Landowners’ incentives for constructing wetlands in an agricultural area in south Sweden

Anna Hansson, Eja Pedersen, Stefan E.B. Weisner

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A B S T R A C T

Eutrophication of the Baltic Sea has in Sweden led to the initiation of government schemes aiming to increase wetland areas in agricultural regions and thereby reduce nutrient transport to the sea. Landowners play a significant role as providers of this ecosystem service and are currently offered subsidies to cover their costs for constructing and maintaining wetlands. We undertook a grounded theory study, in which landowners were interviewed, aiming at identifying landowners’ incentives for constructing wetlands on their land. The study showed that adequate subsidies, additional services that the wetland could provide to the landowner, local environmental benefits, sufficient knowledge, and peers’ good experiences could encourage landowners to construct wetlands. Perceived hindrances were burdensome management, deficient knowledge, time-consuming application procedures and unclear effectiveness of nutrient reduction. The main reason for not creating a wetland, however, was that the land was classified as productive by the landowner, i.e., suitable for food production. Current schemes are directed toward landowners as individuals and based on subsidies to cover costs. We propose that landowners instead are approached as ecosystem service entrepreneurs and contracted after a tendering process based on nutrient reduction effects. This would lead to new definitions of production and may stimulate improved design and placement of wetlands.

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1. Introduction

There is a need in society to use privately owned land to reduce adverse environmental impacts due to human activities. Examples are nature preservation to prevent declining diversity of species (Carr and Tait, 1991; Macdonald and Johnson, 2000; Ferraro and Kiss, 2002; Herzon and Mikk, 2007), maintenance of socially valuable landscapes (Lütz and Bastian, 2002; Kauneckis and York, 2009; Knoot et al., 2010), and creation of wetlands with the aim of counteracting eutrophication (Fleischer et al., 1994; Hey, 2002; Mitch and Day, 2006; Moreno-Mateos and Comin, 2010; Healy and O’Flynn, 2011). Wetland creation is highly needed in the Baltic Sea area, where the influx of nutrients has aggravated the stress on current marine ecosystems, observed by the public as increasing algae growth and leading to, for example, direct adverse effects for the tourism industry as well as for fishery (Gustafson et al., 2000; Larsson and Granstedt, 2010; Thiere et al., 2011). Agri-environment schemes with the aim of encouraging farmers to create wetlands on their land have led to an increase of constructed wetland area in Sweden (Swedish Environmental Protection Agency, 2010). However, the creation rate needs to increase significantly, possibly in combination with optimized design and placement, if the desired effects are to be achieved. Landowners1 have a key position in this process. Results from an interview study among landowners with the objective of capturing motives for creation of wetlands are discussed in this paper together with suggestions for future measures to enhance effectiveness.

One of society’s tools to direct landowners’ activities towards pro-environmental services is legislation or other type of regulation (Kauneckis and York, 2009). Previous studies, however, have found a strong demand among landowners for self-control, and regulation is commonly not supported, especially not for measures that are perceived as beyond taking care of one’s own pollution...
Voluntary programs have been shown to be the most effective in the long run (Kauneckis and York, 2009) and most pro-environmental schemes are accordingly based on voluntariness (Macdonald and Johnson, 2000; Toma and Mathijis, 2007). Programs promoting a targeted pro-environmental behaviour without direct returns are possible for low-effort measures. Farmers' willingness to attract birds to their land, for example, is not associated with economic incentives (Jacobson et al., 2003). The desire to engage in conservation schemes that demand more time and cost is, nevertheless, higher if subsidies are offered (Lokhorst et al., 2010) and expenses covered for such items as fencing and land management (Winter et al., 2007). Recent Swedish government schemes encouraging landowners to create wetlands on their property have all included subsidies to compensate for construction costs and, to some degree, for maintenance (Swedish Environmental Protection Agency, 2010).

