MORE THAN FOOD PRODUCTION

MULTIFUNCTIONAL AGRICULTURE IN POLICY AND PRACTICE

ERIKA ÖHLUND

SÖDERTÖRN DOCTORAL DISSERTATIONS

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To my grandparents: Kerstin and Axel; Hanny and Fritz.

I was thinking about the hours
the many hours at the piano all year long
all the impressions I carry around
and so little that came out in song
- Frida Hyvönen, “Painter”

Abstract

Over the course of the past century, European agriculture has transitioned from small-scale, manual farming to more mechanised, industrial practices. This development has resulted in increased productivity but also in environmental problems, such as greenhouse gas emissions, biodiversity loss, and social challenges. The agricultural sector has evolved from being an integral part of most people's lives to a marginal and sometimes questioned activity. The policy response to the changed role of farming in the EU has been to apply a multifunctional approach to agriculture. Multifunctional agriculture (MFA) can be defined as an agriculture that is not solely focused on food production, but contributes to several different functions in the societies and ecosystems of which it is a part.

Although conflicting values and goals are central challenges in agricultural policy, practice, and research in Europe, and the multifunctional approach to agriculture is dominant in EU policy, conflicts have not been studied to any large extent within the MFA research field. This doctoral thesis analyses conflicting values in relation to multifunctional agriculture. Through semi-structured interviews and focus group discussions with Swedish farmers and an analysis of policy documents at the national, sub-national and EU level, this thesis paints a broad picture of different aspects of multifunctional agriculture. It analyses how multifunctional agriculture unfolds at the local farm level as well as how competing values in relation to multifunctional agriculture can be resolved, in policy and on the farm, in an EU and Baltic Sea Region context.

The thesis contributes a visual conceptualisation of multifunctional agricultural activities to the multifunctional agriculture research field. It then applies this visualisation to pig farming and two different sustainable future scenarios. The findings of this thesis contribute to the body of research that concludes that EU agricultural policy does not contribute enough to multifunctional agriculture. Furthermore, this thesis confirms the existing research finding that Swedish agricultural land is exploited to a larger extent than policymakers intend. There are goal conflicts between different aspects of multifunctional agriculture and it is not possible to solve them all. Practitioners and decision-makers need to decide on the goals they wish to prioritise, even if that decision comes at the expense of other ambitions. One part of the problem is that values are often not commensurable and therefore cannot easily be compared and ranked. Agricultural policy should enable farmers to choose different strategies and encourage diversity, since farmers have different interests and constraints and variable access to agricultural strategies. Such diversity would make EU agriculture better prepared for future environmental and other crises.

Keywords: multifunctional agriculture, agricultural policy, Sweden, Poland, the Baltic Sea Region, EU CAP

Sammanfattning (Summary in Swedish)

Multifunktionellt jordbruk i policy och praktik.

Under det senaste århundradet har det europeiska jordbruket förändrats från småskaligt, manuellt jordbruk till mer mekaniserade, industriella metoder. Denna utveckling har resulterat i ökad produktivitet men även miljöproblem, såsom utsläpp av växthusgaser, förlust av biologisk mångfald och sociala utmaningar. Jordbrukssektorn har utvecklats från att vara en integrerad del av de flesta människors liv till en marginell och ibland ifrågasatt verksamhet. Inom EU-politiken har beslutsfattarna hanterat jordbrukets förändrade roll genom att se jordbruket som multifunktionellt. Multifunktionellt jordbruk (MFA) kan definieras som ett jordbruk som inte enbart är inriktat på livsmedelsproduktion utan bidrar till flera funktioner i de samhällen och ekosystem de är en del av.

Även om motstridiga värderingar och mål är centrala utmaningar inom jordbrukspolitik, praktik och forskning i Europa, och det multifunktionella synsättet på jordbruk är dominerande i EU:s politik, har konflikter inte studerats i någon större utsträckning inom MFA-forskning. Denna avhandling analyserar motstridiga värden i relation till multifunktionellt jordbruk. Genom semistrukturerade intervjuer och fokusgruppsdiskussioner med svenska lantbrukare, samt analys av policydokument på nationell, subnationell och EU-nivå, målar denna avhandling en bred bild av olika aspekter av multifunktionellt jordbruk. Den analyserar hur multifunktionellt jordbruk ser ut på gårdsnivå samt hur målkonflikter i relation till multifunktionellt jordbruk kan lösas, i politik och på gården, i en EU- och Östersjöregionkontext.

Avhandlingen bidrar med en visuell konceptualisering av multifunktionella jordbruksaktiviteter till forskningsfältet multifunktionellt jordbruk. Den tillämpar sedan denna visualisering på grisuppfödning och på två olika hållbara framtidsscenarier. Resultaten av denna avhandling bidrar till den forskning som drar slutsatsen att EU:s jordbrukspolitik inte bidrar tillräckligt till ett multifunktionellt jordbruk. Dessutom bekräftar avhandlingen befintliga forskningsresultat om att svensk jordbruksmark exploateras i större utsträckning än vad beslutsfattarna avsett. Det finns målkonflikter mellan olika aspekter av multifunktionellt jordbruk och det är inte möjligt att lösa dem alla. Lantbrukare och beslutsfattare måste bestämma vilka mål de vill prioritera, även om de prioriteringarna är på bekostnad av andra ambitioner. En del av problemet är att värden ofta inte är jämförbara och därför inte lätt kan jämföras och rangordnas. Jordbrukspolitiken bör göra det möjligt för jordbrukare att välja olika strategier och uppmuntra mångfald, eftersom jordbrukare har olika förutsättningar och varierande tillgång till olika strategier. En sådan mångfald skulle göra EU:s jordbruk bättre förberett för framtida miljö- och andra kriser.

Nyckelord: multifunktionellt jordbruk, jordbrukspolitik, Sverige, Polen, Östersjöregionen, EU:s gemensamma jordbrukspolitik

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Reimersholme/Runmarö, September 2024

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List of papers

Paper I. Öhlund, E., K. Zurek & M. Hammer (2015). Towards Sustainable Agriculture? The EU framework and local adaptation in Sweden and Poland. *Environmental Policy and Governance* 25:4. DOI: 10.1002/eet.1687

Paper II. Öhlund, E., M. Hammer & J. Björklund (2017). Managing conflicting goals in pig farming: farmers' strategies and perspectives on sustainable pig farming in Sweden. *International Journal of Agricultural Sustainability* 15:6. DOI: 10.1080/14735903.2017.1399514

Paper III. Öhlund, E., M. Malmaeus & E. Fauré (2020). The significance of different realms of value for agricultural land in Sweden. Land Use Policy 96, 104714. DOI: 10.1016/j.landusepol.2020.104714

Paper IV. Öhlund, E. (submitted). Farmers' perspectives on multifunctional agriculture in two post-growth scenarios of Sweden. Manuscript, submitted to *Journal of Rural Studies.*

Contributions to the co-authored papers

Paper I: The authors initiated the article together. I collected and analysed the definitions of sustainable agriculture, I collected and analysed the statistics and other information regarding Sweden and analysed the statistics and information about Poland after it had been collected by Zurek. I was the main author of all of the sections except 'Agriculture as Nested Social-Ecological Systems', 'Sustainability in EU Agricultural Policy and Practice', 'CAP and sustainability', and 'CAP Towards 2020', but to these I also contributed some text. All of the authors contributed to editing and improving all parts of the article.

Paper II: I initiated the article and carried out all of the interviews and farm visits. I compiled and compared the regulatory frameworks, analysed the empirical material, and wrote the first draft of the paper. Hammer and Björklund contributed mainly to the Discussion and Conclusion sections.

Paper III: I initiated the article, did all of the empirical work and the analysis in NVivo, and wrote the first draft of the article. Malmaeus and Fauré contributed to the Introduction, Discussion, and Conclusion sections.

Figures and tables

Abbreviations and acronyms

AES	Agri-environment schemes
CAP	Common Agricultural Policy of the European Union
ES	Ecosystem services
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
LRF	*Lantmännens Riksförbund* (The Federation of Swedish Farmers)
MFA	Multifunctional agriculture
OECD	Organisation for Economic Co-operation and Development
SJS	Safe and Just Space
UNCED	United Nations Summit on Environment and Development
WTO	World Trade Organization

‘Cash Crop’

At first you think that not much is needed
to have food
Mother’s breast.
The cow’s udder.
The potato scone[1]
And then you can take everything from nearby.
But then when it turns out that Mother must have a supply of liquid…
is the scoop then hanging in its right place?
Yes, but the water tub is empty.
And the well?
Not dug.
But get a spade, for God’s sake! And dig where you stand. Or where the dowsing-rod strikes. At least!
If you knew how many things the blacksmith needs apart from the iron to be able to forge the pointed lever and spade for digging the well.
And the scone disintegrates with only potato. You have to have a little cereal flour such as rye or wheat, neither of which grows in the area
you wouldn’t have to reach out too far, after all – for rye and wheat are advancing over by the coast.
But. And. You hardly have time to say thankyougoodlord for the food and you’re longing for coffee. And where does that grow?
You only have to look at the tin to see how far away is that bush producing the beans
how hot the sun has to be, even truly hostile, as the foreman is wearing a helmet and why he is carrying a whip as the kneeling coffee-picker holds out his flat basket heaped with beans
all these questions the children ask – until they understand that they them selves have to have coffee to be able to live
it is like that with everything – in the cottage, at the table – hundreds of middlemen you have to turn to and rely on to sustain your own life.

Extract from Sara Lidman (1996), The root of life [Lifsens rot], (trans. Joan Tate) Swedish Book Review, The environment in contemporary Swedish writing, Lampeter 1997.

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[1] *Kornpalt* or *pitepalt* is a Swedish traditional dish made from grated raw potato mixed with flour and filled with minced pork.

1. Introduction

The role of agriculture in European society has changed substantially during the past century. In the late nineteenth century, agriculture was an integral part of most European inhabitants' lives. Small farmers struggled with manual methods to produce enough food with local seeds and manure so that people could live, work, and perhaps get some moments of pleasure through consuming exotic commodities such as coffee or fruit imported from abroad. The agricultural sector was Europe's main employer and most food was produced with local inputs and consumed locally, or at least domestically. The importance of the farmer and agricultural production was not questioned, since growing food was necessary to live. This is the story that Sara Lidman hints at in the scene on the previous page taken from her novel The root of life (1996).

From the early twentieth century, mineral fertilisers and pesticides were introduced to agricultural production in Europe alongside an increased mechanisation of the sector. This so-called green revolution led to drastic changes in the agricultural sector (Batáry et al. 2015; Evenson and Gollin 2003). Agricultural production increased exponentially, the share of the population working in agriculture decreased considerably, and several environmental challenges connected to agriculture emerged. The Millennium Ecosystem Assessment (2005) concluded that 60 per cent of the ecosystem services they analysed were at the time being used unsustainably. One important reason for this was food production. In 2019, the Intergovernmental Panel on Climate Change (IPCC) concluded that agricultural production contributes significantly to greenhouse gas (GHG) emissions, of which industrial livestock farming represents the largest share (Steinfeld 2006). Other sources have shown that agriculture is the main anthropogenic contributor to the rising levels of nitrous oxide, the basic component of GHG, in the atmosphere (Tian et al. 2020). Agriculture has also been shown to contribute to eutrophication of water, which is a severe problem in the Baltic Sea (Conley et al. 2011; Arheimer et al. 2012; Larsson and Granstedt 2010), and biodiversity loss (IPBES 2019). Not only does agriculture affect the climate and the environment, but it is also one of the sectors that is likely to be most negatively affected by climate change (Ibrahim and Johansson 2022; Karimi et al. 2021). It is crucial to mitigate the negative effects of agricultural production, not the least in order to ensure future food security.

On the other hand, agriculture has significant potential to contribute to the improved health of ecosystems and to increased social sustainability in rural regions (Nowack et al. 2023). Agriculture can, for example, provide and protect wildlife habitats, contribute to water purification, and mitigate climate change (Boone et al.

2019; Ricart et al. 2019; van Zanten et al. 2014; Zhang et al. 2007). Furthermore, European citizens appreciate agricultural landscapes and wish to consume food that is produced locally (Van Huylenbroeck et al. 2007).

These changing and conflicting social representations of agriculture fall squarely into the lap of farmers, who feel pressured by the different and sometimes contradictory demands and requirements from consumers, researchers, and policymakers on all governance levels (Buddle et al. 2021; Hubbard et al. 2007; Egoz et al. 2001). Research shows that farmers feel that the general public does not understand their work and their contribution to society, nor do researchers (Belanche et al. 2021; Helfenstein et al. 2024). A Swedish farmer I interviewed expressed this attitude as follows: "[A farmer] basically has an interest in taking care of animals and cultivating the soil. But it is like society thinks that we are some kind of monsters that destroy nature."

As a shaper of agricultural policy, the European Union (EU) is a powerful institution. Its Common Agricultural Policy (CAP) applies to farmers in all of its member states. Within the EU, the response to the changing status of agriculture has been to base agricultural policy on a multifunctional platform (Van Huylenbroeck et al. 2007). From the original financial support system for CAP, which was based on production amounts and hectares of land, a significant share of the CAP budget is now currently allocated through multifunctional measures (Pe'er et al. 2022; European Commission 2023a). The EU's recently launched Farm to Fork Strategy (European Commission 2020), targeting the food sector, also has a multifunctional approach to agriculture (Gargano et al. 2021).

In the literature, multifunctional agriculture as a research field emerged in the late twentieth century (Van Huylenbroeck et al. 2007). In the research, there are two main understandings of multifunctional agriculture: the *market-oriented approach* and the *holistic or integrated approach* (Moon 2012). Defining multifunctional agriculture in terms of markets and commodities was first introduced by the Organisation for Economic Co-operation and Development (OECD). According to the OECD (2001), an agricultural activity is multifunctional if it, together with the agricultural product (food, fuel, or fibre), jointly produces something that is not a commodity and if there is no functioning market for the non-commodity (Gray et al. 2017; OECD 2021). The market approach is designed to pinpoint in which situations it is justified to treat the agricultural sector differently from other producing sectors by giving them financial support. The *holistic or integrated approach* is said to be normative since it stipulates that multifunctional agriculture is desirable and should be encouraged (Nowack et al. 2022; Gargano et al. 2021; Hrabák and Konečný 2018). According to this view, multifunctional agriculture does more than just emphasise food production; it also contributes to other functions in the societies and ecosystems it is a part of (Wilson 2007). Multifunctional agriculture is, according to this view, necessary to achieve rural sustainable development (Kizos et al. 2011; Hrabák and Konečný 2018; Nowack et al. 2023).

Although the multifunctional approach to agriculture is dominant in EU policy (Erjavec and Erjavec 2020; Gargano et al. 2021; Galli et al. 2020) and conflicting values and goals are central challenges in European agricultural policy, practice, and research (Blicharska et al. 2024; Lécuyer et al. 2021), to my knowledge conflicts have not been studied to any large extent within the multifunctional agriculture research field. An exception is that Van Huylenbroeck et al. (2007) who highlight that there might be conflicts, for example, between certain environmental functions and farm employment, if an agricultural activity that contributes to environmental protection results in a decrease in farming income so that the farmer cannot offer employment. Apart from this finding, in general, research on multifunctional agriculture has primarily focused on analysing the positive side-effects of multifunctional agricultural activities (Nowack et al. 2022; Hrabák and Konečný 2018). In a recent review of the MFA literature, Song et al. (2020) identify the lack of studies analysing conflicts between agricultural functions and how such conflicts can be resolved.

