Drivers of Regenerative Agriculture

- insights from southern Sweden

Degree of Master of Science (Two Years) in Human Ecology: Culture, Power and Sustainability
30 ECTS

CPS: International Master's Programme in Human Ecology
Human Ecology Division
Department of Human Geography
Faculty of Social Sciences
Lund University

Author: Amanda Persson
Supervisor: Thabit Jacob
Term: Spring term 2024

Department:	Human Geography
Address:	Geocentrum I, Sölvegatan 10, Lund, Sweden
Telephone:	046-222 17 59

Supervisor:	Thabit Jacob

Title and Subtitle:	Drivers of Regenerative Agriculture – insights from southern Sweden
Author:	Amanda Persson
Examination:	Master's thesis (two year)

Term:	Spring Term 2024

Abstract:

As a response to a changing climate and a growing population that increases the current unsustainable, industrialisation of agriculture, sustainable agricultural practices have gained interest globally. Regenerative agriculture was first mentioned in the 1980s but didn't gain interest until recently. The research around regenerative agriculture is limited, especially concerning the recent growing interest and research on the practise in Sweden. The aim of this study is to add to the research gap on regenerative agriculture, specifically in a Swedish context, and explore the drivers of adoption for regenerative agriculture by farmers in southern Sweden. A literature review and 7 semi-structured interviews was conducted with 8 Swedish farmers and analysed with a framework of tractions and frictions. The results show that the biggest drivers for adoption of regenerative agriculture amongst the farmers were the farmers personal views and morals towards sustainability and nature, and the decreased need for input costs which leads to increased economic viability. The results contribute to the research field on regenerative agriculture in Sweden as well as to the understanding of drivers for adoption for regenerative agriculture. The results also highlight areas for further research with more focus on aspects such as social structures, policies, and laws to increase knowledge and offer other insights on drivers for regenerative agriculture beyond this study.

Keywords: *regenerative agriculture, sustainable agriculture, tractions and frictions, drivers for adoption, Sweden*

Acknowledgments:
I would like to thank my family, friends, and partner for the endless support during the 5 years of my studies. I particularly emphasise the support I have hade from my parents and my partner during this last semester. From CPS I have met some dear friends that always supports and cheer me on and that I have learned a lot from. They continue to inspire me. I thank for the supervision and feedback from my supervisor. Lastly, I would like to thank my participants, the inspiring farmers, that took time out of their busy lives to be a part of this thesis – endlessly thankful.

Contents table

1. Introduction

In times of change and development and a continued growing threat of climate change, many systems and processes connected to nature and the environment are questioned. One of these systems is our current global agricultural system and food production. A system that is moving more and more towards overly industrialised systems that supports mass scale production of food and ignores the consequences on nature and the environment from the agricultural practice (Alj 2021, 243). The increased industrialisation of the food system is degrading the land and is threatening the ability to produce enough food, and more importantly threatens the ability to grow nutritious food from healthy land and soil (Dennett, 2023). The current agriculture practice is responsible for disrupting nature in many various ways, such as deforestation, water scarcity, biodiversity loss, soil erosion, and soil degradation (Gomiero, Pimentel, and Paoletti, 2011). Soil is a non-renewable, scarce resource that takes hundreds of years to create only a centimetre, meanwhile it takes on average only a couple of years for it to be destroyed by conventional agricultural practices (FAO, 2022). Healthy soil provides nutritious food as well as is vital for the surrounding environment and ecosystem services such as biodiversity, water regulations and resilience (ibid). At the same time as the current agricultural system is degrading the environment, the population is expected to increase which will bring a need for an even bigger increase in food production and more pressure on the agricultural system (Whyte, 2020). With an increased population and growing industrial agriculture, the need for a change in the agricultural food system towards more sustainable practises are increasing (ibid). Without actions towards more sustainable agri-food systems, we will continue to overstep the planetary boundaries and contribute to a degrading food system.

As a response to these growing threats of our ability to produce enough food in a more environment friendly way, newer sustainable agricultural food practices have increased in interest (Brown, Schirmer, and Upton, 2021). Regenerative agriculture (RA) is a sustainable agri-food practice that have particularly risen in interest in the last few years even though it was first mentioned already 40 years

ago (Daverkosen et al, 2022). RA is a holistic way of cultivating agricultural land and is based on the idea that the agricultural practice should take advantage of nature's own systems and function, based on the conditions provided on each farm (Newton et al, 2020). Important for the practice is to increase soil health, making sure there is vitality in the ecosystem, as well as minimising negative environmental impact, and at the same time satisfy human needs (LaCanne and Lundgren, 2018).

In the last approximately 10 years, there has been a raised interest in regenerative agriculture and therefore the practise is considered quite new in the academic sphere, even if its methods are similar to traditional agriculture where little to no technology or inputs are used (Alexanderson, Luke, and Lloyd, 2023). Although RA are proven to increase soil health as well as increase crop nutrients compared to conventional farming (Montgomery et al, 2022), the need for more research concerning the practice have been observed (Giller et al, 2021).

