Conflicting Environmental Management Tools
– Grazing of Semi-natural Grasslands vs. Wetland Conservation

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Abstract

The study explores the possibility of conflicts between conservation of wetlands and semi-natural grasslands in the county of Stockholm. Both habitats are important to protect from a biodiversity perspective. The species rich semi-natural grasslands have been created by agricultural practices like grazing and mowing. At the same time, wetlands have diminished due to earlier drainage in order to increase the area of arable land. Both habitats are incorporated in the Swedish Environmental Objectives and are parts of the EU’s Agri-Environmental Schemes (AES), where farmers get financial support to maintain or restore valuable habitats.

Wetland conservation/restoration often requires raised water tables, but also maintenance with cattle grazing in certain areas. On the other hand, raised water tables can act as hinder for grazing animals and lead to conflict situations. Using a mixed method approach, this study scrutinized if the use of different management tools can result in conflicts between actors and objectives. The study is based on a literature review, interviews and the use of Geographical Information Systems (GIS). Institutionalism and the Institutional Analysis and Development framework are used to analyze and evaluate the situation in the county of Stockholm.

The quantitative results reveal that 12.8% of all semi-natural grasslands of high biological value intersects with wetlands. However, these areas are maintained with environmental support to a larger extent than semi-natural grasslands outside wetlands. This indicates there is no conflict between wetland and semi-natural grassland conservation, a perception shared by authorities. From farmers’ perspective the situation is described differently, rule compliance for environmental support is hard to obtain specifically in wet areas. Increased dialogue between authorities and farmers rather than harsh inspections would be preferable as the county of Stockholm needs more farmers and grazing cattle to maintain biologically important habitats.

Grazing in wetlands is needed from a biodiversity perspective but can at the same time disturb the wetlands functioning of nutrient reduction. There is a risk of authorities prioritizing water quality in front of biodiversity in conflicting situations. Water, as a common-pool recourse, is surrounded by stricter regulation and also easier to monitor.

Key words: biodiversity, institutionalism, rational choice, environmental support, Agri-Environmental Schemes, environmental objectives
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1. Introduction

Decreasing biodiversity is an alarming, global environmental problem. The functioning of ecosystems is depending on biodiversity, and many of the ecosystem services used by humans are threatened. One of the most common causes to biodiversity losses is habitat degradation caused by changed land use (MEA 2005). Throughout history agriculture has changed ecosystems, and affected biodiversity in both positive and negative ways. For example, in order to increase the area of arable land, draining has decreased the area of wetlands which are important for many aquatic species. On the other hand, many plant species that are characteristic for semi-natural grasslands are dependent on grazing.

One of the challenges for today’s environmental management is to support agricultural practices beneficial for biodiversity and at the same time prevent their negative impacts. The European Union (EU) is using Agri-Environmental Schemes (AES) as key tools to reverse or reduce the negative trends of intense agriculture. Farmers get financial support for maintenance and restoration of certain important habitats in the agricultural landscapes. The financial support is supposed to create incentives for farmers to use agricultural practices enhancing biodiversity. The AES are mandatory for EU member states to implement and designate to regional needs (Wilson, Vickery, & Pendlebury 2007). Rural development programs and implementation strategies are presented at regional levels to obtain a sustainable development in Sweden (Länsstyrelsen i Stockholms län 2012). However, the effectiveness of these schemes and programs have been questioned when it comes to protection of biodiversity (Kleijn & Sutherland 2003).

Semi-natural grasslands and wetlands are two types of habitats that both have decreased in the Swedish agricultural landscapes during the last century. Both habitat types are considered to be of high environmental value and are included in the national environmental objectives set by the Swedish parliament. Semi-natural grasslands are integrated in environmental objective ‘A Varied Agricultural Landscape’ where the Swedish Board of Agriculture has the main responsibility (Naturvårdsverket 2012 b). Historical land use and agricultural practices created habitats with high biodiversity but only fragments of these exist today. The remaining fragments are supposed to be maintained with environmental support. However, 25 % of the areas that are eligible are not maintained with AES (Jordbruksverket 2009). ‘Thriving Wetlands’ is an environmental objective specifically designed for wetlands, with the Swedish Environmental Protection Agency as main responsible authority. Three million hectares of
wetlands has disappeared in Sweden since the beginning of the 19th century due to anthropogenic causes. At present drainage is prohibited in certain parts of the country. To protect threatened aquatic species it is important to restore and maintain wetlands today (Naturvårdsverket 2013 c). At regional level it is the County Administration Boards who have the overall responsibility to coordinate and administrate the work with both these environmental objectives.

The Swedish environmental objectives are meant to be used as guidance for all involved parties working with environmental protection. The use of interim targets and action plans should make clear what is important to improve and how the progress is going (Miljödepartementet 2012). The Swedish system of environmental objectives separates the setting decided by politicians and the implementation performed by the civil service. Objectives and goals should fulfill the SMART-criteria (Specific, Measurable, Achievable, Realistic and Time-bounded). However, problems with the environmental objectives have been observed because they are imprecise and hard to evaluate. Goal conflicts are not identified and the system could not be used as guidance when conflicts occur (Edvardsson 2004).

1.1 Research problem and purpose
Both the Swedish environmental objectives and the Agri-Environmental Schemes imposed by the EU have been criticized as ineffective, hard to evaluate and imprecise. This study will scrutinize the situation in the county of Stockholm and try to explore and understand what challenges and obstacles there are in conservation of biodiversity in agricultural landscapes, exemplified by conservation of wetlands and semi-natural grasslands. Even if wetlands and semi-natural grasslands are both valuable and important habitats for preservation of biodiversity, problems can occur with grazing in wet areas. Grazing from livestock will keep both the semi-natural grassland and certain wetlands open but high water tables can both be physically hindering for the animals and cause increased parasite loads which cause health problems for the cattle. This indicates that goal conflicts can occur and that there must be trade-offs between different environmental objectives. Since the area of semi-natural grasslands in Sweden, especially important for biodiversity, maintained with environmental support have declined with 2 % between 2008 and 2010 (Karlsson, Cristvall, Edman, & Lindberg 2012) and many wetlands need more maintenance (Naturvårdsverket 2013 c), it is important to study the underlying reasons.
The objective of this study is to gain understanding of how environmental management tools are used and valued by different key actors and also raise awareness of challenges in implementation as well as possible conflicts between objectives and actors. By using institutionalism with rational choice approach as a theoretical lens I will try to answer the following questions:

To what extent are conflicts between conservation of semi-natural grasslands and wetlands a problem in the county of Stockholm?

How can challenges with conservation of wetlands and semi-natural grassland be explained?
2. Method

This study relies on a pragmatic approach and seeks knowledge about problems related to real situations and adaptation of rules for increased protection of biodiversity. The selection of a case-study approach in this study is based on the issue specific questions and material from different sources will be used to describe the context of the case and doing in-depth analysis (Creswell 2007). The intention of the thesis is to scrutinize how often conflicts occur between conservation management of grasslands and wetlands respectively. I also want to identify the main challenges as well as bring deeper knowledge about different positions among the actors. For this I need to use both quantitative and qualitative methods. The design of the study could therefore be described as a mixed method approach (Creswell 2003) and includes:

- literature study of research regarding the different management tools as well as environmental management plans and decisions in the county of Stockholm.
- use of Geographic Information Systems (GIS) to locate areas with potential conflicts between semi-natural grassland management and wetlands.
- interview study with key persons using a semi-structured interview guide with open-ended question in order to get viewpoints from different actors on the environmental management tools in question.