Historically, the Swedish government has encouraged landowners through an agricultural policy to drain wetlands and straighten streams. In response to a growing population during the mid–19th century, arable land for food production was created through land reclamation and flood control. Drainage of wetlands led to losses of biodiversity and the nutrient retention capacity of the land for wetlands that can otherwise influence the nutrient cycle and create more eutrophic conditions. The policy was thought of as interim but laid the foundation on which later legislation was based (Lindahl, 1998). The first subsidy for wetland creation was established in 1989. The aim was to recreate a more diverse landscape, rather than to reduce run-off of nutrients, and, contradictory to earlier measures, reduce production of grain because of a growing grain surplus (Lindahl, 1998). There have since been several forms of subsidies with different coverage of costs to promote wetland creation on national, regional and local levels following a major reform in agricultural policy in 1990 (Weisner and Thiere, 2010a). In 1999, the Swedish Environmental Objectives were established by the Swedish parliament, including the Objectives 'Zero Eutrophication' and 'Thriving Wetlands' (Ministry of the Environment, 2003). The year after, in 2000, the Water Framework Directive, with its main purpose of achieving a 'good' ecological and chemical status for water bodies by 2015, was established by the EU (EU 2000/60/EG). Based on these policy documents, the aims of present schemes for wetland creation are to decrease eutrophication in the sea and to increase landscape biodiversity (Swedish Environmental Protection Agency, 2008; Weisner and Thiere, 2010a). Constructed wetlands in agricultural areas in Sweden typically have a water surface of between 0.5 and 1 ha, are partly covered by spontaneously established vegetation, and have an inflow of drainage water from agricultural fields (Thiere et al., 2009).

Between 2000 and 2010, the main scheme promoting wetland construction in Swedish rural areas granted subsidies of approximately 30 million Euros (Swedish Environmental Protection Agency, 2011a). The subsidies were generally based on compensating the landowners for the main part of the construction costs and maintenance. Within the scheme some landowners were targeted and supported in the construction process and others had to be more active themselves. The scheme led to an estimated 7654 ha being set aside for wetland creation in the Swedish agricultural landscape (Swedish Environmental Protection Agency, 2011b). The target, however, was to have created 12 000 ha of wetland by 2010. Since the goal was far from reached, the target date has been postponed until 2015 (Swedish Environmental Protection Agency, 2010).

Previous studies have shown that easily assessed variables, such as demographic data (Pleninger et al., 2004; Fielding et al., 2008) or property size (Kreutzwiser and Pietrzak, 1986), do not explain landowners’ pro-environmental actions. Predicting participation in voluntary conservation programs has been difficult, even when subjectively measured variables are added (Kreutzwiser and Pietrzak, 1986; Herzon and Mikk, 2007; Kauneckis and York, 2009). Furthermore, studies focussing specifically on landowners’ relation to wetlands management have so far dealt only with preserving or regenerating already existing wetlands (Kreutzwiser and Pietrzak, 1986; Pyroveti and Dautopoulos, 1997; Burgess et al., 2000; Hodge and McNally, 2000) rather than with the high-effort action to create new wetlands.

The urge for increased rate of wetland creation, and thereby the need to find landowners willing to make long-term commitments, together with the lack of feasible knowledge of landowners’ motives for such large changes, initiated the grounded theory study presented in this paper. Its objective is to describe reasons for taking high-effort actions to provide ecosystem services asked for by the society. More specifically, the study aims at identifying landowners’ incentives for constructing wetlands on private land in agricultural areas.

2. Method

2.1. Study design

We wanted to find out how the landowners themselves, without being influenced by preconceptions, describe their motivations and hindrances for constructing wetlands on their land. This led us to choose a qualitative method. The absence of unambiguous previous research findings that could have been applicable in the formulation of hypotheses supported the choice of method. Grounded theory is a well established method that is applied when you need new perspectives in a research area (Dellve et al., 2002). It is not a method for verifying theories but a way to create new conceptual models from the collected data (in this case the landowners’ own stories). These models have a value in itself, but can also inspire further quantitative hypothesis-testing studies. The grounded theory design used in this study is based on that originally described by Glaser and Strauss (1967). The landowners who were interviewed for the study were hence chosen using strategic sampling (Dellve et al., 2002), ensuring that a variety of landowners’ experiences were captured and a comprehensive set of data obtained. The interviews were analysed consecutively, and constant comparisons (Glaser and Strauss, 1967) were made across data, notes, and emerging models throughout the process, developing and verifying theory sequentially. The study was closed when saturation (Goulding, 1998) was reached, i.e., when new data did not give further insights. The study area comprised the agricultural catchment of the river Smedjeån in south Sweden.

