors involved may or may not agree on the causes of the problems or the solutions at stake. Furthermore the measures need to be related to existing land use activities, ownership situations and use rights. As a result the management plan encompasses a broad suite of measures that may specifically be proposed in the framework of the new planning instrument, have their origin in other, pre-existing policies or address specific local issues.

**2.2. Operationalization of theoretical concept for analysis**

To assess to what extent the authoritative force of the management planning system may influence the content of the management plans, four different aspects of these plans will be reviewed: the type of measures proposed, the problems these measures address, the number

or parties involved in executing the measures, and how these parties are motivated to take the proposed measures. Each of these aspects is elaborated below (see also right side of Fig. 1). Based on this analysis conclusions are drawn as to how the selection of particular measures and the plans as a whole relate to the authoritative force of the management planning system.

**2.2.1. Action content**

The Habitats Directive provides the basis for the typology of the action content of the plans. Conservation measures are defined by the Directive and the Guidance Note (European Commission, 2013) which supports it as a ‘a series of measures required to maintain or restore the natural habitat and population of species of wild flora and fauna at a favourable conservation status. In the Guidance Note it is stated that a conservation measure is a positive and pro-active intervention. A conservation measure therefore refers to an action that is required to ensure that the species and habitats are conserved (‘to do’ or ‘to do more’). In addition, Art. 6.2 requires the Member states to ‘take appropriate steps to avoid deterioration of natural habitats and natural habitats of species as well as disturbance of species’. The Guidance document also refers to conflicts that may occur with current land use. For the purpose of this article we refer to such activities as ‘restrictive measures’, i.e. measures that are proposed to avoid deterioration of habitats and disturbance of species resulting from current land use. The activity should not occur or its intensity needs to be reduced (‘do not’ or ‘do less’). Our review of the plans will show that several measures in many of the plans are described in such a generic way that it is unclear whether they constitute a conservation or a restrictive measure (see Table 1) For the purpose of this analysis, therefore, a distinction will be made between three main types of measures; conservation measures, restrictive measures and general measures. In Table 1 the definitions of the measures are provided as well as some examples, in the Supplementary material (Table

**Table 2**  
Classification of threats/problems that might require measures to be taken.

Code	Description
A	Agriculture
B	Forestry
C	Mining, quarrying & energy production
D	Transportation & service infrastructure
E	Urbanisation, residential & commercial development
F	Use of living resources (other than agriculture & forestry)
G	Disturbances due to human activities
H	Pollution
I	Non-native species
J	Modification of natural conditions
K	Natural processes (excluding catastrophes)
L	Geological events, natural catastrophes
M	Climate change
U	Unknown threat or pressure
X	No pressures or threats
XE	Threats and pressures from outside the EU territory
XO	Threats and pressures from outside the Member State

B) the coding system is presented.<sup>3</sup> The plan also includes research (e.g. monitoring) and general communication activities. We did not include these activities in our analysis as implementing them does not have a direct effect on the conservation status of species and habitats within the site.

### 2.2.2. Problems addressed

Most management plans also specify the problems that the measures will address. For the typology of the problems addressed we will use the existing coding system developed by the European Commission for the latest Article 17 reporting. As part of the reporting Member States indicate possible threats to Natura 2000 species and habitats ([http://bd.eionet.europa.eu/activities/Reporting/Article\\_17](http://bd.eionet.europa.eu/activities/Reporting/Article_17)). This typology distinguishes threats based on the sector (f.i. agriculture or urbanisation) or on specific themes (pollution, non-native species, natural system modifications). Seventeen main categories of threats are identified (see Table 2).<sup>4</sup>

Furthermore if the plan includes measures addressing a certain threat, this is taken as an indication that the actors involved consider this threat an actual problem requiring action.<sup>5</sup>

### 2.2.3. Involved party to execute measures

Management plans normally indicate which actors are required to execute the conservation measures or which actors should not undertake specific damaging activities. Management plans can include measures that can be taken by a single party and measures that require co-operation of more parties. To assess whether the measure requires single party action or multiple party action a simple coding system was developed using two values only (1, 2). If the execution of the measure depends on the action of one party the score assigned was 1, if the action depends on the co-operation of more than one parties to execute the action the score assigned was 2. As the general measures were too vague or ambiguous to assess the number of parties required, these measures were not reviewed and excluded from this part of the analysis.

<sup>3</sup> The coding system of the Article 17 reporting for measures we deemed not suitable for our analysis. Whereas this system provides a sectoral typology, our typology is based on the character of the measure itself regardless of the sector executing the measure (see Supplementary Material A).

<sup>4</sup> This typology is not mutually exclusive as overlap between codes is possible for instance pollution caused by agriculture. We addressed this by closely reviewing the text – if a sector was mentioned as threat the corresponding code was used, if no sector was indicated the specific theme code was used.

<sup>5</sup> Note that this implies the possibility that certain threats, e.g. climate change, are not regarded as problems by the actors involved.

### 2.2.4. Authoritative mechanism

To determine the authoritative mechanism behind each measure the typology prevalent in policy instrument theory is used (see section 2.1). If funding is available for either undertaking a measure or as compensation for the restriction is stipulated, the authoritative mechanism used is financial (carrot). If the measure can be enforced through existing law or due to the legal status of the plan the authoritative mechanism is regulatory (stick). If neither funding nor a legal requirement is in place the authoritative mechanism used is communicative (sermon). Due to their generic and often ambiguous character, it turned out to be impossible to assess the authoritative mechanism behind the category of general measures (see Table 1).

