



Towards 'nature- inclusive' agriculture

Prof.dr Hens Runhaar

Inaugural lecture upon taking up the position of
Professor of Management of Biodiversity and Agricultural Landscapes
at Wageningen University on 22 September 2016



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Esteemed Rector Magnificus, dear colleagues, students, family, and friends,

It seems to be becoming more and more difficult to reconcile highly productive and efficient agriculture with nature conservation and the preservation of attractive landscapes in which people like to spend their leisure time and with which they identify themselves. Tensions between modern agricultural production processes and these other societal values are increasing, which has given rise to growing scientific, societal and political concerns (e.g. Kleijn, 2012; RLI, 2013; Van Dam, 2015; WNF, 2015; De Snoo, 2016; VNC, n.d.)¹. I see how farmers are struggling with the conflicting claims made of them. And I observe a variety of initiatives that aim at nature and landscape conservation, by farmers themselves, the government at various scales, by NGOs, by citizen volunteers and, increasingly, by other companies in agri-food chains (Runhaar et al., 2016a). But will this be sufficient to reconcile all demands that are made on modern agriculture?

Reconciling agriculture and nature conservation: key challenges

In this inaugural address I will discuss the governance of nature conservation in agricultural landscapes. I will focus particularly on the Netherlands. Here, just as in many other European countries, the agricultural landscape has been transformed as a result of scale enlargement and agricultural intensification, which in turn are driven by regulations and market forces (Sanderson et al., 2013; Brouwer et al., 2016; O’Rourke et al., 2016). The associated intensified mechanisation, removal of hedges and hedgerows and the lowering of groundwater levels have among other things, contributed to habitat loss, more disturbance and consequently a decline in species abundance and diversity (Stoate et al., 2009; Geiger et al., 2010; Ollerton et al., 2014; EEA 2015a; b). Species about which there are deep concerns in the Netherlands are the Black-tailed Godwit (de Grutto in Dutch) and the Lapwing (de Kievit).

¹ These concerns are not new; see e.g. Barendrecht and Kruseman Jr., 1938 (thank you Dick Melman).

I will explore some of the key challenges that need to be addressed in the quest for agricultural landscapes in which economic, ecological and societal values are more aligned. Such landscapes are logically connected with 'nature-inclusive' farming, a new policy concept adopted by the Ministry of Economic Affairs (EZ, 2014). This term may be a bit 'Dunglish' – an Internet search for it only yielded hits on Dutch websites (but see e.g. IPES Food, 2016, for comparable concepts). Nevertheless, in my view, the concept of nature-inclusive agriculture is appealing for three reasons. One, it captures the very essence of what is central to the debate: a more sustainable form of agriculture that minimises negative ecological impacts, maximises positive ones and at the same time benefits from natural processes (EZ 2014; Sanders and Westerink, 2015). Two, the concept is appealing because of its flexibility. 'Nature-inclusive' farming has not yet crystallised out. Hence it may act as a 'boundary concept', that brings together farmers, stakeholders and policy-makers in order to discuss and negotiate shared meanings and objectives that may contribute to agricultural transformation (see also Velten et al., 2015). Three, and in line with the previous argument, the still undefined meaning of nature-inclusive agriculture also makes it a promising concept that can facilitate the co-production of its meaning and knowledge required to implement nature-inclusive farming practices (cf. Runhaar et al., 2016b).

I fear that nature-inclusive agriculture (i.e. agricultural practices that minimise negative ecological impacts, maximise positive ones and that benefit from natural processes) will not be implemented spontaneously (cf. RLI, 2013). There are many barriers to overcome². For instance, agri-food chains are typically optimised in terms of production and economies of scale (Smit et al., 2009). Some companies may benefit from transforming agri-food chains into nature-inclusive ones but others may lose (compare: Virchow, 1999). More knowledge has to be produced about how agriculture can be made more nature-inclusive while at the same time assuring an income for farmers and while fitting within agricultural production styles (e.g. SCAN, n.d.). Inspiration is forthcoming from various studies (e.g. Norton and Reid, 2013; Delbaere et al., 2014; Lemaire et al., 2014; Sanders and Westerink, 2015; Erisman et al., 2016). Another problem is that the benefits of nature-inclusive farming are less visible than those of conventional agriculture (Carolan, 2006), not only to farmers but also to citizens (SCAN, n.d.). It is important to have more insight into business models for nature-inclusive agriculture (Westerink et al., 2013; Grin et al., 2015; Polman et al., 2015). But a transformation towards nature-inclusive agriculture is particularly a matter of *governance*, and that is the focus of my lecture.

² Compare: Smit et al., 2008; Sathiya Priya and Vivek, 2016.

Governance in the agricultural sector is about how farmers, companies in agri-food chains, banks, governments, NGOs and other stakeholders interact and try to influence each other in order to achieve their objectives (cf. Driessen et al., 2012; Termeer et al., 2013). Governing towards nature-inclusive agriculture requires that all of these actors, not only farmers, are stimulated to contribute to a transformation of agricultural practices (O'Rourke et al., 2016). This in turn requires other forms of interactions and new arrangements, such as intensified cooperation between farmers, scientists and agri-food companies. New incentives are needed that reward farmers who minimise their ecological impacts, maximise positive impacts, or who switch to biological pest control or use other types of natural processes. And a clear definition and implementation of roles and responsibilities among actors is necessary (cf. Runhaar et al., 2016c). But this will not emerge automatically, particularly when nature-inclusive farming does not align with the main interests involved.

This lecture

I will address three interrelated key challenges in the governance of nature-inclusive agriculture: (1) enhancing the performance of governance arrangements; (2) dealing with a multiplicity of views and ideas about nature-inclusive farming; and (3) organising knowledge production for nature-inclusive agriculture. But first, I will briefly zoom out and sketch the situation today in order to give you some context.

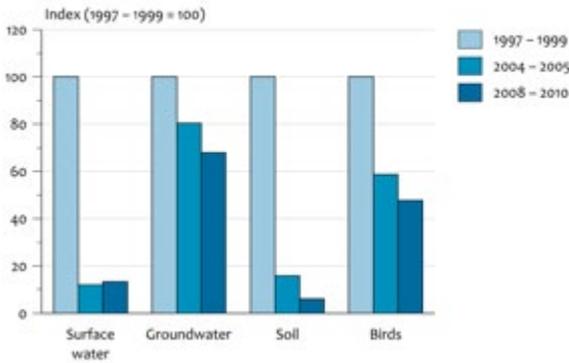
Where are we now?

The good news

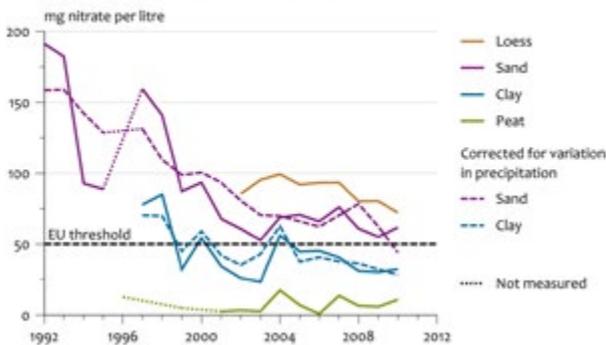
In terms of value, our agricultural sector is the second largest exporter of agricultural products, after the U.S. (Agrimatie, n.d.). In 2015, the total value of Dutch agricultural exports amounted to 81.3 billion euro, 21% of all Dutch exports (CBS, 2016a). Productivity in the agricultural sector has increased substantially. For instance, in the last 60 years, average milk production per cow has at least doubled (Van den Ban, 2011). The level of education of farmers is increasing slowly (Agrimatie, n.d.). Various environmental pressures have been reduced (see Figure 1 for two examples; for more detailed information, see Brouwer et al., 2016 or CLO, n.d.). And food has become relatively cheaper: nowadays Dutch households spend an average of 15% of their budget on food, compared with almost 25% in 1969 (CBS, 2008; 2016b).

Figure 1. Trends in two environmental pressures from agricultural activities

Environmental load of pesticides used in open cultivation



Nitrates in upper groundwater under agricultural land



Source: PBL (2016a; b).

The not so good news

In the last 35 years the agricultural workforce has been shrinking steadily (see Table 1). The proportion of farm household members working on the farm has also declined, from >80% in 1980 to 70% in 2014. Notwithstanding the income support to Dutch farmers from the EU Common Agricultural Policy (CAP), at least 20% of farming households in the Netherlands are below the low-income threshold of 22,000 euros per annum. This percentage differs per subsector and fluctuates over

time³. On April 2, 2016, Rabobank, the bank which most Dutch farmers are customers of, announced that one third of all its dairy farmer customers with Rabobank loans were in financial difficulty. Although the number of bankruptcies in the Dutch agricultural sector has decreased, it has risen within subsectors such as pig farming and dairy farming (CBS, 2016b).

