Farmers building alliances. Learning from and with local experts – Novelty production in the Friesian Woodlands

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Abstract: *The Black-tailed Godwit, a red-list bird species, depends for its reproduction to a large extent on the Dutch grasslands. In the Friesian Woodlands, in the northern part of The Netherlands, farmers take the lead in protecting Black-tailed Godwits. To safeguard bird nests and create foraging conditions for both mother birds and chicks the farmers develop heterogeneous grassland management practices and use what is locally referred to as improved manure. Farmers relate their farm management to that of neighbouring farmers and to observations of bird watchers and hunters in the area. The farm development process we consider as an 'unfolding' practice. The management of interlinked activities and further unfolding practices of farmers is in hands of a territorial cooperative, in which farmers take responsibility and develop their own strategies to reach aims. In this article we analyze how a new ´*technical configuration*´, the soil-plant-animal-manure system, seems to support the survival of the Black-tailed Godwit and other bird species. As the configuration is new and only partly understood by outsiders, we conceptualize it as a novelty. The phenomenon of combining farming and bird protection we analyze as a series of interrelated novelties produced by farmers in the region, at different aggregation levels. Hence,* novelty production *determines the success of farm land bird protection in the area and results in a complex whole of alliances. Besides integration of man and nature at the regional level, the territorial cooperative as organisational novelty gets things translated to and explained at the national level. We clarify interrelations between technical and organizational novelties, explain how novelties at farm level demand for novelties at higher levels of aggregation, and provide insight in how the concept of novelty production represents an analytical frame for exploring and building upon knowledge of land users who manage successful systems. In this way, we provide insight on how locals learn from each other, and scientists and policy makers can learn from and with local experts as well as provide local experts input for improving the success of their systems.*

Keywords: *Black-tailed Godwit, bird watchers, hunters, farmers, local knowledge, social learning, grassland management, improved manure, ecological capital, territorial cooperative, novelties, novelty production*

Introduction

The modernization of agricultural production, characterized by specialization, intensification and increase of scale of agricultural production, has resulted in the destruction and fragmentation of foraging and nesting habitats for field bird species in farmers' fields (Baudry *et al.*, 2003). The deterioration of habitat conditions has led to a decline in the number and range of these bird species (Beintema *et al.*, 1997; Duncan *et al.*, 1999; BirdLife International, 2004). One of the endangered species is the Black-tailed Godwit (*Limosa limosa*). Of all European birds of this species, 40% breeds in The Netherlands (Teunissen and Soldaat, 2006). Until now, most of the attempts to correct the negative side-effects of the agricultural modernization process do not result in higher numbers of field bird species (Kleijn *et al.*, 2001; Berendse *et al.*, 2004; Willems *et al.*, 2004).

However, there are exceptions to this, which are to be found in locally situated and differentiated farmers' strategies regarding nature and landscape preservation (Swagemakers and Wiskerke, 2006). Various promising options for fine-tuning farm management resulting in better bird protection exist, although it is expected that farmers on less intensively managed farms most easily adapt their farming system to the natural conditions for field birds (Swagemakers *et al.*, 2009). In order to be successful, locally 'unfolding' farm management strategies are to be accompanied by the development of, often new, institutional arrangements.

A well documented example of the dynamics of farmers' strategies and along coming institutional arrangements regarding the combination of farming and landscape preservation and nature conservation is the territorial cooperative the Northern Friesian Woodlands (Wiskerke *et al.*, 2003) in the northern part of The Netherlands (figure 1). This cooperative covers 50,000 hectares and has around 900 members, mainly dairy farmers and other land-users. About 90% of the farmers in the area is member of the cooperative. Hence, the NFW cooperative is an important mediator between governmental bodies (at different levels) and NGO's on the one side and the area and its inhabitants (farmers and other land-users) on the other side. Among others, the cooperative helps farmers to optimize their farming system alternatively, and aligns the protection of field bird species, in particular the Black-tailed Godwit, and the interests of (mainly) dairy farmers in the area. In order to protect the endangered bird species farmers adapt their grassland management schemes, which is regionally to be coordinated, and collaborate and build alliances with bird watchers and other relevant stakeholders. As a result a wide range of actors in the region is involved in field bird protection, farming and related activities.

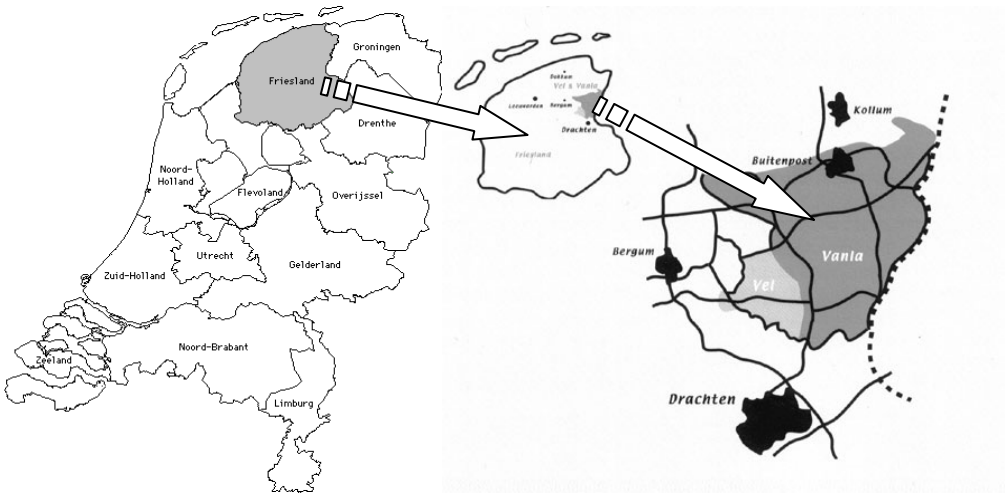

Figure 1: Location of the hedgerow landscape and the surrounding open fields of the Friesian Woodlands in the northern part of The Netherlands (Koeleman, 2003:18 – own modification).