The intention of this mixed method approach and multiple information sources are to receive convergent data and to mitigate the weaknesses of the different techniques (Yin 2011).

2.1 Literature study

The intention with the literature study was two-folded: 1) receive background information of actual status and aims in conservation of semi-natural grasslands and wetlands and 2) gathering of information to be used for data triangulation. The results from the literature study will be used both as background information and integrated with results from the other methods. Actual status of the Swedish Environmental Objectives and aims in conservation management was mainly found in reports from the Swedish Board of Agriculture and the Swedish Environmental Protection Agency, at the Environmental Objectives Portal (website governed by the Swedish Environmental Protection Agency) and in the implementation strategy plan of the rural development program 2007-2013 for the county of Stockholm. These information sources were also used to identify authorities’ view on challenges and rules.
Previous research about farmers’ attitudes to environmental support for wetland restoration and maintenance of pastures were used as information sources in order to triangulate statements from the interview study. Results from studies of the EU’s Agri-Environmental Schemes and the Swedish Environmental Objectives have been used as foundation to the analysis and discussion. The previous research mentioned above could be described as key sources in the literature study and are further presented under result.

Reports from authorities are not an objective source of information and the selection of key research studies are quite few which increases the risk of biases. Avoidance of this weakness in the literature study has been done by using additional sources of information, both in literature but also with interviews and GIS.

2.2 Geographical Information System (GIS)
In order to locate areas with potential conflicts between wetland restoration and semi-natural grassland management, I analyzed vegetation maps with the free software Quantum GIS (QGIS), version 1.8.0. Data from the inventory of naturally and culturally valuable grasslands, performed by the Swedish Board of Agriculture, logged in the database TUVA (Jordbruksverket 2005, Jordbruksverket 2013 a) was imported together with data from the Swedish national wetland inventory (VMI), performed by the Swedish Environmental Protection Agency, SEPA (Naturvårdsverket 2009, Lantmäteriet). Data from the Swedish Board of Agriculture of which areas that are subject to environmental support due to special values, was also used in the analysis.

The wetland inventory (VMI) used a different definition from the Ramsar Convention on wetlands. Open waters in lakes and seas are not counted as wetlands in VMI as these are seen as limnic or marine system, excepted are part time dried bottoms which are still seen as wetlands. The criteria is that water is present under, in or above the ground during a large part of the year and at least 50 % of the vegetation should be hydrophilic (Naturvårdsverket 2009).

Areas listed in TUVA, which are subject to regional action plans because of high natural and/or cultural environmental values, have been inventoried by the Swedish Board of Agriculture. The purpose of the TUVA database is to provide an actual and holistic account over the situation which could be used in monitoring the environmental objective ‘A Varied Agricultural Landscape’. An earlier inventory of meadows and pastures performed 1987-1992 by the Swedish Environmental Protection Agency has been used as baseline for the TUVA inventory. Areas mentioned in the earlier report by the Swedish Environmental Protection
Agency, but without action plan, have been visited again by the Swedish Board of Agriculture. In common for all different characters used to evaluate the land is that they are favoured by grazing or mowing. Depending on the lands condition during the visits in terms of pre-set values, four different categories were used to roughly describe the actual situation: Not applicable, Restorable, Pasture or Meadow. Not applicable means the area no longer has the searched values in such amount that restoration is seen as possible within reasonable time. Restorable are areas still having some values connected to grazing or mowing and evaluated as possible to restore into such condition it would fit ordinary action plans and environmental supports within five to six years. Pastures and Meadows contain values over a dominating part of the area and are maintained today either with grazing (Pastures) or mowing (Meadows) (Jordbruksverket 2005).

To select areas of potential conflict I used GIS to search for all semi-natural grasslands, registered in TUVA, which intersected with wetlands from VMI. These areas were selected as physical areas of potential conflict as grazing or mowing, at least in some part, have to be done in wet conditions. Not all grasslands were selected automatically in the QGIS, probably because of different projection systems in the ground data. Therefore grasslands connecting to wetlands were also manually selected. All TUVA registered grasslands in the county of Stockholm were by this method categorized as wet or dry. Wet is defined here as areas intersecting wetlands and dry are areas with no connection to wetlands in VMI.

The semi-natural grasslands registered in TUVA were also compared with areas which received environmental support for special values during 2012. Areas with environmental support for special values are often consistent with areas registered in TUVA but with small reductions. There are also areas which retrieved environmental support without being registered in TUVA. Thus was the same method used as with categorization of wet and dry grasslands, TUVA areas intersecting areas with environmental support for special values were separated from the other and sorted in two other categories: support and no support.

All data retrieved from QGIS was imported to Excel and all TUVA registered areas in the county of Stockholm was categorized as wet/dry and maintained by environmental support for special values or not. To analyze the binary response of support/no support to size of the areas logistical analytical models has been used. The statistical calculations out of this data were made in the free software R, version 2.15.2.
2.3 Interviews
For this study two officers at Stockholm County Administration Board, one municipality officer and two farmers have been interviewed. The officers were selected due to expertise and profession while the farmers had experiences from both pastures with environmental support for special values and wetland restoration. The municipality officer was recommended by the officers at the County Administration Board as he had special interest in both wetland and grassland conservation. All other interviewees were chosen by the author. The interviews with the County Administration Board officers were done simultaneously. Since the two officers were independent from each other in their work the combined interview situation was not seen as a problem, instead it favored reflective thoughts and discussion regarding different viewpoints. The other actors were separately interviewed.

The main purpose for the interview study was to gain a deeper knowledge about different perspectives on how environmental support to semi-natural grasslands and wetlands works in practice, the personal motivation, what the main challenges are and experiences of goal conflicts. The form of a semi-structured research interview has been used, as described by Kvale and Brinkmann (2009). This means a general interview guide was made in advance, but during the interviews a free conversation was preferred and the interview guide was more used as a checklist to see if all aspects were covered. The questions were open and as non-leading as possible, phrased in a non-threatening and sympathetic way in order to avoid a resistance by the interviewees (Yin 2011). The intention of this study is to reflect on experiences from different involved parties in the implementation phase of environmental management tools. Although not all opinions could be reported I have tried to represent the key points from all interviewees in the result. Statements and opinions from interviewees were compared with written reports and previous research in order to obtain data triangulation (Yin 2011). The results were then analyzed with institutional theory to reveal where problems occur in implementation.

All interviews were done in Swedish and translated into English by the author. No recording was made during the interviews instead notes were taken. Transcription of the interviews was done immediate after. To avoid biases as much as possible caused by my own interpretation and the lack of recorded sound material uncertain and/or ambiguous statements have been left out.
3. Theory

3.1 Rational choice and institutionalism
The theoretical framework for this study is institutionalism with a rational choice approach. Rational choice and game theory rely on the grounded assumption that individuals will make rational choices, i.e. choose the alternative with the best available outcome for themselves, in situations where they have the opportunity to decide. According to institutional theory with a rational choice perspective individual behaviors are also shaped by institutions. Relying on utility maximization, rules and incentives are created by the institutions in order to shape practices and behavior of the actors in a desirable and predictable way. Successful institutions can shape the preferences of individuals in preferred direction, reaching the most favorable outcome to all members whether membership is voluntary or not (Peters 2005).

3.2 The action arena


According to the Institutional Analysis and Development framework (IAD) described by Ostrom (2005), one core fundament in institutional analysis is the action arena. This includes participants and an action situation, i.e. actors interact with each other and make decisions. The action situation is described by Ostrom as:

"Thus, an action situation refers to the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas).” (Ostrom, 2005, p. 14)

The decisions in the action arena are affected by exogenous variables which could be divided into three clusters: the biophysical world, rules and the community. All these will affect the
action arena and finally the outcome (Ostrom 2005). This study will only scrutinize the biophysical world and rules and therefore explain these in more detail below.