In sum, the following four aspects of the plan will be reviewed;

- Action content of the plan (conservation measures, restrictive measures, general measures)
- The problems the measures address (17 problem categories)
- The parties needed to implement the measure (single or multi party action)
- The authoritative mechanism used to ensure that the measures are taken (stick, carrot, sermon) (see Fig. 1)

To compare the plans within as well as between countries, for each plan metrics were developed for the four aspects described above (action content, problems reviewed, number of parties for execution, authoritative mechanism). In the Supplementary material (Table B) the metrics used are described in more detail. A statistical *t*-test or Mann Whitney U test was carried out to assess the significance of differences between the country's plans with regard to the four aspects ( $p > 0.05$ ).

## 3. Country and site selection

The management planning systems of Member States differ considerably, based on national choices regarding, among other things, enforceability, funding available for measures, required content and participation procedures. Furthermore they also feature different levels of authoritative force (European Commission, 2013; Unnerstall, 2008). Whilst in some of the Member States management plans were primarily introduced to be legally binding and enforceable, in other Member States the management plans are voluntary and the plan primarily acts as a communication tool or a funding mechanism. Given the large variation between Member States and sites the selection of the management plans to be reviewed was complex and consisted of two distinct steps. In a first step the Member States for which the review would take place were selected, in the next step the sites for review within the Member States were selected. The following criteria were used to select the Member States for this research:

- 1) Existence of a decision at Member State level to develop management plans for Natura 2000 sites (Bouwma et al., 2016);
- 2) Variation between the selected Member States with regard to the authoritative force of the planning systems
- 3) Existence of a more or less comparable socio-economic and ecological background in the selected Member States
- 4) Availability of a large number of plans within the selected Member States;
- 5) Easy accessibility of management plans, preferably through the internet.

Based on these criteria France and the Netherlands were chosen for the research. Whereas in France the management planning system primarily plays a role as a funding mechanism, in the Netherlands the plans have a more stringent legal status as a review of current land use is required and damaging activities can be forbidden, require a permit, or conditions can be set. Also conservation measures stipulated in the

**Box 1**

Short description of the management planning system in France and the Netherlands.

#### Management planning in France

The management plans in France are called DOCOB ('Document des Objectives, DOCOB'). In France the process started in 2000 (Alphandéry & Fortier, 2010) and for many of the sites the management plans have now been concluded. A guideline is available on both the content and how to organise the process of the development of these management plans (Souheil, Germain, Boivin, & Douillet, 2011). DOCOBs are prepared under the responsibility of the Prefect of each Department, assisted by a facilitator and with full stakeholder participation. In each site a Comité de Pilotage is established by a decree of the Prefect in which stakeholders are present. This committee is involved in drafting the plan and approves it. Once the DOCOB is approved, land owners or users can accept the provisions of the management plan by entering into different types of contracts, signed by the Prefect (the State) for a minimum of five years. The contracts include specification of the work to be carried out to conserve or restore habitats and species, the nature of funding from the State and the conditions of the payments. State funding can be in the form of investment subsidies or annual payments per hectare. Given the focus of the French planning system on funding the authoritative force of the system can be characterised as primarily financial.

#### Management planning in the Netherlands

In the Netherlands the decision to draft management plans is incorporated in law (Natuurbeschermingswet, 1998). Each management plan must indicate which current use is allowed, whether conditions apply and/or whether a permit is required. The responsibility for drafting the management plans is divided amongst fifteen different parties being the Ministry of Agriculture, Nature and Food Quality, the Ministry of Defence, the Ministry of Infrastructure and the Environment or one of the 12 regional governments. Like in France there is a guideline on the content and drafting process of the management plan (Ministerie van Landbouw Natuurbeheer en Visserij, 2005). The organisation responsible for the drafting process provides the person(s) that will draft the plan (either their own staff of commissioned). In most sites, a 'Steering Group' has been established in which the main stakeholders in the area are represented as well as a 'Klankbord Group' that encompasses a larger group of involved stakeholders. The process in the majority of the sites in the Netherlands started in 2008/2009. The majority of the plans were approved in 2015 and 2016.

plan that need to be taken by the government (whether national, regional or local) are binding (see Box 1).

The next step involved the selection of sites within these two Member States. Overall there is a high variation between sites in terms of land cover, ownership, and the occurrence of Natura 2000 species and habitats. As management measures are likely to relate to the conservation features (e.g. habitat types and species) of the sites, sites were selected that contained similar habitat types occurring in both countries. In order to compare the two countries the review restricted itself to the measures taken for habitats present in both countries. Species were excluded as there are many species covered by the Directives and selecting a comparable sample would be difficult. Using the EEA database on Natura 2000 sites,<sup>6</sup> 30 sites were selected that contain 33 habitat types belonging to eight major ecosystem groups (Table 3). The site selection started with Dutch sites as the number of sites in France is higher. In a first step sites were selected that contain at least 5 habitat types that also occur in France. Then a French site with similar habitat types was selected for which a management plan was available. In case more options were available the site with the highest number of overlapping habitat types was selected. For all sites and for each of the 33 habitat types occurring in both countries, the corresponding measures were fed into a MS access database. Finally a check was undertaken to establish whether the selection covered most frequently occurring habitat types in both countries (e.g. habitat types that are present in more than 10 sites in the country).

