Policy instruments and modes of governance in environmental policies of the European Union

Past, present and future

WOt-technical report 60

I.M. Bouwma, A.L. Gerritsen, D.A. Kamphorst & F.H. Kistenkas

WAGENINGEN UR
For quality of life

Policy instruments and modes of governance in environmental policies of the European Union

This WOt-technical report was produced in accordance with the Quality Manual of the Statutory Research Tasks Unit for Nature & the Environment.

The ‘WOt-technical reports’ series presents the findings of research projects implemented for the Statutory Research Tasks Unit for Nature & the Environment by various centres of expertise.

WOt-technical report 60 presents the findings of a research project commissioned by PBL Netherlands Environmental Assessment Agency. PBL is an autonomous research institute in the fields of the environment, nature and spatial planning, as is safeguarded in the Protocol for the Policy Assessment Agencies (Aanwijzingen voor de Planbureaus), Staatscourant (government gazette) 3200, 21 February 2012.

This document contributes to the body of knowledge which will be incorporated in more policy-oriented publications such as the National Nature Outlook and Environmental Balance reports, and thematic assessments.

The research was funded by the Dutch Ministry of Economic Affairs (EZ).

Policy instruments and modes of governance in environmental policies of the European Union

Past, present and future

I.M. Bouwma, A.L. Gerritsen, D.A. Kamphorst & F.H. Kistenkas

Statutory Research Tasks Unit for Nature & the Environment *(WOT Natuur & Milieu)*
Wageningen, December 2015

WOt-technical report 60
ISSN 2352-2739

WAGENINGEN UR
For quality of life

Abstract

Bouwma, I.M., A.L. Gerritsen, D.A. Kamphorst & F.H. Kistenkas (2015). *Policy instruments and modes of governance in environmental policies of the European Union; Past, present and future*. Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), WOt-technical report 60. 42 p.; 1 Fig; 2 Tabs; 80 Refs; 2 Annexes

This report reviews the trends in EU policy instruments and governance modes. Prior to discussing these the report provides definitions for and describes a typology for governance modes and policy instruments. The report identifies three major trends in policy instruments and policy modes of the EU based on the available literature and a quick scan of five EU environmental directives, regulations or policies (Habitats Directive, Renewable Energy Directive, Timber Regulation, Water Framework Directive & Common Agricultural Policy). The trends are: a move from strict compulsory settings to due diligence in new legislation, a move from regulatory to networking, information based instruments and knowledge instruments and an increasing reliance on self-governance.

Keywords: governance modes, policy instruments, European Union, nature, environment

Alterra Wageningen UR
PO Box 47, 6700 AA Wageningen
Phone: (0317) 48 07 00; e-mail:info.alterra@wur.nl

The WOt-technical reports series is published by the Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), part of Wageningen UR. This document is available from the secretary's office, and can be downloaded from www.wageningenUR.nl/wotnatuurenmilieu

Statutory Research Tasks Unit for Nature & the Environment, P.O. Box 47, NL-6700 AA Wageningen, The Netherlands
Phone: +31 317 48 54 71; e-mail: info.wnm@wur.nl; Internet: www.wageningenUR.nl/wotnatuurenmilieu

Preface

This report is the result of a study to support the Nature Outlook of the Netherlands Environmental Assessment Agency, which will be published in 2016. Its results have been used in meetings of the project team working on the formulation of the perspectives of the Nature Outlook. We especially want to thank Henk van Zeijts for commissioning this study and Ed Dammers for the stimulating discussions and critical review of this report.

Irene Bouwma
Alwin Gerritsen
Dana Kamphorst
Fred Kistenkas

Contents

Summary

This report provides a short overview of the current state and recent trends in policy instruments choice and modes of governance in a selection of environmental policies of the European Union. It presents a short overview of literature on modes of governance and policy instruments. The report is a building block of the European 'Nature Outlook' of the Netherlands Environmental Assessment Agency.

The report distinguishes between governance modes and policy instruments and is based on the assumption that policy instruments and modes of governance differ. Policy instruments are usually defined as the tools of the government for implementing their policy. Modes of governance in the Nature Outlook differ from policy instruments in that they are based on the coordinative principles behind the deployment of policy instruments, and not in relation to which actor is dominant.

Five modes of governance are distinguished: hierarchical governance, market governance, network governance, self-governance and knowledge governance. Furthermore five major types of instruments are defined: legislative and regulatory instruments, economic and fiscal instruments, agreement-based or co-operative instruments, information and communication instruments and knowledge and innovation instruments. These governance modes and instrument typologies are used for analysing five directives and regulations from the European Union in the environmental field.

Based on the existing literature supplemented by a quick scan of five environmental directives and regulations of the European Union the following three trends are distinguished:

- *From strict compulsory settings to due diligence*
  Recent EU Directives and regulations such as the Water Framework Directive and the Timber Regulation do not provide the strict command-and-control rules with strict prohibitions that marked many of the environmental directives and regulations developed at the end of the 20th century. Instead they focus on due diligence systems, which are, in short, an agreement that actors will comply with certain measures or procedures in order to gain the desired policy objectives.

- *From regulatory to networking, information based instruments and knowledge instruments*
  In EU Directives and regulations over time more networking, information based instruments and knowledge instruments are included. This reflects a broader shift in governance modes towards network governance and knowledge governance.

- *Increasing reliance on self-governance*
  The newer regulations such as the Timber Regulation and the Renewable Energy Regulation are examples in which the European Union shares responsibility with businesses and to a certain extent trusts them to realise the objectives of the European Union's policy.

The reports concludes that a successful policy uses a variety of instruments and is based on one or several collaborating modes of governance; from coercive public law to voluntary self-regulation, voluntary agreements between actors, financial and legal support and by supporting actors to engage in innovation trajectories. Furthermore all types of policy instruments, even the financial and regulatory ones, are being adapted to new modes of governance, in particular network governance and knowledge governance.

1 Introduction

Since the mid 60-ties there has been increased attention for the decline of biodiversity in Europe and worldwide. The widespread degradation of ecosystems that has occurred in the 20th century also led to a reduction in the ability to deliver ecosystem services to society (EEA, 2015). In order to address biodiversity loss, the unsustainable use of ecosystems and the overall pressure on the environment, the European Union has since the 1970's developed several policies on nature and the environment. For biodiversity, the Birds Directive (1979), Habitats Directives (1992) and the EU Biodiversity Strategy 2020 are the most important ones. But since 1970, both the ideas on the content of nature and environmental policy has changed ('substance') as well as ideas on who is responsible for its protection ('organisation') and in particular what the role of the government is in this respect.

Currently as part of the overall Fitness check of EU legislation the Birds- and Habitats Directives are under review[1]. Furthermore recently the midterm review of the EU Biodiversity Strategy 2020 was completed. An important topic in these discussions is how the governance of nature policies could be optimized.

The objective of this study is to increase insight in the range of policy instruments that have been developed by the EU particular of relevance for nature so far and to explore which modes of governance are underlying these.

This report presents a short overview of literature on modes of governance and policy instruments which can be used for this purpose. The report specifically focusses on the various instruments and modes of governance used in different EU regulatory frameworks relevant to nature. In particular, the Habitats Directive; Renewable Energy Directive, Timber Regulation, Water Framework Directive and the Common Agricultural Policy. Based on the current state and recent trends expectations of how EU policy instruments will develop in the future are also described**.**

By providing the overview of EU policy instruments and governance modes in the past, present and future this report contributes to the development of the Nature Outlook developed by the Netherlands Environmental Assessment Agency. The PBL's Nature Outlook is developed on the request of the Ministry of Economic Affairs of the Netherlands as a contribution to the ongoing discussion on EU nature conservation policy. The Nature Outlook that will be published by PBL Netherlands Environmental Assessment Agency in 2016, presents four perspectives on European nature in 2050, including the pathways leading to establishing and fulfilling these perspectives. To further elaborate the discussion on governance of nature this project was commissioned to Alterra- Wageningen UR.

Our exploration starts from the assumption that policy instruments and modes of governance differ. Policy instruments are usually defined as the tools of the government for implementing their policy (Bemelmans-Videc & Rist, 1998; Salamon, 2002). Of course private businesses and other stakeholders also use instruments for their management, but these are normally not named as policy instruments. The literature on policy instruments therefore has a bias towards public stakeholders. Modes of governance in the Nature Outlook differ in respect from policy instruments that they are based on the coordinative principles behind the deployment of policy instruments, and not on which actor is dominant. We distinguish between five modes of governance, being hierarchical governance, market governance, network governance, self-governance and knowledge governance (e.g. Dixon & Dogan, 2002; Considine & Williams, 2003; Van Buuren & Eshuis, 2010, Meuleman, 2008, Gerritsen *et al*, 2013) In principle every mode of governance can be applied by every type of actor.

[1] http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm

However as these governance instruments are ideal types, in practice they usually occur in combined forms and therefore the deployment of policy instruments is based on various coordinating principles. Although policy instruments differ from modes of governance, policy instruments can be related to the overall mode of steering, although the same instrument can have a different form in different modes of governance.

This report has the following structure. In Chapter 2 the research method for the report is described. In Chapter 3 definitions of modes of governance and a classification of policy instruments is provided. In Chapter 4 the development of policy instruments in the EU are described based on literature review of the five most relevant regulatory frameworks is given. The chapter ends with description of signalled trends in policy instruments and expectations for the future.

2 Research approach

2.1 Introduction

The report was developed using two different methods of research, literature review, and document analysis. Chapter 3 and 4 are mostly based on an analysis of available literature about modes of governance and policy instruments in general. Additionally, in Chapter 4 an analysis was undertaken of a limited set of EU regulatory frameworks particular relevant for the field of nature in the EU. The literature and analysis formed the basis for developing ideas about how EU governance might develop in the future which would match with the scenarios as developed in the PBL Nature Outlook.

2.2 Analysis approach

2.2.1 Literature review

A wide range of books and articles were reviewed from three different fields: governance literature, instrument choice and Europeanisation literature. The governance literature is based in political science, sociology and organisational and political economics – the latter has a history dating back to the 1930's. Instrument choice as a topic for research developed in the early seventies. Main themes are the classification of policy instruments, which processes determine the choice of governments for particular instruments and what are the pros and cons of the different instruments. Europeanisation studies have been proliferating since the mid-1980 and have two major themes being the development of EU policy itself as well as how European Union policies are being put into practice by the Member States (Jordan & Adelle, 2014; Treib, 2014).

2.2.2 Quick scan of EU regulatory frameworks

A quick scan of the following five EU environmental directives, regulations or policies was undertaken: Habitats Directive; Renewable Energy Directive, Timber Regulation, Water Framework Directive & Common Agricultural Policy.