The biggest focus on RA in research and academia is finding a scientific definition or defining the exact methods to use, instead of focusing on the what the practise can achieve (Daverkosen et al, 2022; O'Donoghue, Minasny, and McBratney, 2022) Research on the increased interest and gained traction of RA amongst farmers is also limited and the reasons or motivations behind why farmer choose to transition to or choose to practice RA is lacking in understanding (Frankel-Goldwater, Wojtynia, and Duenas-Ocampo, 2024). Trying to understand the drivers behind farmers choice to use sustainable agricultural practices it is important for our future food production and the need for our agricultural system to transition towards more sustainable practices (Bless, Davila, and Plant, 2023).

The goal of the Swedish government's food strategy is to have a sustainable and increased food production (Regeringen, 2024). The general interest of sustainable agri-food practices is also increasing in Sweden (ibid). Swedish agriculture is expected to become more important globally due to its position in the world and expected consequences from climate change that will disrupt agricultural practices in other parts of the world (Rydbergs et al, 2019). This increases the need for Swedish agriculture to produce more food without harming

the soil and environment more (ibid). Work with soil health and RA is relatively new in Sweden and with increased need and interest for sustainable agriculture, the need for more research also increases (Sellberg et al, 2022).

This study and the subject of sustainable agriculture integrate well within the subject of human ecology. This study explores the social-ecological relationship between farmers and their environment and how this relates to sustainability issues. The study explores the connection between culture, power, and sustainability by trying to understand what factors are involved in driving farmers towards a more sustainable practice. This allows for a deeper understanding of sustainability issues in this specific cultural context and what kind of operators have the power over the drivers for adoption of regenerative agriculture.

1.2 Aim of Research and Research Questions

As the importance of sustainable agri-food practices is increasing (Brown, Schirmer, and Upton, 2021), the need for research is also increasing. The aim of this research is to address the research gap concerning limited knowledge on drivers behind the increased interest in RA as well as contribute to reducing the knowledge gap of RA in Sweden. This study attempts, with the combination of a literature review and semi-structured interviews, to understand the drivers of adoption of regenerative agriculture for farmers in southern Sweden.

The research questions are based on the conceptual framework of this study about frictions and tractions which is later explained in detail. Traction is drivers for adoption and friction is barriers for adoption of RA. The focus will be on tractions, however frictions that is mentioned can add deepened understanding to the aim.

The thesis seeks to answer the following questions:

1. *What are the main drivers of adoption of regenerative agriculture amongst farmers in southern Sweden?*

1.1 *What tractions for regenerative agriculture do farmers in southern Sweden recognise?*

1.2 *Is there any frictions mentioned for the adoption of regenerative agriculture by farmers in southern Sweden?*

2. Background and Review of Literature

2.1 What is Regenerative Agriculture?

Regenerative agriculture originally stems from the US organisation Rodale Institute. An organisation that supports research in organic and regenerative agriculture and coined the term regenerative agriculture in the 1980s (Giller et al, 2021). They defined it as a practice that takes advantage of ecosystems natural tendencies to recover when disturbed and has minimal to no negative impact on the environment (ibid). From the 1980s, it wasn't until the 2010s that regenerative agriculture started to gain traction and at the same time lose its initial definition and became a more diffuse practice within the research sphere (ibid). The search for one specific definition has since been taking up a lot of the current literature on regenerative agriculture where authors present many different definitions that are all very similar, with the goal of creating one unanimous definition (Newton et al, 2020). Some authors mean that there is no specific definition for RA and instead, the practice is explained through multiple methods, underlying principles, and outcomes, such as vitalising ecosystems, increasing soil health and crop nutrients, no use of pesticides or fertilisers and limited or no use of machines and technologies (Dennett 2023; Dudek and Rosa, 2023; Gordon, Davila, and Riedy, 2021; Schreefel et al, 2020).

The understanding of the practice that will be used in this study is the one from Schreefel et al (2020) who reviewed 28 studies with the goal of finding convergence and divergence between objectives and activities that define the practice. They concluded that there is no scientific definition of regenerative agriculture and that it instead is explained through activities, objectives, and outcomes that together result in regenerative agriculture (ibid). They established that the practice is strongly connected to environmental issues and dimensions of sustainability where soil issues are a specific important theme. Improving and enhancing soil health, contributing to soil fertility, and improving soil quality and biodiversity, are important for the practice (ibid). Other objectives such as improving ecosystems, optimising resource management, improving the nutrient cycle, creating resilience, and increased water quality are important as well.

Specific activities connected to regenerative agriculture that Schreefel et al (2020) found were, crop rotations, minimising external inputs and tillage, using manure and compost, and integration of crop-livestock operations. Animals play an important role in regenerative agriculture and are often chosen based on their compatibility with each farm and its environment (ibid).