Table 1. Trends in the numbers of companies and employees in Dutch agriculture (x 1,000)

	1980	1990	2000	2012	2013	2014
Number of companies - arable farming	69	64	36	20	20	19
Number of companies - livestock farming on grassland	107	88	68	51	50	49
Employees (total)	305	-	281	198	193	190
Employees (household)	265	-	194	137	133	132
Of which male	178	-	132	91	91	88
Of which female	87	-	62	46	43	45

Source: CBS (2015).

An increasing share of Dutch farmers (currently 19%) have additional revenue-generating activities, such as recreation, farm shops, care services for vulnerable people, nature conservation and landscape maintenance (Agriholland, 2015; CBS, 2016). For farmers, diversification is a motivating activity, an easy way to earn additional income, or part of a long-term business strategy in order to spread risks and secure a more or less stable income. But it seems that for a growing group of farmers, finding a source of additional income is a necessity. So, how have farmers profited from the scale enlargement and intensification of agriculture and to what extent? It seems that not all farmers have benefited.

Trends in agriculture are worrisome from an ecological perspective too. Species abundance on agricultural land has declined in recent decades, although for some species the decline has been stabilised (CBS et al., 2012; Van Strien et al., 2016) and

3 The percentage of farms with incomes below the low-income threshold is for instance higher in pig farming and in 2002 and in 2009 about 40% of all agricultural households had incomes below the low-income threshold (Agrimatie, n.d.). For an analysis of financial results in dairy farming, see Alfa (2010; 2016). Intensive dairy farmers have lower margins per kilogramme of milk produced and therefore need to maximise their production.

certain species, such as Greylag Goose, are doing very well. I already referred to the deep concerns about the Black-tailed Godwit: a substantial proportion of the European population of this meadow bird breeds in the Netherlands. Compared to other European countries, the decline in species abundance and diversity in the Netherlands is high (EEA, 2015b). This can be attributed to the drastic transformation of agricultural landscapes. Fields have been enlarged by filling in ditches and removing woody elements. Streams have been canalised and water tables adjusted. And so on. (see Brouwer et al., 2016). But Dutch agriculture also has ecological and landscape impacts abroad. For instance, livestock farmers import soya from Latin and South America for feed (PBL, 2014) and environmental NGOs claim that these imports contribute to deforestation (Milieudefensie, 2015; Natuur en Milieu, n.d.).

The future of agriculture

The scale enlargement and intensification of the agricultural sector has had both benefits and downsides, as I briefly discussed. But how will the agricultural sector develop in future? This is of course relevant for the potential for nature-inclusive agriculture. I am certainly not the first person to ask this question. An internet search on “toekomst van de landbouw” yielded no less than 72,700 hits (9 June 2016). Earlier this year, on Wednesday May 18, Cees Veerman gave his farewell lecture in this auditorium and forecasted a divide in Dutch agriculture⁴. He believes that some farmers will continue intensifying and producing for the world market, with no or reduced income support from the EU CAP. These farmers will probably not be the future nature-inclusive farmers. The remainder – the majority – will combine agricultural production with the provision of services for society, such as nature conservation and landscape maintenance, as a precondition for income support. I expect the latter category of farmers will offer the largest opportunities for nature-inclusive agriculture. I can imagine that these farmers will be found in areas of particular landscape and ecological value. But also in areas where the continuation of agriculture is becoming increasingly difficult, such as in the peat polders in the west of the Netherlands where continuous drainage has caused subsidence⁵. In these areas new combinations of land use are needed; nature-inclusive agriculture could be one of them.

4 *Thinking in terms of a divide in the agricultural sector is neither new (e.g. Van Kasteren, 2009), nor is it unique to the Dutch agricultural sector (e.g. O'Rourke et al., 2016). It seems to me that the question is not whether such a divide will emerge, but rather when and how.*

5 *For an overview of problems in these areas see www.waarheenmethetveen.nl.*

Enhancing the performance of governance arrangements for nature-inclusive agriculture

What arrangements are currently in use?

Together with nine colleagues from Wageningen University and Research Centre, Utrecht University, Leiden University and VU Amsterdam/Louis Bolk Institute, I identified and assessed ten distinct arrangements that promote nature-inclusive farming (Runhaar et al., 2016a). The arrangements differed in terms of the actors involved and how they interact. Some are top-down arrangements, such as requirements to preserve natural habitats in the EU CAP as preconditions for income support. At the same time there is self-governance, for instance, by environmental cooperatives: farmers who have organised themselves to conserve nature and restore landscapes. A well-known arrangement that has characteristics of both top-down governance and self-governance is agri-environment schemes (AES): financial compensation for nature conservation by farmers who implement predefined conservation measures to protect stipulated species. More recently, companies in agri-food chains have started developing other schemes, in which farmers are rewarded for good performance and penalised for bad ('bonus-malus'). The focus of these arrangements is not exclusively on nature conservation but on sustainable agriculture in a broader sense: soil quality, use of pesticides, water quality, energy, but also biodiversity (e.g. participation in AES).

How well do these arrangements perform?

In each of the ten arrangements usually only a small proportion of all Dutch farmers participates. For instance, about 10% of all farmers participate in an environmental cooperative. 20% of all farmers participate in AES, but measures are being applied on only 5% of the area of agricultural land. In one specific arrangement – Farming for Nature – only four farmers are participating⁶. One bonus-malus arrangement that is currently being developed by a large dairy processor has a very large potential scope in terms of participating farmers. Taken *together*, the ten arrangements probably target a large number of farmers but the exact number is unknown⁷.

6 The low number probably reflects the scheme's pilot status. Farming for Nature was a project in which participating farmers transformed their farming practices into an extensive form of farming. Nature conservation was one of the objectives. The farmers were supported by researchers by means of knowledge and by governmental actors by means of subsidies.

7 We could not estimate the proportion of farms that are involved because many farmers participate in multiple arrangements and because many arrangements only focus on areas with particular ecological values (Runhaar et al., 2016a).

In ecological terms, the performance of the ten arrangements is not very impressive. For instance, the new greening requirements in the CAP regarding semi-natural habitat ('ecological focus areas') are moderate, and thus very modest ecological impacts are expected (cf. Pe'er et al., 2014 but see Cormont et al., 2016). The ecological performance of AES as it existed until January 1, 2016 was also low. Farmers participated on a voluntary basis and could choose conservation measures themselves. As a consequence, the measures usually selected were easy to implement but had modest ecological impacts. Colleagues such as David Kleijn, Frank Berendse, Geert de Snoo and Dick Melman have made detailed analyses of why AES in the Netherlands and elsewhere have had low performance (Kleijn et al., 2001, 2006; Melman et al., 2008; Kleijn, 2012). Some of the bottlenecks they identified are addressed in the AES system that was introduced on January 1 this year: for example, by the narrower focus on ecological core areas and more regional cooperation that result from the requirement to establish 'farmer collectives'. This may enhance the performance of AES. In nature reserve areas where traditional agricultural landscapes and their associated species are being maintained, ecological objectives are relatively ambitious. However, even there, the ecological results have been moderate⁸. In various other arrangements, species abundance and diversity is not the sole focus and there are often no specific conservation objectives (see Runhaar et al., 2016a).

What explains performance?

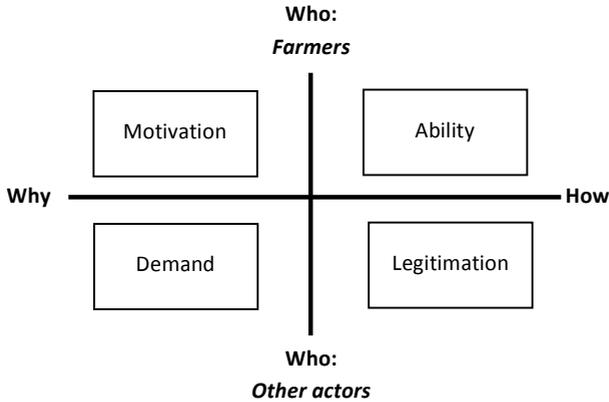
We looked at four preconditions for farmers to participate actively in a nature conservation arrangement (see Figure 2)⁹. Firstly, farmers should be motivated. Participation should not be voluntary only however; so secondly, there should be a demand for farmers to participate. Thirdly they should be able to do so (or, if not, be enabled). This means farmers should have the resources and skills required to implement nature conservation measures. Fourthly, their participation should be legitimised: no governmental regulations or social norms should inhibit particular forms of conservation. These conditions can be provided by the governance arrangements themselves, or by other factors, including the farmers' personal characteristics (e.g. intrinsic motivation; Lokhorst et al., 2011).