3.2.1 The biophysical world
The biophysical factors relate to what kind of goods that are produced and thus could be categorized into four different kinds depending on their ability of exclusion and subtraction: private goods, toll goods, common pool goods and collective goods. Private goods are excludable and subtractable which means the owner has the right and possibility to exclude others from the benefit as well as their consumption will decrease the possibility for others to use the utility. Food is a classic example, the producers have the opportunity to sell their goods or not (exclusion) and consumption will decrease the amount available for others (subtraction). Toll goods are utilities where one has to pay a fee to get access to it but the consumption is not affecting availability of others to use it, e.g. cable TV. Common pool goods (or resources) are not excludable but consumption will decrease possibility of the others to use them. Fisheries in international waters are one striking example of this kind of goods. Finally we have collective goods which are neither excludable nor subtractable and could be exemplified by clean air (Vedung & Klefbom 2002).

Common-pool resources are often subject of central rules as appropriators seem to lack the ability to set up sustainable rules by themselves (Ostrom 2005). Ground water and the use of waters in general is a common-pool resource. Institutions or voluntary associations are often built up to ensure a sustainable use of common-pool resources (Vedung & Klefbom 2002). Free-riding is another concept often used in relation to common-pool goods/resources. If the sustainability of the goods relies on that all actors follow an agreement, but each actor can maximize their own profit by breaking it, then there is an incentive to free-ride. It is rational for each actor to use the resource as much as possible as the cost is shared by several but the profit will fall to the individual actor. The risk of free-riding increases with the number of actors involved in preservation of a resource and is considered to be one reason why common-pool resources are not used sustainably (Vedung & Klefbom 2002).

3.2.2 Rules
Rules are used by the society to bring order and predictability to human actions by forbidding, permitting or putting requirements on certain activities. Monitoring and enforcement of the rules is important to bring stability into the system but not enough. A general shared acceptance of both system and rules is needed to make it work. Differences in interpretations and changed configurations increase the risk of ambiguities and threatens the, from the
beginning, shared criteria. Small communities with common language and understanding of agreements are easier to monitor. Different biophysical conditions also require sensitive analysis and tailor made rules rather than uniform, central rules to work (Ostrom 2005).

The concept of rules could be defined in various ways: from regulations set by authorities to precept and maxims for proper behavior. Rules could also differ in levels depending on the action arena of interest. Operational or working rules are used in day-to-day decisions and in operational situations such as production, consumption and distribution. Often these kinds of rules are related to social habits and used unconsciously. Collective choice rules affect the operational rules and are used in collective choice situations like prescription, monitoring and enforcement. Changes in collective choice rules occur slowly and will make an impact on the operational rules and situations. Finally there are constitutional rules, affecting the collective rules and situations in first hand. These are changed in a very slow pace (Ostrom 2005).

In this report rules will be used in terms of regulation and focus will be on how collective choice rules affects the operational rules/situations and furthermore, the outcome.

3.3 The outcome
Positive outcomes from the action arena will increase the commitment from participants to the structure. Unfair treatment and/or outcomes perceived as less valuable will decrease the commitment and raise a will to change the structure or exogenous variables by the participants. There is a distinction between the physical outcome, the external reward or sanction and the participant’s valuation of them. The physical outcome is related to the actual produced product and the external reward or sanction is related to financial returns or taxes/fines. The participant’s valuation finally, is dependent on extrinsic valuation but also intrinsic valuation such as shame and proudness (Ostrom 2005).

Uncertainty of the outcome makes decisions more complicated and also relates to the control of an action situation. An individual could have absolute control over the decision to take action or not but still have little control over the outcome. Another actor could have huge influence over the outcome but little or no opportunity to choose among different action decisions. Action arenas could involve participants with different set of control over the outcome (Ostrom 2005).
4. Result

4.1 Previous research
The studies presented below have been used as a foundation and/or analytical tool within this study.

Agri-Environmental Schemes (AES) such as rural development programs and environmental support to farmers are environmental management tools used within the EU to improve biodiversity. Kleijn and Sutherland (2003) have scrutinized how the effectiveness of these schemes is evaluated and they come to the conclusion that almost all member states lack a proper evaluation of the AES. There is a huge need for more research in this area and every AES should contain clear and unambiguous objectives regarding biodiversity. Results from evaluation studies should be communicated internationally and within the scientific community in order to make progress with other AES (Kleijn & Sutherland 2003).

Edvardsson (2004) discusses in her study of the Swedish system of environmental objectives the ambiguous formulations used and how this could complicate evaluation of outcomes. Biodiversity is mentioned as one example where definitions differ amongst ecologists in terms of what should be taken into account. Ecosystems, species, populations and genes are all parts of the biodiversity concept and it is not clear what a “natural state” means. The use of indicators as evaluative criteria, and thus simplification of assessments are also discussed. The author means that a more complex system is needed to ensure the objectives precision. Furthermore, the system lacks a comprehensive way of identifying goal conflicts where activities within one objective could have negative impacts to another objective (Edvardsson 2004).

Two studies of motivation and attitudes of Swedish farmers to environmental support have been used in order to confirm/oppose statements obtained by this interview study. Hansson, Pedersen and Weisner (2010) have interviewed farmers in the Southwestern part of Sweden about their attitudes to wetland construction. Nitsch (2009) has performed an interview study in different parts of the country regarding attitudes of farmers towards authorities as well as semi-natural grasslands. In order to increase the commitments to wetland construction on private land, authorities should increase the information to the farmers about risks as well as the long-term use and consequences of wetlands, according to Hansson, Pedersen & Weisner (2010). Further emphasis should be on the environmental benefits gained by wetland construction instead of the negative environmental impacts that come from agriculture. It is
also important to make evaluation programs and give feed-back to the farmers about environmental benefits gained from projects (Hansson, Pedersen, & Weisner 2010). When it comes to farmers’ attitudes to authorities and semi-natural grasslands, Nitsch (2009) also stress communication as an important factor to increase the commitment to the system of environmental support. Actors have to understand each other’s viewpoints and realities. Objectives and measures should rely on a place-specific knowledge base. It is important for the farmer to know what the intention of the rules are, why and by whom they are decided in order to reach acceptance. An open dialogue is desired where all parties are ready to listen and learn from each other (Nitsch 2009).

4.2 Quantitative results – GIS

![Image of bar chart]

Figure 2 TUVA areas in the county of Stockholm categorized as wet/dry and if maintained with environmental support for special values or not. The proportion of wet areas receiving environmental support is significantly larger than the proportion dry areas with environmental support (chi-square = 11.81, df=1, p-value < 0.001, Pearson’s Chi-squared test)

Of all valuable semi-natural grasslands in the county of Stockholm registered in TUVA, 12.8% were intersected by wetlands and thereby categorized as wet and areas of potential conflict between biodiversity management goals. However, the proportion of wet semi-natural
grasslands receiving environmental support is significantly larger than the proportion of dry areas with environmental support due to special values (Figure 2).

The size of the areas can also be an important factor influencing whether farmers apply for environmental support. Small areas are relatively more expensive to maintain due to costs of fencing in relation to produced utility (Jordbruksverket 2009). A general linear model shows that the size of grazed areas has significant positive effect on received environmental support due to special values for wet pastures but not for dry pastures (Figure 3, Table 1).