1.1 Aim and research questions

Considering the different perspectives on multifunctional agriculture, there is a need to operationalise multifunctional agriculture in an EU context and to understand how multifunctionality and conflicts between functions play out on the EU level as well as on national and municipal levels. This is what I attempt to do in this thesis. I explore the changing roles, conflicting goals and functions of agriculture through the lens of multifunctional agriculture.

The aim of this thesis is to understand and analyse conflicting values in relation to multifunctional agriculture. Multifunctional agriculture is exercised by farmers on the farm, which is the reason why my first research question is: How does multifunctional agriculture unfold in practice on the farm level? Since conflicts between values and goals are understudied in the field, my second research question is therefore: How can conflicts between different values in relation to multifunctional agriculture be resolved in policy and in farm practice?

The aim of the thesis is addressed through four research papers. **Paper I** analyses to what extent EU member states are able to adapt the Common Agricultural Policy (CAP) to their local agricultural sectors by comparing CAP implementation in Sweden and Poland. **Paper II** explores how Swedish pig farmers navigate the different and conflicting goals of their farming activities and analyse which policy changes could contribute to solving some of their goal conflicts. **Paper III** draws upon Trainor's (2006) realms of value framework to analyse agricultural land use conflicts through a case study of how Swedish municipalities argue to preserve or exploit agricultural land. Finally, **Paper IV** explores Swedish farmers' perspectives on two future scenarios for Sweden 2050. These scenarios use diametrically different strategies to fulfil environmental and social sustainability goals and analyse which implications the different scenarios have for agricultural multifunctionality. As seen

in Table 1 below, **Papers II** and **IV** address the first research question (RQ1) while **Papers I**, **II**, and **III** address the second research question (RQ2).

Table 1. The research questions and which papers that address them.

Research questions	**Papers that address the research questions**
RQ1: How does multifunctional agriculture unfold in practice on the farm level?	II, IV
RQ2: How can conflicts between different values in relation to multifunctional agriculture be resolved in policy and in farm practice?	I, II, III

1.2 Thesis outline

This thesis consists of two parts: this cover essay and four research papers, of which **Papers I–III** are published in peer-reviewed journals while **Paper IV** is submitted to the *Journal of Rural Studies*. The outline of the cover essay is as follows: In this first chapter, the subject, aim, and research questions of the thesis are introduced. In chapter 2, how multifunctional agriculture has emerged in policy is described. In chapter 3, the state-of-the-art in multifunctional agriculture research and my analytical perspective are presented. The research design, methods, and material used in the thesis are outlined and explained in chapter 4. In chapter 5, the results of the four papers are summarised. In chapter 6, the main findings of the thesis in relation to the research questions are discussed and in the final chapter 7, some conclusions regarding conflicting values in relation to multifunctional agriculture are drawn.

2. Multifunctional agriculture in policy

The term multifunctional agriculture stems from the United Nations Summit on Environment and Development (UNCED or Earth Summit) held in Rio de Janeiro in 1992. In the Agenda 21 declaration that the summit adopted, UNCED calls for a review of agricultural policy to better incorporate matters of food security and sustainable development through acknowledging the "multifunctionality" of agriculture (UNCED 1992). In 2001 the OECD (2001) adopted the term and started using it as a motivation for treating agriculture differently from other industrial sectors. Multifunctionality was a way to justify the need for state support to farmers. In the OECD view, an agricultural activity is multifunctional if it, together with food, fibre, and fuel, jointly produces a non-commodity for which there is a market failure, that is, if there exists no market, or only a poorly functioning one, for that non-commodity (Gray et al. 2017; OECD 2021). Joint production and market failure are, according to this view, the only two reasons to treat the agricultural sector differently from other producing sectors by giving them financial support.

The concept of multifunctional agriculture (MFA) was picked up within EU agricultural policy circles in the 1990s. It was formally incorporated into CAP through 1999 policy statement *Agenda 2000: for a stronger and wider union* reform. The EU agricultural policy discussions leading up to the 1999 statement, which amongst other things reformed the CAP, was dominated by the planned accession of countries from Eastern Europe and by the ongoing WTO trade negotiations (Cunha and Swinbank 2011). The notion of MFA within CAP is broader than how it is used in the OECD context. In CAP, the multifunctional aspect of agriculture is directed more towards the roles it can play in rural development and in society in general (Renting et al. 2009). How MFA is implemented in CAP is explained in more detail in the next section.

The Food and Agriculture Organization of the United Nations (FAO) uses the term MFA mainly in the context of rural development in low-income countries. The multifunctional nature of agriculture in this sense means the role agriculture can play in poverty alleviation, cultural heritage and social welfare in low-income countries. As Renting et al. (2009) state, the FAO notion of multifunctionality is somewhat different from how the term is used in EU policy. According to the FAO, agricultural multifunctionality can be an important tool for alleviating poverty, for example, by diversifying agricultural activity so that it provides additional income (Leakey and Prabhu 2017). However, Twarog (2013) notes that the term MFA has negative connotations in low-income countries since it is seen as a tool that high-income countries use to protect their agricultural markets from competition. A critical difference between how MFA unfolds in high- and low-income countries is that the

latter are not able to financially compensate farmers for the contribution that their agricultural activities make to their local society and ecosystems. Similar complaints have been raised from high-income countries outside of the EU. Australian negotiators in the WTO rounds have frequently argued that the EU MFA policy hinders Australian products from entering EU market (Dibden et al. 2009).

Van Huylenbroeck et al. (2007) outline three agricultural policy paradigms that describe policy development from the mid-twentieth century until the early 2000s: the dependent, the competitive, and the multifunctional paradigm (Table 2). The dependent policy paradigm was dominant in Europe until the late twentieth century and was characterised by low farmer incomes and protectionism, a measure designed to increase farmer income through the state control of supply. The competitive policy paradigm emerged in the late 1980s and early 1990s, in the United States within the GATT/WTO negotiations and in Sweden. This paradigm was characterised by a belief in the free trade of agricultural products without state interventions. Although this paradigm contributed to substantially increased global agricultural production, it also came with social, ecological, and economic challenges (Van Huylenbroeck et al. 2007). The multifunctional paradigm that emerged around the turn of the millennium, and still dominant in Europe, is characterised by a broader view of rural regions and the contributions that agricultural activities have to the environment and society (Nowack et al. 2022; Kizos et al. 2011). In this paradigm, there is a shift away from the maximisation of agricultural production through constant intensification and addition of biochemical inputs in a process called agricultural productivism or rationalisation (see, e.g., Oostindie et al. 2006; Van Huylenbroeck et al. 2007; Wilson 2001).

Table 2. Three agricultural policy paradigms

	Dependent paradigm	**Competitive paradigm**	**Multifunctional paradigm**
Characteristics of the agricultural sector	Low incomes Not competitive with other sectors or countries	Average incomes Competitive with other sectors and on the world market	Inadequate incomes – should be "corrected" Produces public goods without getting paid
Objectives of policy	No markets without governmental aid Supply control needed	Approaching free market Low or no control of supply	Flourishing rural regions Viable agricultural households/businesses
Policy measures	Protectionism (taxes on imports, support exports) Buying surpluses	Decoupled payments during a transition period Risk management Low degree of protection	Environmental subsidies Discouragement of rationalisation of agriculture New institutional arrangements Rural development plans

Source: Adapted from Van Huylenbroeck et al. (2007).

In the next section, I develop how MFA is understood and implemented in EU policy.

2.1 Multifunctional agriculture in the EU: The Common Agricultural Policy

The papers in this thesis analyse agricultural practice and policy during the CAP period 2007–2013. **Paper I** compares the implementation of the rural development aspect of CAP in Sweden and Poland during the period 2007–2013, while **Paper II** compares EU regulations with national regulations and two schemes for organic production during the same CAP period. In **Paper IV**, the multifunctional view of agriculture in the CAP serves as a background for the analytical framework. **Paper III** analyses Swedish municipal land use policy in municipal comprehensive plans launched between 2002 and 2018 and the paper does not refer to the EU CAP. This section outlines the development and the main reforms of CAP from its emergence in the 1960s up until the present time.

One of the first policy areas of the European Union (or the European Coal and Steel Community as it was called when it was founded in 1952) was agriculture. The EUs first CAP was launched in 1962. The objectives of CAP have since then been to improve agricultural productivity through technological development, ensure that farmers' incomes and living standards are competitive, and ensure food security for the inhabitants of the EU (Treaty of Rome 1957, article 39).[2] The arguments for agricultural support were originally based on the dependent paradigm, as outlined in Table 2, but since then the justifications have gradually shifted towards the multifunctional paradigm (Van Huylenbroeck et al. 2007).

The broad introduction of mineral fertilisers and pesticides from the early twentieth century, together with the increased mechanisation which occurred in large part after the Second World War, resulted in an intensification of agricultural production in several parts of the world, a process that has been called the green revolution (Batáry et al. 2015; Evenson and Gollin 2003). During the first decades of CAP, support to EU farmers was based on a so-called market price model whereby the more farmers produced the more support they received (Erjavec and Erjavec 2020). This model strengthened the intensification trend in European agriculture. For

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[2] Food security can be defined as existing "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life". (World Food Summit 1996) In theory, a country can achieve food security without any domestic food production if enough food can be imported and made available for all residents. The IPCC (2019) adds an intergenerational dimension to its definition of food security when it states that food security should also apply to future generations and that today's agriculture must not deprive future generations of the opportunity for food production. After decades of improvement, food security on a global level has started to decrease in recent years. In their report on global food security, FAO et al. (2021) have observed that the Sustainable Development Goals 2.1 and 2.2 will not be met. These goals state that food security should be secured for everyone always, and that no malnutrition of any form should exist in the world. The share of the global population that experienced moderate to severe food insecurity in 2020 was 30.4 per cent (FAO et al. 2021, p. 19). Food insecurity also exists in Sweden and other Nordic countries, although at quite a low level (Borch and Kjærnes 2016).

example, wheat production in the UK increased threefold between 1930 and 1984, while 97 per cent of the UK grasslands disappeared during the same period (van Zanten et al. 2014). A similar development can also be seen in non-EU European countries during the mid-twentieth century. Sweden, who did not join the EU until 1995, had similar levels of state support and intensification trends for agriculture as the EU. Although 51 per cent of all Swedish farms closed between 1944 and 1966, the total value of agricultural production in Sweden did not decline. This indicates that the remaining Swedish farms intensified their production substantially (SBA 2005). There has also been a substantial decrease in the share of the labour force working in the agricultural sector during the twentieth and twenty-first centuries (Üngör 2013). In 2016 only 4.2 per cent of the EU labour force worked in agriculture (EuroStat 2022).

The image of the farmer as an environmental "monster", presented in the introduction to this thesis reflects the growing realisation, among citizens and politicians, of the negative environmental effects of agriculture, in particular the significant share of GHG emissions created by livestock production (Steinfeld 2006). Research, however, also shows that people in the EU in general appreciate agricultural landscapes and want to consume locally produced food (Van Huylenbroeck et al. 2007). Altogether, the European agricultural sector has changed, from being a central part of rural life to being a marginalised activity that does not necessarily contribute to any large extent to a country's employment, income, or even food security. As a response to these changes, the framework of multifunctional agriculture emerged in EU policy (Van Huylenbroeck et al. 2007).

Although the guiding principles have remained the same since its foundation, CAP has undergone several major reforms since its introduction in 1962. The initial MacSharry reform of 1992 was influenced both by the introduction that year of agriculture into the GATT/WTO negotiations in the Uruguay round and by the proceedings of UN Earth Summit in Rio de Janeiro. The MacSharry reform combines a decrease in price regulation with an introduction of environmental measures. Since environmental regulation was now compulsory for all EU member states, the MacSharry reform saw the full implementation of agri-environment schemes (AES) into CAP (Cunha and Swinbank 2011).[3] AES consists of monetary compensation to farmers who carry out environmental measures such as introducing wetlands on their farms or switching to less intensive management methods to decrease the negative environmental effects of farming (Batáry et al. 2015).

The next large reform of EU agricultural policy was launched in 1999 when the CAP was adapted to conform to the Agenda 2000 package that prepared the Union for its enlargement towards the east. This was when the Second Pillar of the CAP was created and when CAP, thereafter, began to give a more pronounced place to rural

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[3] An embryo of AES was introduced into CAP in 1987 when the regulations were changed to allow CAP funds to be used to cover part of the costs for protecting environmentally sensitive areas (Batáry et al. 2015).

development and environmental policy. This was also the first time that EU agriculture was fully framed as multifunctional. The First Pillar provides funding related to agricultural production while the Second Pillar focuses on rural development, environmental support, and knowledge development (Cunha and Swinbank 2011; Brady 2017; Galli et al. 2020).

At the turn of the millennium, agriculture ministers in the EU declared the following:

> The fundamental difference between the European model and that of our main competitors lies in the multifunctional nature of agriculture in Europe and in the role it plays in the economy and the environment, in society, and in the conservation of the countryside; hence the need for maintaining agriculture all over Europe and protecting farmers' income. (European ministers of agriculture in 2000, cited in Van Huylenbroeck et al. 2007, p. 24)

In this quote, multifunctionality is considered crucial, not only for agriculture in the EU, but for European rural development in general. EU agriculture is also described as different from agriculture in other parts of the world.

In 2003, the so-called Mid-term review, or Fischler reform[4] of CAP was presented (Larsson et al. 2018). Enacted in 2005, the reform replaced the income-based farm support model with the new Single Payment Scheme based on farm size, thus decoupling financial support from agricultural output. In addition, farmers became obliged to fulfil some cross-compliance measures regarding the environment, animal welfare, and the maintenance of fallow land, which was stipulated to be kept in good agricultural and ecological conditions (GAEC) (Larsson et al. 2018). The Fischler reform also increased the scope and share of the Second Pillar slightly. Its purpose has been understood as attempting to create "a better balance of support between market policy and rural development" (Cunha and Swinbank 2011, p. 148), but it has been argued that the real aim was to ensure the long-term preservation of the CAP system, in an environment where it was facing tough negotiations with the WTO (Cunha and Swinbank 2011) as well as attempting to manage the accession of twelve new member states between 2004 and 2007 (Stoate et al. 2009).

When new environmental obligations were introduced to the EU's agricultural policy in 2013, in a reform that has often been called the "greening" of the CAP, direct support through the First Pillar was changed so that it required a compulsory "greening" payment from all farmers, equivalent to 30 per cent of their total support and intended to support sustainability and counteract climate change. To be eligible for greening support, farmers had to fulfil three measures: diversify their output (farms larger than 30 hectares were required to grow at least three different crops); preserve permanent grassland; and introduce ecological focus areas (Josefsson et al. 2017). The aim of the ecological focus areas was to preserve biodiversity and improve

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[4] The reform package was named after Franz Fischler, the then EU Commissioner of Agriculture..

soil and water quality by encouraging farmers to introduce fallow, buffer zones, or landscape elements to their holdings. Another component of the 2013 reform was the equalisation of agricultural support. Whereas before regions with the highest agricultural productivity had received more financial support per hectare than others, after 2013 direct CAP support was evened out. This meant that in some countries the amount of direct support was drastically reduced, while in others it was eliminated entirely (Larsson et al. 2018).