The ten governance arrangements generally perform not so well in terms of how many farmers participate because they are not demanding: usually participation is voluntary and conservation ambitions are low. Arrangements also score low on the

⁸ For instance, only slightly more than 10% of grassland reserve areas in the Netherlands meet all the conditions required for the Black-tailed Godwit (Melman et al., 2016).

⁹ For comparable frameworks see e.g. Hemerijck and Hazeu, 2004.

Figure 2. Preconditions for farmer adoption and implementation of nature conservation measures



Source: Runhaar et al., 2016a.

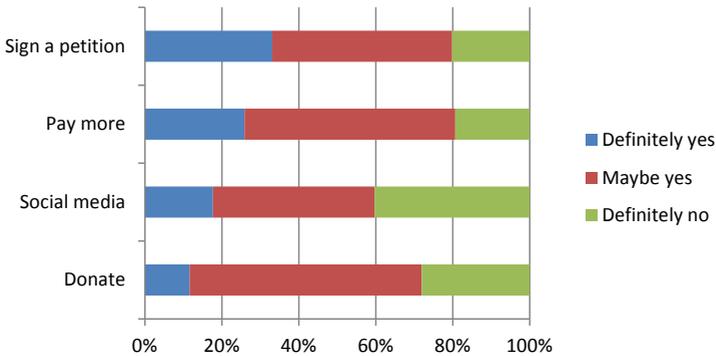
extent to which they enable farmers to participate and take effective nature conservation measures. A major bottleneck for nature-inclusive farming seems to be recouping the costs of implementing conservation measures. Financial compensation or other forms of funding therefore seem an important precondition to enable (and to motivate!) farmers to participate in nature conservation arrangements. Payment can come not only from government subsidies, but also from private actors. Although I am enthusiastic about the bonus-malus systems that are being introduced by companies in agri-food chains because these provide potentially strong incentives for farmers to 'go green', it would not be fair to redistribute revenues only among the supplying farmers: if that were to happen, it would ultimately be the farmers who pay for more nature-inclusive farming¹⁰.

It is unclear to what extent *Dutch consumers* are willing to pay for nature-inclusive farming. In a survey of over 1,000 citizens, Langers and Goossen (2014) found that only a small proportion were willing to pay or to support farmers in other ways for protecting meadow birds; a specific form of nature-inclusive farming (see Figure 3; for a comparable study see Bouma and Koetse, 2016). This also seems to be why, for instance, dairy processors are reluctant to introduce dairy products into the market that are produced in ways that promote nature conservation. All kinds of organic food products are on sale at supermarkets. We even have 'grazing milk' – milk from cows that are not kept in barns but that are on pasture because consumers want to see cows in fields (The Daily Milk, 2015). Only recently one supermarket chain

¹⁰ Of course some forms of biodiversity are 'functional' and therefore benefit farmers (think of pollination).

started selling ‘meadow bird milk’¹¹ – why not more meadow-bird cheese and milk from nature-inclusive agriculture?

Figure 3. Willingness of Dutch citizens to cooperate with initiatives that aim to protect meadow birds



Source: reproduced with permission and translated from Langers and Goossen, 2014: p. 18.

Enhancing the performance of governance arrangements for nature-inclusive agriculture

So how can consumers be stimulated to pay a bit more for agri-food products that have been produced in ways that minimise negative ecological impacts, maximise positive ones or that rely on functional biodiversity? I am well aware that much of what is produced here is exported. Still, about a third of all milk ‘produced’ in the Netherlands is consumed here (Zuivel.nl, n.d.). A first step would be to make citizens aware of what is going on in agricultural landscapes – I am afraid not many citizens are. I am planning a film, or a series of brief films together with my colleagues David Kleijn and Simon Vink. My objective would be to inform citizens about the decline in species diversity and abundance, and its causes, but also about the limited degrees of freedom that farmers have, so as to remove misunderstandings that citizens may have about farmers (and vice versa) and to show how citizens themselves can contribute to nature conservation in their roles of consumers, recreationists and voters.

I have also started analysing individual arrangements in more depth, in order to find out how they can be reinforced. Together with my colleague Nico Polman from LEI

¹¹ June 2016, supermarket chain Jumbo announced that they had started selling ‘meadow bird milk’, supplied by four farmers (see www.vogelbescherming.nl/actueel/nieuws/nieuwsbericht/q/ne_id/1882 or Agriholland, 2016). In cooperation with other actors, BirdLife Netherlands is currently running a campaign titled “Red de Rijke Weide” in order to stimulate other supermarket chains to follow the example of Jumbo.

and Jouke Altenburg and Carleen Weebers from BirdLife Netherlands I am analysing the functioning of the network of 80 dairy farmers initiated and facilitated by BirdLife Netherlands: how are the farmers enabled by this network? Together with Katrien Termeer I am supervising the PhD project of Lyda Dik, an external PhD candidate with many years of experience in advising and training farmers participating in AES. Her research focuses on the new farmer collectives. These groups of farmers are responsible for, among other things, developing AES bids, contracting farmers and monitoring and enforcement. Many farmer collectives are based on existing environmental cooperatives. Farmer collectives will have to work efficiently, achieve better ecological results and acquire new sources of funding. Lyda is analysing their development and performance through the lens of 'professionalisation'. But it is not only farmer collectives that have to professionalise: so do provinces that conclude the contracts with collectives. It is my understanding that farmer collectives have not been given much responsibility and room for manoeuvre in their area bids in all cases. I look forward to cooperating with Lyda and Katrien in this exciting project. Our explicit ambition is to derive lessons for farmers, farmer collectives, provinces and other stakeholders by working with them.

There are many more promising initiatives to be analysed, for instance with students^{12,13}. The *Herenboeren* is a form of self-governance based on a business model in which citizens own shares in a farm, decide what is cultivated and receive a share in the profits as well as the products that they ordered. Water boards are considering payments for measures that prevent water pollution from agricultural sources, which can have positive ecological impacts¹⁴. And so on. But I also hope to learn from experiences elsewhere. A valuable source of inspiration will be the PhD project of

12 *This Summer, Niek Engbers finalised his bachelor thesis, in which he compared three governance arrangements for meadow bird protection in the province of Fryslân (Engbers, 2016). I supervised that thesis and hope to work with more students in the future who are as motivated as Niek was.*

13 *Of course it is also relevant and interesting to learn from previous attempts to govern towards more sustainable forms of agriculture, e.g. the restructuring of pig farming (Driessen, 2005a).*

14 *Examples of these measures are reduced use of pesticides or fertiliser near ditches, 'natural' field margins, and even more far-reaching measures that could contribute to biodiversity and landscape values (see e.g. De Snoo, 1999). For a critical discussion, see Breman et al., 2016.*

Cora van Oosten on landscape governance in developing countries, which I am supervising together with Bas Arts.¹⁵

Mainstreaming nature-inclusive agriculture in other forms of agricultural governance

Ability to participate in nature conservation arrangements is inhibited by other forms of governance that promote ongoing scale enlargement and intensification in the agricultural sector. Decades of agricultural policies, including the CAP, have incentivised farmers to increase their production and efficiency (e.g. Sanderson et al., 2013). In agri-food chains, farmers have far less market power than, for example, food manufacturers, banks, retailers and seed suppliers (Grievink, 2003; Marinho et al., 2014; PBL, 2014). Not only does this situation restrict farmers' freedom in making decisions, it also means farmers are usually 'price-takers' (Assefa et al., 2014; see also Brouwer et al., 2016). As a consequence, farmers are always looking for ways to reduce costs. Nature conservation in Dutch agricultural landscapes should therefore also be adopted by other stakeholders¹⁶ and mainstreamed or integrated into other forms of agricultural governance. We can observe some first, cautious steps towards this objective, such as the greening of the CAP and the earlier decoupling of income support from production volumes¹⁷. These are important steps – I do not expect we will be able to turn back. But more is needed. It would be interesting to analyse the forces driving agricultural intensification in more detail: who benefits from further intensification? who has the power to maintain the intensification? how can nature-inclusive agricultural practices be made profitable for these actors? and what is needed to bring about change in agri-food chains (compare: IPES Food, 2016)? From the literature it seems that substantial changes in governance systems require 'shock events' such as economic crises, changes in public opinion or other pressures from outside the system (Sabatier and Weible, 2007; Runhaar and Van Nieuwaal, 2010; Hegger et al., 2016). Will a near extinction of, for instance, the Skylark,

15 *In addition, my colleagues in the Forest and Nature Conservation Policy Group at Wageningen have conducted interesting research on landscape governance (e.g. Van Oosten et al., 2014; Buizer et al., 2015), forest governance (De Bruin et al., 2015) and supply chain governance (Tieguhong et al., 2015). Equally interesting is international comparative research on specific instruments such as agri-environmental standards (e.g. Higgings et al., 2008) or specific arrangements such as agri-environmental cooperatives (e.g. Prager, 2015a). Switzerland performs relatively well in terms of farmer participation in AES and ecological effectiveness (e.g. Duelli, n.d.; Kohler et al., 2007). Even though it has some unique characteristics (e.g. Alpine landscapes, low population density), we can learn lessons about how to motivate farmers to contribute to nature conservation. The same applies to other countries –Sweden and the UK, for example (Marshall et al., 2006; Hiron et al., 2013).*

16 *In a recent paper, O'Rourke and co-authors state "agricultural advisors need training and competency in agroecology, farm enterprise knowledge and broader rural development, rather than their traditional sole emphasis on production at all costs" (O'Rourke et al., 2016: p. 56).*

17 *Martijn van Dam, our Secretary of State for Economic Affairs, announced in May that he proposed a further greening of the CAP.*

Lapwing, or other iconic species of Dutch agricultural landscapes form the shock event that will drive agri-supply chains towards more nature-inclusive agriculture?