![Graph showing the relationship between area and environmental support for dry and wet areas.](image)

**Figure 3** The relationship between the size of meadows and pastures and the odds of having successfully applied for environmental support, for dry areas (dotted line) and wet areas (solid line) in the county of Stockholm during the year 2012.

**Table 1** Logistic model analyzing the effect of the size of pastures and meadows of two different conditions: dry and wet. The significant interaction is explained by a larger positive size effect for wet areas than for dry areas.

<table>
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<th>LR Chisq</th>
<th>Df</th>
<th>Pr(&gt;Chisq)</th>
</tr>
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<tbody>
<tr>
<td>Condition</td>
<td>5.1953</td>
<td>1</td>
<td>0.02</td>
</tr>
<tr>
<td>Size (m²)</td>
<td>17.5663</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Condition * Size</td>
<td>12.8075</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
The result from splitting the areas into the different classes used in TUVA show that *Pasture* is the dominating class covering 57.3%, followed by *Not applicable* 24.2%, *Restorable* 15.9% and finally *Meadow* 2.7%. There is no significant difference between the categorization made in TUVA in wet and dry grasslands (Figure 3). This means wet areas today are just as active as dry areas according to the TUVA inventory.

![Figure 3 TUVA areas in the county of Stockholm divided in Pasture, Not applicable, Restorable and Meadows using TUVA classification, wet or dry from GIS in this study, and if maintained with environmental support due to special values or not (chi-square = 1.50, df=3, p-value > 0.6, Pearson chi-squared test).](image)

4.3 Wetlands

4.3.1 The actual situation and aims

In general restoration of wetlands in agricultural landscapes have several aims; nutrient reduction in water, increased biodiversity, and creation of cultural and environmental values used for recreation. These aims often conflict with other societal values. Some of the main hindrances for wetland restoration are: farmers’ preference for cultivation, water permits regulating the ground water table, or complex administration with approvals needed from
several land owners. Wetland restoration is always regarded as promoting biodiversity, but studies on the effect of restored wetlands in different parts of Sweden have so far been a disappointment. Negative results may depend on too high criteria used for evaluation, or that evaluations are performed too early after restoration (Naturvårdsverket 2012 d). Certain wetland types need maintenance with grazing animals or mowing in order to prevent overgrowing. However, wetland maintenance using environmental support has decreased in recent years (Naturvårdsverket 2013 b). Restoration of wetlands is complex and needs specific evaluation and science is often not in pace with practice. Ten important ecological principles should be evaluated but are often ignored: 1) Landscape context and position, 2) natural habitat types, 3) specific hydrological regime, 4) development of ecological attributes, 5) nutrient supply affecting biodiversity, 6) specific disturbances regimes, 7) seed banks and dispersal, 8) environmental condition and life history, 9) succession theory, and 10) influence of genotypes (Zedler 2000). An improved bird fauna is otherwise the most striking example of what is appreciated with wetland restoration by several actors (Officer C 2013, Farmer A 2013, Hansson, Pedersen, & Weisner 2010).

In the county of Stockholm exploitation of land due to urbanization is a threat to the agricultural sector and causes land conflicts in the region (Länsstyrelsen i Stockholms län 2012). Fields, meadows and pastures have often been used for residence buildings and road constructions threaten many natural wetlands (Officer A 2013). Natural wetlands in the county of Stockholm are most severely affected by anthropogenic activities in the whole of Sweden. Water regulation is the most significant disturbance in the Stockholm region, and account for over 30 % of the interferences (Naturvårdsverket 2009). In the county of Stockholm 207 ha of wetlands was given financial support for creation and restoration between the years 2000-2011 (Naturvårdsverket 2012 a). The aim was to have 350 ha wetlands restored during 2000-2010 and 180 ha during the period 2007-2013. In 2012 the Swedish Board of Agriculture decided to give restoration and creation of wetlands high priority and therefore the County Administration Board in Stockholm has given efforts linked to water/wetlands first priority followed by efforts linked to pastures/meadows. Areas dominated by arable land with a low amount of lakes and watercourses will be first prioritized for information campaigns, done in cooperation with municipalities. The priority order for the wetlands functions are: 1) reduction of nutrients, 2) biodiversity, and 3) recreation (Länsstyrelsen i Stockholms län 2012). The financial support for wetland restoration/creation has gradually increased (Hansson, Pedersen, & Weisner 2010) and in the county of Stockholm
the maximum amount of environmental support was raised as late as 2011 (Länstyrelsen i Stockholms län 2011).

4.3.2 Challenges
The County Administration Board scrutinizes applications for financial support of wetland projects. The land owner must approve such projects even though it could be other stakeholders, e.g. recreational fishing organizations etc., who are the project owners. The design is compared against the desired function as well as if the water flow and/or depth in the area are regulated by older permits. All stakeholders are informed and the County Administration Board makes an assessment of possible conflicts with other interests. If the projected wetland exceeds five ha or concerns older permits the decision is moved to the Land and Environment Court and needs an extended proceeding (Officer A 2013).

Obtaining approval from other parties and fulfilling all the required demands for an eligible application can be seen as frightening and overwhelming by land owners seeking financial support for wetland restoration. All the paper work, constant demands from authorities requesting more information, and the very complicated rules makes it very difficult for an ordinary farmer to accomplish an application, even with help from consultants. Having the decision moved to court and being questioned by judges made one interviewee feel like a criminal instead of doing something good (Farmer A 2013).

One of the challenges with wetland restoration is to overcome land owners resistance to the long-term commitment the rules apply for. To receive financial support within the rural development programs for wetland, the land owner is bound to maintain the wetland for 20 years. Uncertainty of what happens during this time, like fluctuations on the world market prices on grain for example, makes farmers reluctant to convert arable land into wetlands. The commitment is strong and the wetland could be protected as a valuable biotope which means the land owner risks prosecution and repayment in case of regretting the creation of a wetland. Fear of increased mosquitos and negative attitudes towards wetlands stemming from the older generation are other challenges to overcome (Officer A 2013).

The study of landowners’ motive to wetland construction reveals that farmers in general think productive land should be used to produce food. Less productive land could be easier to convert but it is important to take the business economy into consideration. The financial support for maintenance plays a significant role. It is both a monetary support but also psychologically important confirmation that the farmer is doing something good. Some
farmers lack feedback from the authorities on what benefits the created wetland has produced (Hansson, Pedersen, & Weisner 2010). The lack of confirmation is also mentioned by one interviewee stating the absence of interest regarding improvements of the water quality as strange. He would like to know if there are any reductions of nutrients in the stream after his wetland construction but no officials have shown interest to measure this (Farmer A 2013).

4.4 Semi-natural grasslands

4.4.1 The actual situation and aims
The area of semi-natural grasslands maintained with environmental support declined in Sweden with 13 400 ha during 2008 - 2010. It is specifically areas with environmental support due to special values which have decreased. One reason for the decline could be of administrative nature. As a consequence of new mapping some pastures are now located outside of what is defined as agricultural land. Farmers can no longer seek ordinary financial support within the agricultural program for these areas (Karlsson, Cristvall, Edman, & Lindberg 2012). This redefinition of farmland was made after the criticism from the European Commission regarding Swedish agricultural land contained too many trees. It led to a stricter regulation with fewer trees allowed in pastures and meadows and was implemented in 2008 and 2009 (Jordbruksverket 2012).