Based on these findings, Schreefel et al (2020) proposed their own definition of regenerative agriculture which is the one that will be used for the understanding of the practice in this study and is as follows:

"*An approach to farming that uses soil conservation as the entry point to regenerate and contribute to multiple provisioning, regulating, and supporting services with the objective that this will enhance not only the environmental, but also the social and economic dimensions of sustainable food production.*" (Schreefel et al 2020, 5).

Another important dimension of understanding regenerative agriculture is understanding the use of holistic management in the practice. Holistic management is often mentioned together with RA, however, it is not a requirement for the practice but something that is usually in line with the core of what regenerative agriculture is (Butterfield, Bingham, and Savory, 2019). It is also a framework that is important for many Swedish regenerative farmers as it is used frequently on the two biggest websites for RA in Sweden and the Nordic countries: *Nordiskt nätverk för Regenerativt Lantbruk* and *Regenerativt Sverige*.

Holistic management is developed by biologist Allan Savory and the Savory Institute, an institute that is working with advancing RA globally (Savory Institute). Holistic management is a framework for planning and decision making in complex contexts, such as ecosystems or economies, but also personal lives, while at the same time considering environmental, social, and financial factors (Raven, 2020). It is a way of taking a step back and looking at a system as a whole and how it is connected, instead of seeing every individual part as its own. For RA, this means looking at how the environment, the social wellbeing of the farmer and the economic aspect all work together (Gordon, Davila, and Riedy,

2023). One of the main goals with holistic management in RA is to step away from the idea that agriculture is only about production and start to understand that the environment and the social wellbeing is as important (ibid). For many regenerative farmers, this perspective of intertwining the social, the economic and the farm is very important (ibid).

2.2 Literature Discussion on Regenerative Agriculture

As stated, a lot of the current literature on regenerative agriculture is focusing on the definition of regenerative agriculture (Giller et al, 2021). Whereas that is of course important for the understanding of the subject other aspects such as the understanding of the practice itself, its methods, and benefits, and what makes farmers want to adopt it, are important research areas also. Therefore, this section will focus on previous literature surrounding the aim of this study which is the raised interest in RA and drivers of RA.

According to Dudek and Rosa (2023), online articles relating to RA had its peak between 2017 - 2020. Bless, Davila, and Plant (2023) state that the increased interest started already in 2015 so for around 10 years the practise has risen in interest, specifically amongst farmers. Due to the sudden interest, the practice is considered quite new to the academic and research sphere were published articles on the subject are still seen as limited (Giller et al, 2021). There is especially a noticed research gap concerning the understanding of regenerative agriculture in practice, specifically the understanding of drivers or motivations for the increased adoption and interest in RA (Bless, Davila, and Plant, 2023; Dudek and Rosa, 2023; Frankel-Goldwater, Wojtynia, and Duenas-Ocampo, 2024).

This limited research on regenerative agriculture is also evident in a Swedish context, especially in the academic sphere and research connected to drivers of adoption. However, Daverkosen et al (2022) and Johansson, Brogaard, and Brodin (2022) are two studies done in a Swedish context connected to the idea of RA. Daverkosen et al (2022) wanted to research how RA affects soil health on “real-life” farms on Gotland, a Swedish island located in the Baltic Sea. Daverkosen et

al (2022) examined the soil health on 17 farm fields and 6 gardens on a total of 11 farms that had practised RA between 0 – 30 years. They found that RA had a very positive impact on many environmental aspects on the farms, specifically the soil health and climate change adaptation. They concluded that they support the research on how RA as an environmentally positive agricultural practice, specifically in increasing carbon in the ground (ibid).

Johansson, Broogard, and Brodin (2022) didn't focus on drivers of adoption in their research either, they wanted to create visions for increased carbon sequestration on Swedish farmland to get a picture of what sustainable agriculture could look like and how it could work. Johansson, Broogard, and Brodin (2022) worked together with the organisation Swedish Carbon Sequestration (Svensk Kolinlagring) and they focused on RA and agroecology as sustainable agricultural practises. Two workshops were concluded, one with farmers part of Swedish Carbon Sequestration and one with farmers, farming consultants, and food industry advisors. In these workshops, the respondents developed a picture of what sustainable agriculture could look like in the future and what changes is needed for that transitions to happen. The result they presented was that the respondents focused on practises that align with RA as well as agroecology and how these practises could help create a more sustainable future in agricultural (ibid). The respondents expressed a need for more power in the farm industry as well as policies and funding that would help them to implement more sustainable agricultural practises (ibid).

Sellberg et al (2022) express a need for more research and innovations focused on RA in a Swedish context. Most of the information and current research on RA in Sweden can be found on the websites of Swedish and Nordic networks for RA. The Swedish network is called *Regenerativt Sverige,* and the Nordic is called *Nordiskt Nätverk för Regenerativt Lantbruk*. The aim of decreasing the research gap of drivers and motivations on RA have been explored by Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024), Dipu, Jones, and Aziz (2022), and Gosnell (2022), however in other contexts than Swedish.

Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) conducted 31 interviews with regenerative farmers in the US with the goal to understand the motivations and drivers behind the farmers choice of practising RA. They focused on relational values and economic and environmental drivers of farmers in the US. The relational values that were mentioned as a driver by most of their respondents were social responsibility, meaning that they cared for the health of the community by caring for nature in their agricultural practice. Other relational values that were important for the US farmers were general environmental care because of the effects it will have on future population, land, and environment (ibid). The economic aspects were profitability and livelihoods, where emphasis was on how RA helped achieve economic stability and thereby a good personal well-being. The top environmental factors were soil health and the well-being of ecosystems, both in a larger scale and smaller scale. Another aspect that Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) found to be an important driver for the US farmers was the farmer's personal views of the world and their morals, as well as the social-ecological relationship they felt. However, Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) discovered that a lot of the relational values and economic and environmental drivers integrated in many ways and that further research should focus on the complex view of drivers for adoption across different spheres.

In another way of researching drivers for adopting RA, Dipu, Jones, and Aziz (2022) conducted 21 semi-structured interviews where 14 of the interviews were with self-identified RA producers and the other 7 were a mix of participants from distribution, retail and governments involved in policies. The goal of the research was to identify both drivers and barriers for adoption of RA in southeast Queensland by using a mental model as a method. A method that is based on the idea that the external reality of decision making, and interaction is based on the internal representation or model (ibid). They presented two themes for drivers of RA which were *Regenerative agriculture as a pathway to economic viability* and *Shifting values and priorities of consumers and producers*. The first theme entails respondents explaining that by practising RA they can maintain profitability and improve their financials better than what was possible when practising traditional farming due to the decreased need for input costs (ibid). Dipu, Jones, and Aziz

(2022) also noticed that farmers' ambition to improve the environment was driven by the possibility to decrease costs rather than them caring for the environment. The second theme, *shifting values and priorities of consumers and producers*, showed that farmers adopt regenerative agriculture based on consumer's values on nutritious food, environmentally sustainable produced food, and animal welfare. They also presented that some farmers did show a stronger environmental ethic that goes deeper than wanting to produce environmentally just food for the consumers, and instead some farmers acted out of their own care and interest about making a positive impact on the environment and land (ibid).

The barriers for adoption of RA that Dipu, Jones, and Aziz (2022) found were *Limited access to localised knowledge and mentoring*, *Financial risk*, and *Lack of supportive policies for RA, including finance*. The lack of knowledge about RA in the local environment affected the farmers negatively and were seen as a barrier. Similarly, the farmer felt a lack of supportive policies from governments or other establishments which inhabited the uptake of RA. The financial risk of transitioning the existing production to RA was a barrier for many farmers, however this wasn't specific to RA but to other changes that might be necessary on the farm (ibid).

Gosnell (2022) also conducted her research on drivers for adoption for RA for farmers in Australia but instead in New South Wales. Gosnell (2022) brings another perspective where the focus is on drivers for adoption for farmers that have transitioned from conventional farming to regenerative farming. However, Gosnell (2022) has also chosen to focus on how the farmers' perspective on agrochemicals and microbiome plays a role in the motivation to transition to RA. Gosnell (2022) uses integral theory's four quadrant model, a model that is divided into four dimensions; *experience*, *behaviour*, *culture*, and *systems* that relates to individuals, collectives, interior and exterior factors. Gosnell (2022) presented that farmers with negative perspective on agrochemicals or farming with any chemicals, made them more inclined to transition to sustainable agriculture.

As presented, the research on drivers for adoption of RA are limited, especially in a Swedish context and more research are encouraged by many authors (Bless,

Davila, and Plant, 2023; Dudek and Rosa, 2023; Frankel-Goldwater, Wojtynia, and Duenas-Ocampo, 2024; Sellberg et al, 2022). For the practice to grow more, it is important with more research in general but specifically research that helps to understand what facilitates farmers to adopt it (Giller et al, 2021).

2.3 Swedish Agriculture and the Need for Change

Agriculture has been an important and big part of Sweden and Swedish landscape for a long time. During the post-war period, from 1945 and onwards, the agriculture in Sweden went through a lot of changes due to that the goal of food production changed (Wästfelt and Eriksson, 2017). At this time, the goal was to increase production to guarantee a domestic food production in the event of another war and to secure income for farmers (ibid). This meant that Swedish farmers produced excess food which in the eyes of important economists at the time meant that it could be taken advantage of in the international market. Because of this idea, the Swedish food production got exposed to international competition with the goal of creating economic efficiency and allow producers to adapt the production to international market demand (ibid). The increased production meant that the farms also needed to increase to sustain the production and income. More change in Swedish agriculture happen due to Sweden's membership to EU in 1995 when Swedish farmers could take part in EUs agricultural funding support which help the farms increase in size (ibid).