Concluding: more effective governance for nature-inclusive agriculture

Governing nature-inclusive agriculture requires that governance arrangements for nature conservation that are currently in use need to be reinforced in terms of the preconditions for participation I discussed earlier. Particularly there should be a demand for farmers to participate and they should be rewarded for their participation. This in turn requires that nature-inclusive farming is mainstreamed in the CAP and in the practices in agri-food chains and that consumers are willing to pay for it.

Dealing with a multiplicity of views and ideas about nature-inclusive agriculture

Different ideas: merits and pitfalls

The second governance challenge that I want to discuss has to do with the often differing views, ideas, or frames about what nature-inclusive agriculture is or should be and how to deal with them. A plurality of ideas can have merits: for example, it can promote policy innovation. New ideas about reducing environmental pressure arising from agriculture and nature conservation by farmers have given rise to various new governance arrangements, such as the Farming for Nature arrangement and the environmental cooperatives that I mentioned earlier.

Ideas that are too divergent easily lead to controversy and deadlock (Van Eeten, 1999; Brugnach et al., 2011; Runhaar and Van Nieuwaal, 2010). I observe that people involved in debates about nature in agricultural landscapes often have very different ideas (cf. Hermans et al., 2010). And that does not always result in productive dialogue. I have noticed that there are not only very different ideas about nature conservation in agricultural landscapes, but also that often there is conflict and distrust among people (see also De Snoo et al., 2016). The critical evaluations of Dutch AES have annoyed many farmers, because they feel their efforts have not been recognised; only the results seem to count in the evaluations. A lack of appreciation – actual or perceived – however, easily reduces farmers’ motivation to participate in AES or other governance arrangements for nature-inclusive agriculture.

During my interviews and informal talks I heard people talk about agricultural grassland as ‘green desert’. I wonder what the average citizen sees when in the countryside; many Dutch citizens seem to associate cows and grass with nature (Driessen, 2005b). But there are particularly large differences in opinion about what ecosystems on agricultural landscapes we should aim for (cf. PBL, 2012). I do understand why many ecologists and others are concerned about the decline in

meadow bird populations in the Netherlands, particularly about the Black-tailed Godwit – so am I and I think few people will be indifferent. Yet, the question is what population size to aim for, where and at what price? And more generally – what types of nature do we want in what agricultural landscapes? And who should decide upon that? Farmers? The agri-food industry? Experts? The government? Citizens? Or all of these actors in cooperation? I think the latter.

Nature-inclusive agriculture as a 'boundary concept' for negotiating shared meanings?

As I said in the beginning of my lecture, the concept of nature-inclusive agriculture is still rudimentary and therefore there is potential for farmers, citizens, scientists, policy-makers, agri-food companies and other stakeholders to jointly give it meaning. Similar to 'sustainable agriculture', nature-inclusive agriculture is a concept with which most people will associate ideas. I also expect most people will have a positive attitude towards nature-inclusive agriculture. And the concept has not been predefined in too much detail or hi-jacked by a particular actor (in contrast to, for instance, AES that prescribe target species and measures). Nature-inclusive agriculture can be a boundary concept around which farmers and other stakeholders can be brought together to discuss the opportunities that farmers and others see for this farming approach. However, such dialogues need to be carefully organised, in order to guarantee participation, to contribute to the production of shared meanings and to avoid certain fundamental discussions being ignored (Cuppen, 2012; Cuppen et al., 2015). And again the question is how to ensure that farmers and stakeholders are willing to engage in such dialogues, that there is a demand for them to do so and that they are enabled and legitimised to do so (see Figure 2).¹⁸

What explains the plurality of ideas and frames?

I am interested in explanations for differences in interpretations of what nature-inclusive agriculture is or should be. I can imagine this has to do with core beliefs about what is most important (Weible et al. 2009; see also Van Herten and Runhaar, 2013), in terms of interests at stake and also people's backgrounds and histories (e.g. Buijs, 2009). These factors are undoubtedly related. I am particularly interested in people's *frames of reference*. I noticed on several occasions that people often have a particular historical situation in mind, especially when talking about the decline in species diversity and abundance, although these frames of reference are often kept

¹⁸ *Dialogue about nature-inclusive farming is not only about what it should be, but also about what I discussed earlier: which knowledge is required, what can we learn from farmers themselves, and what is needed in order for farmers to be enabled, legitimised, and motivated to work towards nature-inclusive farming. The latter is a matter of governance and relates to issues of governance arrangements as well as to what conditions should be provided. But I discussed that at the start of my lecture.*

implicit¹⁹. Being aware of such frames of reference, and eliciting these, also has instrumental value as it may help to identify ‘common ground’ and prevent the emergence of ‘dialogues of the deaf’ (Van Eeten, 1999; Van Herten and Runhaar, 2013).

Organising knowledge production for nature-inclusive agriculture

Two distinct approaches...

Since the first AES contracts were concluded in the Netherlands in 1981, much fundamental, ecological research has been conducted on effective nature conservation measures to be taken in agricultural landscapes (De Snoo et al., 2016; Schlaich et al., 2015). Elsewhere in Europe and beyond, scientists have also evaluated AES and provided advice how AES can be improved (e.g. Batáry et al., 2015). Experience in the Netherlands, however, suggests that the most effective measures from an ecological perspective are also those that are the most difficult to incorporate into agricultural production processes (Westerink et al., 2015).

Other studies have therefore taken a different approach: focusing not on which measures are most effective from an ecological perspective, with predetermined target species or habitats in mind, but exploring which measures can be integrated into agricultural processes and what is required to enable farmers to implement them. These studies qualify as applied, participatory research. Earlier, I mentioned Farming for Nature. In this arrangement, farmers and researchers together examine how more sustainable agriculture could be promoted, with nature conservation as an objective that had not been defined beforehand (e.g. Buizer et al., 2015). A similar approach is taken by for instance “Stichting Veldleeuwerik”, a self-governance arrangement initiated by agri-food processors and supported by researchers, among others. These arrangements do not focus specifically on nature-inclusive farming but offer inspiration.

... with one objective: producing ‘useful’ knowledge

Although the two knowledge production approaches start from opposite standpoints, they have the same aim: to generate ‘useful’ knowledge²⁰. I have heard

19 *An example: in April, I talked to a man about the island of Schiermonnikoog. We all know this island as being rich in terms of species diversity and abundance. Agriculture on Schiermonnikoog already seems to be rather nature-inclusive. We talked about a particular farmed area I had visited that winter and where I enjoyed observing many different species of goose and other birds. But in the past, the man explained, in spring there used to be so many Ruffs, but these have now completely disappeared. See also De Snoo (2016).*

20 *I realise the distinction between the two approaches is debatable. There are approaches in-between such as ‘Beheer op Maat’, an online knowledge system developed by Wageningen University and Research Centre (see www.wageningenur.nl/nl/project/Kemissysteem-weidevogels.htm).*

various ecologists complain about their knowledge not being used sufficiently by policy-makers and politicians. I also know of complaints about the (unsurprisingly) abstract character of results from ecological research (although there are probably other reasons why policy-makers and politicians have not adopted all the recommendations from AES evaluations). A key problem in my view is that ecological research insufficiently takes into account the problems farmers face when implementing effective nature conservation measures (which I consider as a form of nature-inclusive farming). More knowledge is therefore needed about measures that work well from an ecological perspective *and* from the farmer's perspective (De Snoo et al., 2012). The balance, or in other words, levels of ecological ambition, will probably differ from region to region. How can the production of 'useful' knowledge be organised in specific situations?