2.2. Data collection

2.2.1. Interviewees

We selected participants among landowners within the study area with a property larger than 5 ha. We tried to get a variation in the data by strategically selecting the owners of both large and small properties, with or without constructed wetlands. Selected landowners were sent a letter that explained the purpose of the study. The letter was followed by a phone call to invite landowners to participate in the study. The prospective participants could at this occasion ask questions and were informed that participation was voluntary. The selection of, and consequently the contact of, landowners went on continuously in parallel with the analysis of
data from completed interviews. In total, fifteen out of 37 invited landowners accepted to participate in the study. Reasons to decline participation were health issues, lack of time, or lack of interest.

All of the participating landowners (here called interviewees) had property belonging to their families for at least one previous generation. The land was used for several types of farming: crop production, crop production combined with livestock and forage, and vegetables. The occupation of the interviewees was either full- or part-time farming. Some of them had previously been engaged in full-time farming but now did different work or had retired. One had leased the land and did not practice any farming and another was a greengrocer. Six of the interviewees had one or more constructed wetlands on their property, and three had ponds with functions similar to a wetland but constructed to clean sewage water (Table 1).

2.2.2. Interviews

The interviews took place either at the interviewees’ homes or at Halmstad University. The interviews lasted between 30 min and 2 h. All the interviews were conducted by the same researcher. The interviews were carried out with openness and flexibility to obtain both predicted and unpredicted information. No pre-formulated questionnaire was used and we asked the landowners to talk freely with their own words so that the interviews took the form of an open discussion. The interviews all started with the same open question: whether the interviewees considered themselves to have an environmental responsibility. The way the interviewees chose to answer this first question decided how the discussions about environmental issues would proceed. The interviewer, however, did make sure to bring certain topics into the discussion: local and global environmental concerns, climate change and adaptation, environmental measures taken within the business, wetland construction in the agricultural landscape, motives, and barriers. The interviewer proceeded with follow-up questions to clarify the information given and to obtain the interviewees’ opinions and feelings about the topics. The interviewer used a checklist to make certain that all topics were discussed. The open approach was kept during all of the interviews, but as the analyses proceeded, the checklist was modified slightly according to the theories that started to form during the continuing analysis. The interviews were recorded and transcribed verbatim to enable a correct analysis of the material.

2.3. Analysis

The transcribed material from each interview was coded, i.e., important concepts and statements were identified. The coding was performed by the interviewing researcher and one additional researcher, separately. The interviewing researcher had a complete picture of the material while the other researcher had not participated in any of the interviews. The separate coding was compared and the meaning of the codes discussed jointly. After seven interviews, an initial model with categories (Dellve et al., 2002) emerged from the coded material. These categories were tested through five additional interviews. After the coding of the additional five interviews, categories were developed and modified until they reflected the complete interview material. One of the categories influenced the others and was chosen as the core category (Strauss and Corbin, 1998) as reported in Section 3.2. To verify the model and confirm that saturation had been reached, three additional interviews were performed.

3. Results

3.1. Overview

We identified six categories from the analysed material that seemed to be connected with landowners’ motives for constructing a wetland: (i) land management in the best possible way, (ii) personal environmental responsibility, (iii) business considerations, (iv) knowledge and understanding, (v) acknowledgement and support, and (vi) unfair conditions. The first category, land management in the best possible way, dominated the landowners’ reasoning about factors that could lead them to create a wetland or not on their land and this category was therefore assigned as core category.

A summary of the categories is presented below along with more detail in the following sections. A conceptual model of the findings is presented thereafter. To highlight the results, quotes from the related interviews addressing the topics raised are also presented (sequential number of respective interviewee given in parentheses). The quotes were translated from Swedish to English by an independent translator at Halmstad University.

Land management in the best possible way was the most important aspect for the interviewees. This meant that land suitable for food production should foremost be used for that purpose, and activities granted through subsidies could only be considered on farmland not suitable for food production. Personal environmental responsibility was taken through rules and regulations that applied to the farming business; the rules were strict and involved extensive environmental measures. Rules were also combined with a personal responsibility for the environment, involving voluntary measures that reduced the environmental impact, often with the local environment and future generations in mind. Insecurity regarding future climate changes among the interviewees made them feel that it was too extensive a matter to worry or do anything about. Business considerations were central and controlled the activities performed. Changes for the environment had to be implemented in such a way that the business profits were not negatively affected. Many environmental measures also benefited the business since it was all about saving resources. Knowledge and understanding of the environmental impact caused by land use was important to the interviewees. They often valued knowledge and experience equally, leading to the situation where decisions regarding the environment often were based on previous experience. Acknowledgement and support such as economic subsidies were important as well as feedback on measures taken. The possibility of obtaining subsidies affected business considerations and decided what environmental actions the interviewees thought of as possible. Unfair conditions and being blamed for environmental adverse impacts such as eutrophication had been experienced by some of the interviewees. They felt more strictly regulated and controlled than other sectors that also were contributing to the eutrophication. Regardless of