In this article we interpret these local specific dynamics on successfully combining farming and bird protection in the Friesian Woodlands in terms of *novelties and novelty production*. These concepts we present and illustrate by case study research. We show that in the construction and the governance of field bird protection *local knowledge* and *social learning* play a crucial role. Our aim is to provide insight on how can be learned from and with local experts.

Theoretical notions on 'unfolding' farming practices

For our analyses on successfully combining farming and field bird protection we focused on the ways in which humans and the natural and socio-political environment mutually shape each other in locally specific contexts. Both empirically and theoretically the focus is thus on the interaction of two or more systems (Norgaard, 1981; 1984). To capture this interaction, concepts as co-evolution and co-production are often used in the academic literature (Hebinck, 2001; Rammel *et al.*, 2007). Central in our analyzes are farming practices based on the use and improvement of ecological capital: the whole of natural resources that a) is the result of former co-production, b) is the basis for coming cycles of co-production in such a way that c) the results of coming cycles are superior (regarding the possible use of locally available natural resources, i.e. the potential autonomous resource base of the farm) to the former ones (Toledo, 1990; Van der Ploeg, 1997; 2003; Wiskerke, 1997; Roep, 2000; Gerritsen, 2002; Swagemakers and Wiskerke, in preparation). As these processes are actively guided by humans (farmers), we prefer to speak of co-production rather than of co-evolution.

In order to improve understanding of the optimization of farmers' strategies and their 'unfolding' practices we analyze how farmers adapted their system. We analyze what changes are involved, how farmers interrelate these changes, and how these changes are adapted to the social and natural environment of the farm. These changes, often small and hardly notable for outsiders, we conceptualise as *novelties*; the unfolding practices, i.e. the development process itself, we conceptualise as *novelty production*.

Novelties, novelty production and successful field bird protection

More generally, a novelty can be understood as a rupture of existing routines. They differ from the innovations as often applied to the farm from outside, derived from external institutional bodies. Different from innovations, novelties reflect and represent local knowledge. Consequently, novelties often conflict with current routines and institutionalized knowledge, i.e. scientific understanding of farming, ecosystems and governance structures which often function along the mechanisms of prescription and, consequently, inflexible control. In this respect novelties are deviations; alternative ways of management that carry the promise things can be done better. A novelty is not an isolated promise, but often relates to other novelties which all evolve in practice (Swagemakers, 2003; Wiskerke and van der Ploeg, 2004). This continuous process of change and adaptation (here: internal optimization of local resources) can be conceptualized as *novelty production*, which *'refers to the capacity, within the region, to continuously improve processes of production, products, patterns of cooperation, etc.'* (Van der Ploeg *et al.*, 2009:9).

Novelties are, in other words, local solutions which, in the case of combining farming and field bird protection, are found, developed and continuously adapted by land users, and result from and strongly depend on local knowledge on both the natural and socio-political environment. The concept of novelty production holds the promise to align two or more systems and to bridge practical, political and scientific insights and needs that contribute to the further success of specific systems. Hereafter we explain and illustrate novelties and novelty production by a case study on a promising 'system innovation' for successful field bird protection.

Case study research, qualitative description, in-depth understanding

Case study research provides an adequate context for in-depth analysis of phenomena under investigation (Yin, 1984), here successfully combining farming and field bird protection. The application and combination of different sources of information and several research methods in the study of the same phenomenon are known as the triangulation method (Mathison, 1988; Verschuren and Doodewaard, 1999). Triangulation aims at improving the credibility of finding in qualitative research by providing results from different angles, all pointing to the same conclusion. Following Nooij (1990) on using a subject-centred approach, case study research is useful for understanding and ordering empirical reality and complexity (Nooij, 1993; Whatmore, 1994), in this case regarding combining farming and field bird protection.

In order to gain insight in farm strategies and novelties for field bird protection we held in-depth interviews with farmers, farm advisors, bird watchers, and hunters and joined the stakeholders during their activities. Additionally, we collected data in the field about grassland management, manure application, and the distribution of birds, and carried out desk studies about the ongoing dynamics in the area. Local experts and researchers informed us about the novelties that already had been tested (often by means of scientific field experiments) and their impact on the environment, nature and the landscape in the research area. In the course of the research we tested the hypothesis that for successful field bird protection local experts play a crucial role.

Case study: a system innovation for successful field bird protection

The Friesian Woodlands is one of the best preserved hedgerow landscapes of Europe. In the early 1990s, governmental regulations for protecting the hedgerow landscape restricted farmers to expand their farms. In exchange for more freedom regarding the development of their farms, farmers committed themselves to the reduction of nitrogen losses and ammonia emission. Partly due to the policy requirements farmers together with scientists reshaped and recombined natural resources important to their farming system, striving towards an ecologically optimized farming system (Stuiver *et al.*, 2003; Swagemakers and Wiskerke, 2006). Over the years, farmers have paid close attention to the integration of agriculture, nature and environment.