The European Green Deal was launched in December 2019 by the European Commission as a tool to further strengthen the Commission's ambitions to address environmental challenges. The goal has been to achieve a just and inclusive transition towards a European Union in 2050 with no net GHG emissions and where GDP growth has been fully decoupled from resource use (European Commission 2019). The Farm to Fork Strategy (European Commission 2020) is the agricultural part of the Green Deal. Although the term multifunctional agriculture is not used in either the Green Deal or the Farm to Fork policies, both describe agriculture as a sector with other functions besides food production. EU agriculture should, according to the Farm to Fork Strategy, "reduce dependency on pesticides and antimicrobials, (…) improve animal welfare, and reverse biodiversity loss", among other things (European Commission 2020, p. 5). The European Green Deal makes it clear that the CAP will continue to be the main policy instrument to achieve the EU's environmental goals (European Commission 2019).

For the CAP period 2023–2027, total funding has been decreased and a larger share than before, around one third of the total CAP budget has been allocated to rural development instead of direct farm support. The CAP period 2023–2027 is structured around ten goals:

1. "Supporting viable farm income"
2. "Increasing competitiveness"
3. "Improving farmers' position in the value chain"
4. "Contributing to climate change mitigation"
5. "Efficient natural resource management"
6. "Halting and reversing biodiversity loss"
7. "Generational renewal"
8. "Jobs, growth and equality in rural areas"
9. "Responding to societal demands on food & health"
10. "Fostering knowledge and innovation." (European Commission 2023a)

Although multifunctional agriculture is not mentioned explicitly in the CAP 2023–2027 strategy document, its ten goals have a clear multifunctional focus. The main aim of agriculture, to produce food, is not mentioned explicitly in the goal headlines. Instead, the goals express what agricultural activities are expected to achieve apart

from food production. It would seem that the goal is that EU agriculture should be multifunctional. Midler et al. (2022) point out that the first three goals are related to the economic dimension of sustainability, while goals 4–6 are related to environmental sustainability and 7–9 are related to social sustainability. The tenth goal, about knowledge and innovation, can be said to cut across all three aspects of sustainability.

EU agricultural policy has been affected by the full-scale Russian invasion of Ukraine in early 2022. Russia has for many years been the world's largest wheat exporter, and Ukraine has been the fifth largest. Although the EU is not dependent on Russian and Ukrainian agricultural produce, decreased exports and restricted trade has started to challenge food security on a global level. For example, Egypt and Somalia imported wheat almost exclusively from Russia and Ukraine before the war (Parasecoli and Varga 2023). The risk of lower global cereal production has urged the EU to make exceptions from the CAP regulations. In order to maximise food production, it has allowed exceptions to the rules on fallow for both 2022 and 2023 (Government of Sweden 2022; Blenkinsop and Baszynska 2022). This development is intriguing and has the potential to transform the European agricultural system, but it is not analysed in detail in this thesis.

2.2 Background to agriculture in Sweden and Poland

This section describes the agricultural sector in this thesis' main case and sub-case studies, Sweden and Poland, respectively. Sweden and Poland are both part of the Baltic Sea Region, which consists in total of nine countries surrounding the Baltic Sea (see Figure 1). Agriculture is one of the main anthropogenic contributors to the eutrophication of the Baltic Sea (Larsson and Granstedt 2010; HELCOM 2019; Wojciechowska et al. 2019). Polish emissions represent 30 per cent of the total nitrogen discharge into the Baltic Sea and stem both from agriculture and other sources (Wojciechowska et al. 2019). Although Poland emits the largest amount in absolute numbers of phosphorous and nitrogen of all of the Baltic Sea countries, Swedish nitrogen emissions per capita are substantially higher than Polish, and phosphorous emissions per capita are slightly higher in Sweden than in Poland (Larsson 2016).

Most of the northern half of the land mass surrounding the Baltic Sea is covered by forests, while the southern half is dominated by agricultural land, of which the largest share (60 per cent) is in Poland while the lowest (7 per cent) is located in Sweden and Finland (HELCOM 2019).

Figure 1. The Baltic Sea and its surrounding countries
Source: shutterstock.com, ID: 500740657.

2.2.1 Agricultural policy and practice in Sweden

Although Sweden was not a member of the European Coal and Steel Community in the 1950s, at the time Swedish agricultural policy had similar objectives. Sweden attempted to secure similar incomes for farmers as for rural industrial workers, to increase farm productivity and farm size so that production would become more efficient and that Swedish agriculture would be able to supply the nation with food in the event of a war or other crisis (Flygare and Isacson 2003).

During the twentieth century, the number of farms in Sweden decreased sharply. With its accession into the EU in 1995 and its access to the large EU market (Eriksson et al. 2020), the Swedish state felt a decreased need for domestic primary agricultural production. It was more than a decade before the government changed tack and implemented, in 2017, the National Food Strategy. For the first time since 1947 Swedish food production was encouraged to increase and become an export sector (Government of Sweden 2017).

The lion's share of the agricultural land in Sweden is cultivated with fodder crops for agricultural animals. In 2018, fodder crops for animal feed occupied 75 per cent of Swedish agricultural land, while the remaining 25 per cent were given over to

cereals for human consumption, mainly wheat, rye, barley, and oats.[5] In 2022 livestock farming in Sweden included 10.3 million broiler chickens, 895,000 fattening pigs, and 297,000 milk cows (Swedish Board of Agriculture 2023). Agricultural production as a whole in Sweden contributed to 1.6 per cent of the country's economic output in 2022 (Andersson & Pupp 2023) and there were approximately 58,000 agricultural companies in 2022.

2.2.2 Agricultural policy and practice in Poland

As many as 14.5 per cent of the Polish labour force currently work in agriculture, the highest share of all EU countries, and Poland is currently the EU's largest producer of rye, potatoes, sunflower seeds, and chicken (Rønningen 2020). Poland also produces and exports a significant amount of agricultural equipment and machinery (US International Trade Administration 2019). Agricultural products account for 9 per cent of total Polish exports and the Polish agricultural sector contributes to 3 per cent of the Polish GDP (Marcinkowski et al. 2023).

Farms in Poland have traditionally been quite small, on average less than 6 hectares, and many farms produce mainly for their own subsistence (Rönningen 2020). Some scholars have seen this small size as a problem for agricultural efficiency (Badach et al. 2023). However, between 2002–2014 average farm size in Poland has risen, from 5,8 hectares to 10 hectares. The recent rapid development of a multifunctional view of Polish agriculture has been cited by some researchers as a successful strategy for rural development (Kutkowska and Hasiński 2018). Because of the unusually small-scale nature of the Polish agricultural sector, the political and academic discussions on multifunctional rural regions, active since the 1990s, have particularly focused on rural entrepreneurship to increase Polish rural incomes, unlike in other Central and Eastern European countries where such discussions developed as the countries accessed the EU (Renting et al. 2005).

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[5] Patrik Eklöf, agricultural policy investigator, Swedish Board of Agriculture, personal communication 04 July 2019. This statistics is not published in any official report, which is why I received it through personal communication.

3. Multifunctional agriculture in research

In this section, I begin by distinguishing between the two main approaches to research on multifunctional agriculture (MFA), the *market-oriented approach* and the *integrated approach*, and by drawing on the conceptualisations by Van Huylenbroeck et al. (2007) and Renting et al. (2009). After that, I describe how I have operationalised a multifunctional agriculture perspective in my research, based on the two terms *activities* and *functions*. Lastly, I discuss how conflicts and trade-offs between different values are handled in MFA research.

Starting with the market-oriented approach to MFA, the terminology used in such research originates mainly from agricultural economics (Renting et al. 2009; Nowack et al. 2022). In the market-oriented research approach, MFA is described as agricultural activity that, alongside private goods such as food, fibre, and fuel, jointly produce public goods or, using economics terminology, external effects (OECD 2021). In economics, the prevalence of external effects is usually described as a market failure. When external effects are positive, they can be described as public goods derived from agriculture and consumed for free by beneficiaries. For example, water can be purified in a wetland located on a farm or fruit trees in private gardens can produce more fruit because of the nearby presence of field edges that provide habitats for pollinators. According to economic theory, these external effects will be produced in a lower-than-optimal amount since the agricultural producer is expected to act in profit maximising fashion (Vatn 2002). A possible policy measure to correct this sub-optimality would then be for the state to provide economic compensation to the farmer for certain identified positive external effects, which is what is done through the CAP payments of the EU (Van Huylenbroeck et al. 2007). In the market-oriented approach to MFA, the aspect of "jointness" is often emphasised. This means that the side effects of agriculture must be produced *simultaneously* with agricultural production otherwise they are not truly multifunctional (Van Huylenbroeck et al. 2007; Renting et al. 2009). With the market-oriented approach, MFA is straightforwardly defined as agricultural activity with multiple outputs, regardless of whether or not those outputs are private or public goods, if they are intentional or unintentional products, or if they are main or side products (Van Huylenbroeck et al. 2007). It is simply ascertained that some agricultural systems are multifunctional while others are not. Thus, within this approach multifunctional agriculture is no more desirable than monofunctional agriculture.

The other research approach to multifunctional agriculture is called the holistic or integrated approach, with roots in rural sociology, human geography, and farming systems research (Renting et al. 2008; Van Huylenbroeck et al. 2007; Wilson 2007;

Nowack et al. 2022). In this approach, multifunctional agriculture (MFA) is understood as place-specific agricultural practices that do not exclusively aim at the production of food, fibre, or fuel (Wilson 2007). It is considered a normative approach in the sense that MFA is considered desirable (Renting et al. 2009; Velten et al. 2015). Scholars taking this holistic approach typically concentrate on understanding and analysing the many contributions agriculture can have for sustainable agriculture and rural development (Nowack et al. 2023). The holistic approach includes analysis of "intrinsically non-marketable" benefits, or functions, of agricultural activities, such as food security and quality of life (Renting et al. 2009 p. S114). Researchers who use this approach consider MFA to be a counterstrategy against the productivist strategies of agricultural expansion and intensification (see, e.g., Hrabák and Konečný 2018; Moon 2012). In the holistic approach, there is a focus on desirable functions of agriculture (Van Huylenbroeck et al. 2007). Nowack et al. (2022, p. 765), for example, define social agricultural functions as "positively conceived effects that unfold in the social sphere of the territory where the respective farms are located" and Hrabák and Konečný (2018, p. 267) state that multifunctional agricultural activities "enhance the resilience and sustainability of the rural community". MFA has been defined in terms such as "the capacity of farm households and other rural actors involved in agricultural activity to respond adequately to societal and consumers demand through the provisioning of a variety of goods, services and non-market functions" (Renting et al. 2005, p. 11). However, I find a definition relying on what society and consumers currently demand too vague since it implies that if consumers suddenly stop demanding open landscapes or biodiversity, such functions of agriculture would no longer be considered multifunctional. Such a definition would therefore risk overlooking the essence of MFA, namely that it is a concept that seeks to emphasise and explain the capacity of agriculture to contribute more to society than just food and fuel production. A definition that better captures the essence of MFA is instead the one by Wilson (2007, p. 186) who states that "[m]ultifunctional agriculture is […] an agriculture or way of farming that serves multiple functions and reduces the emphasis of food and fibre production."[6] This definition emphasises that agriculture has more than just food and fibre to offer to rural societies and ecosystems.

MFA is argued to contribute to the resilience of agriculture (Hrabák and Konečný 2018; Wilson 2007), but MFA does not equal resilience. MFA is a framework to conceptualise and understand how different agricultural activities contribute to different functions in society and ecosystem. It is a lens through which one can categorise and analyse activities on a farm. The resilience of agriculture is, on the other hand, understood through the trinity of robustness, adaptation, and transformation. Robustness refers to the capacity of a farm or other agricultural unit to continue functioning

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[6] Wilson (2007, p. 186) formulates multifunctional agriculture as: "*seen by many to imply simply* an agriculture or way of farming that serves multiple functions and that reduces the emphasis on food and fiber production." (my emphasis) I have removed "seen by many to imply simply" to make the definition clearer and more direct.

when it is exposed to a sudden change or crisis, how it can adapt to new circumstances, and how it can transform in response to more profound changes or shocks (Walker et al. 2004; Buitenhuis et al. 2020). A farm can be highly multifunctional but still not be able to transform if there is a crisis. If farming economically (van der Ploeg and Roep 2003) a farm may only have low access to capital and hence cannot easily invest in the transformation required to save it from the crisis. However, a productivist farmer might have greater access to capital. Their farm, therefore, may be economically robust but it might not have the resources of flexibility that could be needed for its adaptation or transformation in a time of crisis (Buitenhuis et al. 2020).

3.1 Agricultural functions

The public goods and inherently non-marketable benefits that agriculture generate are conceptualised as *functions* in MFA research. There are several ways to categorise such agricultural functions. One common way is to use the same division as the three dimensions of sustainable development: ecological functions, social functions, and economic functions. It may be considered a logical division since the MFA framework emerged from the discussions about sustainable development at the UN Earth Summit in 1992. Some examples of studies using this categorisation are Wilson (2010), Granvik et al. (2012), and Eftekhari and Shadparvar (2018).

A different categorisation of functions to which agriculture could contribute at a slightly higher level of detail was developed by Renting et al. (2008). They divided the economic functions into food and non-food products, and the social functions into cultural, social, and ethical functions. Their categorisation of agricultural functions is therefore as follows:

- Food production (both so-called bulk production and niche production)
- Provisioning of non-food goods and services (e.g., tourism, education)
- Environmental functions (e.g., water management, biodiversity)
- Cultural functions (e.g., heritage, identity)
- Social functions (e.g., social cohesion, employment, food security)
- Ethical functions (e.g., animal welfare, fair trade)

The first two categories by Renting et al. (2008) consist of goods and services (food and non-food), while the other four categories are other benefits that agricultural activities may provide to society and ecosystems. Among these categories and examples of functions, it is of particular interest for the scope of this thesis to note that *animal welfare* is categorised as an ethical function of agriculture by Renting et al. (2008). Cooper et al. (2009) argue that, from a market regulation MFA perspective, problems regarding animal welfare can be understood as a negative external effect of agriculture while high animal welfare standards can be interpreted as a positive side effect of the production if the farm animals have high animal welfare standards (Cooper et al. 2009). Since animals are living and sentient beings, it can be argued

that using them in production entails certain caring obligations. A common ethical view on animal husbandry is that the materials animals provide to humans (for example, meat or leather) may be used by humans to their benefit as long as the animals are well taken care of in a way so that their needs and instincts are fulfilled (OECD (2001). In addition, consumers in the EU tend to place a high value on animal welfare among agricultural animals when asked about the importance of this issue (Cooper et al. 2009). Despite this, animal welfare in agriculture often tends to fall outside of agricultural social science research (Kuns 2021), with a few exceptions (see, e.g., Huik and Bock 2007; Burton et al. 2012). It has not been studied to any large extent within MFA research either. Some conceptualisation has been done by the OECD (2001), for example, which argues that animal welfare can be understood as a joint product of the agricultural products it accompanies, such as pork or eggs. A similar line of reasoning can be found in Guyomard et al. (2021) and Logstein and Bjørkhaug (2023), who both argue that animal welfare is a public good provided by agriculture.