The county of Stockholm is dominated by the presence of Sweden’s capital city Stockholm with surrounding urban municipalities. However, it also contains widespread rural areas in the southern and northern parts of the county. Forty percent of the land areas is classified as forest and seventeen percent as agricultural land which means arable fields or pastures/meadows (Länsstyrelsen i Stockholms län 2012). The short distances between communities and farmers cause problems and conflicts regarding smell etc. (Officer B 2013). In the county of Stockholm the regional objective is set to 15 000 ha semi-natural grassland maintained with environmental support. However, adjustments could be necessary because of the administrative reasons mentioned above. Environmental support was paid for 9 900 ha in 2011 (Länsstyrelsen i Stockholms län 2012).

In order obtain environmental support for valuable semi-natural grassland the farmer has to send in applications to the County Administration Board, who evaluates if the area fulfills the requirements set by the Swedish Board of Agriculture. A first step to check the area is using old maps mainly from the 50s\(^1\). If the area is marked as cultivated in these maps, the

\(^1\) Ekonomiska kartan
biodiversity is assumed to be too low to be classified as “special value” and the application will be denied. However, it is important to note that environmental support for special values also can be approved for cultural reasons, not just biodiversity. The second step is to visit the area and search for key species. If at least five different key species, which are favored by grazing or mowing, are found the application is approved. Action plans are set up with commitments of five years maintenance (Officer B 2013).

Participants’ personal motivation to conservation of semi-natural grasslands contains perspectives like importance to protect rare and species rich habitats with connection to ecosystem services like pollination (Officer B 2013), but also the importance to manage a heritage from older generations and the beautiful landscape (Farmer B 2013, Nitsch 2009).

4.4.2 Challenges
Biologically valuable semi-natural grasslands in the county of Stockholm are threatened by decreasing amount of grazing animals, specifically cattle. The urban development in the region makes it difficult to keep cattle without disturbing the neighborhood (Länsstyrelsen i Stockholms län 2012). The urban public also has a misguided concern for cattle, which leads to reports to animal health authorities. Animals are viewed as pets by the public and the increasing number of reports and conflicts are exhausting the farmers (Officer C 2013). One interviewed farmer had experienced this type of problem and was now a bit anxious when people visit his pastures (Farmer B 2013).

It is hard to recruit new farmers in the county, especially cattle holders. Working with cattle demands a special life style with long working hours and few opportunities to vacations. In the county of Stockholm there are a lot of other opportunities for employment. Sheep are more common to hold in avocation to ordinary jobs, and there are a lot of riding horses in the county. However, horse owners are in general reluctant to let their horses graze in semi-natural area due to injury risks and spare-time farmers are more cautious about long-term commitments (Officer B 2013).

In general it is more economic for farmers to let cattle graze on more productive fields where the grass is more nutritive. This will give the farmer a larger gain because the cattle grow more. Sometimes persuasion is needed to make farmers use valuable semi-natural grassland as pastures (Officer B 2013).
### 4.5 Rules, Control and Conflicting Environmental Objectives

#### 4.5.1 Rules

Water in general is surrounded with strong regulation. All operations or measures changing the depth, location, quality or accessibility of water demand permits according to the Swedish Environmental Code. This includes constructions of bridges, tunnels and dams as well as drainage and power plants. Water Operations (vattenverksamhet) is a legal term with connections to older laws and other set of values regarding the environment, with more focus on production than biological conservation. Permits enacted under these elderly laws are still valid and need court orders or approval if the conditions are about to change (Naturvårdsverket 2008). The EU Water Framework Directive (2000/90/EC) calls all member states to take integrated actions in order to retrieve a good surface water status. The Directive was implemented in Sweden 2004 and sets the level of what is approved water status (Liljegren 2013). Authorities and municipalities have the joint responsibility to monitor and take the needed actions to improve water quality with dissatisfying status. Restoration and creation of wetlands in agricultural landscapes are promoted measures within this field (Länsstyrelsen Västmanlands län 2009).

The rules connected to environmental support of farmers for maintaining valuable semi-natural grasslands stipulate that the County Administration Boards set the terms for: 1) during what time in season the area should be used as pastures, 2) what kind of animals should be used, 3) prohibition to supplemental feeding, and 4) if there is a need to rest the land from grazing one year. If the land is flooded because of large precipitation one year and grazing or mowing is hindered, the financial support is adapted to the area that could be maintained by the County Administration Board (Jordbruksverket 2013 b).

Rules connected to semi-natural grasslands and environmental support to areas with special values prescribes continuous grazing with high pressure and maintenance is controlled by the County Administration Board. The heavy grazing keeps the land open and is seen as beneficial for many vascular plants. From ecological point of view, and with a broader biodiversity perspective, the intense grazing is questioned. Studies show that local conditions such as wetness and soil conditions created in wet meadows favored different bird species and management should vary (Gustafson 2006, Wissman & Lennartsson 2010). The relation between different taxa is complex where plant, birds, bumblebees and butterflies all have their own demands on habitats. There is no simple way to measure the total biodiversity and this
calls for variation in grasslands characteristics (Vessby, Söderström, Glimskär, & Svensson 2002).

The demand of early and heavy grazing is hard to obtain in reality according to Nitsch’s study of farmers attitudes (2009). Weather, local conditions and variation in the animals’ food demand has to be considered by the farmers in doing adjustments of time and number of animals in each pasture. Number of trees and bushes allowed in pastures are also regulated and contradicts with desires of farmers. Farmers in general want more trees and bushes than allowed, as they function as protection to the animals against rain, wind and sunshine but also because groves belong to the landscape (Nitsch 2009). One interviewee also pinpointed the negative side of early and heavy grazing. As all flowers were eaten before blooming he worried about the possibility of spreading. From a long term perspective he also raised questions about soil quality as nutrients and minerals diminish with the years if nothing ever is supplied back to the ground (Farmer A 2013). The strict rules and advices on early and heavy grazing have been debated and in one report on the development of pastures and meadows it is stressed that advices and action plans should be prepared in dialogue with the farmers (Jordbruksverket 2009).

One interviewee was of the opinion that making progression in nature conservation by following the rules of environmental support took too long time and was too complicated. He was of the opinion that more action is needed, knowledge of what to do already exists. In an expansive, urban region action and decisions have to be made with short notice and therefore financing with the help of compensation fees from private investors is more useful. Corporations wanting to invest in land for exploitation could contribute with more money than environmental support within rural development program (Officer C 2013).

4.5.2 Control
Nitsch’s study (2009) on attitudes of farmers to authorities shows that in general farmers are reluctant to depend on subsidies from the society, they prefer a system where they get paid directly from selling their products. However, environmental support for conservation of semi-natural grasslands is seen as needed by the farmers because of the low yields these areas produce. The reasons for their negative attitudes against subsidies are that they feel uncertainty on how the rules will be interpreted by inspectors and if changes in the rules will occur. Decisions are made far away without possibility to influence or insight from farmers. Feelings of governing and control contradict with a self-sufficient life style and some even
mention how their work are treated like environmentally hazardous and they are seen as prospective criminals (Nitsch 2009).

Frustration over different interpretations and rigid implementation of the rules by inspectors are expressed emphatically by one interviewee. According to this farmer, the constant pressure and remarks from inspectors has made him considering quit cattle holding. Stories about picking on small details with no significant relevance have tired him out. According to him, other farmers have already given up their cattle because of rigid inspectors. Inspectors’ opinion stands above what veterinarians or other expertise say, leaving farmers with a feeling of being without legal rights (Farmer B 2013). This frustration is confirmed by another interviewee who claims that inspectors just look at details and lack a holistic environmental approach. Constant conflicts about rules wear down farmers with cattle and cause them to shut down business (Officer C 2013). Both these interviewees described conflicts with inspectors from animal safety departments as the most common and severe. Conflicts and rigid use of rules for grazing areas were also described. Harsh remarks had been made about small parts in pastures surrounding water cups which could not be included in the environmental support because of heavy trample and lack of grass for example. Another example includes the presence of cross-country fences for horse jumping in one of the pastures, disqualifying it from being an object of environmental support. If areas do not fulfill the criteria, the farmer has to repay all support he has received during the period of five year commitment (Farmer B 2013).