This process of continuous adaptation of the farming system to the natural environment was accompanied by the rise of environmental cooperatives. In this type of cooperatives farmers take responsibility and develop their own strategies to reach aims (Renting and Van der Ploeg, 2001; Stuiver and Wiskerke, 2004; Wiskerke *et al.*, 2003). Five of these environmental cooperatives in the area merged together in the territorial cooperative The Northern Friesian Woodlands. The NFW cooperative mediates between different policy levels and NGO's on the one side and the area and its inhabitants on the other side.

Unfolding farmers' practices: the performance of the system innovation

The need of farmers in the region to integrate agriculture, nature and environment resulted in a system innovation, the 'soil-plant-animal-manure system' (Verhoeven *et al.*, 2003; Van der Ploeg et al., 2006 Reijs, 2007). Figure 2 represents this alternative system optimization. Central are the reduction of the input of artificial fertilizers, the delay of mowing dates, and feeding the cows a diet poor in protein and rich in fibre.

In mainstream optimization strategies farmers maximize milk production on the basis of external inputs as artificial fertilizers and concentrates rich in protein. This results in a higher N-content in the manure, and consequently relatively high N-emissions. In order to reduce the N-emissions (also externally defined) prescriptions oblige farmers to inject the manure into the soil. In this way N-emission seems to be reduced.

The externally prescribed solution caused farmers in the Friesian Woodlands difficulties in optimizing their farm strategy. The strategy they developed and applied deviates from the mainstream optimization strategy: in their strategy the farmers strived towards higher N-efficiency in the system itself.

The farmers achieved higher N-efficiency through the reduction of the input of artificial fertilizers and concentrates. This resulted in a diet poor in protein and rich in fibre. The changing diets in turn changed the quality of the manure, which differs in terms of composition, physical appearance, smell and effects, and has a low N-content and high C/N ratio (Goede *et al.*, 2003). The application of the manure draws special attention: the farmers use their own machinery and despite surface application of the manure they reach similar or better levels of N-efficiency (Huijsmans *et al.*, 2004; Reijs *et al.*, 2003; 2007; Reijs, 2007). The application of the improved manure stimulates soil life, and increases the N-delivery of the soil. In order to optimize the uptake of N by soil life the on-surface application of the improved manure is preferably done under rainy weather conditions (Sonneveld and Bouma, 2005; Sonneveld *et al.*, 2009).

'Re-balancing' fodder quality, cow races, quality of the manure and grassland vegetation resulted in improved system performance. Characteristics are the decrease of total N-input, improved nitrogen delivery capacity of the soil, and consequently the increase of overall N-efficiency in the system. Consequently, the system innovation holds the promise to meet the environmental requirements regarding N-emissions, and in fact contributed in achieving the environmental aims: the reduction of nitrogen losses and ammonia emission. Besides reducing the environmental impact of farming activities, the system innovation safeguarded biodiversity in the hedgerow landscape. The grasslands became more heterogeneous, and the edges of the fields as well as the hedges and belts of altered

trees in between the fields richer in plant species. The extensive character of this system optimization leaves more space for biodiversity in and in the edges of the fields in the hedgerow landscape (Weeda, 2004).

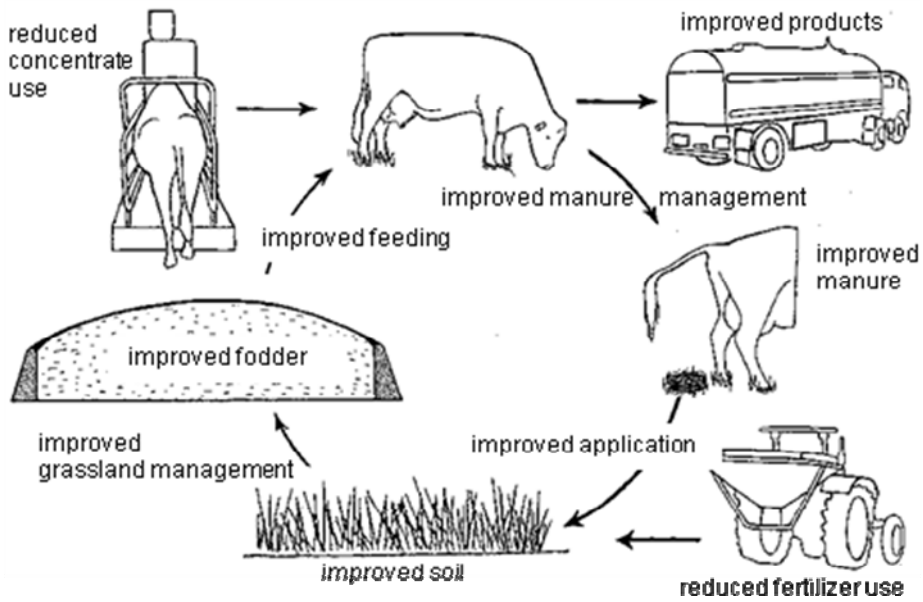

Figure 2. Re-balancing the soil-plant-animal-manure system (Van der Ploeg *et al.*, 2006).