A final way to categorise functions is developed by Nowack et al. (2022). They focus exclusively on conceptualising the social functions of agriculture and through a literature review have developed four categories of social functions. Their categorisation includes social aspects of the ecological and economic functions (Nowack et al. 2022, p. 746):

- Food provisioning functions (e.g., food produced within a local context)
- Socio-economic functions (e.g., income from on and off farm activities)
- Socio-ecological functions (e.g., contribution to people's wellbeing by a certain type of agricultural landscape)
- Socio-cultural functions (e.g., preservation of cultural heritage)

The relevance of conceptualising social functions within the MFA research field in greater detail is high, since it has been previously understudied (Nowack et al. 2022), but since the focus of this thesis is to assess all types of functions of agriculture, not only social functions, I will not apply the categorisation by Nowack et al. (2022) in my thesis.

As Nowack et al. (2022) and Granvik et al. (2012) point out, the theoretical conceptualisation regarding the relation between MFA and diversification is somewhat blurry. Diversification is sometimes used as a synonym for multifunctional agriculture, meaning that as soon as a farm diversifies its activities it is seen to have become multifunctional (Nowack et al. 2022). However, a farm can become multifunctional in several other ways, not just by diversifying their activities.

3.2 Ecological functions

About a decade before the concept of MFA emerged as a response to the environmental problems that came with the intensification of agriculture, Ehrlich and

Ehrlich (1981, cited in Huang et al. 2015) articulated the somewhat similar concept of ecosystem services (ES). ES research emerged out of a concern that the failure to appreciate nature's contribution to humanity was leading to environmental neglect and degradation. Ecosystem services can be defined as "the benefits human populations derive directly or indirectly from ecosystem functions" (Costanza et al. 1997, p. 253), and although MFA and ES research have many similarities, there are also several differences between the two fields (Huang et al. 2015).

The main similarity is that MFA and ES are both anthropocentric frameworks and both analyse the human benefits from agricultural activities and ecosystems, respectively. One main difference is that the ES school of research has a larger scope than MFA since ES research does not solely focus on agriculture but on whole ecosystems. ES researchers analyse ecosystems, while MFA researchers analyse (human) agricultural activities on farms. According to Huang et al. (2015) this implies that ES researchers typically do not analyse very industrial farming systems while MFA researchers assess both industrial and small-scale agricultural methods and systems. Early ES research focused on "natural" ecosystems, identifying one of the main causes of the problems experienced with these systems as the expansion of agriculture. MFA research, on the other hand, has sought to point out that agriculture can potentially have a positive impact on these ecosystems and that it has an important role to play in rural societies in general (Oostindie 2015). The focus of ES research has however changed since then and nowadays ES research often acknowledges that agricultural systems both contribute to and use ecosystem services (Huang et al. 2015). Within an agri-ecological context ecosystem services are values and flows resulting from interactions between human management and ecological processes. Examples of ES in an agricultural context are the purification of water in wetlands or carbon sequestration by planting trees (van Zanten et al. 2014; Zhang et al. 2007).

Although the term *function* is central in both research fields, it has a different meaning. In MFA research, functions can be understood as outputs of agricultural activities, while in ES research, ecosystem services are outputs of ecosystem functions (for a review of the term function from an ES perspective, see Fors et al. 2024). In MFA, agricultural activities contribute to different functions. From an ES perspective, on the other hand, agricultural activities are external drivers that affect which and how much of a different ES can be delivered from an agroecosystem. A further difference is that ecosystem processes are the focus of ES analysis, while MFA research rarely addresses such concerns, at least directly (Huang et al. 2015).

Ecosystem services (ES) generated by agroecosystems are, in MFA research, often interpreted as ecological functions of agriculture. A farmer's activity can, in MFA terminology, lead to an ecological agricultural function such as erosion control by planting perennial crops on a farm (Englund et al. 2023). In an ES research context, the ecosystem service of erosion control can be provided by an ecosystem and the ecosystem can in turn be affected by agricultural activities. In other words, farm

activities have the potential to support and strengthen ecological functions and, hence, to deliver ecosystem services (Huang et al. 2015).

3.3 Multifunctional activities

A farming activity is multifunctional if it has several simultaneous outcomes or fulfils multiple functions (Renting et al. 2008). In MFA research, it is common to divide multifunctional activities into three categories: *deepening*, *broadening,* and *regrounding*. This categorisation was originally conceptualised by van der Ploeg and Roep (2003). *Deepening* activities are directed towards the agricultural supply chain and comprise, for example, the selling of local produce through alternative food networks such as farmers' markets (Kizos et al. 2011). *Broadening* activities are diversification activities, such as the production of energy from food residues or organising agricultural tourism (Hrabák and Konečný 2018). *Regrounding* activities seek to transform the basis for farm income or costs to something completely new. Regrounding can take place by getting off-farm employment which contributes to the farm household economy and thus sustains the continued existence of the farm or, by drastically reducing farming costs by adopting low external input agriculture, also known as farming economically (van der Ploeg and Roep 2003).

The deepening, broadening, and regrounding framework of multifunctional agricultural activities is sometimes illustrated as an equilateral triangle, with one side for each term in the framework (van der Ploeg and Roep 2003; Oostindie et al. 2006). An equilateral triangle can however give the impression that there needs to be a balance between the three types of activities, which is not the case in any study I have come across. On the contrary, it is more the rule than the exception that one of the activity types is dominant in the different case studies of multifunctional activities which feature in the current research. For example, while Kizos et al. (2011) identified regrounding activities such as off-farm employment and deepening activities like the development of short food supply chains among the Greek farmers in their study, they did not observe any broadening activities at all. I have therefore developed an alternative visualisation of the three types of multifunctional agricultural activities and how they interact (Figure 2).

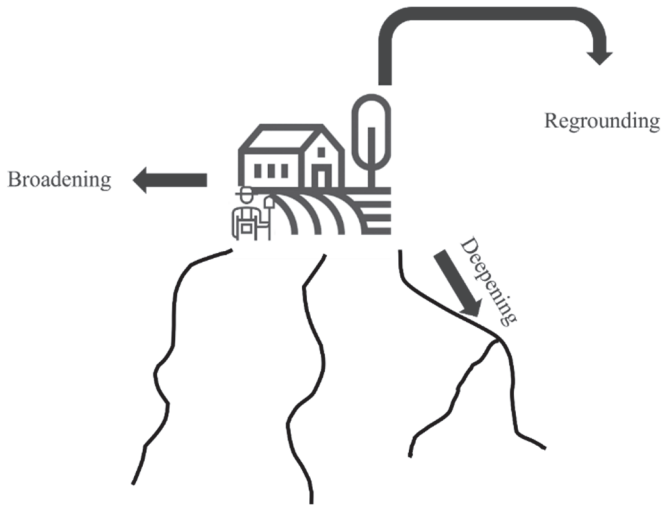

Figure 2. Broadening, deepening, and regrounding activities of multifunctional agriculture. Source: Author's illustration based on the framework originally developed by van der Ploeg and Roep (2003); Oostindie et al. (2006); and Shutterstock ID: 754521349. See also **Paper IV**.

3.4 Conflicts between and values of functions

In ecosystem service (ES) research, conflicts and trade-offs between different ecosystem services are often central parts of the analysis. Some recent examples are Bruley et al. (2021) who study a landscape in the French Alps to show how certain bundles of ES create synergies while others create trade-offs, and Barnaud et al. (2018) who discuss ecosystem services that are either synergetic or antagonistic with other ES. The trade-off between agricultural production and different ecosystem services that are affected by agriculture, or that agriculture affects, have been studied as an example of the trade-offs between the ecosystem service *food provision* and other ecosystem services on a global level (see, for example, Foley et al. 2005).

Studies on trade-offs and conflicts between agricultural functions have not been studied to the same extent in MFA research. The subject is briefly touched upon by Van Huylenbroeck et al. (2007) who describe a conflict between the social functions of rural viability and employment on the one hand and the different environmental functions of agriculture on the other. This conflict typically emerges because an increase in the number of environmental functions tends to require more extensive agricultural practices and hence to lower the value of the agricultural production, in the form of lower income and employment opportunities (Van Huylenbroeck et al. 2007). It can, however, be noted that this conflict does not always arise; extensive agricultural practices often require more labour than intensive, large-scale agricultural methods do.

Another study that analyses the synergies and conflicts between different agricultural functions was published by Haaland et al. (2011). They analyse the existing

agricultural functions at a farm in southern Sweden and make several recommendations to the farmer as to how they could make their farm more multifunctional. Using MFA terminology, I would categorise all of the measures suggested by Haaland et al. (2011) as broadening activities: they recommend planting cherry trees[7] and putting up information boards that inform passers-by about the landscape. One of the synergies they identified was that both biodiversity and cultural heritage can benefit from keeping intact some of the old physical structures in the landscape. Another synergy they identified was that both recreational and aesthetic functions (or values, in Haaland's terminology) benefit from creating beautiful landscape elements such as cherry trees. An example of a conflict they identified was that a farm plot designed to have high biodiversity might look messy and hence lower the aesthetic landscape value of that spot. Another example is that a location with a high cultural value might be damaged by a measure that increases people's access to that location. The recreational value could only be increased at the expense of the cultural heritage value. Some of the conflicts that were identified were able to be resolved, for example, by the farmer moving a suggested measure to another part of the farm than the researchers initially suggested. But for the conflicts that the researchers and the farmer did not manage to solve together, the farmer had to decide which of the values was most important in each specific case (Haaland et al. 2011).

Conflicts between different values have been studied to a greater extent within the closely related research field of multifunctional *landscapes*, in which all possible uses of a rural landscape are analysed, for example, to include all relevant stakeholders, not just agriculture and farmers (Wiggering et al. 2006). Multifunctional landscape analysis has developed in parallel with the MFA literature, and is partly overlapping. For example, Wilson (2010) outlines a framework for the multifunctionality of rural communities. However, to my knowledge, the conflicts that are typically analysed in research about multifunctional landscapes are mainly conflicts between agricultural and other land uses, not between different functions of agriculture per se (Slätmo 2019; Czarnecki et al. 2023). Such conflicts are most common in peri-urban regions, where there are more stakeholders and competing land uses than in more remote rural locations. For example, a study by Schulp et al. (2022) shows that there are conflicts between public goods delivery and intensive agriculture in the landscape of a Dutch peri-urban rural region. The authors conclude that the conflicts could be minimised if regional agriculture became more multifunctional, but they do not raise the question of trade-offs between different agricultural functions within a multifunctional agricultural system (Schulp et al. 2022). Similar studies of several other peri-urban regions, such as in Canada (Rallings et al. 2019) and Sweden (Wästfelt and

[7] Planting cherry trees could be characterised as a deepening activity if it would produce berries. However, as Haaland et al. (2011) describe it as a measure to increase pollinator and bird habitats and the beauty of the landscape, I assume that they refer to the type of cherry tree that bloom profusely but do not produce much fruit.

Zhang 2016), also focus on the conflict between agricultural and other land use in peri-urban regions, not inter-functional conflict within agriculture itself.

In order to determine which combination of functions that best will promote society's priorities and goals, it can be helpful to rank or compare different functions against one another. At the same time, it can be difficult to assess the value of two tonnes of wheat when compared with the biodiversity value of a permanent pasture, with the value of preserving a traditional variety of a cow (both in terms of genetic redundancy and cultural value), or with the vibrant social life that a farm shop can create through job creation and a steady supply of local produce (see Isacs et al. 2023). An attempt to improve the process of choosing between such different ecosystem goods, services, and benefits has been presented in the global initiative The Economics of Ecosystems and Biodiversity (TEEB), where monetary values are assigned to ecosystem services as a way to improve comparability. TEEB (2010) acknowledges several risks with assigning monetary values to ecosystem services: the assignation may not reflect the plurality of values and it might be counterproductive if it goes against cultural norms. TEEB, however, considers the advantages to be bigger than the disadvantages and assigns monetary values for some ecosystem services and processes. Despite that, they conclude that several aspects of ecosystems are too difficult to be assigned monetary values and they recommend that "this information should rather be presented alongside the valuation calculation" (TEEB 2010, p. 12). On the other hand, Jacobs et al. (2016) argue that as many different types of value should be included as possible in a decision-making process, because values are often incommensurable, that is, it is not always possible to convert them to a single value scale. The empirical work Isacs et al. (2023) have done has shown that actors may perceive values as incommensurable. Using a landscape management case study, they analyse the decision-making process to show that people act and argue according to a value incommensurability logic in their decision-making processes. For example, the participants said that several values were impossible to rank or that they were equally important (Isacs et al. 2023).

An example of a framework that allows for an analysis of several value realms simultaneously is the framework developed by Trainor (2006). In this framework, to analyse natural resource management, she introduces ten realms of value, such as spiritual value, aesthetic value, and economic value, that can be assigned to an object or activity. A set of characteristics is then attached to each realm of value, as well as a specification of what it means to value it. Several different value realms can be attached to the same object. For example, a field can have aesthetic as well as historic and economic value for a farmer. Through the framework, it is possible to illuminate conflicts between values. It is also possible to identify conflicts between several values within the same realm. The recreation value realm can comprise both driving a snowmobile and cross-country skiing in a silent winter forest, but these two activities conflict with each other since they cannot be performed at the same place simultaneously (Trainor 2006).

3.5 Multifunctional agriculture as an analytical lens

Against the background of the foregoing research review, the aim of this thesis – to understand and analyse conflicting values in relation to multifunctional agriculture – is fulfilled through two steps. The first step in my analysis is to explore how MFA unfolds in practice on the farm level. Which activities are done in different farming systems, and to which different economic, environmental, cultural, social, and ethical functions do they contribute? I identify functional contribution through assessing different types of pig farms in **Paper II** and by discussing two alternative sustainable future scenarios with farmers in **Paper IV**. The starting point of **Paper IV** is that the EU Green Deal policy package stipulates that the EU should decrease its dependence on GDP growth and the Farm to Fork policy suggests that a multifunctional approach to agriculture is a suitable means to achieving that (European Commission 2019; Gargano et al. 2021). The future scenarios used in **Paper IV** were developed within the research project "Beyond GDP Growth: scenarios for sustainable building and planning,"[8] and based on Raworth (2012)'s Safe and Just Space (SJS) framework. One assumption in the Beyond GDP Growth research project was that societal development according to business as usual is unlikely to lead to a sustainable society (Svenfelt et al. 2019). The research project emerged from concerns that staying within the planetary boundaries might not be consistent with continued Gross Domestic Product (GDP) growth (van den Bergh and Kallis 2012).[9] A positive correlation between economic growth and the extraction of natural resources and emissions has been noted in data from the twentieth century (Krausmann et al. 2009). These concerns have led to the development of alternative frameworks for how societies could be organised if they could not expect nor depend upon GDP growth, or so-called post-growth models (Hickel and Kallis 2020). One such alternative framework is Raworth's Safe and Just Space (SJS) framework, in which nine planetary boundaries are combined with a foundation of eleven social indicators. Based on the social priorities developed for the sustainability conference in Rio de Janeiro in 2012, the social indicators provide a standard of limits for the lowest acceptable level of food, shelter, income and other factors. A safe and just space for humanity, therefore, is a society in which no planetary boundaries are crossed at the same time as all inhabitants reach at least the lowest acceptable level of all social indicators (Raworth 2012, 2017).