Useful knowledge for nature-inclusive agriculture: work in progress

At Utrecht University, I have been analysing problems related to knowledge production and use in the Dutch Wadden Sea (e.g. Runhaar and Van Nieuwaal, 2010; Van Enst et al., 2016), where at issue is not nature-inclusive agriculture, of course, but 'nature-inclusive' fisheries, gas mining and other human activities. With a team of researchers from other universities, we analysed a range of different 'knowledge production arrangements' in the Wadden Sea, which differ in how researchers, policy-makers and stakeholders interact, their objectives and ultimately in the use of knowledge outputs (Runhaar et al., 2016b). The starting point is that useful knowledge should be '*scientifically and societally robust – i.e. credible, salient, and legitimate*' (Van Tatenhove et al., 2016, based on Cash et al., 2003). Credibility is defined as the scientific adequacy of information, salience as the relevance to the policy debate and legitimacy as the perceived degree to which the production of knowledge has respected the values and interests at stake (Cash et al., 2003). Inspired by this work and together with Dick Melman and Douwe Hoogland, I helped set up an MSc thesis project that compares and evaluates distinct knowledge production arrangements for nature-inclusive agriculture. Marten de Groot is working on this project enthusiastically.

But more work needs to be done. At the start of my lecture I stated that the concept of nature-inclusive agriculture is appealing because it can serve as a boundary object that can make it easier for farmers, researchers and other stakeholders such as nature reserve area managers ('TBOs') to co-produce useful knowledge about what nature-inclusive agriculture is. I hope to acquire funding for organising a few studies, both with farmers who are frontrunners in terms of participation in nature conservation arrangements and those who are not, in order to co-produce knowledge about nature-inclusive farming: what forms of nature-inclusive agriculture are already being

practised? what are the opportunities for other forms of nature-inclusive agriculture? which questions need to be answered to become more nature-inclusive?²¹.

Concluding: relevant research for useful knowledge for nature-inclusive agriculture

It is my impression that the literature offers a growing knowledge basis about how to organise processes of knowledge co-production and learning, as a starting point for creating knowledge for nature-inclusive agriculture (see e.g. Van Tatenhove et al., 2016). Our understanding about what is needed to make these processes successful is less advanced (cf. Hegger et al., 2012; 2014). Why and under what conditions people participate in learning processes or in knowledge co-production arrangements? This is not self-evident (Van Buuren and Edelenbos, 2004). I would like to apply the framework depicted by Figure 2 in order to learn more about the *preconditions* for the production and use of useful knowledge and for learning (building e.g. on Young et al., 2014, who provide suggestions for incentives). I suspect that learning for more effective nature conservation requires motivation in particular, but should also be required; it should not be voluntary.²²

The future of nature-inclusive agriculture

Policy concepts come and policy concepts go (e.g. Boezeman et al., 2010). Political interest in nature conservation also fluctuates (Buijs et al., 2014). Nature-inclusive agriculture is not the first concept to be advocated in the quest to integrate nature conservation into agriculture. Various other concepts have been popular such as 'ecosystem services', 'functional agrobiodiversity' and, more recently, 'Natural Capital'; concepts that emphasise the value of particular species and natural processes²³.

21 *Knowledge co-production in the 'new style' AES is worthwhile analysing and contributing to too. In the new system, much is expected from learning, i.e. the monitoring and evaluation of conservation measures and making any necessary adjustments, or in the case of undesirable trends, such as excessive predation, implementing additional measures ('lerend beheren'). But learning is also needed about new roles and interactions between farmers, farmer collectives, provinces, the Ministry of Economic Affairs and stakeholders, with farmer collectives as an important 'boundary organisation' (cf. Franks, 2010; Prager, 2015b). Learning is one of the aspects of professionalisation of farmer collectives that Lyda Dik will analyse in her PhD project.*

22 *But a critical analysis of knowledge co-production processes is also required. Inspired by the inaugural lecture of my colleague Esther Turnhout on June 2nd this year about the politics of environmental knowledge, I want to analyse who is included and who is excluded from knowledge co-production and what that means for the representation of the variety of values involved in the agricultural landscape (i.e. the legitimacy of the knowledge that is produced).*

23 *An important underlying idea is that eliciting and quantifying the value of particular forms of nature may motivate farmers to protect these forms of nature.*

Nature-inclusive agriculture as currently being developed at the Ministry of Economic Affairs may or may not be around in 10 years' time. But I am optimistic about the survival of the underlying idea, namely that agriculture cannot continue working against nature and at the expense of an attractive landscape. I have no hard evidence, but it is my impression that this idea is gaining ground among farmers, industry and politicians. And as I showed at the start of my lecture, agriculture in its current form does not seem to be financially sustainable for many farmers, either.

The 'greening' of the income support for farmers in the CAP will not disappear, although many would like to see more ambitious objectives. The growing attention being paid within agri-food chains to nature-inclusive farming will not vanish either, I am sure. It is naïve to think that our agricultural sector will return to how it was until 40-50 years ago, with a relatively low ecological impact and characterised by mosaics of small-scale landscapes. I am also confident that it is naïve to think the Black-tailed Godwit will go extinct. History has taught us that often, problems have to become grave before they are put on the agenda. Species such as the Badger and the Stork have been successfully protected; in the case of other species (Otter, for example), ongoing efforts are promising but need to be reinforced²⁴. I cannot imagine that our politicians and captains of agri-food industry will want to be held accountable for the extinction of species that are so typical of, and at the same time dependent on, the Dutch agricultural landscape.

As I said at the beginning of this lecture, the adoption of nature-inclusive agriculture will not happen by itself. It will require more effective governance arrangements for nature-inclusive agriculture, as well as the mainstreaming of 'nature-inclusiveness' in agricultural policy and in agri-food chains. This in turn requires political will, leadership from industry and support from citizens in their roles of consumers, voters and recreationists. Governance arrangements for nature-inclusive agriculture should be less voluntary than they are now. At the same time they should enable farmers, citizens, agri-food companies, policymakers, scientists, and stakeholders to negotiate and co-produce shared meanings about nature-inclusive farming. In some agricultural landscapes the emphasis may then be on the Black-tailed Godwit but in others on other species, natural processes, or other aspects of what we call 'nature'. But first and foremost farmers should receive generous rewards, and not compensation, for nature-inclusive farming. In the next four years I will co-produce and share knowledge about how farmers and other stakeholders can be stimulated to contribute to the transformation towards nature-inclusive agriculture.

²⁴ *Of course this success story does not apply to all species that are or were endangered (e.g. Black Grouse).*

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References

Agriholland (2015), *Dossier multifunctionele/verbrede landbouw*, Agriholland, Wageningen (available from www.agriholland.nl/dossiers/verbredelandbouw/home.html).

Agriholland (2016), *Nieuw weidezuivelmerk vanaf 7 juni bij Jumbo*, Agriholland, Wageningen (available from www.agriholland.nl/nieuws/artikel.html?id=181470).

AgriMatie (n.d.), *Agro & food portal* (available from www.agriMatie.nl/Default.aspx).

Alfa (2010), *Cijfers die spreken*, Alfa Accountants en Adviseurs, Wageningen.

Alfa (2016), *Cijfers die spreken*, Alfa Accountants en Adviseurs, Wageningen.

Assefa, T.T., W.E. Kuiper and M.P.M. Meuwissen (2014), The effect of farmer market power on the degree of farm retail price transmission: A simulation model with an application to the Dutch ware potato supply Chain, *Agribusiness*, 30 (4), pp. 424-437.

Barendrecht G. and G. Kruseman Jr. (1938), *De glorie van ons polderland*, Uitgeverij Boot, Voorburg/The Hague.

Batáry, P., L.V. Dicks, D. Kleijn and W.J. Sutherland (2015), The role of agri-environment schemes in conservation and environmental management, *Conservation Biology*, 29 (4), pp. 1006-1016.

Boezeman, D., P. Leroy, R. Maas and S. Kruitwagen (2010), The (limited) political influence of ecological economics: A case study on Dutch environmental policies, *Ecological Economics*, 69 (9), pp. 1756-1764.

Bouma, J. and M. Koetse (2016), *De betalingsbereidheid van individuen voor agrarisch natuur- en landschapsbeheer. Casus: Boeren voor Natuur Twente*, Planbureau voor de Leefomgeving, Bilthoven.

Breman, B.C., V.G.M. Linderhof, I.G.A.M. Noij, M.P.I. Vleemingsh and G.J. Ellen (2016), *Succes- en faalfactoren Agrarisch Waterbeheer*, Alterra Wageningen UR, Wageningen.

Brouwer, F., C. van Bruchem, H. Udo de Haes and W. van der Weijden (2016), Ontwikkelingen in de grondgebonden landbouw, in: G.R. de Snoo, Th.C.P. Melman, F.M. Brouwer, W.J. van der Weijden and H.A. Udo de Haes (eds.), *Agrarisch*

natuurbeheer in Nederland. Principes, resultaten en perspectieven, Wageningen Academic Publishers, Wageningen, pp. 55-83.

Brugnach, M., A. Dewulf, H.J. Henriksen and P. van der Keur (2011), More is not always better: Coping with ambiguity in natural resources management, *Journal of Environmental Management*, 92 (1), pp. 78-84.