Further unfolding practices: the system innovation and bird protection

Besides biodiversity in and in the edges of the fields, in the open fields surrounding the hedgerow landscape of the Friesian Woodlands field birds seem to benefit from the soil-plant-animal-manure system. The quality of the manure affects the organic matter content in the soil, and improves soil life as well as the water containing capacity of the soil. Consequently, the soil does not dry so quickly. This is crucial to the Black-tailed Godwit (adult bird) that uses its long bill to search for worms for egg production (Beintema, 1995). Improved manure, soil life and water containing capacity of the soil are also important to manage the grasslands flexibly, which is relevant for the survival of the Black-tailed Godwit chick.

The lower N-contents in the improved manure result in slower grass growth and, consequently, in flexible grassland management. Lower N-contents also allow for the surface application of the manure and the possibility of using own machinery. In this way farmers remain more autonomous and more flexible regarding *how much* manure to apply at what moment, and thus to *what extent* to stimulate the grass growth. Consequently they remain flexible regarding *when* the grass to be grazed or mown. Flexible grassland management prevents the nests to be harmed by grazing or mowing activities, as often is the case in mainstream farming practices optimized for maximizing milk production, and provides feed for Black-tailed Godwit chicks that live from insects in the top of longer grass at approximately 15 centimetres. This longer grass makes it difficult to predators to locate the nests and young chicks, which are not able to fly during the first weeks after they are born.

Recapitulating, the use of improved manure unexpectedly benefits to the survival of the Black-tailed Godwit. It provides the habitat conditions to the Black-tailed Godwit and its chicks (worms and insects, shelter against predators), and turns otherwise detrimental activities like grazing and mowing in preconditions for field bird protection. Flexibility regarding grass land management is important as harvesting of the grass as well as the breeding season of field birds lasts from April to July.

Having an eye for birds

The application of manure and grazing and mowing activities relate to what in the area is called 'having an eye for birds' (Swagemakers *et al.,* 2009). Having an eye for birds refers to the local knowledge on where field birds nest and why, what type of birds require what type of conditions, the willingness to wait with mowing the grass, or, if mowing to carefully mow the grass, the danger of predation and possible ways of lowering the risk of predation, and, finally, the capacity to judge whether the habitat conditions are successfully fulfilled and result in the survival of young chicks.

In order to optimize the breeding success of the Black-tailed Godwit, and this particular red-list bird species to survive, farmers have to take a range of well adjusted measures. They have to apply the improved manure at the right moment and in the right quantities and simultaneously have to anticipate, *before* the birds arrive to the fields, where the birds will possibly nest, and where chicks possibly can grow up. These observations and interpretation of the conditions in the fields affect and influence the farm activities.

The role and tasks of the territorial cooperative

The fact farmers and field birds have no fixed relations (the location of bird nests might differ from year to year) requires mapping birds and adapting grass land management at the regional level. The NFW cooperative coordinates the mapping of bird nests, manages the required adaptation of grassland schemes of farmers, and investigates and controls other relevant protective measures at the farm. Also, it involves others to support these activities (bird watchers, hunters) and communicates the planning and implementation of measurements and their results to higher governmental bodies.

Continuing the case study: learning from and with local experts

Field bird management entails a complex process of the fine-tuning of farm activities (mainly regarding grassland management) and the organization and implementation of protective measures for field birds (mainly mapping nests, nest protection, delayed mowing dates, and fighting predators). These activities and measures are translated into contracts, mostly on delayed mowing dates, through which payments for field bird protection are organized. Fine-tuning of grassland management and other measures is organized at different levels: the level of the field, of the farm, the fields of neighbouring farmers and/or fields in areas managed by organizations for nature conservation, and the level of governmental policy. In some cases the farmer has an eye for birds, and knows and decides what to do. In other cases he is assisted by volunteer bird watchers who help the farmer to map the nests, adapt grassland management, and implement protective measures. Farmers and bird watchers discuss the relevant measures, after which these are implemented by the farmer. In some cases farmers fight predation, in others hunters assist the farmers. In general the knowledge of hunters is valuable, but often under-appreciated, or, by many people, the knowledge and contribution of hunters in regulating nature is even objected. However, hunting is relevant regarding fighting the predation of chicks. It is an important factor in the breeding success of Black-tailed Godwits but, due to national laws protecting the predators from hunters, a difficult one to optimize.

Grassland management: on the importance of adaptability and flexibility

Many measures, like mapping bird nests and nest protection, can be organized and carried out by others then the farmer. Grassland management however remains a task to be carried out – or at least to be organized (in the case of hiring a contractor to mow the grass) – by the farmer. Grassland management is translated in contracts for bird protection that are based on so-called mosaic-management. This entails a mosaic of different grass altitudes which is created by varying grazing activities, variation in manure application, and delayed mowing of (parts of) the fields and/or field margins, which together these measures compose a habitat for bird species.

Initially these contracts were based on at on-forehand made decisions on grassland management. Consequently the farmer had to decide which fields (or part of a field) should have a delayed mowing date *before* birds had nested. Provisional extended mowing dates were registered and controlled by the governmental bodies. In practice it occurred farmers had to change the initial drawn plans during the season. Birds had nested in other fields, or had not come at all – which made it nonsense to carry out the measures that were agreed on in contracts. In an experimental situation farmers adapted their farm activities to the requirements of bird life in their fields, and operated on the basis of 'adaptability' and 'flexibility' instead of 'prescription' and 'control' (Van Kessel, 1990; Wynne, 1996). The objective of the farmers involved became to prove how flexibility regarding grassland management would result in improved breeding success. In order to fine-tune grassland management and the implementation of measures and thus aligning bird protection at the different levels of aggregation (field, farm, fields of different farms, and governmental regulations), the determining factors for successful bird protection have been mapped and managed at the regional level.