In the beginning of the 1980s, Swedish farmers produced 75% of the country's need for food (Lantbrukarnas Riksförbund, 2022). However, both agricultural land and Sweden's ability to be self-sufficient in food production, have decreased year after year (Rydbergs et al, 2019). In the last 150 years, Sweden's agricultural land has decreased by 25% and in 2016 had the lowest self-sufficiency degree in Europe (ibid). Today Sweden's degree of self-sufficiency is at 50% and in total there is just under 2.6 million hectares of arable land and 0.4 million hectares of pasture, which is equivalent to 7% of Sweden's total land area (Jordbruksverket, 2020). These agricultural lands are decreasing every year with the biggest reasons for this is forest plantation and exploitation where land is turned into roads or

buildings or something similar that means that the land can never be used for food production again (ibid). Swedish food production is very heavily dependent on imports of food, but also things for the food production such as energy, fuel, seeds, inputs, and fertilisers (Lantbrukarnas Riksförbund, 2022). This means that the Swedish agricultural sector is sensitive to disturbances in other countries and to reduce the pressure on imports from other countries, Sweden must take responsibility to sustain a sustainable, domestic agriculture (Rydberg et al, 2019).

Due to its position in the world, Swedish agriculture is expected to become more valuable globally in the future as the possibility of climate change affecting sea level rises, warmer weather and desertification may reduce the availability of agriculture in many other countries that are more exposed (Rydberg et al, 2019; Sellberg et al, 2022). Today, Sweden is responsible for exports of many different agricultural products. During 2022, Sweden exported 973 000 tons of grain meanwhile the imports were only at 163 000 tons (Jordbruksverket, 2022). Lantmännen, who is the biggest exporter of cereal in Sweden, exports between 30-40 % out of 3 million tons every year (Lantmännen). In 2022, the Swedish export of agricultural goods and food, excluding fish, increased by 23% from 2021 and is expected to keep increasing each year (Jordbruksverket, 2022). In the product groups where the export value increased the most were, amongst others, milk, dairy products, cereals, and grains (ibid).

Climate change may also bring positive effects to the Nordic countries as warmer summers and milder winters are expected which will extend the growing seasons and therefore the ability to increase food production is possible (Asplund, 2016). However, for the Swedish agricultural system to be able to increase food production sustainably, a transformation within the food production is needed to achieve this (Rydberg et al, 2019; Schlesinger, 2022). The food strategy decided by the Swedish government is built to fit the times of climate change and it is focused on a resilient food production with the goal of increasing the production of food and at the same time contribute to a sustainable development (Regeringen, 2024). However, a transformation in the Swedish agriculture system requires significant changes in several dimensions of society, especially the relationship between people and nature (Sellberg et al, 2022). Rydberg et al (2019) also

considered a lot of responsibility for adapting agriculture to climate change fall on the individual farmer and their choice of agricultural practice. Rydberg et al (2019) also states that with higher temperatures there will be increased precipitation and evaporation and therefore a lot more water will build on agricultural lands. To meet some of these changes, one way is investing in practices that can handle increased amounts of water such as more crops and vegetation or natural drainage, such as RA, so that the ability for an individual farmer to adapt increases (Rydberg et al., 2019).

The work with soil health and regenerative agriculture in Sweden is relatively new and not very widespread (Sellberg et al, 2022). Due to this, the data collection and monitoring of RA are very limited in Sweden and research on it is lacking (Länsstyrelsen Skåne, 2023). However, increased interest in RA amongst Swedish farmers is shown through creation of the Nordic network and the Swedish organisation that both are relatively new. The Swedish organisation is called *Regenerativt Sverige* and was from the beginning a Facebook group, that in 2023 formed a website and became an official organisation. The Nordic one is called *Nordiskt Nätverk för Regenerativt Lantbruk* and is a network with the intent to share common interest in RA and spread ideas and methods.

There was also positive feedback from the Skåne government for an EU commission's proposal on a directive for the monitoring of soil health and resilience in agriculture (Länsstyrelsen Skåne, 2023). Jordbruksverket, the Swedish agency for agriculture, is a Swedish state authority and have also stated that it’s important to protect agricultural lands and soil due to the importance to have healthy land and soil for food production as well as for heavy rains and the vitality of ecosystems and biodiversity. As well as cultural aspects such as how small scale farms closer to the city can provide opportunities for both integration and rehabilitation, more consumers want to choose locally grown products and a close proximity to nature has a positive impact on people’s health and well-being (Jordbruksverket, 2020).

2.4 Importance of Agriculture in Southern Sweden

The geographical focus on this study is southern Sweden, from Kungsängen outside of Stockholm down to Skåne, the most southern province in Sweden. Southern Sweden, especially Skåne, has always been an important part of Swedish agriculture and food production (Länsstyrelsen Skåne, 2023). Today, southern Sweden is responsible for a third of Sweden's total food production (ibid). Skåne is specifically responsible for growing 70% of the vegetables, fruits, and berries, produced in Sweden (Lantbrukarnas Riksförbund, 2022). Southern Sweden together is responsible for growing the greater part of the country's beans and grains (ibid).