Buijs, A. (2009), *Public natures. Social representations of nature and local practices*, Ph.D. thesis, Wageningen University, Wageningen.

Buijs, A., T. Mattijssen and B. Arts (2014), "The man, the administration and the counter-discourse": An analysis of the sudden turn in Dutch nature conservation policy, *Land Use Policy*, 38, pp. 676-684.

Buizer, M., B. Arts and J. Westerink (2015), Landscape governance as policy integration 'from below': a case of displaced and contained political conflict in the Netherlands, *Environment and Planning C: Government and Policy*, 33 (in press).

Carolan, M.S. (2006), Do you see what I see? Examining the epistemic barriers to sustainable agriculture, *Rural Sociology*, 71 (2), pp. 232-260.

Cash, D., W. Clark, F. Alcock, N.M. Dickson, N. Eckley, DH.. Guston, J. Jäger and R.B. Mitchell (2003), Knowledge systems for sustainable development, *Proceedings of the National Academy of Sciences*, 100, 8086-8091.

CBS, PBL and Wageningen UR (2012), *Ontwikkeling soorten in natuurgebieden en agrarisch gebied 1975 - 2005*, Statistics Netherlands/Netherlands Environmental Assessment Agency/ Wageningen University and Research Centre, The Hague/Bilthoven/ Wageningen (available from www.compendiumvoordeleefomgeving.nl).

CBS (2008), Aandeel voeding in huishoudbudget steeds kleiner, October 15, 2008, Statistics Netherlands, The Hague (available from <https://www.cbs.nl/nl-nl/nieuws/2008/42/aandeel-voeding-in-huishoudbudget-steeds-kleiner>).

CBS (2015; 2016b), Statline, Statistics Netherlands, The Hague (available from <http://statline.cbs.nl>).

CBS (2016a), *Nederland tweede landbouwexporteur ter wereld*, June 6, 2016, Statistics Netherlands, The Hague (available from www.cbs.nl/nl-nl/nieuws/2016/23/nederland-tweede-landbouwexporteur-ter-wereld).

CBS (2016c), *Minder faillissementen in de landbouw*, January 29, 2016, Statistics Netherlands, The Hague (available from <https://www.cbs.nl/nl-nl/nieuws/2016/04/minder-faillissementen-in-de-landbouw>).

CLO (n.d.), *Landbouw en milieu*, Compendium voor de Leefomgeving, PBL, CBS, and Wageningen UR, Bilthoven/The Hague/Wageningen (available from www.clo.nl/onderwerpen/landbouw-en-milieu).

Cormont, A., H. Siepel, J. Clement, T.C.P. Melman, M.F. Wallis de Vries, C.A.M. van Turnhout, L.B. Sparrius, M. Reemer, J.C. Biesmeijer, F. Berendse and G.R. de Snoo (2016), Landscape complexity and farmland biodiversity: evaluating the CAP target on natural elements, *Journal for Nature Conservation*, 30, pp. 19-26.

Cuppen, E. (2012), Diversity and constructive conflict in stakeholder dialogue: Considerations for design and methods, *Policy Sciences*, 45 (1), pp. 23-46.

Cuppen, E., S. Brunsting, U. Pesch and Y. Feenstra (2015), How stakeholder interactions can reduce space for moral considerations in decision making: A contested CCS project in the Netherlands, *Environment and Planning A*, 47 (9), pp. 1963-1978.

De Bruin, J.O., M.A. Hoogstra-Klein, G.M.J. Mohren and B.J.M. Arts (2015), Complexity of forest management: Exploring perceptions of Dutch forest managers, *Forests*, 6 (9), pp. 3237-3255.

Delbaere B., V. Mikos and M. Pulleman (2014), European Policy Review: Functional agrobiodiversity supporting sustainable agriculture, *Journal for Nature Conservation*, 22 (3), pp. 193-194.

De Snoo, G.R. (1999), Unsprayed field margins: effects on environment, biodiversity and agricultural practice, *Landscape and Urban Planning*, 46 (1), pp. 151-160.

De Snoo, G.R., I. Herzon, H. Staats, R.J.F. Burton, S. Schindler, J. van Dijk, A.M. Lokhorst, J.M. Bullock, M. Lobley, T. Wrška, G. Schwarz and C.J.M. Musters (2012), Towards effective nature conservation on farmland: making farmers matter, *Conservation Letters*, 6 (1), pp. 66-72.

De Snoo, G.R. (2016), Succesvol natuur beschermen, diesoratie uitgesproken op 8 februari 2016, Universiteit Leiden, Leiden.

De Snoo, G.R., Th.C.P. Melman, F.M. Brouwer, W.J. van der Weijden and H.A. Udo de Haes (eds.) (2016), *Agrarisch natuurbeheer in Nederland. Principes, resultaten en perspectieven*, Wageningen Academic Publishers, Wageningen.

Driessen, P.P.J., C. Dieperink, F. van Laerhoven, H.A.C. Runhaar and W.J.V. Vermeulen (2012), Towards a conceptual framework for the study of shifts in environmental governance - Experiences from the Netherlands, *Environmental Policy and Governance*, 22 (3), pp. 143-160.

Driessen, P.P.J. (2005a), Restructuring the Dutch countryside: Limits of a governance strategy, *Planning Practice and Research*, 20 (1), pp. 69-77.

Driessen, P.P.J. (2005b), *Sturing op kwaliteit; over veranderende ambities en sturing in het omgevingsbeleid*, inaugural address, Utrecht University, Utrecht.

Duelli (n.d.), *Evaluating current European agri-environment schemes to quantify and improve nature conservation efforts in agricultural landscapes (EASY)*, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf (available from www.wsl.ch/fe/biodiversitaet/projekte/european_agri_environment_schemes/index_EN).

EEA (2015a), *SOER 2015 — The European environment — state and outlook 2015. A comprehensive assessment of the European environment's state, trends and prospects, in a global context*, European Environmental Agency, Copenhagen.

EEA (2015b), *State of nature in EU. Results from reporting under the nature directives 2007-2012*, EEA technical report no2/2015, European Environment Agency, Luxembourg.

Engbers, N. (2016), *Kansen en beperkingen van sturingsarrangementen gericht op het beschermen van weidevogels bij Friese melkveeboeren*, Bachelor thesis Forest and Nature Conservation, Wageningen University and Research Centre, Wageningen.

Erismann, J.W., N. van Eekeren, J. de Wit, C. Koopmans, W. Cuijpers, N. Oerlemans and B.J. Koks (2016), Agriculture and biodiversity: a better balance benefits both, *AIMS Agriculture and Food*, 1 (2), pp. 157-174.

EZ (2014), *Rijksnatuurvisie 2014, Natuurlijk verder*, Ministry of Economic Affairs, The Hague.

Franks, J. (2010), Boundary organizations for sustainable land management: the example of Dutch Environmental Co-operatives, *Ecological Economics*, 70, pp. 283-295.

Geiger, F., J. Bengtsson, F. Berendse, W.W. Weisser, M. Emmerson, M.B. Morales, P. Ceryngier, J. Liira, T. Tschardtke, C. Winqvist, S. Eggers, R. Bommarco, T. Pärt, V. Bretagnolle, M. Plantegenest, L.W. Clement, C. Dennis, C. Palmer, J.J. Oñate, I. Guerrero, V. Hawro, T. Aavik, C.Thies, A. Flohre, S. Hänke, C. Fischer, P.W. Goedhart and P. Inchausti (2010), Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland, *Basic and Applied Ecology*, 11 (2), pp. 97-105.

Grievink, J.-W. (2003), The changing face of the global food supply chain, *paper presented at the OECD Conference Changing Dimensions of the Food Economy*, 6-7 February 2003, The Hague.

Grin, J., N. Polman, M. Dijkshoorn-Dekker and T. Vogelzang (2015), *Verdienmodellen voor natuurinclusieve landbouw. Wat ondernemers al doen, en wat de overheid kan doen om opschaling te bevorderen*, LEI/Wageningen University and Research Centre, The Hague/Wageningen.

Hegger, D., M. Lamers, A. van Zeijl-Rozema and C. Dieperink (2012), Conceptualising joint knowledge production in regional climate change adaptation projects: Success conditions and levers for action, *Environmental Science and Policy*, 18, pp. 52-65.

Hegger, D., A. van Zeijl-Rozema and C. Dieperink (2014), Toward design principles for joint knowledge production projects: Lessons from the deepest polder of The Netherlands, *Regional Environmental Change*, 14 (3), pp. 1049-1062.

Hegger, D.L.T., H.A.C. Runhaar, F.S.J. van Laerhoven and P.P.J. Driessen (2016), Towards explanations for stability and change in modes of environmental governance: the case of Dutch flood risk governance, *Journal of Environmental Policy & Planning* (resubmitted after review).