The role of the territorial cooperative

Hence, the NFW cooperative plays a role in mapping and monitoring field bird populations. It monitors which farmers receive birds in their fields, and who is applying what extended mowing dates. Despite attitudes towards fitting the management of field birds in the farm business differ among farmers, in the case study area can be learned how field bird protection regionally can be optimised. Besides mapping bird nests the NFW cooperative plays a role in organizing and optimizing the habitat conditions of field birds.

Theoretical intermezzo: on novelties and novelty production

As local experts, farmers play a crucial role in field bird protection. Whereas field birds are increasingly endangered in mainstream farming practices, we examine the system innovation that was developed in The Friesian Woodlands as *promising technical configuration* (Rip and Kemp, 1998; Van der Ploeg *et al.*, 2004). After all, the survival of Black-tailed Godwit chicks is very likely to be supported by the adaptation of the soil-plant-animal-manure system. The alternative system innovation and its (unintended) outcomes we analyze in terms of interrelating novelties. The soil-plant-animal-manure system is such a novelty. It contributes to the development of the improved manure, yet another novelty. Along with adapting the farming system farmers in the area organized themselves in environmental cooperatives, again a novelty, at another aggregation level. These environmental cooperatives merged together into a territorial cooperative, covering a larger area, and therefore better able to coordinate variation in grassland management needed for successful field bird protection. Here we just want to make clear that within the context of the one novelty *others* mature and evolve.

Back to the role of local experts in field bird protection

Local experts (farmers and the experts involved in the cooperative) have specific and relevant knowledge on bird protection in the region and are capable of interrelating novelties at different aggregation levels. In order to further increase the breeding success of in particular the Black-tailed Godwit together with these local experts we formulated and tested a series of ideas. In the course of the research these were extended with new ideas.

The local experts had a role in the learning process on *how things possibly could be improved*. Therefore they organized interaction between stakeholders in and outside the region. Resulting from our involvement in this process we discuss four novelties at higher aggregation level that promise to support the protection of field birds. On the one hand these novelties induce adoption and adaptation of novelties for field bird protection at farm level among farmers in the area; on the other hand they call attention from scientists and policy makers regarding dynamics and implications of successful bird protection, both at farm and at the regional level.

A first important novelty: the study group

In the year 2006, study groups were organized by the territorial cooperative. The idea was to meet three times in spring. Short before the breeding season of the field birds the farmers met to discuss the ins and outs of bird protection. Experiences and expectations were shared on where the field birds would nest and what to do to protect them. In an early phase of the breeding season, when the majority of bird nests were mapped but the grassland hardly was mown, the farmers met to relate the mapped bird nests to ideas and decisions on management measures for protecting the field birds and their chicks in the course of the season. By the end of the breeding season a meeting in the field was planned. In this last meeting farmers were challenged to see where and how the young chicks had survived.

Because of unexpected weather conditions and the need of farmers to mow the grass (which until then hardly had been possible due to wet weather conditions) it was decided among the leaders of the experiment (farmers and experts of the NWF cooperative) that the experts of the NFW cooperative would map the breeding success and communicate the results to the farmers. During this round, individual farmers in each study group received feedback on the results. In the course of the breeding season, each farmer was visited by a technician who registered data regarding the spatial distribution of field birds, grassland management, and the knowledge of the farmers on the presence and survival of young birds in their fields.

Important result of the meetings was that the farmers talked about practical solutions for the improvement of the breeding success of field birds, and exchanged knowledge and insight among each other. Resulting from the meetings, it was thought the farmers would more carefully manage their grassland. Adoption and adaptation of novelties created and/or adapted by other farmers, or at least considering these novelties and their relevance in the course of the breeding season, and eventually to experiment with them, was the main aim of the study group.

The meetings were thought to increase the exchange of local knowledge on where field birds nest and why. In the meetings this local knowledge was translated into the maps with bird nests and measures to be taken by individual farmers to protect the birds and their chicks. Farmers having an eye for birds passed their knowledge on bird life and possibilities to adapt farm management to the presence of endangered bird species to neighbouring farmers. In this way, the Black-tailed Godwit became actively involved in the process of interaction between human and nature, and increasingly influences the action of the farmers in the region.

A second novelty: the use of the 'pocket pc' and 'map machine'

The expected positive effects of adapted grassland management and the extended mowing dates are only achieved if carried out on the right moment and in the right field. Therefore, farmers are to be informed where birds nest. Instead of indicating the nests in the fields (often by marking the nest with a wooden stick) and mark them on a map, bird watchers in the case study area experimented with using a 'pocket pc'.

The pocket pc consists of a GPS receiver with internet connection. The GPS receiver, to be placed in or close to the nest, combined with (connected through blue tooth) a mobile phone with internet application (a normal browser), marks the nest on a digital map at the server of the NFW cooperative. Hence, the location of the nest is real time to be followed *from any personal computer* with access to this digital map.