Officers on the County Administration Boards feel bounded by the rules, budgets and orders set by the Swedish Board of Agriculture according to the interview. They acknowledge that farmers are controlled by many regulations and see themselves as mediators, trying to make rules and forms understandable to the farmers (Officer A 2013, Officer B 2013). Within wetland restoration they are restrictive in putting pressure on private landowners as they do not want to act authoritative. Instead they try to convince landowners who have showed interest in wetlands earlier to take action. In situations where municipalities also are land owners more direct demands on actions can be made (Officer A 2013). When it comes to maintenance of semi-natural grasslands, the County Administration Board seeks after restorable land and makes judgments on the possibility of restoration in five years. But it is still up to the landowner/farmer to seek environmental support (Officer B 2013).
4.5.3 Conflicting Environmental Objectives

The quantitative analysis reveals that more than 10% of all meadows and pastures in TUVA are at least in some parts in close conjunction to wet areas. However, there are different opinions on if conservation of pastures and wetlands are in conflict with each other or not. The interviewed officers at the County Administration Board had just experienced conflicts where the presence of grazing cattle could disturb the nutrient reduction function in some wetlands because of trampling and production of manure (Officer A 2013). This conflict is confirmed by another interviewee stating that grazing animals can disturb some wetlands treatment function but are in same time needed to enhance biodiversity. In some water protection areas problems with bacteria in the water areas has occurred. Officers at the municipal Environmental Office want to dismiss the grazing animals because of this. In such cases the water quality is protected by the Swedish Environmental Code and it is up to the County Administration Board or officers at the Environmental Office to decide what to do (Officer C 2013).

Other actors are more troubled about the rules regarding environmental support for maintaining semi-natural grasslands. The grass turf in wet pastures cannot hold for the demanded high grazing pressure without being broken by trampling according to one subject in Nitsch’s study (2009). It is usual that farmers do not seek environmental support for pastures in wet areas as they feel uncertain if they can fulfill the demands (Officer C 2013). Raised water table in a wetland located within one of the interviewee’s pastures causes him trouble as the cows refuse to go into certain areas or risk injuries if they do so. This will prohibit the area from being grazed as much as desired (Farmer B 2013). The raised water table is in this case made in order to increase living conditions for species dependent on wetlands and relates to a cooperative project between municipalities to increase the general water quality of a larger area (Lundberg 2010). The situation is further complicated by the fact that the municipality is landowner and the farmer leases the pastures for grazing (Farmer A 2013). Municipalities and the County Administration Board use leasing contracts with farmers in order to maintain land owned by themselves (Officer C 2013). The Swedish Board of Agriculture states in one report that the complexity of regulation can be one reason why farmers do not seek environmental support for valuable grasslands and therefore there are few documented cases of conflicts between the Swedish Environmental Code and rules for environmental support (Jordbruksverket 2012). However, creation of wetlands can also generate win-win situations, which was experienced by another interviewee. His intention was
to create a wetland with open water attracting birds and with the possibility of nutrient reduction. The neighboring farmer was positive to the project as it would improve his residential view but had some doubts about increased numbers of mosquitos. After the wetland restoration the neighbor’s pasture, bordering this wetland, was counted as more valuable and he could receive more financial support for it. The amount of mosquitoes did not change (Farmer A 2013).
5. Analysis

5.1 The action arena
Using institutionalism with a rational choice approach as theoretical framework, institutions such as the Swedish Board of Agriculture, the Swedish Environmental Protection Agency and the County Administration Boards are created to solve collective problems coming from individual behavior and profit maximization. The collective problem in this case-study is decreasing biodiversity because of diminishing habitats in agricultural landscape exemplified by semi-natural grasslands and wetlands. Farmers are supposed to use practices with adverse effects on these habitats because of economic maximization reasons and regulation creating incentives for protection are thereby needed.

Looking at figure 1 from section 3 again, certain key actors can be identified. Within the scope of this study two main participants of the action arena have been identified: the County Administration Board and the farmers and/or land owners. The land owners/farmers are first and last responsible for how the land in agricultural landscapes is used. It is up to them to decide if a pasture will be used for grazing or not or if a wetland should be restored. The County Administration Board on the other hand has the responsibility to engage and encourage farmers to participate in rural programs with financial support for environmental actions. They are also responsible for monitoring and control, deciding on if areas are suitable for actions and how the regulations are followed by the farmers. The municipalities also have a certain role in the action arena, both as land owners as well as project leaders but also in monitoring.

The actors interact with each other in different situations and phases. Both the County Administration Board and municipalities invite farmers to seminars and educations in order to promote actions within conservation of valuable grasslands and wetlands. These gatherings seem to be appreciated by the farmers and are seen as useful to establish new contacts and stimulating new ideas (Farmer A 2013, Nitsch 2009). This type of action situation has the possibility to shape behavior of participants in wanted direction. The authorities can use their influence by promoting actions in a positive way and convince farmers about the benefits of different measures. The farmers are free to join both the meetings but also the proposed action which means there are no actual conflicts in these types of action situations.

Another action situation is the inspections and monitoring of rule application. The County Administration Board mainly, but also the municipalities in some areas, have in these
situations a huge possibility to dominate the farmers. If seminars and education events were perceived as positive the farmers’ experiences from inspections are more complex. One interviewee was very negative towards the way the officers had been acting in these situations. Too harsh attitude and inspectors with no experience from agriculture made him disbelieving the system and willing to give up the cattle (Farmer B 2013). This perception was shared by some objects in Nitsch’s study (2009), while others had good experiences from inspections and felt they had a positive relation to the officers. Another interviewee stated that he never had problems himself but knew some neighbors having troubles with inspection officers. He also recognized that it is not easy to work as an officer and do these inspections. Often it is younger women who have to tell elderly farmers they are doing something wrong (Farmer A 2013). The interviewed officers on the other hand also expressed sympathy for the farmers; stating that society has many demands on them, they are controlled intensely and are described as polluters (Officer A 2013, Officer B 2013). It is not surprising that enforcement and control situations are subject to more controversies than education events. These situations are also more influenced by the exogenous variables, rules and the biophysical/material conditions, discussed below.

5.2 Rules and the biophysical conditions
Rules are supposed to create order and predictability to the society, promoting wanted actions and prohibit unwanted activities. Enforcement and monitoring are important for the stability but also a shared understanding of how the rules should work (Ostrom 2005). Both in wetland and semi-natural grassland conservation there are rules at the collective choice level, set by the EU or national level, and they certainly affect the operational rules to a large extent. But there are differences between the two examples.

Restoration and conservation of wetlands relates naturally to water use which has been surrounded by strict regulation for a long time. Fresh and surface water is a common-pool resource where the use in one place affects the quality and use in another place. Since water is a vital resource, not least in agriculture, strict regulation is not surprising. But when older laws and rules had no environmental concern per se, it is the main objective to new regulations like the EU Water Framework Directive. Paradoxically the elder rules can be hindering wetland restorations because permits for drainage are still valid and make the situations more complex with more participants. The need of approval and court orders is a heavy burden for landowners who are interested in wetland restoration (Farmer A 2013). In
this case, strict and complex rules could make participants less motivated to join the system of environmental management tools.