## 4. Results

The review of the management plans shows that the content of the plans shows a fair amount of variation, both between sites in the same country as well as between France and Netherlands (see Supplementary material – Table A and B). The following overall picture at country level emerges. In both countries the majority of the proposed measures are

conservation measures (51% France, 65% Netherlands; see Fig. 2). Only a limited number of restrictive measures is proposed (21% France, 12% Netherlands). The measures in the Netherlands are taken primarily to address pollution (both of air and water) and natural system modification (mostly related to changes in hydrology). In France the majority of measures relate to natural biotic and abiotic processes (e.g. to avoid succession) and measures to stimulate less intensive forest and agricultural management. Although similar problems are mentioned in the management plans in both countries, the main difference appears to be that in France the measures address mainly problems related to the biotic condition of the area itself (e.g. abandonment leading to succession as well as intensity of the management) whilst in the Netherlands measures are more often related to abiotic conditions of the site which tend to be influenced by land use activities in the surrounding area (pollution and natural system modifications) (see Fig. 3).

The majority of measures proposed in the plans in both countries are measures that can be carried out by a single party (Fig. 4). The majority of these measures in France and the Netherlands relate to mowing and grazing of grasslands and heathlands, removal of top soil and the removal of trees and bushes. Multi party measures mentioned are related to hydrological measures as well as measures for recreational activities.

The main authoritative mechanism used in both countries is financial (85% France; 84% Netherlands). Regulatory or communicative mechanisms are rarely used to ensure that measures are taken (Fig. 5). If regulatory force is used in France and the Netherlands, it is mainly to reduce recreation pressure in the areas based on pre-existing regulations. Additionally in the Netherlands, a few measures related to water quantity and quality can be regarded as regulatory due to the legal status of the plan.

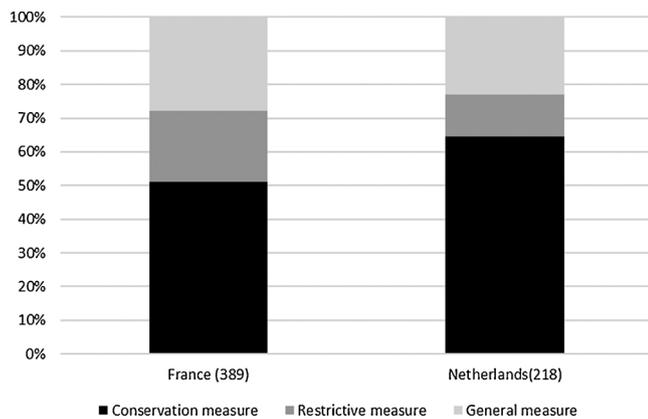
Table 4 presents the outcome of the statistical tests performed to verify whether there are significant differences between the 15 French and 15 Dutch plans regarding action content, problems addressed, parties or authoritative mechanism used. A *t*-test was performed for data with normal distribution, a Mann-Whitney U test for data with a non-normal distribution.

The table shows that there are a number of differences. First, French management plans propose more restrictive measures than those in the Netherlands ( $p = 0.04$ ). No difference is noticed in the percentage of

<sup>6</sup> The European database on Natura 2000 sites consists of a compilation of the data submitted by Member States to the European Commission. It is managed by the EEA and available for downloading at <https://www.eea.europa.eu/data-and-maps/data/natura-8>.

**Table 3**  
Sites selected for the analysis.

Site code	Site name	Date Management Plan	Surface	Nr habitat types in selection
FR2500108	Bois et coteaux à l'ouest de Mortagne-au-Perche	2013	36	2
FR2400534	Brenne	2012	58,311	12
FR2200395	Collines du Laonnois Oriental	2009	1378	16
FR5200640	Corniche de Pail, Forêt de Multonne, Vallée du Sarthon	2007	950	9
FR5200624	Des Marais de l'Erdre	2003	2565	10
FR3100480	Estuaire de la canche, dunes picardes, plaques sur l'ancienne falaise, forêt d'hardelot et falaise d'Equihen	2012	1658	18
FR3100478	Falaises du cran aux oeufs et du Cap Gris-Nez, dune du châtelet, marais de Tardinghen, dunes de Wissant	2005	1079	10
FR3100479	Falaises et dunes de Wimereux, Estuaire de la Slack, Garennes et Communaux d'Ambleteuse-Audresselles	2006	406	8
FR3100491	Landes, mares et bois acides du Plateau de Sorru /Saint-Josse, prairies alluviales de Valencendre et La Calotterie"	2006	60	12
FR5200626	Marais du Mès, baie et dunes de Pont-Mahé, étang du Pont-de-Fer	2007	2673	7
FR2200357	Moyenne vallée de la Somme	2006	1816	14
FR3100495	Prairies, marais tourbeux, forêts et bois de la cuvette audomaroise et de ses versants	2013	563	10
FR2100334	Reservoir de la Marne dit du Der-Chatecoq	2012	6135	6
FR2402001	Sologne	2007	34,5000	16
FR2200359	Tourbières et marais de l'Avre	2003	333	7
NL3000044	Alde Feanen	2015	2142	5
NL9801044	Botshol	2016	215	6
NL2003014	Drouwenezand	2015	223	3
NL3009006	Duinen Schiermonnikoog	2015	1024	6
NL2000008	Elperstroomgebied	2016	522	4
NL2003016	Geleenbeekdal	2009	226	5
NL9801075	Grensmaas	2009	301	4
NL1000022	Kempenland-west	2015	1957	8
NL2000008	Meinweg	2009	1809	9
NL3000036	Nieuwkoopse plassen	2014	2078	6
NL3009016	Oosterschelde	2015	36,577	4
NL1000016	Solleveld & Kapittelduinen	2013	724	6
NL2003044	Stelkampsveld	2015	135	9
NL2003045	Swalmdal	2009	122	3
NL9801017	Vecht en Beneden Regge	2015	4122	16



**Fig. 2.** Type of measures mentioned in the plan for selected 33 habitat types. A total of 607 unique measures are included, a total of 1345 measures are proposed.

general measures or conservation measures between the countries. Second, in terms of the problems addressed, French plans include significantly more measures related to agriculture and forestry whilst in the Netherlands measures are proposed mainly to address pollution and modification of natural conditions. There is no significant difference found in the number of parties that execute the measure between the plans in the countries, both Dutch and French plans mostly feature measures that require one party for the measure to be executed. Finally, no difference is found between the measures based on a stick in Dutch management plans compared to the French plans. Overall the authoritative mechanism behind most measures is the carrot. In this respect no significant difference can be found between the plans in the two countries.