Through real time interaction the conditions for field birds, and in the course of the breeding season for their chicks, can be further optimised. Farmers planning to manure or mow their land can have a look at the map and adapt their grassland management to the local conditions as provided by the 'map machine'. Others, for example bird watchers with an internet connection, can help farmers in their decisions on adapting the grassland management. Also, the information can be shared and discussed in the study groups.

Besides making the registration of bird nests directly available to all stakeholders involved in bird protection, the map machine brings complete information on the design of the mosaic management. All involved stakeholders have an overview over the fields of the farmer involved, the neighbouring farmers, the planning of the grassland management on these farms, and real time adaptation of the grassland management as response to the shared knowledge on the spatial distribution of the bird nests. Also governmental bodies can control the optimization of bird protection in an area, and thus is no longer restricted on on-forehand administrated paperwork. As also bird watchers, neighbours, representatives of the NWF cooperative, and scientists are informed on the farm management of individual farmers. The farmers will be guided, either through personal coaching, by modelling restrictions in the adaptation of their grassland management, or a combination of these two management tools, in taking adequate and relevant decisions on their grassland management.

A third novelty: natural control and limitation of predators

In field bird protection predation turns out to be a major issue. Besides the activities of farmers the presence of predators determines the survival of field birds. If predators like crows, ermines, weasels but also buzzards and kestrels damage the birds, the eggs, or the chicks this disappoints all the involved stakeholders.

For some farmers predation is an excuse for not applying any delayed mowing date (and consequently to accept losses in grassland production). After all, the breeding success is reduced by predators, they reason. For other farmers the control and limitation of predators is part of their daily activities. Here it concerns farmers who actively protect bird life, and see the relevance and necessity of reducing the amount of predators in and in the surrounding of their fields.

Like the other farmers, they are the opinion that the limitation of predators (which like the Black-tailed Godwits and other field birds are often legally protected species) is necessary for the protection of field birds. Buzzards, it was locally explained to us, feed young field bird chicks to their own chicks. Shaking or freezing their eggs decreases the pressure of predation (they need less field bird chicks to feed their own chicks). Crows for example are caught in cages, and just 'disappear' from the field. Also ermines and weasels are caught in this way. Further it is important to take away spots like trees that serve as lookouts for the predators. These type of measures (in our field research we got more examples) are actively carried out by farmers but, as a consequence of the illegal character mostly remain hidden.

The farmers fighting predation added an important and relevant remark to explaining their illegal activities. They explained to us that the Lapwing (*Vanellus vanellus*), as this bird is much more aggressive than the Black-tailed Godwit, helps to chase away predators. Fighting predation, and the resulting clustering of field birds, benefits to the endangered Black-tailed Godwit (in The Netherlands, next to the Black-tailed Godwit and the Lapwing among others the Redshank (*Tringa totanus*) and the Oystercatcher (*Haematopus ostralegus*) are mapped by local bird watchers, and part of the clusters of fields birds). These bird watchers (in some situations it is the farmer himself) have considerable field knowledge. Besides mapping field bird species the idea raised that they, in cooperation with hunters who have specific local knowledge as well, could first of all locate and map predators, and perhaps later on, when fighting predation possibly gets more accepted in society, together with the hunters bring farmers suggestions on favourable protective measures.

The issue of mapping is very relevant: farmers only applied the measures for natural control and limitation of predators at the moment the predators frustrate the breeding success of the field birds. Since fighting predators in essence is, though necessary, illegal as activity it is important to negotiate and balance the elimination of predators. Farmers should not continue fighting predation on their own. Instead they should inform and demand support from others. Therefore knowledge is necessary on where the field birds nest in combination with *what other activities endanger or protect bird life* in a specific area. In the same way as field birds and management measures are registered with the pocket pc, predators and predation could be registered. In our case study the numbers of field birds turned out higher in the fields where predators were fought.

A fourth novelty: flexible contracts for grassland management

As we mentioned, until the moment we carried out our research governmental support for farmers had been translated into fixed and on-forehand to be negotiated grassland management schemes. Farmers were preferably paid *to not use* their land. By farmers staying out of the land it was expected field birds would, without doubt, survive the mowing machine.