Table 1

Description of interviewed landowners. Total number of interviewed landowners was 15; number of landowners within each category is given in the right column.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming — full-time</td>
<td>3</td>
</tr>
<tr>
<td>Farming — part-time</td>
<td>2</td>
</tr>
<tr>
<td>Farming — spare-time</td>
<td>2</td>
</tr>
<tr>
<td>Altered work — previous full-time farming</td>
<td>2</td>
</tr>
<tr>
<td>Retired — previous full-time farming</td>
<td>4</td>
</tr>
<tr>
<td>Civil servant — farmland leased</td>
<td>1</td>
</tr>
<tr>
<td>Greengrocer</td>
<td>1</td>
</tr>
<tr>
<td>Land area</td>
<td></td>
</tr>
<tr>
<td>&gt;50 ha</td>
<td>5</td>
</tr>
<tr>
<td>&lt;50 ha</td>
<td>10</td>
</tr>
<tr>
<td>Constructed wetlands</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td>Pond for sewage water</td>
<td>3</td>
</tr>
</tbody>
</table>
acreage, the interviewees identified themselves as small-scale farmers and experienced small-scale farming as having a smaller environmental impact. They remarked that comparing business conditions in Sweden to those of other countries was unfair since the regulations were stricter in Sweden.

3.2. Land management in the best possible way (core category)

Of most importance for the interviewees was to manage the farmland in the best possible way. They considered food production to be the ultimate use of the land; therefore the land should be kept for cultivation.

‘If you have good land, you don’t want to ruin it. If you have poorer land, no problem, just dig.’ (I 1)

‘We can’t play around with wetlands. Everyone wants food, so it is not right to put land under water.’ (I 2)

‘I don’t think I have any suitable site. I only have arable land and no place large enough to build on. But if I had a favourable place along running water where it’s perhaps always a little wet, that could have worked.’ (I 14)

Unproductive farmland or land that gave small harvests could, however, be considered for other financially beneficial activities. Amongst these were activities that could be granted subsidies, such as growing catch crops, maintaining buffer strips, and constructing wetlands. Wetlands that were granted subsidies could in some cases be considered as irrigation ponds, but not on highly productive land and only if irrigation restrictions were more frequently present than normal.

‘As there is often a watering ban when you need to water, it would have been helpful to use the nitrogen traps.’ (I 5)

A wetland could also be an appreciated addition to the landscape. Wetlands attracted birds and other wildlife, but these aspects of personal interest were still not motivating enough to set aside farmland for wetland creation.

‘I would love to have had a pond for my own interest, to have some fish and ducks in. Then, I would have been able to fish and hunt a little, something I would have thought was fun. So, if I had had a good place, I would have been interested.’ (I 14)

Those who had constructed wetlands stated that the main purpose of the wetlands was nutrient retention. Most of them were positive about their wetlands as they were nice to look at and attracted wildlife at the same time as they seemed to fulfil that purpose.

3.3. Personal environmental responsibility

Interviewees felt a responsibility for the environment in that one was using land essentially only borrowed from nature. To take environmental responsibility primarily meant to follow the laws related to the business; these laws were considered to have been developed in such a way that one’s environmental responsibility was automatically fulfilled.

‘It’s enough to follow the rules – which means you’ve done a lot; everything is extremely controlled.’ (I 1)

Of secondary concern was the idea of voluntary environmental responsibility, which was carried out in numerous ways. This responsibility could be to consider future generations, but could also be a matter of practical actions taken as part of doing business.

‘We only borrow the land; the next generation needs to have healthy and workable land too.’ (I 5)

‘We borrow and use the land – which will outlive us – during our short lifespan; so it’s extremely important to make the best of it.’ (I 3)

‘We do soil mapping to check how much nutrient there is in the soil; we do this periodically, as recently as last autumn. […] We try to avoid fertilizing too much as it’s a cost item too.’ (I 7)

The environmental responsibility described by the interviewees involved both responsibility for the local area and for the global environment. But it was easier to take environmental responsibility locally since it was easier to influence there.