Overall the regulatory frameworks of the EU can be seen as policy programs embodying overall policy goals as well as several policy instruments. The analysis of the regulatory frameworks was undertaken from an instrumental point of view. The following issues were reviewed:

- Which policy instruments are proposed in the respective directives, regulations and frameworks?
- Can we distinguish particular combinations of types of instruments in the regulatory frameworks in the environmental field and has this changed over time?
- How is the responsibility between the European Commission, Member states, regions, businesses or citizens allocated in the different frameworks?

The assessment was undertaken based on an analysis of the different types of instruments mentioned in the official text and plot these in a spider diagram. In cases in which in practice financial instruments are used but they are not explicitly indicated in the legal text itself they were not counted. The spider diagrams provide a snap shot of the predominantly used policy instruments in the given regulatory framework.

In order to assess the types of instruments which are predominantly applied by the EU in the field of nature conservation or related to nature conservation we used the following main typologies of policy instruments (Böcher, 2012; Lascoumes & Le Gales, 2007):

- Legislative and regulatory instruments;
- Economic and Fiscal instruments;

- Agreement-Based or co-operative instruments;
- Information and communication instruments;
- Knowledge and innovation instruments.

2.2.3 From analysis to design: providing input in PBL Nature Outlook

The results of the activities under Sections 2.2.1 and 2.2.2 were used as inspiration and for envisaging the governance aspects of the four perspectives of the Nature Outlook. For, each perspective a distinct governance style is designed, which is constituted by elements from the different modes of governance and policy instruments as described in this report. For this purpose two creative workshops were held with the governance experts working on the perspectives. The identified characteristics of the modes of governance and the policy instruments were compared with the challenges belonging to the perspectives and it was decided which elements of the modes of governance and what instruments fit best for each perspective. The results of these creative workshops were discussed with the broader group of experts working on the Nature Outlook and especially in the second meeting with European stakeholders on the 17-18 March of 2015, in which also two of the authors of this report participated[2]. Designing the perspectives and their governance components was an iterative process with this report as a background. The results of this analysis are not presented in this report but will be published by PBL in the report on the perspectives itself.

[2] The report of this meeting can be found on : http://themasites.pbl.nl/natureoutlook/2016/wp-content/uploads/2014/Nature-Outlook-second-dialogue-report.pdf

3 Theories about modes of governance and policy instruments

3.1 Modes of governance

'Governance' concerns "all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organisation or territory and whether through laws, norms, power or language." (Bevir, 2013: 1). '*Modes of governance'* refer to the underlying logic which can be recognized in governance practices. The modes of governance as used in this report are not characterized by the type of actor (government, business, civilians, etc.) who would be in the lead, but by the coordinative principles that determine its functioning. In principle, every actor can engage in each mode of governance. Of course in real life these modes are not applied in such an ideal form and hybrids are bound to exist. For analytical clarity the modes of governance are nonetheless very useful because the understanding of the underlying logic can clarify why governance processes stagnate and how they can be strengthened.

3.1.1 Different traditions in mode of governance thinking

The literature concerning modes of governance has (at least) two backgrounds. The first one is derived from political science and is rooted in the discovery that new forms of governance emerged in addition to the workings of the classical nation state, with its claim to protect collective goods, legitimised by the people, and its dependence on 'hierarchic governance'. Scholars as Rhodes (1997), Stoker (1998), Pierre and Peters (2000), and Kooiman (2003) noted the emergence of new modes of governance in which government was not solely responsible for the provision of collective goods any more. The emergence of these new modes essentially was a critique on hierarchic governance and especially on its potential for producing societal change in complex societies and markets. This tradition discovered new modes of governance as 'network governance', 'self governance' and 'knowledge governance'.

The second tradition of literature concerning modes of governance originates from economics and more specifically from literature about the coordination of production systems and organisations. The traditional distinction is that between 'markets' and 'hierarchies' (Coase, 1937; Hayek 1944). Hierarchy in this tradition means centrally planned coordination. Sacchetti & Sugden (2009) argue that although it is often assumed that markets prevail, businesses mostly govern hierarchically. This distinction between hierarchies and markets was expanded by introducing 'network governance' (Considine & Lewis, 2003); primarily focussing on networks of businesses, for instance between producers and their suppliers. Sacchetti & Sugden (2009) proposed 'mental proximity' as a fourth mode of governance, which relates to individuals engaging in deliberation. These modes more or less are comparable to the ones identified by the political science-tradition. Mental proximity for instance very much relates to knowledge governance. Only self-governance is mostly absent from this tradition. The economic modes of governance do provide more in depth understanding, especially of hierarchic governance. This tradition also learns that 'market governance' can be a distinct mode of governance.

3.1.2 Hierarchical governance

Hierarchical governance[3] is very much related to the idea of the nation state and democratic government. Legitimated by public elections, government uses authority, a clear division of tasks, rules, rationality and objectivity (Meuleman, 2010) for intervening in society and markets. *"Hierarchical governance rests on the assumption that it is possible to realize coordination on the basis*

[3] In literature debating the shift from 'government' to 'governance' the hierarchical mode of steering is associated with 'government'.

of power relations, on ordination and subordination. In essence, hierarchical governance is about top-down steering. The classical bureaucratic organization is the prototype of hierarchical governance." (Van Buuren & Eshuis, 2010: 286). Hierarchy is not limited to governmental governance. Firms can also be coordinated by hierarchies which can substitute market transactions (Coase, 1937) and in fact do so regularly: *"... observed market economies (despite their being perceived as alternatives to centrally planned economies) are populated by actors whose nature is essentially based on a centralized and hierarchical strategic planning of activities (Cowling and Sugden 1998) in a mechanistic way (Burns and Stalker 1961) ...".* (Sacchetti & Sugden, 2009: 290).

Hierarchic governance has been heavily criticized in political sciences: "*This governance approach was useful for realizing collective action for a long time. But its application presupposes the availability of enough "capacity" for governments to realize their ambitions without the voluntary cooperation of their subordinates. In the context of current network societies the necessary resources to realize collective action (e.g. money, knowledge, organizational capabilities and legitimacy) are dispersed among many actors. Therefore hierarchical governance oftentimes falls short to realize collective action and is regularly replaced or supplemented by network governance* (Pierre and Peters 2000; Kettl 2002; Koppenjan and Klijn 2004; Klijn and Skelcher 2008)…" (Van Buuren & Eshuis, 2010: 286).

Traditionally, environmental law has been focussing itself heavily on this hierarchic (public) governance. A core coordinative principle in environmental law always has been the coerciveness of prohibitive legislation. In environmental planning, other types of governance have been scarcely mentioned or even been neglected in environmental law literature (Backes *et al*, 2006; Havekes and Van Rijswick, 2010).

Initially, regulation in environmental law has been featured by top-down imposed and detailed – even rigid - norms with a prohibitive character to alter human behaviour or human attitude towards nature or other environmental issues. Such altering legislation could be called *modification*, as it tries to modify societal patterns. This modification legislation contrasts with re-affirmative *codification*, as this legislation only aims at consolidating an already broadly accepted and supported norms or an already settled-down *communis opinio*. Both altering legislation (modification) and consolidating legislation (codification) might have a strong prohibitive character and both are coercive public law instruments exclusively given by a (higher) public authority hierarchically governing societal entities or other (lower) public authorities or member states.

In environmental policy, hierarchical governance by rigid prohibitive legislation is said to have been remarkably dominant over a long time (Backes *et al*., 2006). More recently however, environmental legislation appears to have a less rigid and precise character, as it seems to be is moving towards a more 'open-textured' and flexible norm-setting with merely *due diligence* codification rather than classic modification purposes (Ebbeson, 2010; Kistenkas, 2014a; Kistenkas 2014b). Due diligence refers to procedures and measures ensuring all parties involved are acting carefully (cf. operator's carefulness in the recent European Union Timber Regulation) (see Section 4.2). De Sadeleer (2002) states that 'postmodern' codification of open norms or generally accepted principles 'do not suffer from the burden of detail and thus allow courts to weigh and reconcile highly divergent interests with maximum flexibility'.

Over the years, European and domestic environmental legislation has itself strongly identified with hierarchical governance (Backes et al., 2006), but nowadays environmental legislation seems to vary from codifying legislation to modifying legislation and within those types one may recognize strong prohibitive legislation and merely loose due diligence systems.

3.1.3 Network governance

Network governance (for instance Kickert *et al.* 1997; Rhodes 1997; Koppenjan & Klijn 2004; Sørensen & Torfing, 2009) refers to the interdependence of the (many) actors that are involved in planning and governing issues in modern societies (Edelenbosch and Teisman, 2008). These actors represent a range of interests and perceptions on the problems at stake, as well as on the preferred solutions. Network governance assumes that policy is developed and implemented in networks of

organizations. These networks emerge and continue to exist because actors cannot reach their objectives without each other (Klijn and Teisman, 2003). Network governance relies on cooperation as the mechanism to deal with this interdependence. It makes use of the potentials of actor networks, and their ability to combine multiple agenda's and responsibilities and to distribute gains in order to arrive at policy outcomes. Reciprocity and collaboration are coordinative principles in network governance. Other coordinative principles are: interdependency, trust and empathy (Meuleman, 2010).

In this mode of governance, public and private parties usually work together as partners in coalitions, although networks can be found in varying forms. The coalitions that are formed are sometimes open and easily accessible for everybody, but they can also be closed and consist of a small coalition of chosen partners (Arnouts, 2010). Furthermore, Parilli & Sacchetti (2008) make a distinction between 'networks of direction' and 'networks of mutual dependence'. In networks of direction, the internal relationships are based on *"direction and control", and* one core actor is dominant in the network (Parilli & Sachetti, 2008: 393). The government may well be the core actor in networks in which it participates. Networks of mutual dependence on the other hand, *"... are heterarchical networks characterised by substantial participation in strategic decision making"* (Parilli & Sachetti, 2008: 393). Our understanding of network governance is close to the networks of mutual dependence. In such networks, the actors in the networks make decisions together, often based on negotiating on shared goals.

However, it should be emphasized that decision-making in networks is not necessarily easy, since the fact that networks develop in the first place, often indicates that there is no authoritative solution at hand that is acceptable for all actors at stake (De Bruijn *et al*., 1998). The participating actors may be very different in nature and act strategically. This multiplicity of actors, the various and conflicting interests at stake, and the strategic behaviour of actors involved, has been the reason why network governance has been presented as a complex series of games (Klijn and Teisman, 2003) and there may be winners and losers. Furthermore it can be resource intensive as it often requires frequent meetings. Network governance emerges when problems are complex, its processes are dynamic and the perceptions of the problems and solutions may shift over time, for example because the constellation of participants changes or new information becomes available (De Bruijn *et al.*, 1998).

3.1.4 Market governance

To achieve coordination, market governance relies on the powers of the market. Competition and pricing decide what path is selected and where financial incentives are an important instrument (Coase 1937; Williamson 1985). Or more elaborate: *"Market governance is based upon the economic principles of the interplay between the demands of consumers and the supply of producers. It coordinates through the invisible hand of the price-based system of exchange between self-interested actors (e.g. Williamson 1985). Within the public domain, market principles are used to formulate incentives that safeguard the proper working of imperfect markets. In some cases, governments provide a market for goods with specific merit aspects which are not produced by the common market."* (Van Buuren & Eshuis, 2010: 286).