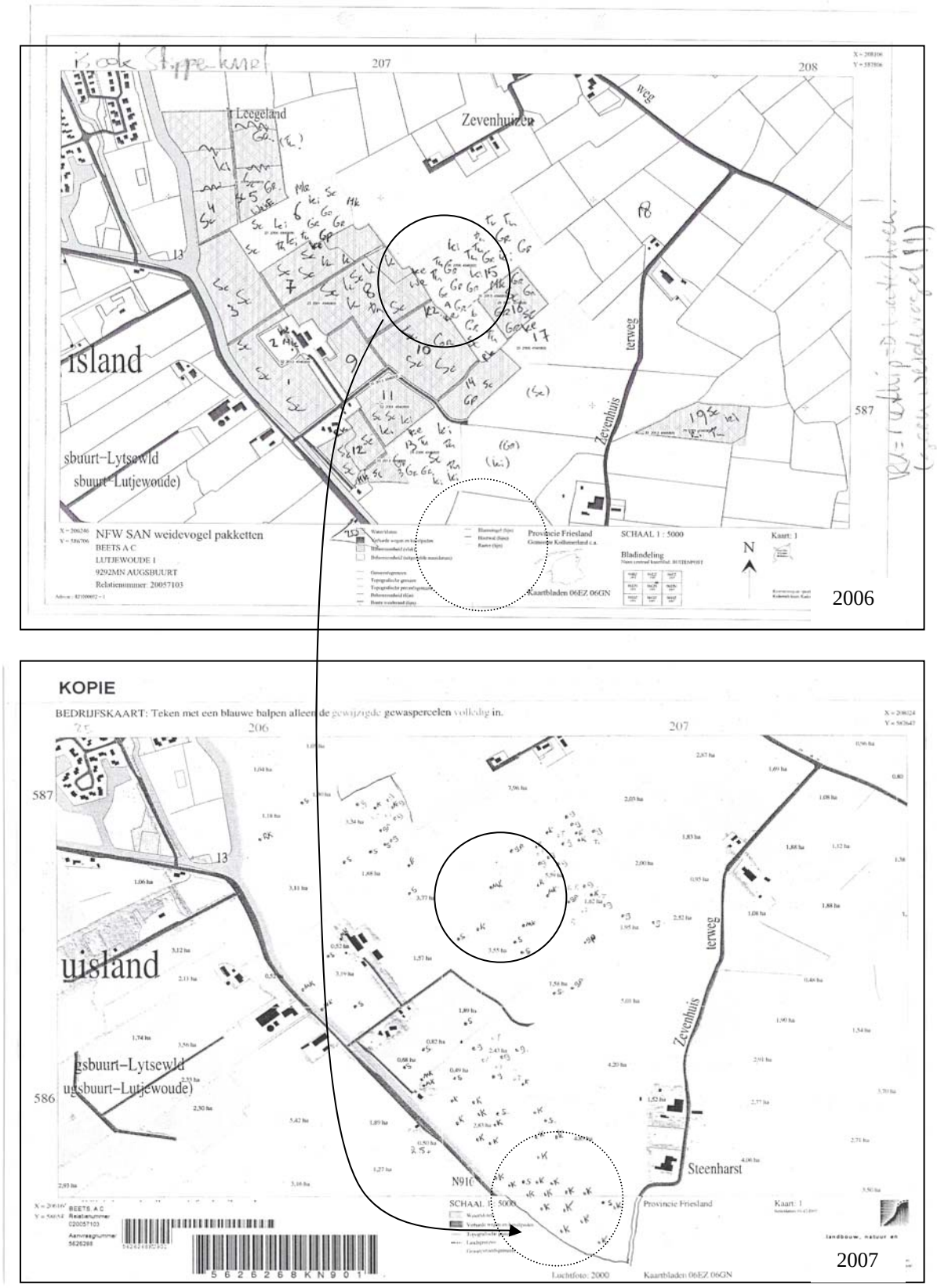

Figure 3. Shift in spatial distribution of nests, outside area of an individual farmer (2006-2007).

Unfortunately, many more factors influence the breeding success of field birds. Moreover, without people actively involved information *on where the birds nest* and the *detrimental effects on bird life* would never become available. Farmers have to watch the birds in their fields. In this way they become aware of the spatial distribution of the birds, and learn about bird protection. In order to optimize field bird protection farmers are in need of flexible field bird management contracts.

Our argument gets expressed in a shift in spatial distribution of nests on one of the farms (see figure 3). The farm, with high densities of bird nests and survival rate of Black-tailed Godwit chicks, is one of the best performing farms regarding bird protection in the region.

The owner of the farm safeguards the chicks during mowing by taking them up in the tractor. Figure 4 shows how this farmer catches the chicks. Catching the chicks is not easy, firstly because the chicks are difficult to see and secondly because, once getting out of the tractor, they run away. The knowledge of the farmer on the spatial distribution of the nests combined with knowledge on the survival and possible location of the chicks in his fields makes him aware of where to expect and watch out for the chicks. Here, having an eye for birds is crucial. The farmer is proud once after mowing he can conclude he has hardly affected bird life in his fields.

Figure 4. Farmer catching a Black-tailed Godwit chick whilst mowing the field, with the alarming adult bird protecting its chick.

At a certain moment his neighbour changed the land-use, and part of the birds move to these fields (again see figure 3). In the old situation, Lapwings helped the Black-tailed Godwits to protect their chicks against predators. The moment the neighbour started cropping cereals, most of the Lapwings are attracted, already early in the season, even before sowing, to the recently ploughed, black soils in that fields. At that moment the protection of Black-tailed Godwit chicks by Lapwings disappears. Likewise cropping cereals, also cropping maize endangers the survival of Black-tailed Godwit chicks.

Flexible grassland management schemes are needed to safeguard bird life in the fields and to compensate farmers who are taking measures for protecting the chicks during the season.

Novelty production as unfolding management system

Restoring foraging and nesting habitat conditions of field birds in farmers' fields relates to a series of technical and organizational novelties. We discussed technical novelties as improved manure, the system innovation that is optimized on the basis of improved manure, and the role of this system innovation in flexible grassland management. We discussed organizational novelties, among others the territorial cooperative, study groups, and the one that remained only an idea: the one of fighting predation (this one is practised but is still collectively to be organized). With our case study we aimed at enabling outsiders to understand novelty production as unfolding management system, in this particular case on field bird protection.