## 5. Discussion

In this article, we have explored the question to which extent the authoritative force of the national planning system influences the measures proposed in the locally developed management plans. Our study shows that the majority of the measures included in the French plans are based on financial incentives (carrots) and thus reflect the national authoritative force of the system. In the Dutch case the relationship between the national management system and the measures taken locally is less obvious. The Dutch management system was aimed at assessing the impact of various land use activities on protected habitats and providing clarity about the need to put forward restrictions on these activities. The plans were supposed to determine, by way of permits, which activities could or could not be allowed. However, almost no restrictive measures are actually included in the management plans. Compared to French plans, the Dutch plans show no significant difference in the number of restrictive measures included. Instead, the Dutch plans mainly include conservation measures that are funded by the government. This raises the question why in the Dutch situation the content of the managements plans has shifted towards a system based on financial incentives and consequently a lower authoritative force than might be expected on the basis of the character of the national planning system.

To some extent the differences between the types of measures included in the French and Dutch plans can be explained by the particularities of the problems that are addressed. In France measures mainly relate to halting natural succession and to stimulate less intensive agricultural and forest management of the sites themselves. In the Netherlands the main problems for the sustainable conservation of Natura 2000 are pollution and natural system modification. These problems differ considerably in complexity and possible measures. In France many problems can be tackled through measures requiring single party agreement and for which compensation or subsidy

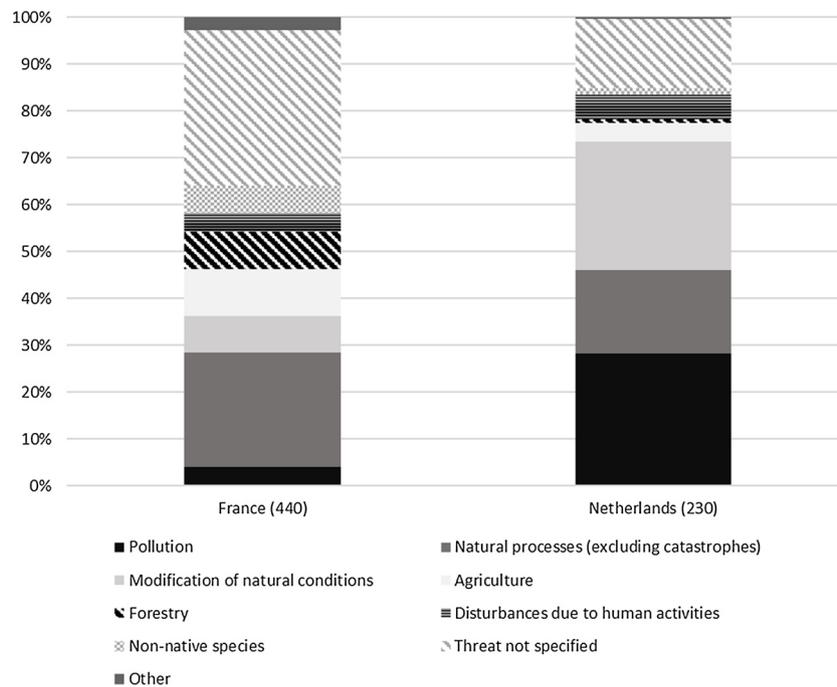


Fig. 3. Type of problems addressed by the conservation, restrictive and general measures mentioned in the plan for the 33 selected habitat types. The total number of measures is higher than the total number of problems as some measures address more than one problem. For some measures no threats were specified in the plans.

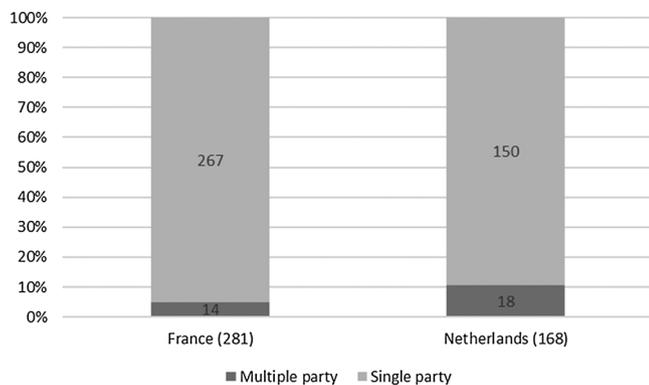


Fig. 4. Number of parties required to execute the conservation and restrictive measures for the 33 selected habitat types.

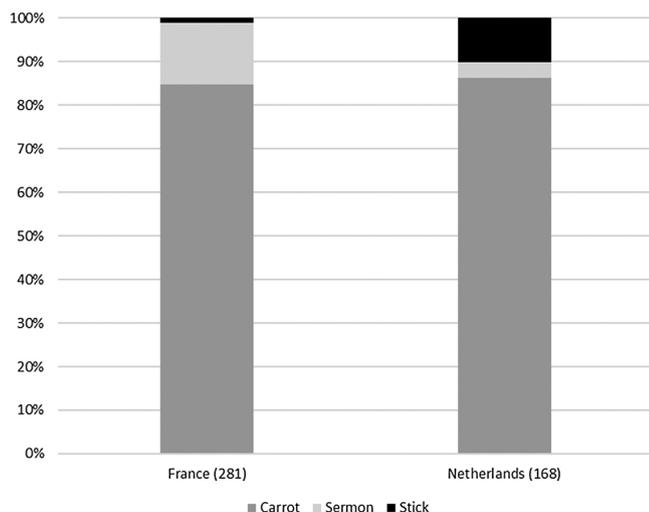


Fig. 5. Authoritative mechanism used to implement restrictive measures as well as conservation measures for 33 selected habitat types.