In the 1980s and 1990s the idea emerged that governments should also function as if it were a company and by applying conditions as competition and pricing. Although this movement was very diverse it was labled as *'New Public Management'* (Osborne and Gaebler, 1992; Pollitt and Bouckaert 2000; Osborne, 2006). Pollitt (2002: 474) defined how a public sector functions in New Public Management: *"It will be a smaller public sector, intensively focused on efficiency and continuous improvement. It will consist of small, core ministries (responsible for strategy) and a range of specialized, semi-autonomous agencies (responsible for operations). It will work within clear performance frameworks that specify budgets and expected results. It will make widespread use of market and market-type mechanisms, and will frequently work in partnership with for-profit and voluntary sector organizations."*

A relative new example of market governance from the environmental policy domain is the idea to price ecosystem services (e.g. payment for ecosystem services). The idea is to develop market mechanisms for external non-market values of the environment so that the financial incentives might stimulate actors to take these into account in their management decisions (Engel *et al.*, 2008). At present the current price of many products does not take into account the costs of natural resources use or damage done- the costs are externalised. By taking these costs into account or developing a market mechanism for them these external costs would have to be paid by the company or other actor who is inflicting the damage. A possibility to create markets for these is to introduce a system of rights and to organise trade. The greening of the Common Agricultural Policy which has a much longer history can also been seen in this light. To obtain additional income support from the Commission, farmers would need to provide services to society, especially in environmental management.

3.1.5 Self-governance

Self governance is a form of governance in which 'the capacity of societal entities to govern themselves autonomously' (Kooiman 2003: 79) is the central coordinative principle. In self-governance actors make voluntary agreements (Van Buuren & Eshuis, 2010). Self-governance is sometimes seen as a mode of governance which will increase its importance for the coordination of society (Huygen *et al.*, 2012). Traditionally self-governance is used as a form of governance in which government relies on the capacities of actors from market or society to govern themselves (e.g. VROM-Raad, 1998; Van Montfort & Oude Vrielink-van Heffen, 2006). Self-governance can also mean that actors from society or market themselves claim an issue which they want to solve themselves and which government does not meddle in. To prevent an overlap with market governance we see self-governance primarily as governing by societal communities (which might involve businesses). In this we follow authors as Blond (2010) with their focus on active communities or 'Big Society' as it is named in British politics, which in the British case is linked to attempts to reduce the size of government and give initiative and responsibility back to communities. This political stream is related to work on community building (e.g. Gilchrist, 2004; Scott, 2010). A particular type of literature focuses on self-governing by local communities in shared natural resources or common pool resources (Ostrom *et al.*, 1994; Ostrom, 2005; Termeer *et al.*, 2013). This school of thought criticises the notion that government is needed to prevent 'tragedies of the commons' to happen and studies what conditions are needed for self governance of national resources by local communities. Self-governance as mode of governance is less clearly described than the previous ones. This is even stronger the case for knowledge governance.

3.1.6 Knowledge governance

The governing of knowledge and learning processes has recently been proposed as a distinct mode of governance which cannot be reduced to one of the modes described above (Van Buuren & Eshuis, 2010; Gerritsen *et al.*, 2013) and of specific interest to sustainable development (Van Kerkhoff, 2014). What does is entail? Michailova & Foss (2009) use knowledge governance as the governance of knowledge management activities and this is also more or less how Stehr (2005) sees his 'knowledge politics' concept, although he also writes about the emergence of a 'knowledge society' (e.g. Stehr, 2007) in which society becomes dependent on the production, dissemination and use of knowledge. In this report knowledge governance is understood as: '*... purposefully organizing the development of knowledge in order to deal with societal problems. Knowledge* governance is aimed at *creating new insights, and innovative solutions which tempt actors to leave traditional insights and practices and get away from inert interaction patterns, stalemate negotiations, and interest conflicts'* (Van Buuren & Eshuis, 2010: 284).

Knowledge governance as a concept implies that actors deliberatively engage in a learning process centred on knowledge development and dissemination. That is the activity by which coordination and collective action is organized. Knowledge governance can open up new possibilities to actors and make room for solutions which previously could not be thought of or were not perceived as feasible (Gerritsen *et al.*, 2013). Knowledge can be seen as an alternative to network governance, because some problems or situations are so complex that not even network governance is able to come up with feasible solutions. In knowledge governance knowledge production and exchange are

purposefully organised around real life problems in a multi actor setting, with at its core a learning community which is set up by its participants who willingly participate in social learning and are aiming to use this to change existing policies, frames, practices, habits, etc. The results of the knowledge and learning process is actively shared and translated by boundary workers to non-participants of the learning community who may decide to use the results of knowledge governance for decision making or the execution of policies.

The idea of 'mental proximity' in production networks (Sacchetti & Sugden, 2009) is also relevant to knowledge governance. This is grounded in economic geography and spatial economy theory in which proximity is traditionally a core theme. Proximity was originally seen as spatial proximity, but a social and organisational meaning has been added to this. Mental proximity makes it possible to achieve common objectives by engaging in deliberation. Gerritsen *et al.* (2013) see this as part of social learning condition. A knowledge community is needed to be able to exchange knowledge and to attach meanings. In organisation science these are called 'learning networks' (e.g. Hansen, 2002; Contactor & Monge, 2002).

3.1.7 Modes of governance framework

Each mode of governance is characterized by a distinct set of coordinative principles to achieve collective action (see Table 1). Each mode of governance has its strengths and weaknesses, based on their coordinative principles. Network governance for instance, cannot function well, when actors want to remain in control and mutual trust is low, market governance finds it hard to cope with market failures and free rider behaviour, and hierarchic governance does not function properly when regulations are lacking and when the allocation of tasks and responsibilities is unclear (Van Buuren & Eshuis, 2010). Self governance has problems with coping with outside influences, by governments (Ostrom, 1999) or businesses. All of these limitations limit the potential of these modes of governance to tackle complex policy problems.

3.2 Policy instruments

3.2.1 Policy instrument research

The study into policy instruments started in the 1970's. Although different definitions of policy instruments exist, most of them start from the premises that policy instruments are developed by the government as a way to implement their policies and influence the behaviour of citizens and businesses (Howlett, 1991; Bemelmans-Videc & Rist, 1998). Due to changing views of the role of the government and society in policy implementation also views on policy instruments have broadened in order to account for situations in which network governance or knowledge governance dominates (Gunningham *et al.*, 1998; Jordan *et al.,* 2005; Lascoumes & Le Gales, 2007).

Policy instruments are sometimes depicted as neutral devices. Governments can select a broad array of policy instrument to implement their policy based on considerations regarding effectiveness or efficiency (Salamon, 2002). However in practice their choice is often limited due to their embedding in a larger framework of established modes of governance and policy regime logics (Howlett, 2009; Gossum *et al*., 2010; Böcher, 2012). Furthermore over time governments tend to develop a preference for specific instruments e.g. policy instrument mixes referred to as implementation styles (Kagan and Axelrad 1997; Howlett 2002 and 2005).

Often policy instruments, as are modes of governance, are described in their ideal form – however in practice many hybrids exist. The following instruments are commonly distinguished in different typologies (Vedung, 1998; Jordan & Adelle, 2014; more ref) being 1) legislative /regulatory instruments, 2) economic/fiscal instruments, 3) agreement based/co-operative instruments, and 4) (traditional) information/communication based instruments. Additionally in this report we distinguish: 5) knowledge instruments. Although one could argue that knowledge instruments are akin to information and communication instruments, the focus is different. Central in these knowledge instruments is that they aim to develop shared knowledge between actors and promote innovation.

Unlike the more traditional information and communication instruments, they are not one-way but two-way communication. They are not about the government of a government agency that brings a message but about shared knowledge development.

In Section 3.2.2 these instruments are described in more detail and in Table 1 examples of these instruments in the EU policy are given.

3.2.2 Legislative and regulatory instruments

Legislative and regulatory instruments are used to denote a broad variety of laws and regulations. Their main characteristic is that a public authority sets binding requirements, which in cases of non-compliance will be followed by sanctions. Government apply "command-and-control" principles to influence actors' behaviour. The requirements can either be prohibitive (e.g. forbid certain behaviour) or be prescriptive (e.g. require certain behaviour). Overall the approach of the EU – in particular in environmental policy – has been based on legislative and regulatory instruments. Examples of EU legislative and regulatory instruments are provided in Table 1.

The most obvious mode of governance which is related to these instruments is hierarchical governance. However the approach to these instruments has changed over time. Initially they contained strict prohibitions and assessments, but nowadays they can also contain more loose due diligence systems prescribing some corporate carefulness or merely process rules. Different reasons underlie the choice for these types of instruments. First of all they have the advantages that they enforce stakeholders to comply even if they do not want to, as such they do not rely on the free co-operation of the targeted actor (high degree of coerciveness). Also they apply equally to all targeted actors and protect them from arbitrary governmental decisions (rule of law). Furthermore they improve the predictability of governmental actions. However there are also disadvantages to such types of instruments. Often there is considerable reluctance towards selecting these instruments on side of actors involved. One of the reasons for this reluctance is that often the costs to comply are paid by the involved actors (externalisation of costs). In case of high noncompliance, the cost of enforcement on the side of the government will be high. Furthermore they have a limited ability to cope with complex dynamic situations and do not stimulate stakeholders to commit themselves to policy objectives.

3.2.3 Economic and fiscal instruments

Economic and fiscal instruments are based on a government that influences market mechanisms though for instance subsidies, loans, taxes, concessions of rights. The most logical mode of governance is market based. Furthermore for a majority of these instruments, compliance has a more voluntary character as they simulate the involved actor to act in a certain way by rewarding or financially discourage certain behaviour. The advantage of these instruments is that they have a potential to correct market failure in particular in respect to common goods for which markets do not exist. The usage of economic and fiscal instruments in principle can create the economic conditions for the establishment of functioning markets. However the possibilities to create and manage these market failures with financial instruments is extremely difficult. Disadvantages are the costs associated with the subsidies. Loans or taxes themselves require coordination programs to distribute or collect the money. Also financial incentives can prevent compliance for other reasons, such as intrinsic motivations. Also the competition for the funds between stakeholders can lead to high transactions costs and much frustration on their side.

3.2.4 Agreement-Based or cooperative instruments

Agreement based or co-operative instruments are those instruments in which the government and/or involved actors jointly and on a voluntary basis decide to behave in a certain way. They often arise from consortia that share an agenda – mostly consisting of both public as well as private actors (public-private partnerships). Often the agreements reached between the parties (whether governmental or not) are fixed in a covenant code or agreement. Advantages are that these instruments are completely voluntary and that actors use them because they rely on one another to

achieve anything. These instruments are related to network governance and are suited for situations in which resources are divided among multiple actors, and are therefore quite complex.