In Skåne almost 45% of the land area is agricultural land meanwhile it is also the province with the most hectares exploited and a lot of agricultural land around the coast in southern Sweden has a problem with nitrogen and phosphorus pollution in surface water (Wivstad et al, 2019). A continued intensification of agriculture which is taking advantage of the increased need for production in Sweden, risks worsening the possibility of increased biodiversity loss, emissions of greenhouse gases, leakage of nutrients and pesticide, fragmentation, and degradation of natural habitats (Ödman et al, 2015).

With its geographical position, southern Sweden has the potential of improving conditions to produce crops and other vegetation with warmer weather and increased growing seasons because of consequences from climate change (Ödman et al, 2015). However, to take advantage of this in the best way, the work with sustainable agriculture, such as RA, must increase instead of worsening the environmental conditions through increased use of the current food production system (ibid). Work with soil health and regenerative agriculture is quite new for Sweden in general but Länsstyrelsen Skåne (2022), the county government, have shown increased interest and have stated that work with soil health must be more widely spread and the implementation of work with soil health must become more accepted in food production as it would have a large positive impact on agricultural land and its production. Degraded soils are a cross-border problem

and therefore work with soil health benefits agricultural production of food as well as the environment, climate, and nature (ibid).

The importance of southern Sweden's food production as well as the scope of the research and availability of farmers, is what helped decide the geographical focus for this study.

3. Theoretical and conceptual framework

The conceptual framework that will be used for the analysis is the framework of *zones of friction and traction* from Gosnell, Gill, and Voyer (2019). It is a conceptual framework that draws on the idea of friction and traction in our three spheres of transformation which analyses the decision making behind the choice of practising regenerative agriculture (ibid). Gosnell, Gill, and Voyer (2019) emphasises the importance that social, personal, and economic factors play in sustainable agriculture practices.

The zones of friction and traction occur in the three spheres that are originally presented by O'Brien and Sygna (2013): the personal, the practical, and the political. The zones are meant to help understand what the key factors that obstruct (friction) and drive (traction) change and transformation inside the spheres. The key factors of friction and traction are the decision makers of transformation in the three spheres and these factors include social, ecological, psychological, and economic aspects (Gosnell, Gill and voyer, 2019).

Zones of friction can be seen as barriers or an obstruction for sustainable agriculture, meanwhile zones of traction are drivers and therefore a pathway for transformation towards sustainable agriculture (Gosnell, Gill and Voyer, 2019). Friction constraints change in the sphere, it occurs when routines, norms or values do not align with the practice, whereas traction on the other hand drives transformation. Traction can occur when crisis or change occur, a moment that can make one's personal life turn upside down or make one question their world view. Traction then helps to reappraise one's worldview or values to fit into the new changed circumstances. The transformation that follows from such moments needs to be internally aligned with one's norms, routines, and feelings to be continuously sustained (ibid).

By understanding the zones of friction and traction as well as how they are interconnected and how they affect each other, the understanding of how they affect change and transformation will increase (Gosnell, Gill and Voyer, 2019). In

the case of a regenerative agriculture, the farmer can be open for change due to a drastic change (traction) but choose not to go through with the change because of peer pressure (friction), or the other way around where the farmer has a lot of support (traction) and therefore choose to adopt RA for example (ibid).

As stated, the zones of friction and traction are connected to the three spheres: personal, practical, and political. The biggest focus is on the personal sphere where the subjective dimension of factors such as values, ethics, culture, and identity are presented (Gosnell, Gill, and Voyer, 2019). Zones of friction and traction, i.e., the transformation, in the personal sphere is important because transformation in the personal sphere affects transformation in the other two spheres. The personal sphere is where change of in the subjective dimension occur (ibid). The subjectivity of the personal sphere views how we see the practical and political sphere. For example, the personal sphere decides how we view systems or rules, which are a part of the political sphere, while it also decides possible solutions, which are a part of the practical sphere (ibid).

In the practical sphere introduction of new management practices and technologies are included as well as transformation in behaviour, cultural advancements, and strategies (Gosnell, Gill, and Voyer, 2019). They present it as the outcome-sphere and explain that it is dependent on the other spheres for transformation. The political sphere is "Where the 'rules of the games' are set: where social movements, collective action campaigns, lobbying, electoral politics, and revolutions respond to them, and where threatened interests resist or quash pressures to change." (Gosnell, Gill, and Voyer 2019, 2). It is connected to different systems such as legal, social, and economic.