Table 4

Outcome of *t*-test and Mann–Whitney test for differences between 15 French en 15 Dutch management plans. Aspects with *p*-values for the *t*-test below 0.05 or with values below the critical value of the Mann–Whitney U test are indicated with an \*.

Content of plan	Aspects	<i>p</i> -value
Type of measure	Conservation measure	0.11
	Restrictive measures*	0.04
	General	0.32
Problems addressed	Agriculture*	0.05
	Modification of natural conditions*	0.00
	Natural processes (excluding catastrophes)	0.08
	Pollution*	0.00
	Unspecified*	0.00
Parties needed for execution	Single party	0.29
	Multiple party	0.29
Authoritative force	Carrot	0.46
Mann–Whitney U Test (Critical Value = 64, <i>p</i> < 0.05)		
Authoritative force	Sermon	73
	Stick	73
Problems addressed	Disturbances due to human activities	85
	Forestry*	42.5
	Non-native species	70
	Mining	105
	Transportation & service infrastructure	83
	Urbanisation, residential & commercial development	105
	Use of living resources (other than agriculture & forestry)	105

mechanisms are either in place or can easily be designed. Furthermore, and particularly for the measures to halt natural succession due to agricultural land abandonment, the interests of nature conservation are to a large extent in line with those of agricultural owners. In the Netherlands the solutions are more difficult due to the nature of the predominant problems of environmental pollution and water management.

One of the most prominent environmental pollution problems in the Netherlands is the high level of nitrogen deposition. Although high

levels of nitrogen deposition occur in some parts of France too, the problem is much more prominent in the Netherlands. Nitrogen deposition has many sources ranging from local to global. Addressing it tends to require multiparty co-operation (Van Grinsven, Tiktak, & Rougoor, 2016; Vitousek et al., 1997). Water management also constitutes a complex governance problem that is strongly connected with intensive agriculture land use in the Netherlands (Bressers & Kuks, 2004; Gaalen et al., 2016; Hoppe et al., 2016). Ensuring a favourable conservation status by addressing these problems would require stringent and far reaching restrictive measures not only impacting stakeholders in the direct vicinity, but also in a wider area around the sites (Ministerie van Economische Zaken & Ministerie van Infrastructuur en Milieu, 2017; Wamelink et al., 2013). When the extent of the problem of nitrogen deposition was acknowledged, the process of the development of management plans halted in many sites (Regiebureau Natura 2000, 2011; Regiebureau Natura 2000, 2011). Eventually, a national approach to tackle this problem was elaborated, the Dutch National Programme for Nitrogen Deposition (Programmatische Aanpak Stikstof, PAS) (de Heer, Roozen, & Maas, 2017; Ministerie van Economische Zaken & Ministerie van Infrastructuur en Milieu, 2017). This programme introduced a dual approach consisting of (1) an overall reduction of emissions and (2) a reduction of the negative effects of nitrogen through conservation measures that remove nitrogen from the habitat, like sod-cutting, mowing, or grazing. Due to the expected positive effect of these measures on the conservation status of the Natura 2000 sites responsible authorities are currently able to allow activities that lead to nitrogen deposition. The policy came with a substantial budget to fund necessary measures and this might explain the shift to more financial, incentive-based measures in the Dutch management plans. Many of the proposed measures aim to reduce (in the short term) the effect of N-deposition and are funded through the PAS. Although that programme aims to reduce the total emission in the Netherlands, it is rather uncertain if it will indeed lead to the reduction levels needed to ensure the long term favourable conservation status of habitat types sensitive for N-deposition (PBL, 2014). Similar problems are also faced in relation to water quality in the Netherlands. Recent studies show that current policies will fail to meet the Water Framework Directive (WFD) objectives by 2027 (Gaaen et al., 2016; Van Grinsven et al., 2016). Nutrient levels, mainly from agricultural activities, are also too high and delimit ecological improvement; but no policy has been put in place to address this problem.

Another explanation might be that responsible authorities are reluctant to include restrictive measures in the management plans, because those would likely generate opposition from land owners, farmers or other users and the interest groups that represent them. The issue of land owners rights played a dominant role in both countries during the decision making process on the new management planning system (Alphandéry & Fortier, 2001; Nederlandse overheid, 2002). The French system that resulted from this discussion was based on the premises of compensation, whilst the Dutch system was not. Consequently, the French system provided the mechanism to negotiate at local level on compensation or subsidisation, whilst the Dutch system did not. The latter might be a reason why very few restrictive measures were actually included in the Dutch plans. The Dutch planning system specifically aimed at management plans that would rely on legal rules as authoritative force. These plans should therefore distinguish between activities that, with a permit, could be allowed and those activities that should be restricted or even halted to prevent deterioration of the sites. Although in very few sites habitats and species are in an excellent conservation and specific problems related to other land use activities are identified in almost all of the studied plans, the stick was rarely used to ensure effective action or to impose restrictions.