In general there will be limited resistance towards the instrument on side of actors involved, although this depends on how open or closed the networks are in which agreement is being sought. Actors who are not included in these agreements could very well oppose these instruments. Disadvantages can be that they have a low level of coerciveness – because it has not been arranged that if parties do not upheld the agreement sanctions can follow. Of course, voluntary agreements can be formalized with contracts which do include penalties. Agreement based instruments often have high transaction costs because they take a long and intensive process to be employed. These instruments also might lead to unclear division of tasks and responsibilities, which can cause all kinds of conflicts and can limit their potential to bring about change.

3.2.5 Information and communication instruments

These instruments try to influence behaviour through disseminating information to actors on certain issues in the hope that this will entice them to change their behaviour. It therefore is limited to one way communication. These instruments can target a broad audience and use media as a way to reach people (publicity information campaigns) for instance campaigns against smoking. However they can also consist of targeted educational programs to reach a specific audience (group lessons, individual coaching) or providing product related information through certification (labeling) or ranking. Whichever approach, all instruments are voluntary as people can decide to ignore them. This is also the main disadvantage of these instruments; information does not lead to compliance in a direct way; only indirectly. Furthermore it might be difficult to reach non-interested parties because they are not searching for information or follow other logical frameworks than the regulator (information has little meaning to them).

Of course, recently there are also more interactive communication instruments, such as direct dialogue, interactive workshops, and invitation of sharing opinions and viewpoints between governments and communities. These instruments are on the boundary of information and knowledge instruments (see at Section 3.2.6).

3.2.6 Knowledge and innovation instruments

Knowledge based instruments are those instruments in which participating actors jointly increase their knowledge by engaging in social learning. In these instruments knowledge is both information and capacity to act and therefore includes bot tacit and explicit knowledge. Examples of such instruments are developing communities of practice (exchanging best practice), living labs, creative workshops, or pilots (e.g. legal pilots by means of environmental law experiments, or trying out new technologies), and constructing business cases or land use plans. A benefit of these instruments is the limited resistance on the side of the involved actors and that they can cope with situations that are complex and dynamic.

Actors might be enthusiastic to participate as it might provide them with new insights and capabilities. These instruments also may lead to actual new ideas which have a better chance of succeeding than previously considered policy measures. A disadvantage is that these instruments might primarily benefit a small group of front runners or might only appeal to actors that belong to a certain community. The instruments require a high level of co-operation and a shared identity between the actors involved. In case this is absent, the instrument might not work as actors might not be able to reflect on their own viewpoint and learning does not occur due to a 'knowledge fight' between different epistemic communities. The transaction cost will even be higher than at the agreement based instruments, because innovation is a labor intensive process with a high chance of failure. These instruments therefore are primarily relevant for stagnating processes in which knowledge or capabilities are lacking.

Table 1

Examples of EU policy instruments in the environmental field (based on Jordan & Adelle, 2014 and this study)

Legal and regulatory instruments	Financial and economic	Agreement based	Information/ communication	Knowledge instruments
• Habitats Directive assessment (Art 6.2 of the Habitats Directive) • Due diligence systems (Art. 6 of the EU Timber Regulation) • Requirements for drinking water (Art. 4 of Water Framework Directive)	• Agri-environmental subsidies (1992-now) • EU Upper and lower limit for national fuel taxes • Emissions trading	• Voluntary Car emissions in Automotive industry (1999/2000) • Requirement for stakeholder inclusion in European Water Framework Directive	• Eco-labelling • Energy labelling for houses	• European Innovation Partnership on Agricultural Productivity and Sustainability • Horizon 2020 innovation and research programs • Joint Programming initiatives

4 Past, present and future

4.1 Policy instruments and modes of governance of the European Union

The European Union over time has developed a broad array of different instruments to implement their policies[4] (Adelle & Jordan, 2014). In his report we primarily focused on directives and regulations. We will show that even these are maybe less 'regulatory' in nature as their name might imply. For example, most of the reviewed directives and regulations also include proposals for economic instruments.

Reason to focus on regulations and directive are that these are binding for the Member States compared to the non-binding instruments that the European Union also develops (see Annex 2). Particular in the field of environment many directives set strict legal requirements (Adelle & Jordan, 2014). Initially, policy focused on regulating technical standards for environment and nature (EEA, 2015). In 1992 with the reform of the Common Agricultural Policy also financial incentives became an important mechanism as agri-environmental measures became an obligatory part of the Common Agricultural Policy.

In the Green paper 'on market based instruments for environmental policy purposes' the European Commission further explored the use of market- based instruments for the environment. More recently the EU started to develop and promote new instruments for its environmental policies which were more based on network, knowledge and agreement based modes of governance (Schout *et al*., 2010). As a result the policy mix of the EU has broadened considerably (EEA, 2015). Nevertheless the use and development of economic, agreements based instruments the EU way of operating remains to a large extent regulatory in nature (Adelle & Jordan, 2014).

We want to review whether these general trends also can be discerned in the development of nature related directives and regulations. Therefore five regulatory frameworks of the EU were reviewed that have a high impact on nature: the Habitats Directive, the European Water Framework Directive, the Timber Regulation, the Renewable Energy Directive and the Common Agricultural Policy. These frameworks combined, in our expectations, would represent the total variety of European policies, relevant to nature.

4.2 Results of the analysis of regulatory frameworks for nature

Based on the text of the respective regulation an overview was made of the types of instruments which are mentioned in the texts of the directives and other regulations In Annex 1 an overview is given of the respective article and the types of instruments mentioned. In cases in which in practice financial instruments are used but they are not explicitly indicated in the legal text itself they are not counted.

[4] See Annex 2 for a description of the most important EU policy instruments in this study

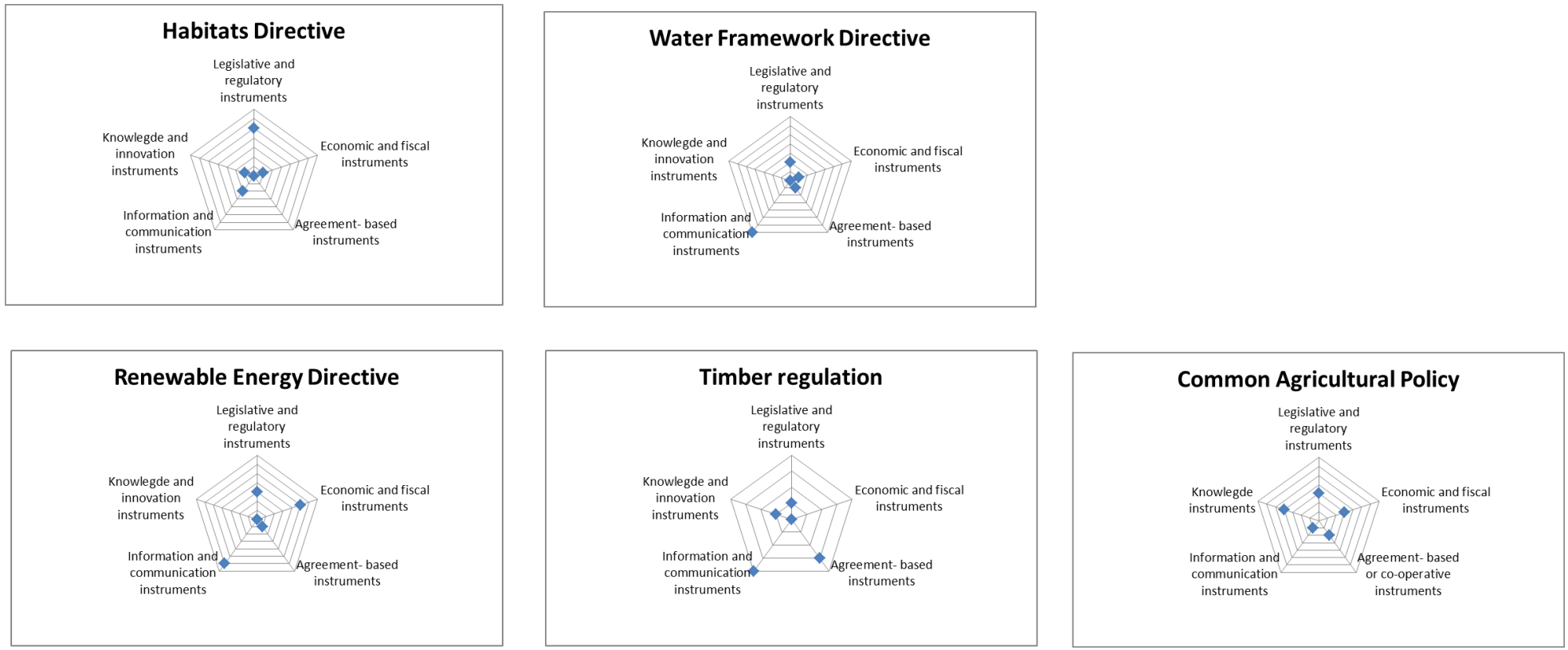

Figure 1. *Overview of types of instruments mentioned in the Directives and regulations (see Annex 1)*

The spider diagrams in Figure 1 depict the various policy instruments present in the regulatory frameworks that were analysed. The analysis demonstrates the previously mentioned trend (which we will present in more detail in Section 4.3) in environmental policies to move away from regulation in the 1990s towards other ways to achieve coordination, mainly with a focus on finances, information and agreement between actors at the end of the 2010's (Schout *et al.*, 2010; Jordan & Adelle, 2014; EEA, 2015).

However although this trend is apparent, all frameworks propose or incorporate different types of policy instruments. None of the Directives, policies or regulations features only one type of instrument. But remarkable differences exist. If we look at the dominant instrument or instruments proposed in the Directive or regulation we can see that in the Habitats Directive regulatory instruments are dominant. In the Water Framework Directive information based instruments are dominant and, after the latest revision of the Common Agricultural Policies, a mix financial and regulatory instruments and knowledge based instruments are dominant. In the Renewable Energy Directive financial and information instruments are dominant and in the Timber Regulation financial and agreement based instruments are dominant. Striking is also the presence of agreement based instruments in four of the five frameworks. Although new modes of governance and instruments emerged in European environmental policies, legislation is still a very important one.

In the scanned directives we did not yet find many knowledge instruments (as innovation programs, research projects, exchange of best practices, creative contests, etc.), except for the Common Agricultural Policy. Although the EU is promoting, (co-)funding and programming research and innovation (Horizon 2020, EIT, EIP, JPI's), they are only not mentioned in most directives.

4.3 Trends

The results of our study show three trends in EU policy which are in line with those mentioned in governance literature, instrument choice literature and EU policy studies being: a movement from compulsory settings towards 'due diligence system' (DDS); a movement from regulatory to information and agreement based instruments and an increasing reliance on self-governance. These three trends are discussed in more detail below.