The second step of my analysis focuses directly on conflicting values in agriculture. Different aspects of agricultural multifunctionality might, as stated above, conflict with each other. For example, a high animal welfare standard with free-range pigs can lead to higher GHG emissions since the pig manure ends up in fields instead of being

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[8] FORMAS grant number 259-2013-1842.

[9] Economic growth is usually measured as the annual increase in a country's GDP. That is, economic growth is the increased value of all goods and services traded in a country during a year. GDP is hence not a measure of national development or prosperity, but only of economic activity.

collected from the stable floor (Stern et al. 2005). I explore these conflicts in different ways in this thesis, often by using current policy frameworks and regulations as the starting point for the analysis. In **Paper I**, the policy that I use as a starting point is that the EU CAP has a multifunctional basis and should contribute to a slightly more sustainable agricultural system. I assess rural development support received by the EU member states Sweden and Poland and compare the different preconditions each state had during the analysed CAP period. In **Paper II**, I compare the different regulatory frameworks for pig farming in Sweden and in the EU with one another as well as with strategies and goals that farmers themselves have, thereby comparing different priorities and motivations. Regarding **Paper III**, the starting point in policy is that the European Commission has set up a goal that no new land should be exploited for buildings or infrastructure after 2050 (European Commission 2011) and that the Swedish government has decided that Sweden should aim to increase its domestic food production (Government of Sweden 2017). I analyse how this policy decision corresponds with current land use policy and practice in Swedish municipalities and analyse the consequences it may have on land conversion in the EU and food production in Sweden.

The analytical framework of **Paper III** draws on the value realms framework developed by Trainor (2006) and starts from an assumption that different value types are not commensurable with each other, an approach of value pluralism rather than value monism (Martinez-Alier et al. 1998; Trainor 2006). This means that I assume that many values are impossible to convert to the same scale (monetary or other) and rank. My approach to value is in line with the empirical results in Isacs et al. (2023), who showed that participants in their discussion groups expressed values that they could not rank because the values belonged to different scales or value realms.

4. Research design, methods, and material

In this chapter, I outline my methodological choices, describe the study design and the empirical material that was used in each paper, and outline how I analysed the material in the different papers in the thesis.

4.1 Methodological choices

Environmental science is a multidisciplinary research subject with diverse perceptions of what the world is made of (ontologies) and views on how knowledge about the world can be gained (epistemologies). Some of the environmental science research that I build on in this thesis has a so-called naturalist perspective. According to the naturalist perspective, there is a real world with certain laws and patterns that can be observed and explained by researchers (Moses and Knutsen 2012). Planetary boundaries research, for example, claims that there are measurable global biophysical limits for human activity (Rockstrom et al. 2009; Steffen et al. 2015; Richardson et al. 2023), and that nitrogen and phosphorous leaks from agriculture contribute to the eutrophication of the Baltic Sea (Larsson and Granstedt 2010). If an understanding of multifunctional agriculture is to be acquired and its investigation carried out, these natural processes and their consequences for agri-ecological systems must be considered. However, my own research is grounded in a constructivist perspective. In my understanding, there is a large difference between phenomena in the natural and the social worlds. Other research approaches are necessary if social events are to be compared with natural events (Moses and Knutsen 2012). I acknowledge that there is not one singular truth in the social world, but that knowledge about the social world is constructed through interpretation based on our preunderstandings and mental structures. There will always be different values, beliefs, and stakeholder interests in analyses of social events or phenomena (Pretty 1995). However, this constructivist perspective is certainly possible to combine with a belief in a real world of natural processes hidden under socially constructed layers. As Moses and Knutsen (2012, p. 13) state: "we doubt that there are many constructivists who are willing to reject outright the possibility that a Real World might exist out there, buried deep, deep down, or in significant areas of human endeavour. After all, engineers and physicists are able to send rockets to the moon."

My constructivist research approach makes it logical to formulate the thesis aim as follows: to understand and analyse conflicting values in relation to multifunctional agriculture and to analyse how MFA unfolds at the farm and in policy on different levels. I do this in four research papers. The different papers encompass different temporal and geographic scales and policy areas. As can be seen in Figure 3 below,

Paper I examines the period 2007–2013. In that paper, I analyse the EU Common Agricultural Policy and its implementation at the national level in different countries during this time. **Paper II** presents a snapshot of several pig farmers' strategies for managing the potentially conflicting aspects of the activities they carried out in order to conform to the EU and Swedish regulations on sustainability, and accordingly, that applied at the time of the study. The focus of **Paper III** is on conflicting values relating to municipal physical planning of agricultural land as I analyse municipal comprehensive plans published between 2002 and 2017. In Figure 3 the dotted area stretching from **Paper III** towards the future means that the consequences of these municipal decisions stretch far into the future and are likely to have an impact on policy and practice on a much larger geographic scale than just the municipal, since agricultural land is a long term resource for national and European food security. In **Paper IV**, I analyse which multifunctional activities are likely to unfold in two post-growth future scenarios for Sweden in 2050. The dotted area stretching backwards from **Paper IV** means that the farmers involved in this future study related their perceptions back in time to their current activities and contexts.

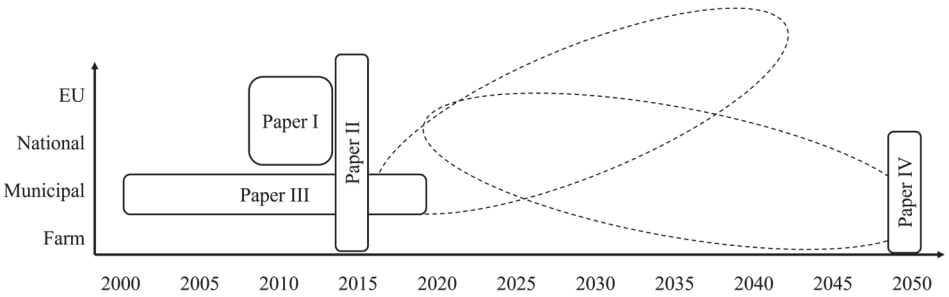

Figure 3. The geographic and temporal scales that the four papers concern

4.2 Case selection

The four papers in this thesis examine multifunctional agriculture (MFA) from several different angles. The geographic region, namely the EU and two of its member states, Sweden and Poland, was selected because the EU Common Agricultural Policy has a multifunctional view on agriculture (Van Huylenbroeck et al. 2007; Gargano et al. 2021). Furthermore, agriculture is considered part of the solution for conservation and environmental problems to a greater extent in Europe than it is in other parts of the world (Batáry et al. 2015). It was therefore logical to begin in **Paper I** by analysing how CAP is implemented in two EU countries with slightly different preconditions. The focus of the analysis in **Paper I** is on the part of CAP that at the time of writing was called rural development support, since that is where the MFA perspective is most explicit (Erjavec and Erjavec 2015).

Paper I gave me an overview of how the MFA policy framework is implemented in two EU member states. In **Paper II**, I wanted to shift focus and explore how MFA

unfolds on the ground. I wanted to examine local practice on different farms and assess how farmers deal with conflicting goals related to sustainability. I therefore chose to analyse how farmers themselves reasoned regarding their activities and conflicting goals. In order to include perspectives on animal welfare, a relatively understudied aspect of agricultural social science (Burton et al. 2012), I decided to focus on animal farmers. I selected pig farms since the animal welfare challenges for pigs and other non-ruminant animals are typically greater than those for ruminants (OECD 2001).

A farm is part of a rural society and ecosystem. There are often conflicting goals on a farm, not only within agricultural production but also with land use and the decisions to be taken between using land for agricultural or other purposes (Schulp et al. 2022). On a global level, preservation of agricultural land is crucial for long term future food security (Viana et al. 2022). Although the Swedish share of agricultural products produced in the EU is currently quite marginal, this situation might change in the coming decades. Van Passel et al. (2017) predict that, because of climate change, the production value of agricultural land in the northern parts of Europe is likely to increase substantially until 2100, while production values are predicted to decrease in Southern European countries such as Spain, France, and Italy. Climate change is likely to entail more extreme weather events for northern Europe, but it might also bring about longer growing seasons and thereby give these currently more marginal agricultural areas an increasingly important role in securing future European and global food security (Juhola et al. 2017; Sorvali et al. 2021). Against this background, **Paper III** focuses on how Swedish municipalities argue when they want to preserve or exploit agricultural land. Which different value realms are referred to in their arguments and what do these different arguments imply for the preservation of agricultural land? Since EU agricultural policy aims to contribute to a lower dependence on GDP growth in the future by adopting a multifunctional approach to agriculture (Gargano et al. 2021; European Commission 2019), I chose to explore how different sustainable future developments could affect agricultural multifunctionality on the farm level in **Paper IV**. I analysed how farmers imagined that multifunctional activities could unfold on the farm level in the future, in two different sustainable future scenarios. I analysed the possibilities and obstacles these farmers saw in the two scenarios.

A final point that may be said to have affected the case selection is the source of the research funding. This PhD project is funded by the Foundation for Baltic and East European Studies (Östersjöstiftelsen) who set the geographical terms of my research to countries within the Baltic Sea or East European region. This is not a problem for the relevance of my research, but I find it relevant to be transparent about it. As Robert and Zeckhauser (2011) point out, it is not so important in a research project if the values that shape it stem from the researcher or from another involved actor. The point is to be transparent about why the research has been designed in a certain way.

4.3 Methods

In this section, I describe the methods used in the four papers: content analysis, semi-structured interviews with farm visits, and focus group discussions.

4.3.1 Content analysis

I employed different types of content analysis in **Papers I** and **III** in this thesis. The content analysis in **Paper I** was qualitative while I combined qualitative and quantitative content analysis in **Paper III.**

To analyse how regulatory frameworks in the EU and on a national level shape agricultural practices in **Paper I**, current policy documents and regulations as well as the documents describing the foundation of the European Union were analysed to determine how sustainability, agriculture, and sustainable agriculture were described. This enabled me to understand the emergence of sustainability concerns in EU policy in general and agricultural policy in particular.

In **Paper III**, the contents of thirty Municipal Comprehensive Plans from three Swedish regions were analysed using the data analysis software NVivo 12 Pro (QSR International Pty Ltd. 2018). The content analysis was partly quantitative: for example, the number of plans that used different arguments for preserving and exploiting agriculture were counted (Denscombe 2007). It was also a partly qualitative argumentation analysis (Boréus 2015). The argumentation analysis entailed an analysis of the text sections in the plans that dealt with the preservation and exploitation of agricultural land and categorised them according to different arguments. I identified ten different arguments for preserving agricultural land and four arguments for exploiting it. **Paper III** was based on an analytical framework comprised of several of the value realms identified by Trainor (2006). The arguments we found were then categorised according to this framework. A detailed description of how I performed the different steps of the analysis can be found in **Paper III** and a list of the texts included in the content analysis can be found in Appendix B of that paper.

4.3.2 Semi-structured interviews and farm observations

Semi-structured interviews are suitable for studies that aim to analyse different perspectives and ideas regarding a concept. This was the case in **Paper II**, where the aim was to analyse different farmers' perspectives and ideas about sustainability goal conflicts in pig farming. I brought some pre-decided questions to the interview sessions, all held on the farms, but the semi-structured approach allowed me to exercise a flexible approach regarding the order in which I could ask the questions and which follow-up questions I posed, depending on the interviewee's answers (Bryman 2018). The farmers were thus able to develop their thoughts and perspectives freely around the questions. The interview questions were open-ended and organised around the themes analysed in **Paper II**, namely their pig farming practices, how they perceived sustainable and efficient pig farming, which goal conflicts they experi-

enced, and their coping strategies regarding such conflicts. Five pig farmers were interviewed and the interviews were combined with observations in the company of the farmers of their stables and fields, where they were able to talk and show me the results of their activities and strategies, such as why they had chosen a particular type of pig stable or where they were planning to build a biogas plant. This type of observation contributed to data triangulation, since I could see that the stables were constructed the way the farmer said they were. Triangulation increased overall study quality since it allowed me to see and interpret how the farm functioned in practice and to not just rely on the farmer's description of it (Yin 2011; Denscombe 2007).

In my analysis of this material, I categorised the farmers' talk according to the three aspects of sustainable agriculture that were the focus of **Paper II**, namely, environmental aspects, animal welfare aspects, and profitability aspects. The three dimensions of sustainability – ecological, social, and economic, – served as the starting point for this categorisation. The ecological dimension in the paper is addressed by the different ecological effects of pig farming, while the social dimension is represented by animal welfare and the economic dimension is interpreted as the farm's financial viability. The analysis was an iterative process in which I and my co-authors scrutinised the material and categorisations numerous times and related the statements from each category to those in other categories.

4.3.3 Focus groups

Paper IV explores what two sustainable future scenarios for Sweden could imply for agriculture. These scenarios are sustainable in the sense that they fulfilled the criteria for four sustainability goals (see Svenfelt et al. 2019). To test what a sustainable future in Sweden might look like, I chose to carry out focus groups with a set of farmers. Focus groups are appropriate for discussing the consequences of future scenarios since they encourage participants to brainstorm, to building on one another's thoughts and arguments and by so doing come up with more elaborate and detailed ideas that what might be produced with individual interviews (Börjeson et al. 2006). To this end I arranged four focus groups with seventeen farmers. I analysed the material from the focus groups in the data analysis software NVivo (QSR International Pty Ltd. 2018). I categorised the material into the possibilities and obstacles presented by each of the two scenarios and then analysed which multifunctional agricultural activities were discussed by the farmers. More details on how the focus groups were organised and how the material was analysed can be found in **Paper IV**.

4.4 Materials

To analyse conflicting values in relation to multifunctional agriculture from different perspectives, I have used a range of different types of empirical material in the papers. In **Paper I**, I analysed how Sweden and Poland implemented EU agricultural policy, especially focussing on environmental support, during 2007–2013. The material is

therefore comprised of EU treaties, as well as policy documents and statistics from both the EU and national levels. In **Paper II**, I analysed how farmers in the pig sector, where sustainability conflicts can be argued to be more pronounced than in other branches of agriculture, navigate through these conflicts. Farm observations and interviews with the farmers were thus the main material for that study, complemented by an assessment of the different regulations regarding pig farming in Sweden and the EU. In **Paper III**, where I studied how municipalities reason regarding preserving or building on agricultural land, I analysed the main strategic policy document for 30 Swedish municipalities through the lens of a value framework based on value pluralism. Finally, in **Paper IV**, I returned to the farmers' perspectives and let farmers discuss future scenarios in a post-growth context. The questions that guided the work and the material used to answer them in each of the four papers are summarised in Table 3.

Table 3. The questions addressed, and the material and methods used in the papers.