Furthermore the study indicates that the formulation of management plans is influenced by other policies that influence activities in and around Natura 2000 sites and by shifts in the political landscape whether to address certain issues and the way in which to do so. In the

Netherlands this drove a shift from a system with a high authoritative force (sticks) to measures primarily based on funding (carrots). Along similar lines, many existing measures already funded by the national subsidy system for nature were incorporated in management plans. The latter was also the case in France many measures included in the plans stem from the Common Agricultural Policy (CAP). But in France the CAP and the Natura 2000 management system shared a focus on financial instruments (carrots) from the beginning.

Natura 2000 management plans can be a useful tool for establishing necessary conservation measures and for organising funding for such measures. Yet many of the measures included in the French and Dutch plans are voluntary and thus highly dependent on the willingness of land owners to participate. There seems to be little political will to restrict damaging activities, and especially not if no financial compensation can be provided. In addition, our study shows that the financial opportunities are often strongly dependent on funding from adjacent policies such as the Common Agricultural Policy, or specific national funding programs that might not always focus on Natura 2000 objectives (Sarvašová et al., 2017). There is a risk that management measures are proposed for which money is available, rather than those that are most effective. It is also possible that necessary measures are not proposed at all due to lack of funding. These insights show that it is important to consider the extent to which national funding schemes are suitable for ensuring the selection of effective measures at site level.

The value of management plans to avoid further deterioration of the Natura 2000 sites also in sum looks rather limited. Even in the Dutch system where the explicit intent was to formulate restrictive measures only a limited number of such measures were actually proposed. Management plans are likely to be insufficient to safeguard the conservation of species and habitats threatened by damaging activities in the site. More generally speaking, the value of the management plans as a tool for addressing complex environmental issues seems limited. This is illustrated by the fact that the plans are hardly used to restrict activities with a possible negative effect on conservation objectives. The review of the different management plans shows that complex problems are very difficult to solve through a collaborative planning process at local level. Rather this requires a different approach that combines considerable resources, a higher authoritative force, and a high level of political commitment. Earlier criticism of collaborative planning of natural resources has already alluded to this problem by concluding that if success was achieved this could be attributed to the fact that the management agreed between the parties focused on obvious solutions to easy problems, the long-term effectiveness of which was not guaranteed (Kenney, 2000; Lieferink, 1999). The potential of stakeholder involvement for solving environmental problems depends on power relations amongst involved stakeholders and on the possibilities and limits decided at a national level, taking into account that various stakeholders, both at a local level and in national politics, might not favour sustainable solutions (Blondet et al., 2017; Goodwin, 1998; Jentoft, 2017; Sarvašová et al., 2017; Van Assche, Beunen, & Duineveld, 2016).

This article only reviews the Natura 2000 management planning systems of two of the twenty-eight EU Member States. This raises a question about the extent to which the results found may be expected to be representative for other Member States. First, the problems addressed in the management plans in France and the Netherlands are representative for the overall threats for Natura 2000 species and habitats in the entire EU (European Environmental Agency, 2015). High ranking pressures and threats reported for habitats are agriculture, modification of natural conditions, natural processes and pollution. These are therefore also the most urgent problems that management plans can be expected to address in other Member States. Second, almost all Member States are developing management plans, although not all of them have developed new management planning systems (Bouwma et al., 2016). In the majority of Member States the designation of Natura 2000 sites has increased the protected area in private

ownership. Consequently new management plans increasingly need to deal with private owners and their property rights. In sites with private ownership restrictive measures cannot be introduced without a discussion about subsidization and financial compensation. This is also reflected by the discussion at EU level on Natura 2000 that also centres on how land owners could be compensated (European Commission, 1998; Ferranti et al., 2014).

## 6. Conclusions

This article explores to what extent the authoritative force of the national planning system influences the types of measures included in the management plans that are developed for Natura 2000 sites. Our review of 30 management plans developed in two Member States reveals that both Dutch and French plans mainly propose conservation measures that can be executed by a single party and for which funding from the government is available. Only a limited number of restrictive measures is proposed. Restrictions are only included if they are accompanied by financial compensation. The study shows that largely irrespective of the original ambitions of the national authorities the main emphasis is on financial instruments. The authoritative force of the instruments for governing and managing Natura 2000 sites therefore seems rather low. This shifting emphasis, from sticks to carrots as the main tool for coordinating the management of Natura 2000 sites, could be described as ‘the carrotisation’ of nature conservation policy. The Natura 2000 management plans appear to have become a tool to elaborate the necessary pro-active measures in discussion with stakeholders, and to organize the financial opportunities for funding these measures. However, the extent to which the management plans can fulfil this role depends on their interaction with other policies and the availability of financial resources. Apart from that, it remains to be seen to what extent a largely carrot-based management of sites will provide sufficient protection to prevent further deterioration of habitats and species. This study suggests that moving back from carrots to sticks will require a significant tightening of the national boundary conditions for management plans.

On the basis of this study, it may be wondered to what extent management plans can help solving complex problems such as nitrogen deposition, that require the co-operation and agreement of many parties and more fundamental changes in current land use activities. The results indicate that this might be difficult, especially if no funding is available, because decision-makers seem reluctant to put in place restrictions to prevent further deterioration of protected habitats. Further research could therefore investigate how policies and measures are actually negotiated (process), the role that adjacent policies play in this, and the eventual effectiveness of those policies. Such research should take into account the extent to which national policies shape the possibilities and limits for stakeholder involvement and local decision-making. From a Natura 2000 perspective it would be most relevant to focus on complex problems related to natural systems modification, pollution and its relationship with agricultural practices, as these are major threats for Natura 2000 species and habitats EU-wide.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.jnc.2018.09.001>.