‘In the areas close-by, you notice you can influence and do something about it immediately. […] It’s these areas that you feel most for.’ (I 3)

‘It’s the areas close-by that we can influence. As an individual, you have no impact on what’s further away.’ (I 11)

There was a large expression of insecurity about future climate changes and threats. Climate change did not seem as serious as being presented and even if it was a continuing global issue, it had not affected local areas. Some extreme weather conditions had occurred recently, but as in the past. Humans were likely to affect the environment and climate but there were also natural changes to take into consideration. Some interviewees said that the choice to not believe in climate change was a way of not having to take action. They also felt that climate changes leading to rainier or drier seasons were too comprehensive for them as individuals to do anything about.

‘Areas where you can have most influence are often areas close-by. But there’s also the world climate. […] So, as an individual, it feels like you have little influence on the whole.’ (I 5)

‘It’s been back and forth. If you look very far back in time, it has been both warmer and colder. So I am not sure that I take these threats seriously.’ (I 7)

‘It has probably gone a little bit too quickly to say that it is just a natural change in the climate, although I do believe it is. However, it’s an easy way to defend yourself, to believe that this is the reason. […] It’s the weather that controls things and it’s far too complicated for us mere mortals to understand, when even experts can’t agree. So I feel the common man does not have to worry about it just yet.’ (I 6)

‘They say there will be more extreme weather. If this is true, I don’t know, but we have had extreme weather in the past. […] We’ve experienced tough years before, but maybe they’ll be more often now, I just don’t know.’ (I 8)

‘It doesn’t feel as if there’s anything I can do about it, so I don’t worry.’ (I 10)

3.4. Business considerations

The interviewees believed that environmental benefits were often linked to economic benefits. To save on purchases and the use of diesel and fertilizers were beneficial to both business and the environment. Everybody had to follow the laws and restrictions, but some went further and voluntarily invested in pro-environmental measures. These investments gave a feeling of being ahead, being aware, and prepared at the same time as it was beneficial for business. Small farms were struggling to get the same proportional turnover as larger farms. So it was crucial that all changes made for the environment were also beneficial for business.
I feel I have environmental responsibility, but at the same time, I feel I have more responsibility for my own survival and economy. But I don’t do anything purposely that I know is wrong.’ (I 14)

Wetland construction could be interesting for landowners if it provided more money than it does today. A need for irrigation water could also turn wetland construction into a business consideration since wetlands could provide water storage and enable irrigation during dry seasons when irrigation was restricted. However, the interviewees considered it more beneficial to improve other parts of production. They believed that wetlands were expensive and gave uncertain results. Other measures could be effective usage of fertilizers and pesticides; if usage could decrease without causing smaller harvests, it would be valuable both for the environment and for business.

‘I think maybe it’s better to be good at something else. […] I think this is smarter, much smarter, as wetlands cost millions and billions. […] With regard to wetlands, we don’t really know if it’s good or beneficial in any way.’ (I 1)

‘I suppose that I have never really understood when they say it pays back to nature for the money it costs, especially when you consider it is no small projects.’ (I 6)

Financial controls such as higher prices on fertilizers and diesel were considered to potentially benefit the environment. However, higher prices were not seen as a positive thing; if prices were to increase, there must be some type of economic compensation for the resulting environmental benefits.

‘As it was so expensive, it made you think more about being extra economical. […] Then you used less fertilizer, which was probably good for the environment. […] But you don’t want to have higher prices, of course.’ (I 1)

Wetland as a business consideration means not only getting subsidies for the construction and maintenance of a wetland; the wetland should also generate an income, the same way as other activities in the farming business do.

‘Once again it’s about money. What would I as a landowner gain from it? If I were to build a wetland, it would mean half a hectare or even a hectare less for me to lease. And nobody pays me for constructing a wetland, which means no revenue. Maybe I get 100% of the investment and maintenance costs, but all that happens is that it just sits there and I get money to mow the lawn, but there’s nothing extra to earn money on. I earn more by leasing the land. It’s only if you can find a place somewhere where you can’t grow anything — poor ground or pasture-land. So, once again, what would I gain from it? I get the entire investment, but no gains. Yes, of course, I help the environment. But this is nothing that I feel so strongly about; pastures are beautiful too.’ (I 15)

3.5. Knowledge and understanding

The interviewees had extensive knowledge about farming’s environmental impact and discussed the matter with great interest. However, they considered knowledge to be equated with experience. To just have read about something was not enough to call it knowledge, they thought.