Paper	Main questions	Empirical material	Analysis of the material
I	How does the EU CAP, in particular the agri-environmental share of the scheme, impact two EU member states' opportunities to adapt their agricultural policy to local conditions and contribute to more sustainable agriculture?	Agricultural statistics from the EU, Sweden, and Poland published between 2005 and 2013. Four Swedish and Polish policy documents published between 2007 and 2013. Three EU treaties published in 1957, 1997, 2002. 10 EU regulatory and policy documents regarding the CAP published between 1986 and 2012.	Comparison of agricultural statistics and agricultural policy documents from the two countries as well as EU policy documents.
II	How do Swedish pig farmers navigate the threefold challenge of environmental, animal welfare, and profitability goals?	Five transcribed semi-structured interviews with Swedish pig farmers and notes from farm observations at their farms. The farm visits were between 2 and 4 hours, including interviews. Regulatory frameworks for pig farming in the EU and Sweden.	Categorisation of the interview material into environmental, animal welfare, and profitability goals, and the intersections between them. Comparing the regulatory frameworks from aspects related to the environment and animal welfare.
III	Why do Swedish municipalities build on agricultural land, which arguments do they use, and what could the implications of these arguments be for preservation of agricultural land?	30 Municipal Comprehensive Plans (MCPs), published 2002–2018.	Quantitative and qualitative content analysis of the MCPs to distil arguments for preservation and exploitation of agricultural land and categorise the arguments in different realms of value.
IV	Explore farmers' perspectives of two analysed future scenarios and discuss how the conditions in the scenarios could affect farmers' roles and practices.	Transcribed discussions from four groups with a total of 17 farmers, using two future scenarios for Sweden as the starting point of the discussions. The discussions took between 90 and 180 minutes.	Categorisation of focus group material into possibilities and challenges associated with each scenario and then analysed to determine which multifunctional agricultural activities and functions were in focus in each scenario discussion.

4.5 Research ethics

Research ethics have been an integral part of my work with this thesis. I did interviews with farmers in **Paper II** and focus groups with other farmers in **Paper IV**. None of my questions dealt with integrity-sensitive content such as ethnicity or sexual orientation since I was exclusively focusing on the farmers' work-related practices and strategies in relation to the current regulations and societal contexts and what they thought about potential future changes in the agricultural system. In both cases, I followed ethical practices regarding interviews. I treated personal information according to the GDPR "Principles relating to processing of personal data" (Regulation (EU) 2016/679 2016, ch. 2 article 5). For example, I informed the respondents about how I would use the information they gave me, namely in peer-reviewed articles within my PhD research project. I did not collect more information about the farmers than was necessary to answer my research questions.

The interviewees in **Paper II** gave oral consent to participate in the study prior to the interviews, while the interviewees in **Paper IV** gave written consent. All interviewees were informed how the interview material would be used. All of them are given fictive names in the papers and the location and operations of their farms are only vaguely described so that they are not easily identifiable. Furthermore, they were all given the opportunity to approve the quotes I used in the papers. The empirical material in **Papers I** and **III** consists exclusively of publicly available reports and statistics, which is why it was not necessary to do an extensive ethical assessment before analysing this material (Denscombe and Larson 2018).

4.6 Limitations of the research design

Each research design has its advantages as well as its limitations. In this thesis, I have chosen to examine a variety of different types of empirical material and to analyse them using a mixed methods approach. I did this because I wanted to illuminate multifunctional agriculture from several different perspectives. This could risk giving an, albeit broad, but shallower, understanding of each different aspect of multifunctional agriculture compared with other approaches. If I would have solely concentrated on analysing policy documents, only interviewed farmers, exclusively worked with different potential futures, or focused on one certain subnational region of Sweden and analysed the multifunctionality of the agriculture in that context in detail, I would have been able to draw deeper conclusions about one aspect of multifunctional agriculture, but would have missed other aspects. Another alternative could have been to interview farmers in other EU countries, or to explore multifunctional agriculture in other parts of the world than the EU, where multifunctional agriculture might not be as prominent in policy as it is in the EU. All of these alternative pathways are relevant approaches for future research to take.

5. Results from the papers

This section summarises the results from each of the four papers of the thesis and offers additional interpretations in the light of multifunctional agriculture.

5.1 Paper I: Towards sustainable agriculture? The EU framework and local adaptation in Sweden and Poland

Paper I analyses how the European Union Common Agricultural Policy (CAP), in particular the agri-environmental part of the scheme, impacts the opportunities Sweden and Poland have to make their agriculture more sustainable. The study departs from an understanding of agricultural systems as nested social-ecological systems, by which is meant that they stretch over different geographic and temporal scales, and that humans, institutions, and ecosystems are part of the same system (Foley et al. 2005; Folke 2006; Hagedorn 2008). The importance of adaptation to local contexts to achieve sustainable agriculture is emphasised in the paper and different understandings of what sustainable development and sustainable agriculture comprise are reviewed. The aim of the paper is to analyse how the EU CAP is implemented on a national level in Sweden and Poland in an attempt to understand which flexibilities exist for EU member states to adapt the CAP support to the sustainability challenges they face in their local agricultural sector.

According to the Treaty on the Functioning of the European Union (2012), the EU should contribute to sustainable development; this includes the EU agricultural sector. The CAP as the main policy structure for agricultural governance in the EU is thus an important tool for reaching sustainable development in agriculture. As described in section 0, the second pillar of the CAP emerged from the discussions following the UN Conference on Environment and Development in 1992 and was created to strengthen multifunctional agriculture in the EU. In this paper, the second pillar of CAP is scrutinised to assess the opportunities the case countries have to fulfil their particular sustainability concerns. The paper argues that the broad diversity of agricultural practice within the EU might call for different strategies for achieving sustainable agriculture and rural development in different countries, but that such diversity risks being discouraged by the uniform structure of the lion's share of the CAP.

As a basis for the analysis in **Paper I**, I compared the definitions of sustainable agriculture active in Sweden and Poland with the definitions constructed by the EU Commission and the FAO that were valid at the time of writing. The different parts of the four definitions are displayed in Table 4 below.

Table 4. Aspects of sustainable agriculture put forward in definitions by FAO (1995), Swedish Board of Agriculture (2007), Polish Agency for Restructuring and Modernization of Agriculture (2013), and the European Commission (1999), reproduced from **Paper I**.

	FAO (1995)	European Commission (1999)	Sweden (2007)	Poland (2013)
Not give rise to unacceptable pollution	X	X		X
Not overuse resources	X	X	X	
Imitate natural processes	X		X	
Maintain/increase biodiversity		X	X	
Soil preservation			X	
Deliver ecosystem services			X	
Produce enough food	X			
Optimal/efficient production			X	X
Provide employment, income	X			X
Education, recreation		X	X	

As can be seen from Table 4, all of the definitions emphasise different aspects of sustainability. Two of the aspects – to not give rise to unacceptable pollution and to not overuse resources – are present in three of the four definitions, while most other aspects are present in only one or two of the definitions.

Paper I concludes that although CAP is supposed to even out the varying conditions of agriculture between the different EU member states, Swedish and Polish agricultural policies had quite different room for manoeuvre during the studied period, 2007–2013. One example is that Poland had to increase sanitary and hygiene standards in their agricultural sector to live up to EU standards, which is why they allocated a significant amount of for the CAP funding intended for environmental support to such measures. In Sweden, a significant share of the agricultural land receives some kind of environmental support.

Paper I also concludes that no matter how efficiently the rural development part of CAP is designed and implemented, during 2007–2013 it still comprised only a small share of the total CAP support. In Sweden this amounted to no more than 16 per cent. Hence, CAP cannot be said to have had a transformative ambition during the analysed period. Instead, most of the CAP support went to large conventional farms and supported a continuation of business as usual on productivist farms with presumably low degrees of multifunctionality.

Although **Paper I** was published quite a few years ago, the results do still have relevance. The main result in **Paper I**, that CAP in the late 2000s did not have a transformative ambition, more recent analyses (Buitenhuis et al. 2020; Pe'er et al. 2022), indicate that this conclusion is still valid, a point that will be further developed in the discussion section of this thesis.

5.2 Paper II: Managing conflicting goals in pig farming: farmers' strategies and perspectives on sustainable pig farming in Sweden

Paper II aims to identify how Swedish farmers resolve or cope with the conflicting goals in pig farming that emerge from the agricultural regulations they face and the demands that are placed on them by, among others, consumers. The three questions guiding the research were: How do the farmers prioritise their goals, how have they resolved conflicts, and which strategies can be identified to solve some of the remaining conflicts? The evidence collected allowed me and my co-authors to identify a threefold challenge for Swedish pig farmers: the environmental, animal welfare and profitability goals of pig farming are often in conflict. We wanted to understand how the farmers themselves navigate these sometimes contradictory demands.

Among the five farms that were included in the study, different challenges were raised and different coping strategies adopted to solve them. Regarding their environmental goals, some farmers focused on optimising their natural resource efficiency, more specifically their conversion from feed to meat. Others thought that the ecosystem service provision of the pigs to the farm's ecosystem was the most important to optimise. Closing the nutrient cycle was important for some and improving soil quality as a stewardship measure was an objective for one farmer. Regarding animal welfare, all of the farmers were dissatisfied with the Swedish animal welfare regulations which are so much stricter than the EU regulations. The conventional farmers argued that the regulations made it more expensive for them to raise pigs and hence difficult to compete with cheaper foreign pork, although they also expressed a sense of pride in Sweden's low levels of antibiotic use and that Swedish pigs get to keep their tails. The organic farmers argued that the Swedish regulations did not do enough to ensure pigs' welfare and wanted the regulations to be stricter. Almost all of the farmers did more for animal welfare than the regulation system they followed (conventional Swedish regulations, EU organic, KRAV organic) stipulated. The farmers supplied more straw, for example, or allowed longer lactation periods. Regarding profitability, the two conventional farmers had invested regularly in their farms which meant that they needed to keep as many pigs as they could fit in their stables in order to generate enough income and cover their investment costs. The three organic farmers did not spend as much on investment because, they argued, it made them less dependent on earning a high income.

Based on the goal conflicts that emerged, we outlined four policy suggestions that could contribute to resolving them. First, communication to consumers could be improved so that consumers would know better how different types of pig production systems differ and be able to make informed purchasing decisions. Second, public procurement could be used as a tool to increase the demand for pork that is produced according to more sustainable methods. A third route could be to seek to change the EU CAP regulations to include more animal welfare and environmental aspects than today, in other words, to increase the amount going to Pillar II. A fourth suggested

measure could be to put a cap on total pork production on local, national or EU level. This could have the effect of decreasing GHG emissions while allowing pigs to be outdoors and fulfil their natural behaviour. Combined with a rationing system for pork, a production cap would affect all income groups more equally and thus avoid the potential inequity that a pork tax would create by restricting access to pork for people on lower incomes.

Paper II emphasised the practical path dependency that the farmers experienced. They perceived that it would be close to impossible to shift from, for example, conventional pig farming to organic since their farm design was specialised for conventional management. **Paper II** also concluded that farmers perceived that they were squeezed between other actors' contradictory demands. For example, consumers demand cheap food that contributes to agricultural sustainability, even though the pork from Swedish pig farms is obliged to comply with the high Swedish animal welfare standards and is thus more expensive than pork from farms in countries with the lowest allowable EU standards for animal welfare. The farmers feel they try to respond to such demands but feel also that they get the blame if they do not manage to live up to expectations – something which they cannot do since the demands placed on them are contradictory. One of the main goal conflicts that the farmers struggled with resolving was the tension between animal welfare and profitability. The results show a need to further develop the understanding of animal welfare as an ethical agricultural function in the framework of multifunctional agriculture.

Paper II was published some time ago, which means there is a risk that the results are no longer current. The regulatory frameworks and practices regarding pig farming in Sweden which were analysed in **Paper II** are however still valid. Sweden still has a significantly higher standard for animal welfare in pig production compared with the EU standard (Sandøe et al. 2020). A recent quantitative sustainability assessment of organic versus conventional pork production and consumption in Sweden concluded that, because of the higher conversion of feed to meat among conventionally raised pigs in Sweden, Swedish organic pork production outperformed conventional in 18 of 20 sustainability indicators when measured per area unit, but only 11 of 20 indicators when measured per product unit, (Zira et al. 2021). Regarding the animal welfare of pigs in Sweden and the EU, two studies by Wallgren et al. (2019a; 2019b) confirm that, despite its widespread practice in other parts of the EU, tail docking is not performed in Sweden. The research also shows that tail docking can be avoided if the pigs' environment is improved.

5.3 Paper III: The significance of different realms of value for agricultural land in Sweden

Paper III focuses on how and why Swedish municipalities choose to preserve or exploit agricultural land. The starting point for the study is the threefold pressure on agricultural land: increased global population, the expected increase of meat con-

sumption when global incomes rise, and increased demand for land for biofuel production because of goals to tackle climate change. These are challenges with a global impact, but land use is often decided at the municipal level in spatial land use plans. This is why I and my co-authors examine how 30 Swedish municipalities aim to preserve and exploit agricultural land according to their Municipal Comprehensive Plans (MCPs). The paper aims to contribute to an explanation of why municipalities build on agricultural land, by analysing arguments to preserve or exploit agricultural land according to a value pluralism framework which has drawn on Trainor (2006) to identify nine value realms. We also analyse what the implications of the municipal arguments could be for the preservation of agricultural land in Sweden.

In Sweden, according to the Swedish Environment Code (EC 3:4, ch. 3, section 4), agricultural land is considered to be of "national importance" (Sw. *nationell betydelse*) but does not have the stronger protective designation of "national interest" (Sw. *riksintresse*). Thus, it is Swedish municipalities who are responsible for whether or not agricultural land is preserved or exploited. The Environment Act (EC 3:4, ch. 3, section 4) stipulates that:

> Agricultural land that is suitable for cultivation may only be used for development or building purposes if this is necessary in order to safeguard significant national interests where this need cannot be met satisfactorily from the point of view of public interest by using other land.[10]

Researchers (Slätmo 2017; Granvik et al. 2015) as well as public authorities (Swedish Board of Agriculture 2013) have expressed concerns that too much agricultural land is being exploited in relation to the legislator's intention. The exploitation rate has been relatively constant over recent decades, with around 600 hectares of agricultural land being converted to other uses annually (Swedish Board of Agriculture 2021).

In **Paper III**, the arguments that municipalities promote to preserve or exploit agricultural land in their MCPs are analysed and categorised as belonging to one or more of the nine realms of value. It is concluded that municipalities connect at least eight different realms of value to agricultural land, namely the aesthetic, cultural, economic, ecosystem, moral, preparedness, scientific, and social realms. Several of the realms are thus concerned with other values of agricultural land than the production of marketable goods and services. Some examples of arguments are that agricultural land contributes to cultural heritage preservation, or that it can be a habitat for rare plants or animals. This reasoning among municipalities regarding why agricultural land should be preserved is in line with a multifunctional view of agricultural land. However, if a municipality intends to exploit agricultural land, they often use economic arguments for doing so. As the Haninge municipality argued when looking to

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[10] Translation by Slätmo (2017) of EC Chapter 3 section 4: "Brukningsvärd jordbruksmark får tas i anspråk för bebyggelse eller anläggningar endast om det behövs för att tillgodose väsentliga samhällsintressen och detta behov inte kan tillgodoses på ett från allmän synpunkt tillfredsställande sätt genom att annan mark tas i anspråk."

convert agricultural land to urban housing, "with a denser housing structure (…) there is, however, a larger basis for public transport, which is socio-economically advantageous…" (Haninge MCP quoted in **Paper III**, p. 7).