## References

- Alphandéry, P., & Fortier, A. (2001). Can a territorial policy be based on science alone? The system for creating the Natura 2000 network in France. *Sociologia Ruralis*, 41(3), 311–328. <https://doi.org/10.1111/1467-9523.00185>.
- Alphandéry, P., & Fortier, A. (2010). Local settings and biodiversity a sociological approach to the implementation of the EC habitats directive in France. *Current Sociology*, 58(5), 755–776.
- Bemelmans-Videc, M. L., & Rist, R. C. (1998). *Carrots, sticks & sermons: Policy instruments and their evaluation*. New Brunswick [etc.]: Transaction.
- Beunen, R., & de Vries, J. R. (2011). The governance of Natura 2000 sites: The importance of initial choices in the organisation of planning processes. *Journal of Environmental Planning and Management*, 54(8), 1041–1059. <https://doi.org/10.1080/09640568.2010.549034>.
- Birdlife Europe, EEB, Friends of the Earth, & WWF (2018). *Nature's last line of defence*.
- Blondet, M., de Koning, J., Borrass, L., Ferranti, F., Geitzenauer, M., Weiss, G., ... Winkel, G. (2017). Participation in the implementation of Natura 2000: A comparative study of six EU member states. *Land Use Policy*, 66, 346–355.
- Bouwma, I., Liefferink, D., van Apeldoorn, R., & Arts, B. (2016). Following old paths or shaping new ones in natura 2000 implementation? Mapping path dependency in instrument choice. *Journal of Environmental Policy & Planning*, 18(2), 214–233.
- Brescancin, F., Dobšinská, Z., De Meo, I., Šálka, J., & Paletto, A. (2017). *Analysis of stakeholders' involvement in the implementation of the Natura 2000 network in Slovakia. Forest policy and economics*.
- Bressers, H., & Kuks, S. (2004). *Integrated governance and water basin management*. Dordrecht: Springer Science + Business Media.
- Cent, J., Grodzinska-Jurczak, M., & Pietrzyk-Kaszynska, A. (2014). Emerging multilevel environmental governance – A case of public participation in Poland. *Journal for Nature Conservation*, 22(2), 93–102. <https://doi.org/10.1016/j.jnc.2013.09.005>.
- de Heer, M., Roozen, F., & Maas, R. (2017). The Integrated Approach to Nitrogen in the Netherlands: A preliminary review from a societal, scientific, juridical and practical perspective. *Journal for Nature Conservation*, 35, 101–111.
- Diez, M. A., Etxano, I., & Garmendia, E. (2015). Evaluating participatory processes in conservation policy and governance: Lessons from a Natura 2000 pilot case study. *Environmental Policy and Governance*, 25(2), 125–138. <https://doi.org/10.1002/et.1667>.
- Duhalde, M., Levrel, H., & Guyader, O. (2017). Is the choice of conservation measures influenced by the targeted natural habitats? The case of French coastal Natura 2000 sites. *Ocean & Coastal Management*, 142, 15–27.
- European Commission (1998). Natura 2000 and people: A partnership. *Proceedings of a Conference held in Bath (UK) on 28–30 June 1998*.
- European Commission (2013). *Establishing conservation measures for Natura 2000 Sites*. Luxembourg: Office for Official Publications of the European Communities.
- European Environment Agency (2015). *State of nature in the EU. Results from reporting under the nature directives 2007–2012*. Luxembourg: Publications Office of the European Union.
- European Environmental Agency (2015). *State of Nature in the EU. Results from reporting under the nature directives 2007–2012*. Luxembourg: Publications Office of the European Union.
- Ferranti, F., Turnhout, E., Beunen, R., & Behagel, J. H. (2014). Shifting nature conservation approaches in Natura 2000 and the implications for the roles of stakeholders. *Journal of Environmental Planning and Management*, 57(11), 1642–1657.
- Gaalen, F., Tiktak, A., Franken, R., Boekel, E., Puijenbroek, P., Muijlwijk, H., ... Groenendijk, P. (2016). *Waterkwaliteit nu en in de toekomst: eindrapport ex ante evaluatie van de Nederlandse plannen voor de Kaderrichtlijn Water: beleidsstudie*. PBL-publicatie/Planbureau voor de Leefomgeving 1727.
- Geitzenauer, M., Blondet, M., De Koning, J., Ferranti, F., Sotirov, M., Weiss, G., ... Winkel, G. (2017). The challenge of financing the implementation of Natura 2000—Empirical evidence from six European Union Member States. *Forest Policy and Economics*, 82, 3–13.
- Geitzenauer, M., Hogl, K., & Weiss, G. (2016). The implementation of Natura 2000 in Austria—A European policy in a federal system. *Land Use Policy*, 52, 120–135.
- Goodwin, P. (1998). ‘Hired hands’ or ‘local voice’: Understandings and experience of local participation in conservation. *Transactions of the Institute of British Geographers*, 23(4), 481–499.
- Hoppe, T., Kuokkanen, A., Mikkilä, M., Kahiluoto, H., Kuisma, M., Arentsen, M., ... Linnanen, L. (2016). System merits or failures? Policies for transition to sustainable P and N systems in the Netherlands and Finland. *Sustainability*, 8(5), 463.
- Howlett, M. (1991). Policy instruments, policy styles, and policy implementation – National approaches to theories of instrument choice. *Policy Studies Journal*, 19(2), 1–21. <https://doi.org/10.1111/j.1541-0072.1991.tb01878.x>.
- Jentoft, S. (2017). Small-scale fisheries within maritime spatial planning: Knowledge integration and power. *Journal of Environmental Policy & Planning*, 19(3), 266–278. <https://doi.org/10.1080/1523908x.2017.1304210>.
- Kati, V., Hovardas, T., Dieterich, M., Ibsch, P. L., Mihok, B., & Selva, N. (2015). The challenge of implementing the European network of protected areas Natura 2000. *Conservation Biology*, 29(1), 260–270. <https://doi.org/10.1111/cobi.12366>.
- Kenney, D. S. (2000). *Arguing about consensus: Examining the case against Western watershed initiatives and other collaborative groups active in natural resources management*. Colorado: Boulder: Natural Resources Law Center, University of Colorado.
- Kovacs, E., Kelemen, E., Kiss, G., Kalóczkai, A., Fabok, V., Mihok, B., ... Balázs, B. (2017). Evaluation of participatory planning: Lessons from Hungarian Natura 2000 management planning processes. *Journal of Environmental Management*, 204, 540–550.
- Laffan, B., & O'Mahony, J. (2008). ‘Bringing politics back in’. Domestic conflict and the negotiated implementation of EU Nature Conservation Legislation in Ireland. *Journal*