From strict compulsory settings to due diligence
In Dutch law literature Havekes and Van Rijswick (2010) have already argued a new approach in EU environmental law starting with the Water Framework Directive. This new approach is featured by more flexibility, less coercion and more programmatic obligations. It is indeed true environmental legislation started with a highly coercive directive like the Birds Directive (1979) and the Habitats Directive (1992), moving forward towards a mere programmatic approach in the Water Framework Directive(2000) and Renewable Energy Directive (2009) and from thereon to a due diligence approach of the recently made European Timber Regulation (2013).

In the two decades since the EU Habitats Directive came into force, the most recently made European legislation relevant for nature apparently does no longer rely on determining specific settings, but leaves us au contraire with more open norms.

This DDS demands risk assessment and mitigation procedures as well as measures and procedures providing access to information concerning the operator's supply of timber or timber products on the market. So DDS asks compliance of market operators and is merely procedural whereas the Habitats Directive provides specific settings to which Member States need to adhere to. The conservation objectives of the Natura 2000 site should be met and national authorities may not agree to a plan or project likely to have a significant effect on these conservation objectives (Article 6 Habitats Directive). The recent Galway bypass case (European Court of Justice , ECJ C-258/11 [2013]) and the Rijksweg A2-case (ECJ C-521/12 [2014]) re-confirms the small margin of discretion to member states when applying the habitats assessment (Borgstrom and Kistenkas 2014; Kistenkas 2014). The Water Framework Directive, however, basically consists of a program towards good ecological potential (GEP) of all European waters. This GEP appears to be a long-term procedure and process with room

for discretion and many derogation possibilities for Member states rather than a strict norm or rigid assessment (De Boer *et al*., 2010).

Open-textured Due Diligence system provides more room for systems developed in partnership with involved parties. Businesses might, for instance, use private certification schemes in their risk assessment procedures, but they might also rely on CITES[5] permits or FLEGT[6] licensing. Operators are free to choose their assurance of compliance. Though privately held certification as FSC or PEFC is not granted the same status as FLEGT licenses or CITES permits, it is still recognized to play a role. So new instruments as partnerships (Visseren-Hamakers, 2013) are embedded and recognized in this new regulation,

Whereas the Habitats Directive and its habitats assessment impose EU law on domestic law in a quite top-down way, the Timber Regulation merely follows and adopts domestic law (more bottom-up), as legal timber is defined as timber being in compliance with the domestic law of the country where it has been harvested (Tuomasjukka, 2013). It also follows FLEGT Voluntary Partnerships Agreement (VPA) outcomes as FLEGT-licensed timber is *eo ipso* legal. Every country that has concluded VPA negotiations has its definition of legal timber set out in its own VPA and this is the operator's reference as they assess and mitigate risk as part of DDS. This is in line with a more bottom-up approach recently favored in EU policy.

As said above the EUTR demands a procedural approach of risk reduction measures (Due Diligence) rather than a normative approach. Here we might perhaps distinguish a move from strict public law norm-setting (HBD) to less coercive instruments like self-regulation, private law and programmatic voluntarism (Kistenkas, 2013; Borgstrom and Kistenkas, 2014).

Table 2
Overview of differences between the 5 reviewed directives and regulations

	Legislation	In force since	Central focus	Legal technique	Coercive-ness	Margin of Member States discretion
Habitats Directive	EU Directive	1992	Regulation, Assessment	Compulsory settings (conservation objectives)	High coerciveness (top-down)	Small margin of discretion to member states
Water Framework Directive	EU legislation	2000	Planning	Goal setting	Highly coerciveness (intermediate between top-down, bottom-up)	Medium margin of discretion to member states
Renewable Energy Directive	EU Regulation	2009	Information Financial incentives	Goal setting	Medium	Medium margin of discretion to member states
Common Agricultural Policy - revision 2014	EU Regulation	2014	Financial incentive, knowledge/net work	Cross compliance Conditional payments	Medium to low	Large margin of discretion to member states
European Timber Regulation	EU Regulation	2013	Due diligence	carefulness (DDS)	Low coerciveness (bottom-up)	Large margin of discretion of operators

[5] Convention on International Trade in Endangered Species of Wild Fauna and Flora; see: https://www.cites.org/
[6] Forest Law Enforcement, Governance and Trade; . http://www.euflegt.efi.int

This is also true for the Common Agricultural Policy that has removed many market restrictions and increasingly provides incentives for innovation and for producer collaboration. It is basically the move from a strict command-and-control with strict prohibitions to a loose due diligence, which is, in short, an agreement that actors (whether public or private) will comply with certain measures or procedures with some risk management rather than strict prohibitions.

Table 2 illustrated five interesting differences in respect to legal technique, coerciveness and margin of secretion. between the related legislative entities.

From regulatory to networking, information based instruments and knowledge instruments
Another difference is the acceptance of concurring regulation of private and public law (Heyvaert 2012; Kistenkas 2013) in the Timber Regulation. By accepting private law, agreement based instruments developed between private parties are acknowledged by the government.

Partnerships are *de iure* irrelevant in current Natura 2000-law (Habitats Directive) whilst they are more recognized in the Water Framework Directive and even more in the Common Agricultural Policies in the European Timber Regulation. In the European Timber Regulation, modern partnerships as privately held certification schemes are no longer ignored. As both European Timber Regulation and FSC and PEFC aim at sustainably produced timber, the regulatory concurrence is de iure about identical goals. Their competitiveness lies merely in the origin of the regulations: it is public law from the EU and private law given by forest certification organizations. The purpose and content of the regulations might be concurring, but they are not necessarily contradictory. They might indeed support each other and the EUTR seems to be the first nature regulation to fully recognize this.

Currently forest regulation comes from all levels of government; from international and European to national and subnational and perhaps even local, but also from public to private as there is also regulatory competition among privately held certification organisations. In contemporary environmental law it is becoming common to engage in regulatory competition and concurring legislation (Heyvaert, 2012) and privatisation (Reid, 2011). Mutually supportive regulation consists of economic, education and information but also of self-regulation and voluntarism as well as of course classic command and control regulation (Gunningham *et al*. 1998; Howlett and Rayner 2004; Schout and Jordan 2005; Van Gossum *et al*., 2008; Van Gossum *et al*., 2012; Rehbinder, 2012).

In line with scientific discussions on the emergence of Informational governance (e.g. Mol, 2006) we see a clear rise in the reliance on information provisioning. Informational governance concerns the governance changing effects of data and information and how information and data can be used to support policies. The Birds and Habitats Directives, The Water Framework Directive, the Timber Regulation and the Renewable Energy Directive use monitoring, which is an information instrument. All frameworks use information instruments to some extent. Actors are required to provide information on what they do and what it contributes to. The Commission may or may not decide on other actions, based on this information, but to some point rely on this information to form an opinion on what is happening.

The governing of knowledge and learning is increasingly noticed as an emerging mode of governance, which is particularly relevant to sustainable development issues (Gerritsen *et al.*, 2013; Van Kerkhoff, 2013). Knowledge governance concerns the purposeful organisation of knowledge production and knowledge exchange, with at its core a learning community which is set up by its participants who willingly participate in social learning and are aiming to use this to change existing practices. The results of the knowledge and learning processes are actively shared and translated by boundary workers to non-participants of the learning community who may decide to use the results of knowledge governance for decision making or the execution of policies. Knowledge instruments are primarily applied in the Common Agricultural Policy, which mentions the European Innovation Program on Agricultural Productivity and Sustainability, and certain Joined Programming Initiatives (such as FACCE). These knowledge instruments are mostly not explicitly coupled with nature policies. Although, there is much research being done on habitats and green infrastructure, (co-)funded by the European Commission. The biogeographical seminars for Natura 2000 do involve learning and knowledge sharing.

Increasing reliance on self-governance
The newer regulations as the Timber Regulation and the Renewable Energy Regulation can also be seen as examples in which the European Union to some point trusts businesses to establish objectives of the European Commission. This is also true for the greening of the Common Agricultural Policies. Financial incentives are used to stimulate companies to comply. This makes it understandable why regulations become less directive and limit themselves to types of monitoring. Self-governance in the European Union is more focused on market actors (companies, sectors), than on local communities.

4.4 Concluding remarks

A successful policy uses a variety of instruments (Howlett, 2009) and is based on collaborating modes of governance; from coercive public law to voluntary self-regulation, voluntary agreements between actors, financial and legal support and by supporting actors to engage in innovation trajectories. Regulation nowadays will not only be classic 'command-and-control' public law but also less coercive private law and voluntary partnership agreements. Adopting dual or hybrid approaches relying both on conventional 'command-and-control' and private regulation could perhaps lead easier to the accomplishment of sustainability goals. Problem solving could be pursued at all levels of the political spectrum, from local to global, but also beyond, by private environmental regulators (Visseren-Hamakers and Pattberg, 2013). Although the European policy instruments have and will maintain a strong regulatory character, we can expect that the signalled trends towards a due diligence approach and agreement based instruments will continue. This means that the EU will rely on a certain level of self-governance by businesses and in which governance more or less is limited to agreements, to information gathering and (to managing) knowledge development and dissemination.

For financial, agreement based, knowledge and information instruments there are also new applications emerging. Information for instance is increasingly used for certification of private or societal initiatives. Not only so governments can check their viability, but for instance also to enable consumers to make informed decisions in their behaviour as consumers. Knowledge instruments increasingly are used to enable multi actor networks (public, private, societal) to explore new ways of working and valorisation and deriving policies from what they want and need. Knowledge no longer is the exclusive domain of universities, schools and specialized institutes, but something which is engrained in commercial and societal practice.

References

Backes, Ch.W., Gilhuis, P.C., Koeman, N.S.J. (2006). Milieurecht. Kluwer Deventer.

Bemelmans-Videc, M. L., & Rist, R. C. (1998). *Carrots, sticks & sermons : policy instruments and their evaluation*. New Brunswick [etc.]: Transaction.

Blond, P. (2010) Red Tory, Faber & Faber, London.

Böcher, M. (2012). A theoretical framework for explaining the choice of instruments in environmental policy. Forest Policy and Economics, 16, 14-22.

Boer, S. de, M.J. Bogaardt, P.H. Kersten, F.H. Kistenkas, M.G.G. Neven, M. van der Zouwen (2010). Zoektocht naar nationale beleidsruimte voor het milieu- en natuurbeleid. Een vergelijking van d eimplementatie van de VHR, KRW, NiR . WOt-werkdocument 174. WOT Natuur & Milieu, Wageningen UR, Wageningen.

Borgström, S. and F.H. Kistenkas (2014). The compatibility of the Habitats Directive with the novel EU Green Infrastructure policy, European Energy and Environmental Law Review, april 2014: 36-44

Chalmers, D., G. Davies, G. Monti (2010), European law, Cambridge

Coase, R.H. (1937) ''The Nature of the Firm,'' Economica IV: 386–405.