‘This is nothing I know about, only something I have read.’ (I 2)

Personal experience partly controlled the views of pro-environmental behaviour and also determined the attitude toward environmental and water management, such as wetland creation. Interest in wetlands was lower among interviewees who knew less about wetland ecosystem services. The same was observed amongst interviewees who had experienced or had heard from others that wetlands had caused problems.

‘Several of them have burst and all the water has flowed out into the river again, so then it’s pointless. If they don’t work, then there’s no use in them. […] I think people have become more cautious. […] There are many that do not work which people have seen, making them more careful.’ (I 10)

‘It worked well the first few years, but then the water began to dry out, and now it doesn’t work as it should. I’ve spoken to the county administration to let in some additional water from the river and to deepen and extend the pond and use it as irrigation and for the rest of the year, use it as a nitrogen trap.’ (I 3)

The opportunity to apply for subsidies for wetland construction and maintenance was known amongst the interviewees. But who could apply, what the subsidies were used for, and how the actual application was handled were less clear.

‘It grows a lot in my pond and it costs me quite a lot to look after it. So there should be something to cover it.’ (I 12)

3.6. Acknowledgement and support

Financial support and subsidies were central and controlled many business considerations, according to the interviewees. All those with wetlands had constructed them with the support of subsidies. The subsidies could motivate and improve maintenance of the wetland. Non-financial support was also of importance. To get help, advice, and acknowledgement on pro-environmental behaviour was crucial. Interviewees felt there was currently a lot of help available for landowners but that it was up to the landowners to seek out the information and request support.

‘You must be interested yourself, but then they come and do things — great things — for free. However, farmers have to be alert and interested, as nobody will just come knocking at your door.’ (I 1)

Acknowledgement and confirmation that a constructed wetland was functioning as planned gave a positive feeling about the wetland. When constructing a wetland granted with subsidies, support and advice were offered during the construction phase. When the wetland was finished, maintenance was handed over to the landowner who risked feeling deserted if not given additional follow-ups and support. To be more involved in the whole construction process and afterwards, to obtain knowledge about how much the wetland actually was contributing to nutrient reduction was good; knowing this could give a feeling of pride and satisfaction.

‘They were here all day and had a boat and took a lot of samples, on which I later received a report. […] It was interesting that they had chosen this wetland to check.’ (I 4)

‘It does look beautiful, I must say. But otherwise I don’t know, there has never been anyone who has been there and taken some samples to my knowledge. […] It is a pity; I’d like to have known if it was of any use.’ (I 9)

‘The municipality went in and built it, then they left it over to me and since then I have not heard anything about it.’ (I 12)

3.7. Unfair conditions

The interviewees felt that farmers often got the blame for eutrophication. Yet they considered the farms strictly controlled, compared to other contributing sectors.
'But then, I personally think that agriculture is put under a magnifying glass when it comes to emissions, especially when you consider that boat owners discharge their toilets directly into the sea.' (I 7)

'Look at homeowners; they're the main culprits, while we farmers have all the rules that we follow, not like the homeowners.' (I 10)

All interviewees considered there to be a difference in environmental impact between small- and large-scale businesses, in this case mainly farming, and they identified themselves as small-scale farmers. They considered that small-scale farms took better care of animals and the environment directly connected to the business than large-scale farms, which were more like industries. The interviewees did not feel that they got the same financial benefits through subsidies and discounts.

'The system's built-in to benefit the big boys unfortunately. It has become an agricultural industry.' (I 5)

The interviewees did not consider competition to be fair between Sweden and other countries. The rules were perceived as stricter in Sweden and directives were implemented faster than in other EU countries, affecting the economy of the business and making the production more expensive, e.g. rules about pesticides.