When it comes to rules connected to maintenance of semi-natural grasslands the regulation at the collective choice level is more liberal, leaving room for place-specific adaptations at the operational level. The County Administration Board is responsible for setting the terms on how valuable grasslands should be maintained in order to retrieve environmental support. Since semi-natural grasslands can obtain very different biophysical conditions, tailor made rules and solutions are good and required (Ostrom 2005). In practice however it seems like the working rules and recommendations are uniform, favoring early and heavy grazing everywhere. Farmers and other expertise are questioning these uniform recommendations and rules both of practical reason but also due to the outcome. Uniform and general rules could undermine the conservation of valuable semi-natural grasslands in certain areas if farmers see them as too hard to fulfill, or incongruous. Furthermore, regulation about maintenance of semi-natural grassland is complicated by the circumstances that most grazing is done on private property and thus private goods. The wanted outcome, conservation of biodiversity, is quite the opposite – a collective good with no possibility of exclusion or subtraction – and leads into next section; the outcome and evaluative criteria.

5.3 The outcome and evaluative criteria
Positive outcomes will increase participants’ commitments to the system while unfair treatment or disappointing results will either decrease the commitment or cause an opinion to change the exogenous variables. The outcome could also be divided into physical (product), external reward (financial return) and finally the participants’ own valuation of it (Ostrom 2005). The physical outcome, or product, in this case-study is an increased or conserved biodiversity, it is what the environmental support to farmers and landowners are aimed for even if there are other objectives connected to these management tools also. Wetland conservation especially has the aim of nutrient reduction and increased water quality while conservation of semi-natural grassland could be related to cultural/historical protection. Thus the external reward is in this case the financial support the farmers or landowners get to maintain grasslands and wetlands while the personal valuation includes individual motivations to actions.

The main evaluative criteria used in the Swedish Environmental Objective ‘A Varied Agricultural Landscape’ is the amount of area of semi-natural grassland maintained by
environmental support (Naturvårdsverket 2012 c). There are also other indicators, such as the amount of nesting birds in agricultural areas (Naturvårdsverket 2013 a). In ‘Thriving Wetlands’ areas of created and protected wetlands together with the amount of nesting birds in wetlands are used as indicators and evaluative criteria (Naturvårdsverket 2011). Amount of birds, or TRIM-index, is one of the few existing official measurements covering biodiversity within the EU. It builds on trends of common bird populations, typical for special habitats, and includes several species. The idea is to mirror the biodiversity condition in general by counting birds in the same place and in the same way year from year (Lindström & Gren 2013). Besides trends in bird population, there is no direct connection between biodiversity and the evaluative criteria.

The analysis of the empirical results with institutional theory and the IAD framework is summarized in table 2:

Table 2 Summary of actors’ different perspectives of environmental support to conservation of semi-natural grasslands/wetlands

<table>
<thead>
<tr>
<th></th>
<th>The County Administration Board</th>
<th>Farmer/Landowner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>Increase the areas maintained by environmental support</td>
<td>Make a financial return, feelings of making positive contribution to the environment</td>
</tr>
<tr>
<td><strong>Rules</strong></td>
<td>Designed in order to give the desired physical outcome, stated at the collective choice level</td>
<td>Demands to retrieve financial support, connection to desired physical outcome not clear</td>
</tr>
</tbody>
</table>
| **Control**          | Enforcement gives control over farmers’ external outcome. Some possibility to rule adaptation and thereby physical outcome (semi-natural grasslands) | Control over decisions about:  
  • grazing/wetland creation  
  • join Agri-Environmental Schemes or not |

Municipalities can be both land owners/project leaders but also have monitoring responsibility and act as an authority which means that they can belong to both columns in Table 1. The County Administration Board can also be a landowner, and thus control how the land shall be used. Farmers, leasing land as pastures and meadows, are vulnerable to the authorities’ decisions as they have a less degree of control in action situations.
5.4 Challenges and Conflicting Environmental Objectives
Identified challenges to conservation of semi-natural wetlands in the county of Stockholm are decreasing numbers of farmers, especially cattle holders, and rules for environmental support that are not in accordance with the reality the farmers meet. In wetland conservation the stringent rules including long-term commitments, older laws and farmers’ negative attitudes towards wetlands are seen as challenges. A common denominator is farmers’ fear of inflection regarding the external award if rules could not be fulfilled, while the validation in terms of personal motivation differs. Pastures are seen as a heritage to manage by the farmers in contrast to their views on wetlands. This difference in farmers’ perspectives is understandable as semi-natural grasslands are important habitats created by historical agricultural practices while wetlands have diminished on the same reasons.

Regarding conflicts between environmental objectives, farmers have experiences of difficulties to maintain the heavy grazing rules provide in wet pastures. This should implicate a lower commitment of environmental support to valuable semi-natural grasslands close to wetlands, categorized as wet in the GIS investigation, and thereby physical areas of potential conflict. The quantitative results in this study however show the opposite, wet areas have a proportionally larger share of the environmental support due to special values than dry areas. There is no significant difference in TUVA classification between wet and dry areas either. The classifications Not applicable and Restorable in TUVA means that the searched values have been lost in different degrees and these classifications are equally distributed in wet and dry areas. Wet pastures seem to be just as active as dry pastures. This indicates that the Agri-Environmental Schemes with financial support to farmers conserving semi-natural grasslands work in the county of Stockholm, especially in wet pastures. Interesting to note is that the environmental support to wet pastures seems dependent on the size of the pasture in contrast to dry pastures where there is no size effect (Figure 3, Table 1). This could mean that grazing animals could retreat to dry parts of the pasture during wet conditions if it is big enough. It is interesting however that no authority or official report mentions the problem of rule compliance in wet areas while farmers do. For future program periods in rural development plans, it is important to take different perspectives into account and early meet obstacles to Agri-Environmental Schemes.

While no decreased commitment to environmental support in wet pastures could be verified with the quantitative results, other conflict situations have occurred during the study. Nutrient reduction is one strong incentive to wetland construction for authorities and relates to water
status and the EU Water Framework Directive as well as other strict water regulation in the Swedish Environmental Code. Grazing animals, close to water, affect the water quality in negative ways by trampling and spreading manure. Situations of conflicting environmental objectives occur when semi-natural grasslands are located close to water, and need maintenance with grazing. Biodiversity in some wetlands are also favored by grazing but at the same time there is a need to increase the water quality. Conservation of biodiversity and water status issues will then stand against each other and decisions of trade-offs have to be made. The authorities’ lack of interest, mentioned by farmers (Hansson, Pedersen, & Weisner 2010, Farmer A 2013), to measure the effect on water quality after wetland constructions is consequently surprising. Animal health is another conflicting objective according to interviewees, even though it is not an environmental objective. The county of Stockholm needs more farmers and grazing animals in order to keep the semi-natural grasslands maintained. Constant disputes with surrounding public, and too rigid inspectors tire them out and make them abandon agriculture (Farmer B 2013, Officer C 2013).
6. Discussion

A striking result of this study is the weak connection between rules and physical outcome in nature when it comes to biodiversity. It concerns environmental support to both semi-natural grasslands and wetlands. The demands on heavy and early grazing is questioned both by farmers and some expertise. There is a risk of farmers abandoning valuable areas if the rules do not fit their reality. In their perspective, according to rational choice, it is a balance: the financial outcome from the environmental support has to compensate the work needed to fulfill the rules. Application of environmental support for wet pastures also contains uncertainty to a larger extent than dry pastures. Uncontrolled factors like weather conditions have to be considered when decisions of five year commitments shall be made. According to the quantitative result in this study, TUVA areas intersecting wetlands are maintained with environmental support due to special values to a higher degree than dry areas. But what happens if farmers for the next period decide to abandon the environmental support system because the risk of not fulfilling the rules is too high? Probably a lot of habitats important for the biodiversity will be lost. One possible solution to decrease the risk of farmers to abandon areas would be additional use of local adjustments of the rules, meeting the place-specific biophysical conditions. An explanation of the relatively high use of environmental support in wet pastures could be that local adjustments have been done. However, this sets high knowledge demands on the officers at the County Administration Board. Increased participation of farmers in formulation of action plans is suggested by Nitsch (2009), and would probably gain farmers personal valuation of the system. But the main problem still consist, how do we evaluate effects of different actions on biodiversity?