Both O'Brien and Sygna (2013) and Gosnell, Gill, and Voyer (2019) draw theoretically from sustainability transition literature, which this study also draws on. By theoretically drawing on sustainability transition literature, it is possible to explore how farmers embark on, navigate, and maintain a significant change or choice in their agricultural approaches (Gosnell, Gill, and Voyer, 2019). This allows for the understanding of factors that drive the adoption and receptivity of new agricultural practices as well as resources, strategies, and behavioural

patterns that facilitate and uphold the adaptation (Dowd et al, 2014). Sustainability transition often refers to adaptation within agriculture and is often focused on incremental adaptation, meaning adaptation that is smaller and implemented on current actions which makes it less effective in the long run (ibid). Meanwhile transformative adaptation focuses on long-term, larger scale and system change (Rickards and Howden, 2012). Transformative adaptation allows for the understanding of the root of the problem to be able to create larger change that transforms the ecological or social systems functions (Fleming, Park, and Marshall, 2015). It seeks to address the underlying causes of vulnerabilities to climate change, such as social, economic, environmental, cultural, and power factors (ibid).

Transformative adaptation is less common in adaptation projects due to that system change and large-scale change is more difficult to implement whereas incremental change is easier to implement (Fedele et al, 2019). The understanding of transformative adaptation is therefore limited and is often connected to aspects within incremental adaptation such as policies, technologies, and institutions and lacking in subjective aspects such as values, morals, and believes which are important for transformative adaptation to happen (Kates, Travis, and Wilbanks, 2012). Transformational adaptation in sustainability agriculture can be affected by many subjective factors that influence climate adaptation and by identifying the subjective aspects that can instigate this transformation can lead to a better understanding of the adaptation of sustainability agricultural practices when understood together with objective aspects (Dowd et al, 2014). By addressing economic, social, and psychological aspects of decision making with the goal of supporting the resilience of the broader social-ecological systems in which farms and farmer operate in, would help facilitate the understanding of sustainability transition within agriculture (Rickards and Howden, 2012).

Subjective aspects that can affect the transformative adaptation in sustainability agriculture can be related to the farmers previous knowledge and feelings towards sustainability (Burton, 2014). For example, farmers that have had positive feelings and experiences with sustainability before, are more inclined to be positive to the adoption of agricultural sustainability transitions (ibid). Another subjective factor

that can influence farmers likelihood to transition is their previous experience with environmental degradation within agriculture and how this is normalised as an issue for farmers to have to deal with. If the farmer doesn't see this as normal and instead problematise it, transformation is more likely to happen (Fedele et al, 2019).

By focusing on understanding the interaction between the personal, the practical, and the political spheres it will help to understand what facilitates and foster as well as obstruct transformative adoption in sustainability agriculture such as regenerative agriculture (Head et al, 2013; O'Brien and Sygna, 2013).

For this study, interviews will be held with regenerative farmers with the focus on understanding tractions (drivers) in the three spheres, rather than frictions. Frictions might be mentioned by the respondents; however, the focus will lay on tractions. With the help of understanding tractions, the aim is to get a better understanding of what drives the increased interest of regenerative agriculture for farmers in southern Sweden.

4. Research Design

4.1 Methodology

This study is a qualitative study and therefore the emphasis is on words, interpretation, and constructions of nature of the respondents (Bryman 2016, 454). The epistemological position, the interpretation-oriented perspective in qualitative research, has an emphasis on understanding the social reality based on how the participants interpret the reality in a certain environment (Ahrne and Svensson 2015, 52). The ontological position implies that the social properties are the result of an interaction between individuals and not phenomena that exist "out there" and are separate from those involved in their construction (Bryman 2016, 455).

Using an inductive research strategy has allowed for the theory to be generated based on the practical research results (Bryman 2016, 464). The theory therefore emerged from the data which allows the theoretical ideas to be derived from the data collection (ibid) The idea of reflexivity is also considered in this study. Meaning that this study reflects the researcher's place in time and in the social sphere, which has been considered during execution of the study (Bryman, 2016, 471).

A critical realist perspective has been used and this allows for the understanding of social science from a stratified world where the distinction between the empirical world and the real world can be drawn (Danermark, Ekström, and Karlsson, 2019). With the help of a critical realist perspective, the aim of trying to understand how reality works instead of trying to describe or predict it, has been the goal. As the study is based on the understanding of the respondent's social reality, the perspective of critical realism helps stress that the scientific practice is influenced very much by the social environment (Benton and Craib, 2011).

4.2 Method

The main method of choice used for data collection for this study is semi-structured interviews with the aim of trying to understand the respondent's

position with emphasis on what the respondents themselves feel is important in the understanding of events, patterns, and behaviours (Bryman 2016, 563). Semi-structured interviews help to address more specific questions and themes connected to the study's focus (Ahrne and Svensson, 2015, 38), which is helpful for this study as the aim is to focus on drivers for adoption of RA. Therefore, an interview guide was made with the aim of creating questions related to the study's focus as well as still making sure there is flexibility in the interview by leaving space for the respondents to talk freely. The goal with the chosen method was to get an understanding of what the respondent feels is important as well as what the respondent feels is of importance in relation to each of the issues and themes that the interview guide revolves around (Bryman 2016, 564). For the interview guide, see Appendix 1.