Considine, M. & Lewis, J.M. (2003). Bureaucracy, Network, or Enterprise? Comparing Models of Governance in Australia, Britain, the Netherlands, and New Zealand. Public Administration Review, 63(2): 133.

Contractor, N.S. & Monge, P.R. (2002). Managing knowledge networks. Management Communication Quarterly 16(2): 249-258.

De Bruijn, H. E.F. ten Heuvelhof en R.J. In t Veld (1998). Procesmanagement: over procesontwerp en besluitvorming.

Dworkin, R. (1985). A matter of principle Oxford University Press,

Ebbeson, J. (2010). The rule of law in governance of complex socio-ecological changes. Global Environmental Change 20: 414-422

Edelenbosch, J. and G.R. Teisman (2008). Public private partnership, on the edge of project and process management. Insights from Dutch practice; the Sijtwende spatial development project. In Environment and planning C: Government and policy 2008 vol. 26, 614-626

Engel, S., Pagiola, S., & Wunder, S. (2008). Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics, 65(4), 663-674.

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.

Gerritsen, A.L., Stuiver, M., Termeer, C.J.A.M. (2013). Knowledge governance: An exploration of principles, impact, and barriers. Science and Public Policy 40 (2013) pp. 604–615.

Gilchrist, A. (2004) The Well-connected Community: a Networking Approach to Community Development, Policy Press, Bristol.

Gossum, P. van, Arts, B., & Verheyen, K. (2010). From "smart regulation" to "regulatory arrangements". Policy Sciences, 43(3), 245-261. doi: 10.1007/s11077-010-9108-0

Gossum, P. van, L. Ledene, B. Arts, R. de Vreese, G. van Langenhove, K. Verheyen (2008). New environmental policy instruments to realize forest expansion in Flanders (northern Belgium): A base for smart regulation? Land Use Policy 26/4: 935-946

Gossum, P. van, B. Arts, K. Verheyen (2012). "Smart regulation": Can policy instrument design solve forest policy aims of expansion and sustainability in Flanders and the Netherlands? Forest Policy and Economics 16/1: 23-34

Gunningham, N., P. Grabowsky, D. Sinclair (1998). Smart regulation. Designing environmental policy. Oxford: Clarendon Press

Habermas, J. (1996). Between facts and norms: contributions to a theory of law and democracy. MIT Press, Cambridge MA

Hansen, M.T. (2002). Knowledge networks: explaining effective knowledge sharing in multiunit companies. Organization Science 13(3): 232-248.

Havekes, H.J.M., H.F.M.W. van Rijswick (2010), Waterrecht in Nederland, Kluwer Deventer

Hayek, F.A. (1944) The Road to Serfdom, Chicago, IL: University of Chicago Press.

Heyvaert, V. (2012). Regulatory competition. Accounting for the transnational dimension of environmental regulation. Journal of Environmental Law 25/1: 1-31

Hoogerwerf, A., & Herweijer, M. (2008). Overheidsbeleid: een inleiding in de beleidswetenschap: Kluwer.

Howlett, M. (1991). Policy instruments, policy styles, and policy implementation - national approaches to theories of instrument choice. Policy Studies Journal, 19(2), 1-21. doi: 10.1111/j.1541-0072.1991.tb01878.x

Howlett, M. (2009). Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design. Policy Sciences, 42(1), 73-89. doi: 10.1007/s11077-009-9079-1

Huygen, A. van, E. van Marissing & H. Boutellier (2012). Condities voor zelforganisatie. Wmo Kenniscahier 18, Verwey-Jonker Instituut.

Jordan, A., Wurzel, R. K., & Zito, A. (2005). The rise of 'new'policy instruments in comparative perspective: has governance eclipsed government? *Political Studies, 53*(3), 477-496.

Kettl, D.F. (2002). The transformation of governance: public administration for twenty-first century America. Baltimore: Johns Hopkins University Press.

Kickert, W. J. M., Klijn, E. H., & Koppenjan, J.F.M. (1997). Managing complex networks: Strategies for the public sector. Sage: London.

Kistenkas, F.H. (2012). Recht voor de groenblauwe ruimte. Wageningen: Wageningen Academic Publishers

Kistenkas, F.H. (2013). Concurring regulation in European forest law. Forest certification and the new EU Timber Regulation, GAiA Ecological Perspectives for Science and Society 22/3: 166-168

Kistenkas, F.H. (2014a). Innovating European nature conservation law by introducing ecosystem services, GAiA Ecological Perspectives for Science and Society 23/2: 88-92

Kistenkas, F.H. (2014b), Reconsidering the habitats assessment, WOt-paper 32 behorende bij :Juridische aspecten van gebiedsgericht natuurbeleid (Natura 2000), WOt-technical report 17, WOT Natuur & Milieu, Wageningen UR, Wageningen

Klijn, E.H., & Skelcher, C.K. (2007). Democracy and governance networks: compatible or not? Four conjectures and their implications. Public Administration, 85(3), 1-22.

Klijn. E. and Teisman, G.R. (2003) Institutional and strategic barriers to public private partnerships: an analysis of Dutch cases. In: Public money and management, July 2003.

Kooiman, J. (2003) Governing as Governance (London: Sage).

Koppenjan, J.F.M., & Klijn, E.H. (2004). Managing uncertainties in networks. London: Routledge.

Lascoumes, P., & Le Gales, P. (2007). Introduction: Understanding Public Policy through Its Instruments—From the Nature of Instruments to the Sociology of Public Policy Instrumentation. *Governance, 20*(1), 1-21. doi: 10.1111/j.1468-0491.2007.00342.x

McGillavray, D. (2011). Mitigation, compensation and conservation: screening for appropriate assessment under the EU Habitats Directive. JEEPL 2013 8.4 329-352

Meuleman, L. (2008) Public Management and the Metagovernance of Hierarchies, Networks and Markets. The Feasibility of Designing and Managing Governance Style Combinations, Physica-Verlag, Heidelberg.

Meuleman, L. (2010) The Cultural Dimension of Metagovernance: Why Governance Doctrines May Fail, Public Organization Review 10, 49–70.

Mol, A.P.J. (2006) Environmental governance in the Information Age: the emergence of informational governance. Environment and Planning C: Government and Policy 24: 497 - 514

Osborne, D. and Gaebler, T. (1992) Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector, Reading, MA: Addison Wesley.

Osborne, S.P. (2006) The New Public Governance? Public Management Review, 8:3, 377-387.

Ostrom, E. (2005) Self-governance and forest resources, in: P. J. Shah & V. Maitra (Eds) Terracotta Reader: A Market Approach to the Environment, pp. 131–154 (New Delhi: Academic Foundation).

Ostrom, E. (1999) Coping with tragedies of the commons, Annual Review of Political Science 2: 493–535.

Ostrom, E., Gardner, R. & Walker, J. (1994) Rules, Games and Common Pool Resources (Ann Arbor, MI: University of Michigan Press).

Parrilli, M.D. & Sacchetti, S. (2008) Linking learning with governance in networks and clusters: key issues for analysis and policy, Entrepreneurship & Regional Development: An International Journal, 20:4, 387-408

Pierre, J., & G. Peters (2000). Governance, politics and the state. New York: St. Martin's Press.

Pollitt, C. (2002) Clarifying Convergence. Striking similarities and durable differences in public management reform, Public Management Review, 3:4, 471-492.

Pollitt, C. and Bouckaert, G. (2000). Public Management Reform. A comparative analysis. Oxford: Oxford University Press.

Rehbinder, E. (2012). Sustainable resource management. New legal approaches needed? Journal for European Environmental & Planning Law 9/1: 34-62

Reid, C. (2011). The privatisation of biodiversity? Possible new approaches to nature conservation in the UK. Journal of Environmental Law 23/2: 203-231

Rijswick, M. van, Salet, W. (2012). Enabling the contextualization of legal rules in responsive strategies to climate change. Ecology and Society 17(2):18

Rhodes, R.A.W. (1997) Understanding Governance: Policy Networks, Governance, Flexibility and Accountability, Open University Press, Buckingham, 1997.

Sacchetti, S. and Sugden, R. (2003) ''The Governance of Networks and Economic Power: The Nature and Impact of Subcontracting Relationships,'' Journal of Economic Surveys 17: 669–691.

Sacchetti, S. and Sugden, R. (2009) The Organization of Production and its Publics: Mental Proximity, Market and Hierarchies, Review of Social Economy, 67:3, 289-311.

Sadeleer, N.de (2002). Environmental principles. Oxford University Press

Salamon, L. M. (2002). The tools of government: A guide to the new governance: Oxford University Press, USA.

Schout, A., Jordan, A., & Twena, M. (2010). From 'Old' to 'New' Governance in the EU: Explaining a Diagnostic Deficit. West European Politics, 33(1), 154-170. doi: 10.1080/01402380903354205

Scott, M. (2010). Reflections on the 'Big Society'. Community Development Journal 46 (1): 132–137.

Sorenson, E., & Torfing, J. (2009). Making governance networks effective and democratic through metagovernance. Public Administration, 87(2), 234-258. doi: 10.1111/j.1467-9299.2009.01753.x

Stehr, N. (2005) Knowledge Politics: Governing the Consequences of Science and Technology, Paradigm Publishers: Boulder Colorado.

Stehr, N. (2002). Societal transformations, globalisation and the knowledge society. International Journal of Knowledge and Learning 3(2/3): 139-152.

Stoker, G. (1998) Governance as Theory: Five Propositions, International Social Science Journal 50, 17-28.

Termeer, C.J.A.M., M. Stuiver , A. Gerritsen & P. Huntjens (2013): Integrating Self-Governance in Heavily Regulated Policy Fields: Insights from a Dutch Farmers' Cooperative, Journal of Environmental Policy & Planning, 15 (2), 285-302.

Tuomasjukko, T. 2013. Towards legal timber and better forest governance. EFI News 21/1: 20-21

Van Buuren, M. W. van, & Eshuis, J. (2010) 'Knowledge governance: complementing hierarchies, networks and markets?', In 't Veld, R. J. (ed.) Knowledge democracy - consequences for science, politics and media, Springer: Heidelberg: 283-297.

Van Kerkhoff, L. (2014). Knowledge governance for sustainable development: a review. Challenges in sustainability 1(2): 82-93.

Van Montfort, C. & M. Oude Vrielink-Van Heffen (2006). Bestuurskunde over zelfregulering. Bestuurskunde, 2006-4: 2-6.

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.

Visseren-Hamakers I.J. (2013). Partnerships and sustainable development: the lessons learned from international biodiversity governance. Environmental Policy and Governance 23 145-160

Visseren-Hamakers, I.J., P. Pattberg (2013). We can't see the forest for the trees. The environmental impact of global forest certification is unknown. GAIA 22/1: 25-28

VROM-Raad (1998). De sturing van een duurzame samenleving. Advies over de sturing van het leefomgevings¬beleid. Advies 006.