'What is allowed in Germany is not allowed in Sweden for example. [...] A Swede who cultivates has a totally different cost as he cannot eliminate certain unwanted weeds by spraying. Therefore the crop suffers. [...] It is to be prohibited in other countries in Europe as well, but there is always some sort of delay which allows them to continue. So they live well, at least for a while.' (I 6)

3.8. Landowners incentives for creating a wetland or not

The findings from the interview study are depicted in Fig. 1 as a conceptual model of factors that could lead to constructing a wetland or not. A wetland could only be considered if the land is not suitable for production, as defined by the landowners (core category: land management in the best possible way). Adequate subsidies, need for additional services that the wetland could provide (for example, storage of water), perceived local environmental benefits such as a scenic view, sufficient knowledge and good experiences among other landowners further increased the willingness to create a wetland. Hindrances were burdensome management, deficient knowledge, time-consuming application procedures for subsidies and unclear effectiveness of nutrient reduction.

4. Discussion and implications

Our study shows that landowners could consider constructing wetlands on land that was not rated as productive if some hindrances were removed. Successful examples of how such hindrances can be overcome have been shown for wetlands (Söderqvist, 2003; Lindahl and Söderqvist, 2004) as well as for other ecosystem service measures (Lokhorst et al., 2010). Authorities can play a role in removing hindrances and promote wetland construction by focussing on what advantages wetlands can offer landowners and how this land use can benefit their businesses. It should be made clear to landowners what the different subsidies mean and how constructed wetlands can affect their business in a long-term perspective. Landowners must also be offered clear information about how wetlands, and specifically their "own" wetlands, contribute to decreased eutrophication and improved biodiversity. Follow-up schemes providing feedback to landowners about how their wetlands contribute to nutrient removal and biodiversity could promote a lasting confidence in wetland construction among landowners.

Creating wetlands only on land that today is considered as non-profitable for agricultural production is probably not enough, and it could well be that the decreased rate of new establishments in Sweden is because easily converted land already has been used for wetland creation. ‘We have done all the obvious planting’ as the interviewees said in another study, investigating the outcome of a re-vegetation scheme (Smith, 2008). Also, a serious societal attempt to decrease nutrient transport to the sea must include the possibility of designing and placing wetlands on all types of land to maximize nutrient removal (Moreno-Mateos and Comin, 2010). Some land which is defined by owners as productive (in terms of food production) may need to be used for wetland creation. Critical, then, is the meaning of production — which needs to be changed from the concept of producing food or material goods (Lütz and Bastian, 2002) to a concept that includes other ecosystem services.

Food production as a priority choice emerged in this study from the desire to manage the land in the best possible way. The feeling of stewardship toward the countryside and the farm in particular has previously been proposed as a predictor of pro-environmental behaviour among farmers (e.g., Sullivan, 1996). Stewardship embraces a special relationship to the land (Sullivan, 1996) or nature (Plieninger et al., 2004), including perceived moral obligations and lifestyle (Davies and Hodge, 2007). Such fundamental values are perhaps not easily changed. The strong concern for the land could, however, also be seen as an expression of professionalism, in which the land is viewed as a capital resource that should be properly managed to secure profits in the future. Other forms of long-term investment would consequently be possible if the

![Fig. 1. Conceptual model of landowners' incentives for creating a wetland or not. The core category land management in the best possible way determines the status of the land (unproductive or productive) followed by several considerations emerging from the five categories personal environmental responsibility (PER), business considerations (BC), knowledge and understanding (KU), acknowledgement and support (AS), and unfair conditions (UC).](image-url)
options were attractive and directed toward the business, rather than to the landowner as an individual. This approach requires a change of view on the part of authorities, away from the perspective of landowners as those who only need to be informed of what to do (Burgess et al., 2000) to professional providers of ecosystem services (Hey et al., 2005). A change of identity among landowners is correspondingly needed (Burton, 2004), from seeing themselves as unfairly treated struggling entrepreneurs to being business managers within the ecosystem service market. A dualism of the landowners as individual citizens and at the same time business managers was clearly visible in this study. The landowners saw themselves as experienced rather than knowledgeable in how ecosystems function, but revealed at the same time a high understanding of nutrient reduction in wetlands. They expressed concern for the environment but did not think that they as individuals could do much about environmental changes or threats. They thought of themselves as pro-environmentalists within their businesses. Voluntary measures seemed furthermore to always be connected with business concerns, either as lower costs (for example, using less fertilizer) or being ahead of competitors. Societal needs were therefore possibly better met if requested from an ‘entrepreneur’ rather than ‘just another citizen’.

