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

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ABSTRACT

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.

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. Landowners[1] 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

[1] Farmers are typically addressed as the executors for measures such as creating wetlands, presuming that agricultural land is farmed. The post-production farm era, however, already includes several activities other than food production (Burton, 2004) and the label 'farmer' is not always appropriate. All types of landowners or land managers mentioned in this article are therefore considered as potential agents of environmental services.

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(Plieninger et al., 2004). 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 Mathijs, 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 landscape (Krug, 1993). Eutrophication is currently one of the most serious and challenging environmental problems in Swedish water bodies and the Baltic Sea (Swedish Environmental Protection Agency, 2008). In 1985, the first legislation with explicit policy goals regarding leaching of fertilizers, environmental protection and nature conservation were developed by the government, but food security was still the first priority. 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 (Plieninger et al., 2004; Fielding et al., 2008) or property size (Kreutzwiser and Pietrazko, 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 Pietrazko, 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 Pietrazko, 1986; Pyrovetsi and Dautopoulus, 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