Williamson, O. (1985) The economic institutions of capitalism, Free Press, New York.

Justification

This study was carried out and supervised by *Irene Bouwma, Alwin Gerritsen, Dana Kamphorst and Fred Kistenkas* of Alterra Wageningen UR. The research methods and research approach has been supervised by members of Nature Outlook: *Henk van Zeijts* and *Ed Dammers* of PBL Netherlands Environmental Assessment Agency and have provided feedback on earlier drafts of this final technical report. Their comments have been considered and incorporated as much as possible in this final report. Furthermore Lawrence Jones Walters of Alterra Wageningen UR acted as reviewer of the final version of this document.

Annex 1 Overview of the instruments included in the reviewed frameworks

Policy instrument/ reviewed framework	Legislative and regulatory instruments	Economic and fiscal instruments	Information and communication instruments	Agreement- based instruments	Knowlegde and innovation instruments
Habitats Directive	1. Art. 6 (habitats assessment, assessing plans or projects affecting significantly conservation objectives of the Natura 2000-site) 2. Art. 12 (species protection; prohibitions protecting animals) 3. Art. 13 (species protection; prohibition plants) 4. Art. 16 jo art. 15 (species protection; derogation) 5. Art. 23 (duty of implement-ation into domestic law)	1. Co-financing (member-states and European Commission jointly finance) ex art. 8	1. Art. 16 (member-states reporting derogations to the Commission) 2. Art. 17 (member-states reporting every 6 years)	Not relevant	1. Art. 18 (member are obliged to do research)
Water Framework Directive	1. Article 3 (Coordination of administrative arrangements within river basin districts). 2. Article 4 (1) (objectives for surface waters, ground waters, protected areas) + article 10, 11, 12, 13, 16, 17.	1. Article 9 (1) (principle of recovery of the costs of water services)	1. Article 5 (1) (analysis of characteristics, the impact of human activity and economic analysis) 2. Article 6 (1) (register of areas which have been designated as requiring special protection)	1. Article 14 (1) active involvement of all interested parties)	Not in directive: 1. Guiding documents and technical reports

Policy instrument/ reviewed framework	Legislative and regulatory instruments	Economic and fiscal instruments	Information and communication instruments	Agreement- based instruments	Knowlegde and innovation instruments
			3. Article 7 (1) (identification of water bodies used for the abstraction of water 4. Article 8 (1) (monitoring of water status) 5. Article 15 (1) (river basin management plans and all subsequent updates) 6. Article 18 (1) (report on the implementation of the Directive) Not in directive: 7. Online information exchange platform CIRCA		
Renewable Energy Directive	1. Art, 13. 4 Requirement to use energy from renewable resources in new buildings and major renovated buildings 2. Art 18.1 requirement for economic operators to use a mass balance system 3. Art 17. Raw material for biofuel shall take into account sustainability criteria	Art. 3 support schemes such as 1. investment aid 2. tax exemptions or reductions 3. tax refunds 4. renewable energy obligation support schemes including those using green certificates, 5. direct price support schemes including feed-in tariffs and premium payments	1. Art 14. 1 information on support measures available for relevant actors 2. Art 14. 2information on the net benefits, cost and energy efficiency of equipment and systems for the use of heating, cooling and electricity from renewable energy sources is made available either by the	1. Art 7, art 9 co-operation between Member States, Member States and third countries	

Policy instrument/ reviewed framework	Legislative and regulatory instruments	Economic and fiscal instruments	Information and communication instruments	Agreement- based instruments	Knowlegde and innovation instruments
			supplier of the equipment or system or by the national competent authorities 3. Art 14.3. -Guidance on options to relevant actors (4. Art 14. 4. Ensure that certification schemes or equivalent qualification schemes become or are available 5. Art 14.5 Develop awareness-raising, guidance or training programss] 6. Art 14. 6. Ensure that a guarantee of origin can be provided.		
Timber Regulation	1. Article 19: obligation to set up penalties	Not relevant	1. Art. 13 (member states may facilitate the exchange of information) 2. Art. 12 section 2 (competent authorities cooperate to exchange information on shortcomings) 3. Art. 20 (member states report two yearly to the commission on the application of the regulation) 4. Art. 6 (Due Diligence; operator's carefulness)	1. Art. 3 (FLEGT and CITES licenses are valid under due diligence as well) 2. Art. 6 (private certification schemes such as FSC and PEFC,) 3. Art. 12 section 1 (cooperation) (competent authorities cooperating with each other to ensure compliance with the regulation	1. Art. 8 lid 1 sub b (monitoring authorities shall monitor and evaluate the Due Dilligence Systems)

Policy instrument/ reviewed framework	Legislative and regulatory instruments	Economic and fiscal instruments	Information and communication instruments	Agreement- based instruments	Knowlegde and innovation instruments
Common Agricultural Policy	1. 1308/2013 - Article 8 and Article 20 (rules on market intervention) 2. 1306/2013 Article 58 (adopting legislative, regulatory and administrative provisions) 3. 1306/2013 - Article 94 (ensuring environmental conditions)	1. 1307/2013 (direct payments) 2. 1308/2013 - Article 1 (1) (common organisation of the markets) 3. 1308/2013 / 1305/2013 – article 6 (support for rural development)	1. 1306/2013 - Article 48 (access to information) 2. 1306/2013 - Article 48 (access to documents)	1. 1305/2013 – article 26 (setting up of producer groups and organisations)	1. 1305 / 2013 - article 14 (knowledge transfer and information actions) 2. 1305/2013 – article 55 (EIP for Agricultural Productivity and Sustainability) 3. 1306/2013 – article 110 (common monitoring and evaluation framework) 4. 1306/2013 - article 15 (advisory services)

Annex 2 Policy instruments of the European Union

Source: http://eur-lex.europa.eu/summary/glossary/eu_action_cfsp.html

European legal instruments

Regulations
A "regulation" is a binding legislative act. It must be applied in its entirety across the EU. For example, when the EU wanted to protect the names of agricultural products coming from certain areas such as Parma ham, the Council adopted a regulation.

Directives
A "directive" is a legislative act that sets out a goal that all EU countries must achieve. However, it is up to the individual countries to decide how. This was the case with the working time directive, which stipulates that too much overtime work is illegal. The directive sets out minimum rest periods and a maximum number of working hours, but it is up to each country to devise its own laws on how to implement this.

Decisions
A "decision" is binding on those to whom it is addressed (e.g. an EU country or an individual company) and is directly applicable. For example, when the Commission issued a decision fining software giant Microsoft for abusing its dominant market position, the decision applied to Microsoft only.

Non-binding instruments

Recommendations
A "recommendation" is not binding. When the Commission issued a recommendation that pay structures for financial-sector employees should not encourage excessive risk taking , this did not have any legal consequences. A recommendation allows the institutions to make their views known and to suggest a line of action without imposing any legal obligation on those to whom it is addressed.

Opinions
An "opinion" is an instrument that allows the institutions to make a statement in a non-binding fashion, in other words without imposing any legal obligation on those to whom it is addressed. An opinion is not binding. It can be issued by the main EU institutions (Commission, Council, Parliament), the Committee of the Regions and the European Economic and Social Committee. While laws are being made, the committees give opinions from their specific regional or economic and social viewpoint. For example, the Committee of the Regions issued an opinion on how regions contribute to the EU's energy goals

White paper
White Papers are documents containing proposals for Community action in a specific area. In some cases they follow a Green Paper published to launch a consultation process at European level. When a White Paper is favourably received by the Council, it can lead to an action programme for the Union in the area concerned.

Communications
Communication usually set out a Commission action plan in a specific policy field. Relevant communication for nature are the Communication on EU Biodiversity Strategy to 2020 and the communication on Green Infrastructure.

Published documents in the Technical reports series of the Statutory Research Tasks Unit for Nature & the Environment.

WOt-technical reports are available from the secretary's office, T 0317 – 48 54 71; E info.wnm@wur.nl
Reports can also be downloaded from www.wageningenUR.nl/wotnatuurenmilieu