Hemerijck, A.C. and C.A. Hazeu (2004), Werkt het, past het, mag het, en hoort het? De kernvragen van beleidsvorming, toegepast op milieubeleid, *Bestuurskunde*, 13 (2), pp. 55-65.

- Hermans, F., I. Horlings, P.J. Beers and H. Mommaas (2010), The contested redefinition of a sustainable countryside: Revisiting Frouws' rurality discourses, *Sociologia Ruralis*, 50 (1), pp. 46-63.
- Higgings, V., J. Dibden and C. Cocklin (2008), Neoliberalism and natural resource management: agri-environmental standards and the governing of farming practices, *Geoforum*, 39, pp. 1776-1785.
- Hiron, M., Å. Berg, S. Eggers, J. Josefsson and T. Pärt (2013), Bird diversity relates to agri-environment schemes at local and landscape level in intensive farmland, *Agriculture, Ecosystems and Environment*, 176, pp. 9 - 16.
- IPES-Food (2016), *From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems*, International Panel of Experts on Sustainable Food systems, Louvain-la-Neuve.
- Kleijn, D., F. Berendse, R. Smit and N. Gilissen (2001), Agri-environment schemes do not effectively protect biodiversity in Dutch agricultural landscapes, *Nature*, 413 (6857), pp. 723-725.
- Kleijn, D., R.A. Baquero, Y. Clough, M. Díaz, J. de Esteban, F. Fernández, D. Gabriel, F. Herzog, A. Holzschuh, R. Jöhl, E. Knop, A. Kruess, E. Marshall, I. Steffan-Dewenter, T. Tschamtker, J. Verhulst, T.M. West and J.L. Yela (2006), Mixed biodiversity benefits of agri-environment schemes in five European countries, *Ecology Letters*, 9 (3), pp. 243-254.
- Kleijn, D. (2012), *De effectiviteit van agrarisch natuurbeheer*, commissioned by RLI-PBL, Wageningen (available from www.rli.nl/sites/default/files/u61/david_kleijn_-_de_effectiviteit_van_agrarisch_natuurbeheer.pdf).
- Kohler, F., J. Verhulst, E. Knop, F. Herzog and D. Kleijn (2007), Indirect effects of grassland extensification schemes on pollinators in two contrasting European countries *Biological Conservation*, 135 (2), pp. 302-307.
- Langers F. and M. Goossen (2014), *Beleving van de weidevogelproblematiek in Nederland*, Alterra, Wageningen.

Lemaire G., A. Franzluebbers, P.C.D.F. Carvalho and B. Dedieu (2014), Integrated crop-livestock systems: Strategies to achieve synergy between agricultural production and environmental quality, *Agriculture, Ecosystems and Environment*, 190, pp. 4-8.

Lokhorst, A.M., H. Staats, J. van Dijk and G. de Snoo (2011), What's in it for me? Motivational differences between farmers' subsidised and non-subsidised conservation practices, *Applied Psychology*, 60 (3), pp. 337-353.

Marinho, C.D., F.J.O. Martins, A.T. Amaral Jr., L.S.A. Gonçalves, O.J.A.P. dos Santos, D.P. Alves, B.P. Brasileiro and L.A. Peternelli (2014), Genetically modified crops: Brazilian law and overview, *Genetics and Molecular Research*, 13 (3), pp. 5221-5240.

Marshall, E.J.P., T.M. West and D. Kleijn (2006), Impacts of an agri-environment field margin prescription on the flora and fauna of arable farmland in different landscapes, *Agriculture, Ecosystems and Environment*, 113 (1-4), pp. 36-44.

Melman, Th.C.P., A.G.M. Schotman, S. Hunink and G.R. de Snoo (2008), Evaluation of meadow bird management, especially Black-tailed Godwit (*Limosa limosa* L.), in the Netherlands, *Journal of Nature Conservation*, 16 (2), pp. 88-95.

Melman, D., W. Teunissen and A. Guldemond (2016), Weidevogels – op weg naar kerngebieden, in: G.R. de Snoo, Th.C.P. Melman, F.M. Brouwer, W.J. van der Weijden and H.A. Udo de Haes (eds.), *Agrarisch natuurbeheer in Nederland. Principes, resultaten en perspectieven*, Wageningen Academic Publishers, Wageningen, pp. 137-161.

Milieudefensie (2015), Nog steeds op grote schaal oerwoud gekapt voor veevoer, Milieudefensie, Amsterdam (available from <https://milieudefensie.nl/veevoer/nieuws/Nog-steeads-op-grote-schaal-oerwoud-gekapt-voor-veevoer>).

Natuur en Milieu (n.d.), Verantwoord veevoer: duurzame soja, Natuur en Milieu, Utrecht (available from www.natuurenmilieu.nl/themas/voedsel/campagnes-3/verantwoord-veevoer-duurzame-soja).

Norton D. and N. Reid (eds.). 2013. *Nature and farming: sustaining native biodiversity in agricultural landscapes*, Csiro Publishing, Melbourne.

Ollerton J., H. Erenler, M. Edwards and R. Crockett (2014), Extinctions of aculeate pollinators in Britain and the role of large-scale agricultural changes, *Science*, 346 (6215), pp. 1360-1362.

O'Rourke, E., M. Charbonneau and Y. Poinot (2016), High nature value mountain farming systems in Europe: Case studies from the Atlantic Pyrenees, France and the Kerry Uplands, Ireland, *Journal of Rural Studies*, 46, pp. 47-59.

PBL (2012), *Natuurverkenning 2010-2040. Visies op de ontwikkeling van natuur en landschap*, Environmental Assessment Agency the Netherlands, The Hague, (available from www.pbl.nl/sites/default/files/cms/publicaties/PBL-2012-Natuurverkenning-2010-2040-50041400.pdf).

PBL (2014), *The Netherlands in 21 infographics, facts and figures on the human environment*, Environmental Assessment Agency the Netherlands, Bilthoven (available from www.pbl.nl/en/publications/the-netherlands-in-21-infographics).

PBL (2016a), *Nitrates in upper groundwater under agricultural land, 1992-2010*, Environmental Assessment Agency the Netherlands, Bilthoven (available from www.compendiumvoordeleefomgeving.nl/indicatoren/en0271-Nitrates-in-upper-groundwater-under-agricultural-land.html?i=41-205).

PBL (2016b), *Environmental load of pesticides, 1998-2010*, Environmental Assessment Agency the Netherlands, Bilthoven (available from www.compendiumvoordeleefomgeving.nl/indicatoren/en0548-Environmental-load-of-pesticides.html?i=41-205).

Pe'er, G., L.V. Dicks, P. Visconti, R. Arlettaz, A. Báldi, T.G. Benton, S. Collins, M. Dieterich, R.D. Gregory, F. Hartig, K. Henle, P.R. Hobson, D. Kleijn, R.K. Neumann, T. Robijns, J. Schmidt, A. Shwartz, W.J. Sutherland, A. Turbé, F. Wulf and A.V. Scott (2014), EU agricultural reform fails on biodiversity, *Science*, 344 (6188), pp. 1090-1092.

Polman, N.B.P., M.W.C. Dijkshoorn, R.B. Doorneweert, P.J. Rijk, T.A. Vogelzang, A.J. Reinhard and A. Heideveld (2015), *Verdienmodellen Natuurinclusieve landbouw*, LEI, Wageningen UR, The Hague (available from <http://edepot.wur.nl/346410>).

Prager, K. (2015a), Agri-environmental collaboratives for landscape management in Europe, *Current Opinion in Environmental Sustainability*, 12, pp. 59-66.

Prager, K. (2015b), Agri-environmental collaboratives as bridging organisations in landscape management, *Journal of Environmental Management*, 161, pp. 375-384.

RLI (2013), *Onbeperkt houdbaar, naar een robuust natuurbeleid*, Raad voor de Leefomgeving en Infrastructuur, The Hague.

Runhaar, H. and K. van Nieuwaal (2010), Understanding the use of science in decision-making on cockle fisheries and gas mining in the Dutch Wadden Sea: putting the science-policy interface in a wider perspective, *Environmental Science & Policy*, 13 (3), pp. 239-248.

Runhaar, H.A.C., Th.C.P. Melman, F.G. Boonstra, J.W. Erisman, L.G.. Horlings, G.R. de Snoo, C.J.A.M. Termeer, M.J. Wassen, J. Westerink and B.J.M. Arts (2016a), promoting nature conservation by Dutch farmers: a governance perspective, *International Journal of Agricultural Sustainability* (under review).

Runhaar, H., H.J. van der Windt and J.P.M. van Tatenhove (2016b), Conclusions from the Environmental Science & Policy special issue on Organising productive science-policy interactions for sustainable coastal management. Lessons from the Wadden Sea, *Environmental Science and Policy*, 55 (1), pp. 467-471.