Novelties, local knowledge and social interaction processes

Many of the novelties are developed on the basis of or using local knowledge. In a process of social interaction can be learned about field bird protection. New elements can be added, as for example the use of improved manure and the natural control and limitation of predators. Social interaction processes help local stakeholders (farmers, bird watchers, hunters), policy makers (at the local, regional and national level) and scientists (part of different disciplines) to align their search for improving the breeding success of field birds. Novelties such as the improved manure and natural control of predators demand for adaptations at higher levels of aggregation. If not communicated and organized well, local knowledge remains ignored and the novelties consequently remain illegal, whilst the both novelties in this example hold the promise (at least to contribute) to improve foraging habit conditions for field birds.

Social interaction and social learning

Theoretically, field bird protection can be interpreted as a *social interaction process* (Berger and Luckmann, 1966). Social interaction either improves understanding or on the contrary causes major fights among stakeholders. Either understanding or fighting, interaction results in people learning about each other and other world views.

In the Friesian Woodlands, the occurring interaction process largely takes place *outside legal and formalized policy* frames. Consequently, local knowledge on the integration of farming and nature protection, and the capacity of local experts to organize alliances is often overlooked by both scientists (biologists, ecologists studying field bird populations) and policy makers (often informed and advised by aforementioned scientists on issues of landscape conservation and nature protection).

Ideally bird watchers and farmers discuss how farm activities can be adapted to bird life in the fields, and what measures should be taken in what part of the fields. As farmers and bird watchers not necessarily speak similar vocabularies, and think from different point of reference, a common language has to be learned. Social interaction at the farm and regional level stimulates mutual understanding of the stakeholders involved.

The series of novelties as we discussed so far enlarges the transparency among stakeholders in the region, and enables the farmers to build alliances with others outside the farming sector. Instead of the exclusion of farmers as advocated by nature conservationists we argue that a process of social interaction induces social learning and finally *improves* field bird protection. This interaction process unfolds at various levels and arenas, i.e. occurs at the interface of activities as farming, bird watching, and hunting. It challenges scientists and politicians to build new frames for understanding and guiding the ongoing dynamics.

Once more: novelty production and the role of the territorial cooperative

In the course of the research our hypothesis that local experts fulfil a crucial role in field bird protection got more and more confident. However, in order bird protection to be successful, it demands *'room for manoeuvre'* (Long, 2001). Important to the survival of the Black-tailed Godwit as red-list bird species is that alliances are found at the regional level. Interests, actions, and agendas of different actors can be framed in a common defensive strategy. The territorial co-operative plays a crucial role in integrating farming and bird protection: in guiding and communicating on unfolding farming practices that successfully protect bird life. Novelties could be best communicated and organized by the territorial cooperative within the region, and are simultaneously more easily explained at higher policy levels, that is at the provincial and national policy level.

From the case study we have learned how novelties evolve together, strengthen each other, and call up for novelty production at higher aggregation levels. Hence, novelty production induces a process of change, of which the outcome is unpredictable, and therefore *calls for novelties at higher levels of*

aggregation. Further improvement of the habitat conditions for field birds can be realized through increasing flexibility regarding land use. In our view, the issues of surface application of improved manure and natural control and limitation of predators are on the agenda of scientists and policy makers: in order to make the novel configuration successful, politicians and scientists have to learn from and with the local experts in the area. They have a role in constructing the conditions for successful bird protection. In this respect, creating *transparency* in the ins and outs of field bird protection is a major need and result of the novelties that unfold under the auspicious of the NFW cooperative.

Conclusions

We explored the management strategies of farmers and other stakeholders in the Friesian Woodlands regarding the successful integration of grassland management and bird protection. The adoption of a system innovation that is based on improved manure in combination with having an eye for birds and fighting predation seems a promising strategy for protecting the Black-tailed Godwit.

In order to bring insight in how humans and the natural and socio-political environment mutually shape each other in locally specific contexts we captured farmers' strategies in terms of novelties and novelty production. We reported on technical and organizational novelties. Examples of technical novelties are the improved manure and the system innovation. Examples of organizational novelties are mapping of bird nests, study groups, and the territorial cooperative. Technical and organizational novelties mutually shape each other. The territorial cooperative for example strengthens novelty production and farm performance at lower aggregation levels. The cooperative communicates and negotiates the success of local farm strategies that use and reproduce natural resources: the soil, the grassland, cows, and manure but also flora and fauna living in and around the fields. Like the natural resources directly of use for agricultural production, also field birds are considered part of *locally available* ecological capital. Integration of farming and field bird protection at lower aggregation levels, i.e. the level of the farm and/or the region, is communicated to higher levels of aggregation: to politicians and scientists outside the region. We conclude that farmers who adopt the system innovation (that is based on the use of improved manure) and who building alliances with other stakeholders can be successful in field bird protection.

Possibilities for further improvement of field bird protection we found at higher aggregation level. Regarding the integration of farming and field bird protection we reported on four novelties that were developed within the territorial co-operative. These novelties represent locally organized and specific trajectories, in which a range of relevant stakeholders is involved and farmers and other experts learn from each other on improving the breeding success of the Black-tailed Godwit. Scientists and policy makers should learn from and with these local experts, and accordingly adapt their institutional frames.

On the basis of our case study research, we suggest the protection of the Black-tailed Godwit can be further developed through supporting local experts. Simultaneously, we expect these local experts to find a context and, consequently, new alliances for continuing learning about their successful systems. Through building alliances they will further improve this success.

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