- of *Environmental Policy & Planning*, 10(2), 175–197. <https://doi.org/10.1080/15239080801928428>.
- Liefferink, D. (1999). *The Dutch national plan for sustainable society*. London: The Global Environment, Institutions, Law and Policy, Earthscan Publications Ltd.
- Ministerie van Economische Zaken, & Ministerie van Infrastructuur en Milieu (2017). *Programma Aanpak Stikstof 2015-2021 zoals gewijzigd na partiële herziening op 17 maart 2017*. Den Haag: Rijksoverheid.
- Ministerie van Landbouw Natuurbeheer en Visserij (2005). *Handreiking Beheerplannen Natura 2000-gebieden*. Den Haag: IFZ bedrijfsuitgeverij.
- Nederlandse overheid. (2002). Tweede Kamer. Wijziging van de Natuurbeschermingswet 1998 in verband met Europeesrechtelijke verplichtingen. 28 171 Nr. 5.
- PBL (2014). *Beoordeling Programmatische Aanpak Stikstof. De verwachte effecten voor natuur en vergunningverlening*. Den Haag: PBL.
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. <https://doi.org/10.1016/j.biocon.2008.07.014>.
- Regiebureau Natura 2000. (2011). Beheerplanprocessen Natura 2000 Voortgangsrapportage nr. 12 6 april 2011. 7.
- Salamon, L. M. (2002). *The tools of government: A guide to the new governance*. USA: Oxford University Press.
- Sarvašová, Z., Ali, T., Đorđević, I., Lukmine, D., Quiroga, S., Suárez, C., ... Franz, K. (2017). Natura 2000 payments for private forest owners in Rural Development Programmes 2007–2013—A comparative view. *Forest Policy and Economics*.
- Souheil, H., Germain, L., Boivin, D., & Douillet, R. (2011). *Document d'objectifs Natura 2000. Guide Méthodologique d'élaboration*. Montpellier: Atelier Technique des Espaces Naturels.
- Sundseth, K., & Roth, P. (2013). *Article 6 of the habitats directive rulings of the european court of justice*. Unknown: Ecosystems LTD (N2K Group).
- Unnerstall, H. (2008). Public participation in the establishment and management of the Natura 2000 Network—Legal framework and administrative practices in selected Member States. *Journal for European Environmental & Planning Law*, 5(1), 35–68.
- Van Assche, K., Beunen, R., & Duineveld, M. (2016). Citizens, leaders and the common good in a world of necessity and scarcity: Machiavelli's lessons for community-based natural resource management. *Ethics, Policy & Environment*, 19(1), 19–36.
- Van Grinsven, H. J., Tiktak, A., & Rougoor, C. W. (2016). Evaluation of the Dutch implementation of the nitrates directive, the water framework directive and the national emission ceilings directive. *NJAS-Wageningen Journal of Life Sciences*, 78, 69–84.
- Vedung, E. (1998). Policy instruments; typologies and theories. In M. L. Bemelmans-Videc, R. C. Rist, & E. Vedung (Eds.). *Carrots, stick and sermons* (pp. 21–59). New Brunswick, New Jersey: Transaction Publishers.
- Vitousek, P. M., Aber, J. D., Howarth, R. W., Likens, G. E., Matson, P. A., Schindler, D. W., ... Tilman, D. G. (1997). Human alteration of the global nitrogen cycle: Sources and consequences. *Ecological Applications*, 7(3), 737–750.
- Wamelink, G., De Knegt, B., Pouwels, R., Schuiling, C., Wegman, R., Schmidt, A., ... Sanders, M. (2013). Considerable environmental bottlenecks for species listed in the Habitats and Birds Directives in the Netherlands. *Biological Conservation*, 165, 43–53.
- Winter, S., Borrass, L., Geitzenauer, M., Blondet, M., Breibeck, R., Weiss, G., ... Winkel, G. (2014). The impact of Natura 2000 on forest management: A socio-ecological analysis in the continental region of the European Union. *Biodiversity and Conservation*, 23(14), 3451–3482. <https://doi.org/10.1007/s10531-014-0822-3>.
- Young, J., Watt, A., Nowicki, P., Alard, D., Clitherow, J., Henle, K., ... Matouch, S. (2005). Towards sustainable land use: Identifying and managing the conflicts between human activities and biodiversity conservation in Europe. *Biodiversity and Conservation*, 14(7), 1641–1661.
- Young, J. C., Jordan, A., Searle, K. R., Butler, A., Chapman, D. S., Simmons, P., ... Watt, A. D. (2013). Does stakeholder involvement really benefit biodiversity conservation? *Biological Conservation*, 158, 359–370. <https://doi.org/10.1016/j.biocon.2012.08.018>.