Rules are created in order to increase predictability and wanted actions within the society (Ostrom 2005). Then it is important to know what the effects of the rules will be. Kleijn and Sutherland (2003) stress the need of more studies on effectiveness of schemes on biodiversity and evaluation criteria. Edvardsson (2004) also asks for more precise and complex evaluation systems in her study of the Swedish environmental objectives. This could be interpreted such as action plans should be more detailed, containing more specific criteria to be fulfilled. On the other hand one interviewee was of the opinion that we already have the knowledge of what to do; we should focus on more actions. Complicated rules and criteria are more of a hindrance then a help (Officer C 2013). What comes out from this reasoning is that the use of Agri-Environmental Schemes and environmental support to farmers as environmental management tools has to be a balance act. Strict rules connected to complicated evaluative
criteria have to weight against easy appliance. An increased dialogue between farmers and officers at the County Administration Board would at least be useful according to this study. Officers working with inspections have a special responsibility to explain background and motives behind rules and decisions in order to gain farmers’ confidence to Agri-Environmental Schemes. The farmers’ commitment to the system will decrease if they, who actually have to do the physical work, do not understand on what grounds the rules exist or even find them counterproductive to biodiversity.

Since biodiversity have few official indicators and is hard to evaluate while water quality is relatively easy to measure, conservation of semi-natural grasslands is in a weaker position related to water status when it comes to evaluation. I would argue that hard facts about chemical composition or polluting substances are strong incentives for authorities to take actions while more diffuse indicators due to complex ecosystems with interactions between different taxa are harder to protect. If the connection between action and physical outcome is vague then it will decrease the commitment from the actors, in this case the authorities. This could explain the strict regulation of waters and wetlands while rules about semi-natural grassland are more liberal as authorities have been more forced to protect water. Water, being a common-pool resource, has early been subject of regulation and authorities’ responsibility. Collective goods, as biodiversity, are on the other hand harder to take responsibility of. What follows from this reasoning is that authorities in conflict situations about water status and presence of grazing animals could be more likely taking decisions favoring water quality than biodiversity. This could be a threat to semi-natural grasslands near water in the future but also wetlands in need of maintenance with grazing.

There is no reason to believe that the problems mentioned above in the discussion are specific to the county of Stockholm. Instead they are probably consistent to most agricultural landscapes within the country where semi-natural grasslands integrate with wetlands. However the extent of the problem is specific to the county of Stockholm where more farmers and grazing animals are needed in order to keep the semi-natural grasslands maintained. Therefore, it should be of particular interest to avoid farmers quitting because of conflict situations. Authorities, i.e. the County Administration Board and municipalities, could probably improve the situation by having an integrated organization and holistic assessments.
7. Conclusion

The aim of this study was to gain understanding of how environmental management tools like financial support to farmers for conservation of wetlands and semi-natural grasslands are implemented. Furthermore, the intention was to raise awareness of challenges and possible conflicts between actors and objectives.

The result from the quantitative analysis showed that 12.6 % of all valuable semi-natural grasslands, in the county of Stockholm, intersected wetlands and can thereby be physical areas of potential conflicts. However, comparisons of the proportion of environmental support and classification in the Swedish Board of Agriculture’s database TUVA with areas not intersecting wetland, show that wet areas are just as or even more maintained than dry areas. Still, farmers mention that fulfilling the demands of heavy grazing connected to environmental support are problematic in wet pastures. Trampling from cattle breaks the grass turf and too wet conditions hinders the animals to visit certain areas. Authorities in general, on the other hand, experience more problems with the presence of grazing cattle disturbing the functioning of nutrient reduction in some wetlands and decreasing the water quality.

The different perception of problems connected to grazing of wet pastures among the actors raises awareness of two important issues: 1) the risk of farmers abandoning valuable pastures in the future and 2) the risk of authorities dismissing grazing cattle in wet areas because of water protection.

The risk of farmers abandoning biologically important areas relates to conflicts regarding rules. If rules are seen as injustice, not applicable or even counterproductive the commitment to environmental support and Agri-Environmental Schemes will decrease among the farmers. The county of Stockholm needs more farmers and cattle in order to keep both semi-natural grasslands and certain wetlands maintained. An open dialogue between farmers and authorities is therefore preferable to harsh inspections, especially since the connection between rules and the wanted outcome, an increased biodiversity, is vague.

The risk of authorities prioritizing water quality in front of biodiversity conservation by grazing relates to regulation of common-pool resources and evaluative criteria. Water and wetlands are surrounded by strict regulation since long time as it is a common-pool resource. Authorities have a special responsibility to ensure a sustainable use of common-pool resources and regarding water has the responsibility increased with the EU’s Water
Framework Directive. Biodiversity on the other hand is a collective good, which is hard to find responsibility over. Furthermore, water quality is quite easy to measure while biodiversity relates to complex ecosystems which are hard to evaluate. The responsibility of common-pool resources combined with better evaluative criteria of water quality increases the risk of authorities favoring water status in front of biodiversity in conflict situations. This could be a threat to both semi-natural grassland and biodiversity in wetlands in the future.
8. References


**Interviews**


Appendix 1

Interview guide

1 General background information
Name:

Position:

Work description:

Education:

2 General standpoints
   a) Why do you think it is important conserve/restore:
      Wetlands?
      Semi-natural grasslands?
      - Biodiversity
      - Cultural reasons
      - Nutrient reduction
   
   b) What is the main challenge with conservation/restoration of
      Wetlands?
      Semi-natural grasslands
      - What are the main hindrance
   
   c) How is the situation in the county of Stockholm compared to other regions in Sweden?

3 Organisation
   a) How is the work with environmental management organized?
      - What is done in practise
      - How many persons are involved?
   
   b) Does cooperation between different environmental measures exist? If yes, how?
      - Within your organisation and with other institutions
   
   c) How are contacts with other actors maintained?
      - Governmental offices
      - Municipalities
      - Farmers
      - Corporations
      - NGOs
4 Influences

a) What is the main influence to changes and priorities in environmental management?
   - The EU
   - Governmental offices
   - Parliament decisions
   - Environmental Objectives

b) What role does science and new knowledge play?

c) How are new knowledge received within your field of work? What are the sources?
   - Interest/- lobby organisations
   - Science

5 Management of conflicts and consequences

a) Are consequence assessments done in restoration/creation of:
   Wetlands?
   Semi-natural grasslands?
   If yes, how?
   - Are landscape perspectives used?

b) What are prioritized in conflict situations and on what grounds?
   - Who makes the decisions?
   - Water permits?

c) Is general regulation problematic to apply on practical level?
   - Place-specific conditions?

d) Have you experienced conflicts between measures to maintain wetlands and semi-natural grasslands?
   - If so, could you describe the case(s) and how it solved?