Socio-economic arguments seem to weigh heavier than cultural or aesthetic arguments when municipalities are about to decide whether to exploit or preserve agricultural land. If agricultural land needs to be preserved, it may therefore be risky to connect it too closely to a realm of value other than the economic, since cultural or aesthetic realms simply do not carry the same decisive weight in exploitation decisions. Furthermore, it should be noted that the economic arguments used in the MCPs to motivate exploitation decisions are not related to agricultural production, but to broader economic consequences for the municipality as a whole. Other studies have pointed out that municipalities tend to aim for continued growth of housing and population as a way to increase their tax base and to be able to deliver the services for which they are responsible (Lehtinen 2018; Buhr et al. 2018; Syssner and Olausson 2016). The results in **Paper III** imply that such urban growth goals might stand in the way of achieving goals that are better placed to contribute to a more multifunctional landscape and agriculture. It is suggested that municipalities should work with future scenarios to prepare for unexpected future developments and take longer time perspectives into account.

5.4 Paper IV: Farmers' perspectives on multifunctional agriculture in two post-growth scenarios in Sweden

Paper IV aims to explore farmers' perspectives on two future agricultural scenarios and to discuss how the conditions these scenarios describe could affect farmers' roles and practices. The first scenario describes a high-technology future society in which agricultural and other activities are largely automated and people have a lot of time to spend on other activities than paid labour. The second scenario describes a local and self-sufficient future with a high degree of local nutrient cycling and manual agricultural work. Both scenarios were designed to be indifferent to GDP growth and focus instead on fulfilling the two environmental and two social sustainability goals drawing on Raworth (2017)'s SJS framework. The goals and scenarios are described in more detail in **Paper IV** and by Svenfelt et al. (2019).

The broadening, deepening, and regrounding multifunctional agricultural activities that emerged in focus group discussions with farmers are visualised in Figure 4 below.

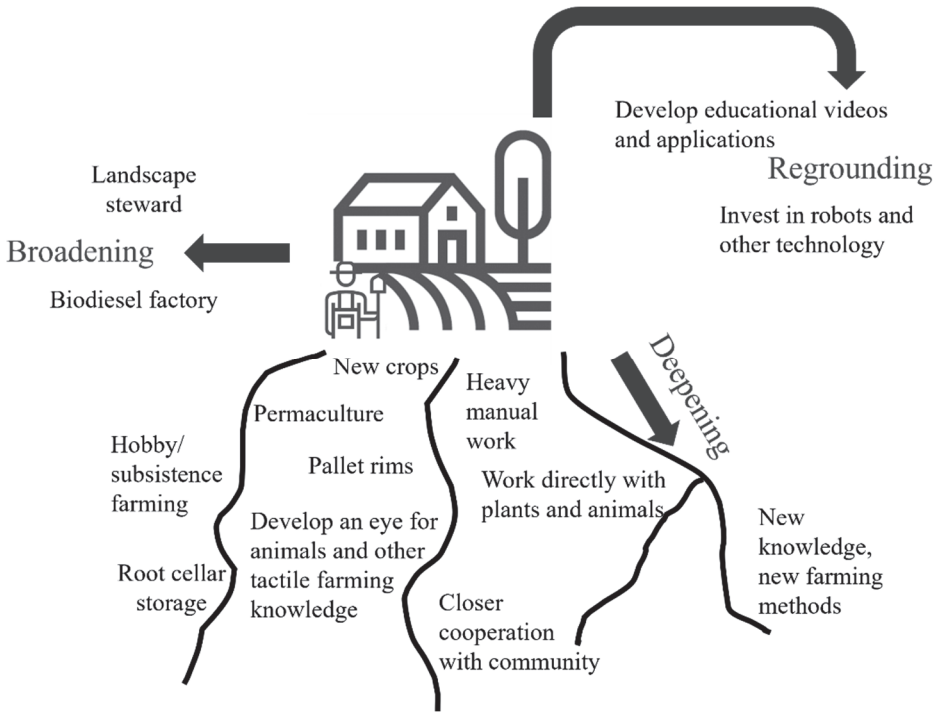

Figure 4. The broadening, deepening, and regrounding multifunctional activities as expressed by farmers in Paper IV. Source: Author's conceptualisation in Paper IV.

The activities that the farmers suggested can be categorised according to the different functions of agriculture identified and described by Renting et al. (2008):

- Food production
- Provisioning of non-food goods and services (scenic landscapes)
- Environmental functions (decreased GHG emissions, biodiversity, erosion control)
- Cultural functions (identity as farmers, cultural heritage)
- Social functions (social cohesion, regional food security, spreading knowledge to farmers and others, income)
- Ethical functions (animal welfare)

The automation scenario was perceived by the farmers to be a plausible future development for Swedish agriculture. The vulnerabilities of digitalisation and automation were identified, such as that traditional agricultural knowledge might be lost if farmers started to fully rely on digital systems in their activities and that a cut in power or internet provision could then have severe consequences on food production.

The farmers mentioned several deepening activities that they thought would be difficult to perform in this scenario, such as working directly with the soil and ani-

mals. They perceived these activities to be important for their identities as farmers. The willingness to become a farmer is low amongst the younger generations in Europe (Joosse and Grubbström 2017). A survey among 510 young Czech farmers showed that the two most common reason for them to become farmers were to continue their family's farm work and to work with animals and in nature (Šimpachová Pechrová et al. 2018). If, in the automation scenario, farmers would work less with animals and in nature, this might therefore risk further increasing the challenge of farmer succession in Europe.

Lack of investment capacity and state support for agriculture were the main obstacles identified for a transformation towards a more multifunctional agriculture in the local self-sufficiency scenario. Lack of time and resources to perform agricultural activities that do not primarily produce food was also mentioned. Furthermore, the social sustainability in this scenario might be at stake because a large share of the population would need to do heavy manual agricultural labour and the risk of food insecurity might be high.

6. Discussion

European farmers do not have the same role in society in the 2020s as they did in the 1960s. Today, farming in the EU is a marginalised occupation and only a small share of the population has a direct relationship to food production. Farming is no longer perceived as a "natural" process; it is more frequently viewed as contributing to different environmental problems. Agriculture is, however, crucial for our survival. It has the potential to contribute positively to society and the environment in different ways. This thesis has sought to explore the complex relationship between farming and modern society through the lens of multifunctional agriculture. In this chapter, my two research questions are discussed and I reflect on some implications that this thesis has for future research, agricultural policy, and agricultural practice. My two research questions are:

RQ1: How does multifunctional agriculture unfold in practice on the farm level?

RQ2: How can conflicts between different values in relation to multifunctional agriculture be resolved in policy and in farm practice?

The next subsection answers and discusses RQ1, the second subsection focuses on RQ2, and the third subsection synthesises the discussion.

6.1 Multifunctional agriculture in practice at the farm level

In this subsection, I discuss the first research question. I initially analyse the results in **Paper II** from an MFA perspective, using the visualisation I developed in **Paper IV**. I then compare them to the results in **Paper IV**. Based on this analysis, I then develop two reflections on where I see future research needs – the first regarding animal welfare from an MFA perspective, and the second regarding farmer identities.

In **Paper II**, the focus has been on how pig farmers in Sweden navigate between mitigating the negative environmental effects of their activities, adapting to regulations and consumer demands for high animal welfare standards, as well as struggling to maintain profitability in the face of international competition. Agricultural multifunctionality is briefly discussed in the paper. The practices that the farmers raised (in **Paper II)** are visualised in Figure 5 as the deepening, broadening, and regrounding activities of multifunctional agriculture.

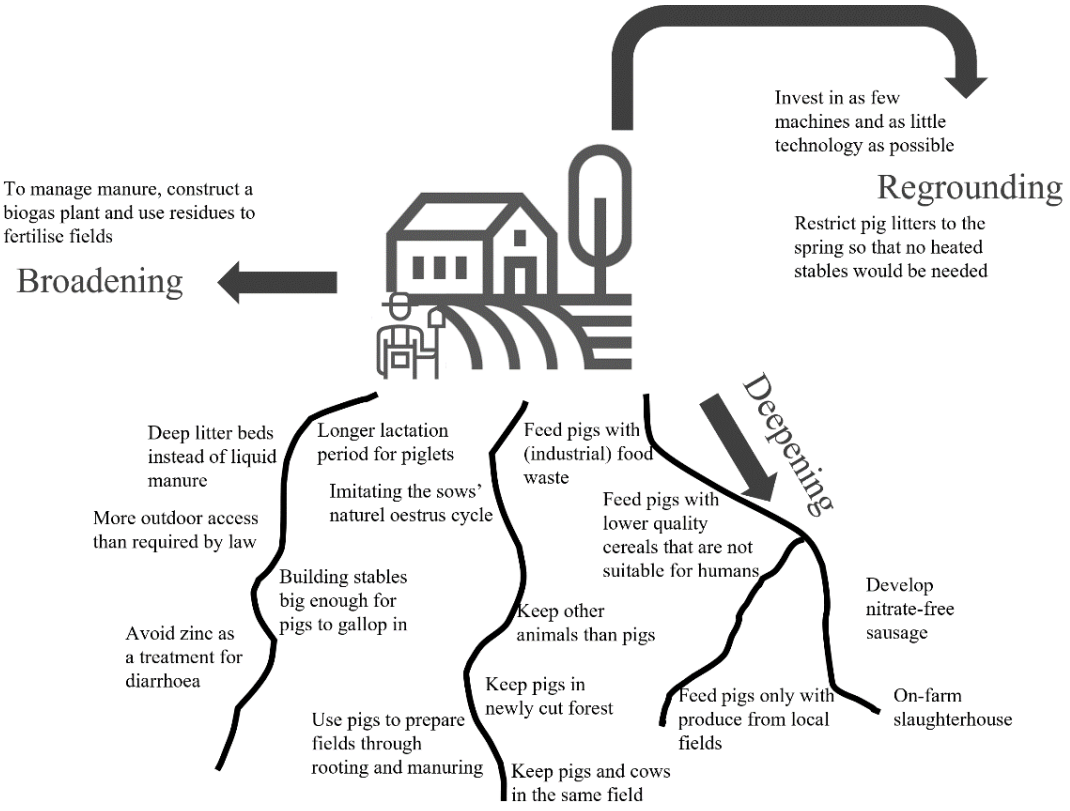

Figure 5. Deepening, broadening, and regrounding activities among the pig farmers in Paper II. Source: Author's conceptualization of the results in Paper II.

As shown in Figure 5, several of the activities reported by the farmers in **Paper II** can be categorised as deepening. Several of the deepening activities directly contribute to what Renting et al. (2008) categorise as an ethical function of agriculture, namely animal welfare. The farmers in this study wanted to provide their pigs with more outdoor access and allow longer lactation periods than stipulated in the regulations. Other deepening activities contribute to ecological functions. Farmers wanted to close nutrient cycles and feed their pigs only with local produce.

Building a biogas plant in which the pigs' manure would be used was the only example the farmers provided of a broadening activity. If biogas could be used to drive machinery on the farm, or be sold for use elsewhere, the biogas plant has the potential to reduce nutrient loss and decrease GHG emissions.

The farmers in this study came up with three types of regrounding activities that can be described under the category of "new forms of cost reduction" (van der Ploeg and Roep 2003, p. 7). These activities were directed towards reducing costs for animal housing and other inventories in farm operations. Minimising investments in pig farming is an example of what van der Ploeg (2000) categorises as farming economic-

ally. All of these regrounding activities may contribute a strengthening of farmer identities as innovative or alternative.

Most of the activities reported by the farmers in **Paper IV** were deepening, while a couple were broadening and regrounding activities, respectively. Only one activity was mentioned by both sets of farmers, namely the broadening activity of using agricultural residues in a biodiesel factory or a biogas plant. The deepening activities the interviewed farmers raised in **Paper II** were focused exclusively on exemplifying different aspects of pig farming, while the focus group farmers gave examples of several different kinds of agricultural activities in **Paper IV**. Further similarities are that both sets of farmers reported activities that could be seen as promoting a farming lifestyle and identity as non-mainstream or innovative, such as keeping pigs in the forest and introducing perennial crops.

The activities that the farmers discussed in **Papers II** and **IV** give rise to a number of reflections. The first reflection concerns animal welfare. This is analysed in **Paper II** as an aspect of farm management that farmers might want to consider. The interviewed farmers interpreted animal welfare quite differently – from being free from disease to being able to exercise their instincts and natural behaviour. These different interpretations of animal welfare demonstrate the difficulty in defining value-laden concepts (Velten et al. 2015). It is not possible to find an ultimate or objective definition of animal welfare, but it can be stated that a society that takes care of farm animals can be considered to have high ethical standards and empathy levels since its inhabitants care for its weaker members. High ethical standards and empathy can in turn be considered an important trait of social sustainability (Bergmann 2019; Clay et al. 2020; Tarazona et al. 2020). The farmers in **Paper IV** also emphasised caring for animal welfare in the sense of understanding what the animals need and developing an "eye for animals". They viewed these emotional responses as a crucial aspect of their identity as farmers, which is conceptualised as a social function in the categorisation by Renting et al. (2008).

The second reflection considers the discussion of farmer identity that was raised in both **Papers II** and **IV**. Previous research about farmer identities and norms has concluded that full-time farmers are often repelled by notions of farmers as "landscape gardeners" or other definitions that include elements other than food production (Renting et al. 2008). However, the Swedish farmers in this study did not hesitate to describe their farming identities as including much more than simply producing food. Some considered themselves planet stewards, some thought that growing food or raising pigs gave them a higher purpose in life, and some actively chose not to invest in further automation of their activities because they preferred working the soil with their hands. As the role of agriculture changes in society, so also do farmers' identities and motivations diversify. In a productivist context, farmers could be understood as aiming to maximise their profit. In a multifunctional context, farmers can be assumed to have motivations for their activities other than profit and to consider themselves as actors who are more than exclusively profit-seeking (Renting

et al. 2008, pp. 376–377). Research shows that there are strong and narrow notions among farmers of what a "good farmer" is, but that the norms are slowly evolving. Symbols of being a "good farmer" are often visual (Burton et al. 2008). As an example, when tractors became common farm equipment, it became important to have "tidy" fields that were evenly coloured, without weeds, and sown in straight lines. In contrast, the dominant values of agricultural practice in eighteenth-century England meant that it was important to keep weeds in near proximity to sown fields because weeds were important signals of soil quality and condition (Burton et al. 2021). A study of Swedish farmers by Saunders (2016) indicates that there has been a change, albeit slow, from the dominant farming values of tidiness and productivism towards more multifunctional notions of increasing biodiversity and taking an active role in the rural community. To better understand the relationship between farmer identity identities and the role of agriculture in modern society, further research relating MFA to the research field of "being a good farmer" would be fruitful.

6.2 Attempting to solve conflicts between values in relation to multifunctional agriculture

In this section, I discuss the second research question. I analyse the competing values and conflicting goals in relation to multifunctional agriculture that emerged in my four research papers and look to identify the changes that might be implemented to help resolve them.

The conflict between the different functions of agriculture that is most prominent in **Paper I** is that a large share of the CAP support was distributed to Polish farmers as income support to increase their viability (which can be interpreted as a social function of agriculture), while less support was distributed to the environmental functions of agriculture. Farm viability was thus increased, but possibly at the expense of climate mitigation or biodiversity-increasing measures. In **Paper I**, it was highlighted that CAP funds have the potential to contribute to several multifunctional aspects of agriculture. With CAP funding rural employment could be increased, cultural history could be protected by preserving agricultural landscapes, and rural social diversity sustained by enabling a larger range of different types of farmers to continue their activities. During the early 2000s, however, the CAP policy did not always support such multifunctional development of agriculture. Rather, it had the tendency to push agriculture towards larger, more productivist, and hence less multifunctional, farms that were more likely to further deplete soil quality and decrease farmland biodiversity. In addition, the conditions for CAP funding for newer EU member states like Poland were not as generous as they were for older member states like Sweden. These inequalities gave us some concern in **Paper I** that during this period Poland could not see its way to direct enough funds towards environmental measures in agriculture. This approach seems to have continued since 2013. An assessment of the Polish Strategic Plan for implementation of the CAP cycle

starting in 2023 has concluded that Poland is prioritising basic income support for farmers at the expense of environmental, climate, and rural development measures (Midler et al. 2022).