1	Arets, E.J.M.M., K.W. van der Hoek, H. Kramer, P.J. Kuikman & J.-P. Lesschen (2013). *Greenhouse gas reporting of the LULUCF sector for the UNFCCC and Kyoto Protocol. Background to the Dutch NIR 2013.*
2	Kleunen, A. van, M. van Roomen, L. van den Bremer, A.J.J. Lemaire, J-W. Vergeer & E. van Winden (2014). *Ecologische gegevens van vogels voor Standaard Gegevensformulieren Vogelrichtlijngebieden.*
3	Bruggen, C. van, A. Bannink, C.M. Groenestein, B.J. de Haan, J.F.M. Huijsmans, H.H. Luesink, S.M. van der Sluis, G.L. Velthof & J. Vonk (2014). *Emissies naar lucht uit de landbouw in 2012. Berekeningen van ammoniak, stikstofoxide, lachgas, methaan en fijn stof met het model NEMA*
4	Verburg, R.W., T. Selnes & M.J. Bogaardt (2014). *Van denken naar doen; ecosysteemdiensten in de praktijk. Case studies uit Nederland, Vlaanderen en het Verenigd Koninkrijk.*
5	Velthof, G.L. & O. Oenema (2014). *Commissie van Deskundigen Meststoffenwet. Taken en werkwijze; versie 2014*
6	Berg, J. van den, V.J. Ingram, L.O. Judge & E.J.M.M. Arets (2014). *Integrating ecosystem services into tropical commodity chains- cocoa, soy and palm oil; Dutch policy options from an innovation system approach*
7	Knegt de, B., T. van der Meij, S. Hennekens, J.A.M. Janssen & W. Wamelink (2014). *Status en trend van structuur- en functiekenmerken van Natura 2000-habitattypen op basis van het Landelijke Meetnet Flora (LMF) en de Landelijke Vegetatie Databank (LVD). Achtergronddocument voor de Artikel 17-rapportage.*
8	Janssen, J.A.M., E.J. Weeda, P.C. Schipper, R.J. Bijlsma, J.H.J. Schaminée, G.H.P. Arts, C.M. Deerenberg, O.G. Bos & R.G. Jak (2014). *Habitattypen in Natura 2000-gebieden. Beoordeling van oppervlakte representativiteit en behoudsstatus in de Standard Data Forms (SDFs).*
9	Ottburg, F.G.W.A., J.A.M. Janssen (2014).*Habitatrichtlijnsoorten in Natura 2000-gebieden. Beoordeling van populatie, leefgebied en isolatie in de Standard Data Forms (SDFs)*
10	Arets, E.J.M.M. & F.R. Veeneklaas (2014). *Costs and benefits of a more sustainable production of tropical timber.*
11	Vader, J. & M.J. Bogaardt (2014). *Natuurverkenning 2 jaar later; Over gebruik en doorwerking van Natuurverkenning 2010-2040.*
12	Smits, M.J.W. & C.M. van der Heide (2014). *Hoe en waarom bedrijven bijdragen aan behoud van ecosysteemdiensten; en hoe de overheid dergelijke bijdragen kan stimuleren.*
13	Knegt, B. de (ed.) (2014). *Graadmeter Diensten van Natuur; Vraag, aanbod, gebruik en trend van goederen en diensten uit ecosystemen in Nederland.*
14	Beltman, W.H.J., M.M.S. Ter Horst, P.I. Adriaanse, A. de Jong & J. Deneer (2014). *FOCUS_TOXSWA manual 4.4.2; User's Guide version 4.*
15	Adriaanse, P.I., W.H.J. Beltman & F. Van den Berg (2014). *Metabolite formation in water and in sediment in the TOXSWA model. Theory and procedure for the upstream catchment of FOCUS streams*.
16	Groenestein, K., C. van Bruggen en H. Luesink (2014). *Harmonisatie diercategorieën*
17	Kistenkas, F.H. (2014). *Juridische aspecten van gebiedsgericht natuurbeleid (Natura 2000)*
18	Koeijer, T.J. de, H.H. Luesink & C.H.G. Daatselaar (2014). *Synthese monitoring mestmarkt 2006 – 2012*.
19	Schmidt, A.M., A. van Kleunen, L. Soldaat & R. Bink (2014). *Rapportages op grond van de Europese Vogelrichtlijn en Habitatrichtlijn. Evaluatie rapportageperiode 2007-2012 en aanbevelingen voor de periode 2013-2018*
20	Fey F.E., N.M.A.J. Dankers, A. Meijboom, P.W. van Leeuwen, M. de Jong, E.M. Dijkman & J.S.M. Cremer (2014). *Ontwikkeling van enkele mosselbanken in de Nederlandse Waddenzee, situatie 2013.*
21	Hendriks, C.M.A., D.A. Kamphorst en R.A.M. Schrijver (2014). *Motieven van actoren voor verdere verduurzaming in de houtketen.*
22	Selnes, T.A. and D.A. Kamphorst (2014). *International governance of biodiversity; searching for renewal*
23	Dirkx, G.H.P, E. den Belder, I.M. Bouwma, A.L. Gerritsen, C.M.A. Hendriks, D.J. van der Hoek, M. van Oorschot & B.I. de Vos (2014). *Achtergrondrapport bij beleidsstudie Natuurlijk kapitaal: toestand, trends en perspectief; Verantwoording casestudies*
24	Wamelink, G.W.W., M. Van Adrichem, R. Jochem & R.M.A. Wegman (2014). *Aanpassing van het Model for Nature Policy (MNP) aan de typologie van het Subsidiestelsel Natuur en Landschap (SNL); Fase 1*
25	Vos, C.C., C.J. Grashof-Bokdam & P.F.M. Opdam (2014). *Biodiversity and ecosystem services: does species diversity enhance effectiveness and reliability? A systematic literature review.*
26	Arets, E.J.M.M., G.M. Hengeveld, J.P. Lesschen, H. Kramer, P.J. Kuikman & J.W.H. van der Kolk (2014). *Greenhouse gas reporting of the LULUCF sector for the UNFCCC and Kyoto Protocol. Background to the Dutch NIR 2014.*

27 Roller, te J.A., F. van den Berg, P.I. Adriaanse, A. de Jong & W.H.J. Beltman (2014). *Surface WAter Scenario Help (SWASH) version 5.3. technical description*

28 Schuiling, C., A.M. Schmidt & M. Boss (2014). *Beschermde gebiedenregister; Technische documentatie*

29 Goossen, C.M., M.A. Kiers (2015). *Mass mapping; State of the art en nieuwe ideeën om bezoekersaantallen in natuurgebieden te meten*

30 Hennekens, S.M, M. Boss en A.M. Schmidt (2014). *Landelijke Vegetatie Databank; Technische documentatie*

31 Bijlsma, R.J., A. van Kleunen & R. Pouwels (2014). *Structuur- en functiekenmerken van leefgebieden van Vogelrichtlijn- en Habitatrichtlijnsoorten; Een concept en bouwstenen om leefgebieden op landelijk niveau en gebiedsniveau te beoordelen*

32 Commissie Deskundigen Meststoffenwet (2015). *Nut en risico's van covergisting. Syntheserapport.*

33 Bijlsma, R.J. & J.A.M. Janssen (2014). *Structuur en functie van habitattypen; Onderdeel van de documentatie van de Habitatrichtlijn artikel 17-rapportage 2013*

34 Fey F.E., N.M.J.A. Dankers, A. Meijboom, P.W. van Leeuwen, J. Cuperus, B.E. van der Weide, M. de Jong, E.M. Dijkman & J.S.M. Cremer (2014). *Ecologische ontwikkeling binnen een voor menselijke activiteiten gesloten gebied in de Nederlandse Waddenzee; Tussenrapportage achtste jaar na sluiting (najaar 2013).*

35 Kuindersma, W., F.G. Boonstra, R.A. Arnouts, R. Folkert, R.J. Fontein, A. van Hinsberg & D.A. Kamphorst (2015). *Vernieuwingen in het provinciaal natuurbeleid; Vooronderzoek voor de evaluatie van het Natuurpact.*

36 Berg van den, F., W.H.J. Beltman, P.I. Adriaanse, A. de Jong & J.A. te Roller (2015). *SWASH Manual 5.3. User's Guide version 5*

37 Brouwer, F.M., A.B. Smit & R.W. Verburg (2015). *Economische prikkels voor vergroening in de landbouw*

38 Verburg, R.W., R. Michels, L.F. Puister (2015). *Aanpassing Instrumentarium Kosten Natuurbeleid (IKN) aan de typologie van het Subsidiestelsel Natuur en Landschap (SNL)*

39 Commissie Deskundigen Meststoffenwet (2015). *Actualisering methodiek en protocol om de fosfaattoestand van de bodem vast te stellen*

40 Gies, T.J.A., J. van Os, R.A. Smidt, H.S.D. Naeff & E.C. Vos (2015). *Geografisch Informatiesysteem Agrarische Bedrijven (GIAB); Gebruikershandleiding 2010.*

41 Kramer, H., J. Clement (2015). *Basiskaart Natuur 2013. Een landsdekkend basisbestand voor de terrestrische natuur in Nederland*

42 Kamphorst, D.A., T.A. Selnes, W. Nieuwenhuizen (2015). *Vermaatschappelijking van natuurbeleid. Een verkennend onderzoek bij drie provincies*

43 Commissie Deskundige Meststoffenwet (2015). *Advies 'Mestverwerkingspercentages 2016'*

44 Meeuwsen, H.A.M. & R. Jochem (2015). *Openheid van het landschap; Berekeningen met het model ViewScape*

45 Groenestein, C.M., J. de Wit, C. van Bruggen & O. Oenema (2015). *Stikstof- en fosfaatexcretie van gangbaar en biologisch gehouden landbouwhuisdieren. Herziening excretieforfaits Meststoffenwet 2015*

46 Bruggen, C. van, A. Bannink, C.M. Groenestein, J.F.M. Huijsmans, H.H. Luesink, S.M. van der Sluis, G.L. Velthof & J. Vonk (2015). *Emissies naar lucht uit de landbouw, 1990-2013. Berekeningen van ammoniak, stikstofoxide, lachgas, methaan en fijn stof met het model NEMA.*

47 Boonstra, F.G. & A.L. Gerritsen (2015). *Systeemverantwoordelijkheid in het natuurbeleid; Input voor agendavorming van de Balans van de Leefomgeving 2014*

48 Overbeek, M.M.M., M-J. Bogaardt & J.C. Dagevos (2015). *Intermediairs die bijdragen van burgers en bedrijven aan natuur en landschap mobiliseren.*

49 Os, J. van, R.A.M. Schrijver & M.E.A. Broekmeyer (2015). *Kan het Natuurbeleid tegen een stootje? Enkele botsproeven van de herijkte Ecologische Hoofdstructuur.*

50 Hennekens, S.M., J.M. Hendriks, W.A. Ozinga, J.H.J. Schaminée & L. Santini (2015). *BioScore 2 – Plants & Mammals. Background and pre-processing of distribution data*

51 Koffijberg K., P. de Boer, F. Hustings, A. van Kleunen, K. Oosterbeek & J.S.M. Cremer (2015). *Broedsucces van kustbroedvogels in de Waddenzee in 2011-2013.*

52 Arets, E.J.M.M., J.W.H van der Kolk, G.M. Hengeveld, J.P. Lesschen, H. Kramer, P.J. Kuikman & M.J. Schelhaas (2015). *Greenhouse gas reporting of the LULUCF sector in the Netherlands. Methodological background.*

54 Groenestein, K. & J. Mosquera (2015). *Evaluatie van methaanemissieberekeningen en -metingen in de veehouderij.*

55 Schmidt, A.M. & A.S. Adams (2015). *Documentatie Habitatrichtlijn-rapportage artikel 17, 2007-2012*

57 Fey F.E., N.M.A.J. Dankers, A. Meijboom, C. Sonneveld, J.P. Verdaat, A.G. Bakker, E.M. Dijkman & J.S.M. Cremer (2015). *Ontwikkeling van enkele mosselbanken in de Nederlandse Waddenzee, situatie 2014.*

58 Blaeij, A.T. de, R. Michels, R.W. Verburg & W.H.G.J. Hennen (2015). *Recreatiemodule in Instrumentarium Kosten Natuurbeleid (IKN); Bepaling van de recreatiekosten*

60 Bouwma, I.M., A.L. Gerritsen, D.A. Kamphorst & F.H. Kistenkas (2015). *Policy instruments and modes of governance in environmental policies of the European Union; Past, present and future*

Theme Nature Outlook
Wettelijke Onderzoekstaken
Natuur & Milieu
PO Box 47
NL-6700 AA Wageningen
T +31 (0) 317 48 54 71
E info.wnm@wur.nl

ISSN 2352-2739

www.wageningenUR.nl/
wotnatuurenmilieu

The mission of WOT Natuur & Milieu is to carry out statutory research tasks on issues relating to nature and the environment. These tasks are implemented in order to support the Dutch Minister of Economic Affairs, who is responsible for these issues. The Statutory Research Tasks Unit for Nature and the Environment (WOT Natuur & Milieu) works on products of the Netherlands Environmental Assessment Agency (PBL), such as the Assessment of the Human Environment reports and the Nature Outlook reports. In addition, the unit advises the Ministry of Economic Affairs about fertilisers and pesticides and their authorisation, and provides data required to compile biodiversity reports to the European Union.

WOT Natuur & Milieu is part of the international expertise organisation Wageningen UR (University & Research centre). Its mission is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 6,000 members of staff and 9,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the various disciplines are at the heart of the unique Wageningen Approach.