Based on the interview results, we suggest that turning away from the view of the landowner as ordinary citizen (individual landowner) toward a view of the landowner as a professional business manager or entrepreneur may create new conditions for promoting ecosystem services (Table 2), as further elaborated below. Although current pro-environmental schemes pay for the construction of a wetland and in some cases also for maintenance, they do not provide a profit. Direct (rather than indirect) payment for ecosystem services gives more value for the money in schemes directed to conservation measures in developing countries (Ferraro and Kiss, 2002). For example, paying people directly to protect habitats such as rainforest is more cost-effective than offering subsidies to cover costs for wetland construction and maintenance. In other words, it would be beneficial to move from a practice-based approach to a performance-based approach. Specific requirements and a tendering process on regular market terms would give landowners a fair base for their decisions, similar to the ‘nitrogen farming’ concept proposed by Hey (2002). If this should be based on characteristics of the wetland and its catchments, on actual measurements of water quality achievements, and/or on other approaches, will need to be developed. Even though previous research has shown that irreversible measures, such as creating a wetland, are met with higher resistance than more temporary ones (Lütz and Bastian, 2002), long-term leasing agreements are preferred by professionals (Lindahl and Söderqvist, 2004) and are also beneficial for societal needs. A tendering process would also motivate landowners to seek knowledge (hire consultants) or acknowledge already gained knowledge, rather than being passive receivers of information.

Using productive land for wetlands does not necessarily rule out food production. A high level of food production could be maintained or even increased by higher efficiency, allowing larger amounts of fertilizers when the run-off is sufficiently captured and providing an evened-out access to water for irrigation. The possibility of placing wetlands where they are most needed (Fleischer et al., 1994; Moreno-Mateos and Comin, 2010) in combination with optimized design and management (Weisser et al., 1994; Kadlec, 2005; Mitch and Day, 2006; Millhollon et al., 2009; Weisser and Thiere, 2010b) also means that acreage converted into wetlands does not have to be as large as otherwise. Recycling of phosphorus from wetlands to arable land may contribute to a decrease in the global shortage of phosphorus and thus to better conditions for food production in other parts of the world. Analysis of interviews with landowners, together with previous findings, encourage us to propose that schemes directed toward landowners with the aim of providing society with ecosystem services (e.g., nutrient retention by creating wetlands) should not appeal primarily to landowners as individual citizens by referring to the public good and offering only financial compensation. It has been suggested that legislation and regulation could be the only effective means to ensure stable long-term environmental measures as the identity of landowners as stewards of the land is strongly rooted (Carr and Tait, 1991). We argue that this is not necessary if landowners are viewed as professional business managers, rather than only as individual citizens, and the meaning of production is changed to include the ecosystem services desired by society. Several issues need to be addressed to develop a system for wetland creation in agriculture based on this concept. Future research should (i) advance the knowledge of optimal placement and design of wetlands; (ii) find efficient ways to estimate the annual nutrient reduction in created wetlands; and (iii) develop financial systems for nitrogen and phosphorus reduction.

Acknowledgement

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Table 2
Comparisons of implementation processes for ecosystem services if landowners are viewed upon as citizens (individual landowners) or as professional business managers (ecosystem services entrepreneurs).

<table>
<thead>
<tr>
<th>Communication</th>
<th>Individual landowner</th>
<th>Ecosystem services entrepreneur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal contacts</td>
<td>Specification of requirements</td>
<td></td>
</tr>
<tr>
<td>Information meetings</td>
<td>Tendering</td>
<td></td>
</tr>
<tr>
<td>Brochures</td>
<td>Contract</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Economy</th>
<th>Individual landowner</th>
<th>Ecosystem services entrepreneur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost-neutral subsidies</td>
<td>Profit</td>
<td></td>
</tr>
<tr>
<td>Passive knowledge provided by governmental extension agents</td>
<td>Active knowledge from various sources or contract with experts</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental impact</th>
<th>Individual landowner</th>
<th>Ecosystem services entrepreneur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased landscape qualities</td>
<td>Sustainable management of capital resources to secure profits in the future</td>
<td></td>
</tr>
<tr>
<td>Good local environment for future generations</td>
<td>Business benefits (irrigation, improved possibilities for fertilization)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other benefits</th>
<th>Individual landowner</th>
<th>Ecosystem services entrepreneur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational benefits (birds, fishes, landscape view)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References


Swedish Environmental Protection Agency, 2010. de Facto 2010: Sweden’s environmental objectives — Swedish consumption and global environmental pressures (in Swedish only).