Runhaar, H., C. Uittenbroek, M. van Rijswick, H. Mees, P. Driessen, H. K. Gilissen (2016c), Prepared for climate change? A method for the ex-ante assessment of formal responsibilities for climate adaptation in specific sectors, *Regional Environmental Change*, 16 (5), 1389-1400.

Sabatier, P. and C.M. Weible (2007), The advocacy coalition framework: innovations and clarifications, in: P. A. Sabatier (Ed.) *Theories of the policy process*, Westview Press, Boulder, pp. 189-220.

Sanders, M. and J. Westerink (2015), *Op weg naar een natuurinclusieve duurzame landbouw*, Alterra Wageningen UR, Wageningen.

Sanderson, F.J., M. Kucharz, M. Jobda and P.F. Donald (2013), Impacts of agricultural intensification and abandonment on farmland birds in Poland following EU accession, *Agriculture, Ecosystems and Environment*, 168, pp. 16-24

Sathiya Priya, T. and N. Vivek (2016), Restructuring the agricultural supply chain, *International Journal of Business Innovation and Research*, 10 (1), pp. 135-148.

SCAN (n.d.), *Onderzoeksvragen collectieven tbv ANLb, door Astrid Manoudt en Harm Kossen*, Stichting Collectief Agrarisch Natuurbeheer, Utrecht (unpublished document).

Schlaich, A.E., R.H.G. Klaassen, W. Bouten, C. Both and B.J. Koks (2015), Testing a novel agri-environment scheme based on the ecology of the target species, Montagu's Harrier *Circus pygargus*, *Ibis*, 157 (4), pp. 713-721.

Schrijver, R.A.M., D.P. Rudrum and T.J. de Koeijer (2008), *Economische inpasbaarheid van natuurbeheer bij graasdierbedrijven* (WOt-rapport 80), Alterra, Wageningen.

Smit, A.A.H., P.P.J. Driessen and P. Glasbergen (2008), Constraints on the conversion to sustainable production: The case of the Dutch potato chain, *Business Strategy and the Environment*, 17 (6), pp. 369-381.

Smit, A.A.H., P.P.J. Driessen and P. Glasbergen (2009), Conversion to organic dairy production in the Netherlands: Opportunities and constraints, *Rural Sociology*, 74 (3), pp. 383-411.

Stoate, C., A. Báldi, P. Beja, N.D. Boatman, I. Herzon, A. van Doorn, G.R. de Snoo, L. Rakosy and C. Ramwell (2009), Ecological impacts of early 21st century agricultural change in Europe – a review, *Journal of Environmental Management*, 91 (1), pp. 22-46.

Termeer, C.J.A.M., M. Stuiver, A. Gerritsen and P. Huntjens (2013), Integrating self-governance in heavily regulated policy fields: insights from a Dutch farmers' cooperative, *Journal of Environmental Policy & Planning*, 15 (2), pp. 285-302.

The Daily Milk (2015), *9 weetjes over de weidegang* (available from www.thedailymilk.nl/9-weetjes-over-de-weidegang).

Tieguhong, J.C., V. Ingram, W.A. Mala, O. Ndoye and S. Grouwels (2015), How governance impacts non-timber forest product value chains in Cameroon, *Forest Policy and Economics*, 61, pp. 1-10.

Van Buuren, A. and J. Edelenbos (2004), Why is joint knowledge production such a problem? *Science and Public Policy*, 31 (4), pp. 289-299.

Van Dam, M. (2015), *Kamerbrief over nieuw stelsel agrarisch natuur- en landschapsbeheer en weidevogels*. Brief aan de Tweede Kamer van staatssecretaris Van Dam over het nieuwe stelsel agrarisch natuur- en landschapsbeheer en weidevogels, Parliament, The Hague (available from <https://www.rijksoverheid.nl/documenten/kamerstukken/2015/11/30/kamerbrief-nieuw-stelsel-agrarisch-natuur-en-landschapsbeheer-en-weidevogels>).

- Van den Ban, A. (2011), Increasing labour productivity in agriculture and its implications, *Journal of Agricultural Education and Extension*, 17 (5), pp. 401-409.
- Van Eeten, M.J.G. (1999), 'Dialogues of the deaf' on science in policy controversies, *Science and Public Policy*, 26 (3), pp. 185-192.
- Van Enst, W. H. Runhaar and P.P.J. Driessen (2016), Boundary organisations and their strategies: Three cases in the Wadden Sea, *Environmental Science & Policy*, 55 (1), pp. 416-423.
- Van Herten, M. and H. Runhaar (2013), Dialogues of the deaf in Dutch eel management policy. Explaining controversy and deadlock with argumentative discourse analysis, *Journal of Environmental Planning and Management*, 56 (7), pp. 1002-1020.
- Van Kasteren, J. (2009), Tweedeling landbouw onvermijdelijk, *Volkskrant*, 28 december 2009.
- Van Oosten, C., P. Gunarso, I. Koesoetjahjo and F. Wiersum (2014), Governing forest landscape restoration: Cases from Indonesia, *Forests*, 5 (6), pp. 1143-1162.
- Van Strien, A.J., A.W. Gmelig Meyling, J.E. Herder, H. Hollander, V.J. Kalkman, M.J.M. Poot, S. Turnhout, B. van der Hoorn, W.T.F.H. van Strien-van Liempt, C.A.M. van Swaay, C.A.M. van Turnhout, R.J.T. Verweij and N.J. Oerlemans (2016), Modest recovery of biodiversity in a western European country: The Living Planet Index for the Netherlands, *Biological Conservation*, 200, pp. 44-50.
- Van Tatenhove, J.P.M., H. Runhaar and H.J. van der Windt (2016), Editorial for the special issue on Organising productive science-policy interactions for sustainable coastal management. Lessons from the Wadden Sea, *Environmental Science and Policy*, 55 (1), pp. 377-379.
- Velten, S., J. Leventon, N. Jager and J. Newig (2015), What is sustainable agriculture? A systematic review, *Sustainability (Switzerland)*, 7 (6): pp. 7833-7865.
- Virchow, D. (1999), Conservation of plant genetic resources for food and agriculture: Main actors and the costs to bear, *International Journal of Social Economics*, 26 (7-9), pp. 1144-1161.

VNC (n.d.), *Deltaplan voor het landschap*, Vereniging Nederlands Cultuurlandschap, Beek-Ubbergen (available from <http://nederlandscultuurlandschap.nl/wat-doet-vnc/deltaplan-voor-het-landschap>).

Weible, C.M., P.A. Sabatier and K. McQueen (2009), Themes and variations. Taking stock of the Advocacy Coalition Framework, *The Policy Studies Journal*, 37 (1), pp. 121–140.

WNF (2015), *Living Planet Report. Natuur in Nederland*, Wereld Natuur Fonds, Zeist (available from https://www.wnf.nl/wat-wnf-doet/onze-aanpak/onderzoek-en-innovatie/living-planet-report.htm?gclid=CjwKEAjw4dm6BRCQhtz16Z6N4ioSJADFPu1nK7hHp-S5pLCID4FAhV4flFtCMUHOLvoD_rtJvTRp7BoCCmTw_wcB).

Westerink, J., G. Migchels and K.A. Engelsma (2013), *Natuur als onderdeel van het product. Kunnen onderscheidende merken natuur en landschap financieren?* Alterra, Wageningen.

Westerink, J., D.C.P. Melman and R.A.M. Schrijver (2015), Scale and self-governance in agri-environment schemes: experiences with two alternative approaches in the Netherlands, *Journal of Environmental Planning and Management*, 58 (8), pp. 1490-1508.

Young, J.C., K.A. Waylen, S. Sarkki, S. Albon, I. Bainbridge, E. Balian, J. Davidson, D. Edwards, R. Fairley, C. Margerison, D. McCracken, R. Owen, C.P. Quine, C. Stewart-Roper, D. Thompson, R. Tinch, S. van den Hove and A. Watt (2014), Improving the science-policy dialogue to meet the challenges of biodiversity conservation: having conversations rather than talking at one-another, *Biological Conservation*, 23, pp. 387-404.

Zuivel.nl (n.d.), *Zuivel in cijfers, 2014* (available from www.zuivelnl.org/wp-content/uploads/2015/09/Zuivel-in-cijfers-2014.pdf).



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'It is becoming increasingly difficult to combine nature conservation by farmers with intensive and large-scale farming. A transformation towards 'nature-inclusive' farming faces three governance challenges. First, agri-environment schemes and other conservation arrangements need to become more effective. At the same time, nature conservation should be mainstreamed in agricultural policies and in agri-food chains. Second, we need shared meanings about nature-inclusive farming. Third, other forms of knowledge production for nature-inclusive farming are required that focus more on farmers' knowledge needs.'