The conflicts that we analysed in **Paper II** were between environmental, animal welfare, and farm viability goals. In MFA terminology, these conflicts were between different environmental functions, the ethical function of animal welfare, and the social function of operational income security. One of the suggestions we put forward in **Paper II** to manage such conflicts was to change EU policy so that CAP contributes to multifunctional agriculture to a greater extent. CAP has gone through a so-called greening process after **Papers I** and **II** were published, and the share of environmental and rural development support it provides has increased. In the CAP period 2014–2020, three so-called "greening measures" were introduced to make EU agriculture more sustainable: crop diversification, permanent grasslands, and ecological focus areas. All three measures are in theory likely to contribute to increased agricultural multifunctionality, mainly for the ecological functions (Erjavec and Erjavec 2015). Most Swedish farmers, however, did not have to change their activities to fulfil the first two greening measures (Josefsson et al. 2017; Larsson et al. 2018). Buitenhuis et al. (2020) show that the situation is similar in the Netherlands; most Dutch farmers did not need to change their practices to receive greening support. This could indicate that the measures might not be enough to have a significant impact on agricultural multifunctionality. Erjavec and Erjavec (2015) conclude that the EU blended a multifunctional discourse around greening measures for the period 2014–2020 with strong productivist language concerning the distribution of the budget between member states and different types of farmers. Since 2020 the greening measures have been strengthened still further and the twin policies of the Green Deal and the Farm to Fork Strategy have also contributed to strengthening the multifunctional and sustainable aspects of EU policy (see section 2.1 for details about these policy documents). There are, however, still concerns in the research community that the post-2020 CAP still does not have enough transformative ambition for EU agriculture (Pe'er et al. 2022).

One example of a conflict between functions that was highlighted in **Paper II** was manure management. Two different manure management systems were advocated by the farmers. Some suggested that deep litter beds with an abundance of straw be used while others suggested reducing straw usage to the lowest amount required and instead adopting liquid manure collection methods. The farmer already using deep litter beds argued that they had soil-improving qualities and were better for animal welfare although admitting that they might have a greater negative effect on GHG emissions when compared with liquid pig manure. Another similar conflict was identified between different functions that free-range pig farming could contribute to. Such a system contribute to increased animal welfare but manure in the open air, uncollected and with poorly controlled storage, will likely increase GHG emissions. Two other activities that were suggested as a way to contribute to environmental

functions (decreasing food waste and avoiding high zinc concentrations in soil) were feeding pigs with food waste and not using zinc to treat diarrhoea. Both activities could have potential harmful effects on the pigs' welfare. Although high animal welfare, soil improvement, and low GHG emissions are aspects of sustainable agriculture to which multifunctional agricultural activities can contribute, it seems difficult to fulfil all of these ambitions simultaneously on a single pig farm.

In **Paper III**, the analysed conflicts were between the different values ascribed to agricultural land. We show that some types of values are systematically neglected in municipal policy-making processes. Socioeconomic values tended to be prioritised in land exploitation decisions at the expense of vaguer values such as cultural heritage or future food security. **Paper III** highlights that agricultural land in Sweden is exploited to a much larger extent than the policymakers have intended, even though agricultural land is protected from exploitation according to the Environment Act. On a municipal level, there are several competing value realms related to agricultural land, from food production and the preservation of cultural heritage to the economic and social values of promoting housing and services in order to attract new inhabitants. In the terminology of MFA, there is a conflict between functions such as food security and cultural heritage on the one hand and the economic function of housing (a type of *non-food good or service* to which agricultural land can be converted) on the other. Municipalities also tend to stress that converting agricultural land can actually increase *rural viability* in that particular community. For example, the Eslöv municipality encouraged applications for rezoning of agricultural land to use arguments around increasing rural diversity by saying (quoted in **Paper III**, p. 7): "Housing in the countryside can, depending on the purpose, also have positive effects on agriculture as a business or other agriculturally related businesses. It is therefore important to state the purpose of the exploitation when applying for construction permit in the countryside."

Increased protection of farmland, especially in peri-urban regions, is brought forward as a key issue for sustainability in several parts of Europe (Diamantini 2016). In Barcelona, for example, this has been handled by creating agricultural parks in which agricultural land has a high degree of protection to hinder exploitation (Paül and McKenzie 2013). Poland is also experiencing land use conflicts. Because 30 per cent of Poland's land mass is protected in some way (for example through Natura 2000) this can make demand for conversion of agricultural land to housing very high. This raises the potential for land-use conflicts in some parts of the country (Czarnecki et al. 2023).

One way for Swedish policymakers to handle the conflict between preserving or exploiting agricultural land is to strengthen the protection of agricultural land through including agricultural land in the legal category *'Riksintresse'* ('National interest'). When an asset is of 'National interest', public agencies on higher geographic levels than municipalities have the mandate to stop exploitation decisions that threaten them. This stronger legal protection of agricultural land has been suggested

by two recent state inquiries, Ds. 2023:28 (2023) and SOU 2024:8 (2024). The support on local and regional levels for increased protection of agricultural land is however not unanimous: A survey included in Ds. 2023:28 showed that 42 per cent of the surveyed municipalities and 20 per cent of the surveyed County Administrative Boards answered that they think that agricultural land should get stronger protection than it has today (Ds. 2023:28). It would be relevant for future research to analyse further why different governance levels have such diverse views on preservation of agricultural land.

Another approach to the issue of agricultural land preservation is to further analyse which needs and goals that municipalities want to fulfil through exploiting agricultural land. Which problems do they attempt to solve by building new housing areas? Which different future scenarios do they plan for, regarding, e.g., population development, climate change consequences, and need for domestic or local food production? These questions go beyond agricultural multifunctionality and agricultural land use. Instead, they are connected to how sustainable development in rural regions in general may be achieved.

6.3 Synthesis of the discussion

This thesis has attempted to understand and analyse conflicting values in relation to multifunctional agriculture. The thesis is a contribution to the research field of multifunctional agriculture, within a broad and varied frame. It has developed a new visual conceptualisation of multifunctional activities, and has demonstrated how this conceptualisation might be used through its application to pig farming and two scenarios of sustainable futures. The conceptualisation and its empirical applications contribute to a better understanding of how multifunctional agriculture can unfold in different contexts. This visual tool can also help to advance the theoretical understanding of animal welfare as a function to which agriculture can contribute.

The thesis also contributes to the never-ending stream of research that analyses if and how CAP helps the EU to achieve a multifunctional agriculture. The thesis concludes, much like the rest of this research, that CAP unfortunately does not contribute to any great extent to multifunctional agriculture, although its ambitions to do so seem to be increasing in recent years. Suggestions for a redistribution of all CAP support towards multifunctional activities have not achieved a majority opinion in the EU Commission. Finally, the thesis contributes to the body of knowledge seeking to understand how Swedish municipalities treat agricultural land. It has identified the arguments (and the values upon which they are based) that local policymakers use when they want to exploit agricultural land. This research confirms the findings of previous studies that conclude that Swedish agricultural land is exploited to a larger extent than policymakers have intended.

7. Conclusions

The aim of this thesis was to understand and analyse conflicting values in relation to multifunctional agriculture. As seen throughout the thesis, agriculture has the potential to contribute to a wide range of environmental, social, and other functions and to the protection of vital ecosystems if agricultural multifunctionality is strengthened. Since agriculture represents the main type of land use in the EU and the world as a whole (Foley et al. 2011), it would be unwise not to use that potential. It should however be noted that biodiversity in any given field would probably be higher if allowed to grow naturally than it is when planted with wheat. If we did not need to grow food, we could use the landscapes across the world in other ways than we do today. We could let landscapes develop freely without cultivating them, or we could shape the landscapes according to other principles and goals. We could, for example, maximise biodiversity, optimise water purification, or aim to decrease the prevalence of certain unwanted animals or plants by removing their habitats. Growing wheat in a field is certainly not the way to maximise biodiversity on that plot. However, cultivating that land in a multifunctional way could supply food *as well as* increased biodiversity, better water purification, a stronger sense of community, and other ecological and social functions, when compared with the contribution a monofunctional agricultural systems could likely make.

For the agricultural sector to be a critical player in the transition towards a more sustainable society, the multifunctionality of agriculture needs to be strengthened. One way of doing that is through agricultural policy. This thesis demonstrates that despite ambitious rhetoric, the EU CAP does not contribute enough to multifunctional agriculture and by extension to a more sustainable agriculture (**Paper I**). This conclusion is supported by other recent research, such as Buitenhuis et al. (2020) and Pe'er et al. (2022).

The roles of agriculture in society are changing and can contribute to different ecological and social functions depending on what the future looks like, as seen in **Paper IV**. The end of 2023 and the beginning of 2024 were characterised by farmer demonstrations and protests in several parts of the EU. Echoing my interviewee's representation of the ignorant public in the beginning of this thesis, the protesting farmers were sometimes portrayed in the media as evil beings who dislike the strict environmental regulations of the EU (Radio Sweden 2023). Their worries however seem to be similar to the pig farmers' dilemmas in **Paper II** of this thesis: how can they strike a balance between different multifunctional objectives and achieve environmental, animal welfare, and farm viability goals that are sometimes conflicting. Such goal conflicts are not easy to resolve, as this thesis has shown, nor is it possible

to find an objectively optimal weighing or ranking of all goals. Instead, when there are goal conflicts, decision-makers (both policymakers and farmers) need to decide on which goals and values they want to prioritise at the expense of others. The fact that values are often incommensurable and hence not fully comparable (Isacs et al. 2023; Trainor 2006) makes this task difficult.

This thesis has not analysed the way to prioritise between different goals, but points to the problem that some realms of value are typically not prioritised in decision-making processes. This is seen in **Paper III**, where local Swedish decision-makers acknowledge they apply several different value types to the process of re-zoning agricultural land. These values are connected, for example, to the aesthetic, cultural, and environmental values of the agricultural landscape. Local decision-makers therefore express a multifunctional view of agriculture in their comprehensive plans. However, when decisions to exploit agricultural land are explained and justified, our research shows that economic arguments are more common than cultural and environmental ones. My results suggest some confusion regarding the prioritization of different goals and values among the municipal decision-makers. Similar confusion was seen in a study by Eckerberg et al. (2023) who analysed prioritisation between the different and sometimes conflicting goals in an EU agricultural innovation program. They point out that it is important that the public decision-makers clearly prioritise between different sustainability goals as well as between sustainability and other goals. Furthermore, they recommend that the hierarchy of priorities should be clear to all actors involved, something that does not seem to be the case today (Eckerberg et al. 2023).

Since farmers' activities are dependent on their geographic context, not all strategies are possible nor desirable for all farmers (Helfenstein et al. 2024). One of the farmers interviewed in **Paper IV** was excited about the idea, outlined in one of the proposed future scenarios, that agriculture would be completely automated and robotised, since this would mean that they could cultivate much more land, even abroad in other countries through remote monitoring and field management. They did not express much interest in more multifunctional approaches to agriculture. Another farmer in **Paper IV** lived in the north of Sweden and had expanded their activities so that they could keep as many cows as possible, although they had still not managed to keep their farm technology up to date. The limiting factor for them was the landscape conditions in the north, that the amount of land accessible to them were too little to maintain more than 160 cows, even though it would take 500 to be able to afford the most modern technology and hence stay competitive. Enabling farmers to choose different strategies depending on local landscape and other conditions is important to ensure that agriculture is better prepared for the effects of climate change, biodiversity loss, and other crises. One of several measures that might be adopted in order to achieve a better preparedness for such crises is to develop relevant policy frameworks such as CAP and national and local regulations so that they encourage a multifunctional approach to agriculture to a greater extent than

such frameworks currently do. Such frameworks should take farmers' different needs and conditions into account.

Epilogue: A global pandemic and a war in Europe

The COVID-19 pandemic and Russia's full-scale aggression against Ukraine are not part of any of the papers in my thesis, but I cannot avoid reflecting briefly on the consequences that these crises might have for EU agricultural policy and the multifunctionality of agriculture in the longer run, especially since I have been working as an analyst at the Swedish Defence Research Agency (FOI) in parallel with finishing this thesis.

The pandemic and the war have affected European and global food security. The pandemic led to the closing of national borders for several days in March 2020 for food and other transports before coordinated action in the EU exempted food and other commodity transports from the travel bans (Eriksson and Öhlund 2020). Directly after the pandemic, Russia's aggression against Ukraine led to severe challenges for global food security since both countries are large producers of agricultural products and inputs (OECD 2022). For example, the price of mineral fertiliser and other agricultural inputs increased substantially during 2022 (European Commission 2023b). While these crises have exposed the vulnerability of the current globalised and "efficient" food system, they might also open a window of opportunity for change. The pandemic and the war show that conditions can (and will) change in the most unexpected ways. Although the future can't be predicted, it seems a safe bet that several unforeseen crises will likely emerge at some point in the coming years.

Since the full-scale Russian aggression against Ukraine began in February 2022, I see a tendency in Sweden and on the EU level to focus on short-term food contingency planning and food security at the expense of the long-term measures to achieve agricultural sustainability. The EUs granting of an exception to the requirement of fallow periods that was passed at the beginning of the war (Government of Sweden 2022) is one example of a measure that may have the intended effect of larger harvests in the short run but that counteract sustainability goals. Short-term measures to secure food supplies reveals the tension between that exists between defence and environmental policy, a tension that was observed by Eriksson in 2018 and is unfortunately still prevalent.

It might be tempting to argue that the most important goal for EU agriculture right now is to maximise harvests by using mineral fertilisers and pesticides on all fields instead of, encouraging organic farming methods, crop rotation, and fallow periods. While such an action would potentially increase harvest size during the early years, in the longer term, such a food security and preparedness strategy is not sustainable. It does nothing to reduce, for example, the EUs dependence on imported inputs like mineral fertilisers. Also, if the war ends and the geopolitical situation once again

becomes calm, how would the EU return to agricultural multifunctionality if it has scrapped all of the greening measures of the CAP in order to secure short-term food security? If EU agricultural policy and practice were to abandon all efforts at multifunctionality, which arguments would then remain for continued support of EU agriculture in comparison with agricultural production in countries outside of the EU? I argue that, even in crises like the ones facing us today, long-term perspectives on agricultural sustainability are more important than ever.

8. References

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The EU agricultural sector has evolved from being an integral part of most people's lives to a marginal and sometimes questioned activity. The policy response to the changed role of farming in the EU has been to apply a multifunctional approach to agriculture, that is, to acknowledge that agriculture is not solely producing food, but also contributes to several different functions in the societies and ecosystems of which it is a part. This research has attempted to understand and analyse conflicting values in relation to multifunctional agriculture.

Erika Öhlund carries out research in the field of environmental science with a special focus on the multifunctionality of agriculture. This is her PhD thesis.

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