There were 7 interviews with 8 respondents conducted. The sampling method was purposive sampling and snowball sampling where I let the study's focus help choose relevant respondents who then could suggest other participants with the experiences and characteristics relevant to the research (Bryman 2016, 495). Relevant respondents were decided as farmers who was self-proclaimed regenerative farmers on their own farms in southern parts of Sweden. Most of the respondents were found through the availability on websites and networks and later through snowball sampling technique. The scope of the research and the availability of farmers as well as the importance of southern Sweden's food production, helped decide the geographical focus.

The 8 respondents consist of 7 regenerative farmers and 1 advisor. The regenerative farmers are farmers who self-identified their farming practice as regenerative. The advisor works with advising farmers on the practice of regenerative agriculture and other sustainable agricultural practices. The advisor will work as an "expert" and the goal of an expert interview was to get deeper insight on the practice of regenerative agriculture as well as to get a perspective from an advisor, who is in contact with many regenerative farmers, where issues or drivers of interest might be discussed. The aim with the expert interview is to help complement and deepen the data collection and the understanding of RA (Ahrne and Svensson 2015, 39).

There have been 7 interviews with 8 respondents, 2 of the respondents are a couple and choose to have their interview together because of time availability. The chosen respondents have different sized farms and out of 7 of the regenerative farmers, 3 of them are working full time at the farm. The other 4 have other work commitments alongside farming, most of them working between 70-85% outside of farming. See Figure 1 for more information on the respondents. They are anonymised and labelled between 1-7 and the advisor is labelled as *The Advisor* further on. The couple is respondents 4 and 5.

Respondents	Location of farm (in Swedish provinces)	Profession
The Advisor	Uppland	Crop – and regenerative agriculture advisor
1	Skåne	Full time regenerative farmer
2	Småland	Regenerative farmer, board member of *Regenerativt Sverige* and other work commitment
3	Västra Götaland	Full time regenerative farmer
4	Skåne	Regenerative farmer and other work commitment
5	Skåne	Regenerative farmer and other work commitment
6	Skåne	Regenerative farmer, board member of *Regenerativt* Sverige and other work commitment
7	Uppland	Full time regenerative/permaculture farmer at a farm cooperative

Figure 1: explaining the alias for the respondents, their location, and their profession.

The interviews varied between 30-50 minutes depending on the time availability of the respondents as well as the length of the respondents' answers.

All interviews were recorded, with consent, for the purpose of being able to focus on the interview during it and transcribing the interviews after for the analysis. 3 of the interviews were conducted online via Zoom, 3 were conducted via telephone and 1 interview was in person. This varied due to the availability and comfortability of the respondents as well as distance issues and illnesses. However, when conducting interviews there should be no noticeable or remarkable differences through conducting interviews in person or online or telephone when the interview doesn't contain any specifically sensitive questions or themes (Bryman 2016, 582).

As regenerative farming is relatively new in Sweden, the lack of data of regenerative farmers limited the number of interviews as it was difficult to find and get in contact with RA farmers. Farming is a busy and hectic work environment which also limited the number of respondents being available, as many I reached out to didn't have the time or possibility to take part in the study.

4.3 Ethics

Following ethical research principles have been very important in this study as a lot of personal information is shared in interviews. The idea of ethical universalism has been used, meaning I, as the researcher, have followed ethical principles during the study and specifically in contact with the respondents.

Before every interview and before agreeing to participate in the study, each participant received informed consent in an email, which was information about the research, what it was for, what the interviews would entail, and how the data would be used and stored to ensure reliability (Wiles, 2012). During the start of the interview the same information was given to each respondent again as well as the question if recording was okay and the choice to be anonymous. None of the respondents felt the need to be completely anonymous. Recorded consent was therefore given once in an email and then again verbally before starting the recording. It was also made clear to each participant that they are free to change their minds to participate as well as to drop out of the study whenever they would

want. The respondents were also informed that they do not have to answer any questions if they do not want to. To ensure credibility, all participants were offered a share of the final product of the study as well (Bryman 2016, 467). The aim was to show respect to my respondents by being open and curious to ensure they felt safe and wanted to share their feelings and opinions with me.

My own personal values, ideas or theoretical orientation have been assured to not deliberately influenced the execution and the conclusion of this study.

4.4 Limitations

In qualitative research, it is important to remember that the research only offers deeper insight and understanding on the specific case and respondents in the study. Although the aim of the study is to increase the research on drivers on adoption of RA, conclusions can only be drawn based on the study's framework and limitations. Qualitative research is rarely generalisable because of the specific focus as well as the often, smaller sample size of the research (Bryman 2016, 465). However, when researching the social reality of individuals there will never be one answer or one picture that is applicable to everything and everyone (Bryman, 2016, 467). A larger sample size would be desirable and would help increase the generalisability as well as the understanding of the study's focus.

The initial idea was to have a larger sampling size and at first for the sampling to be regenerative farmers in Skåne. However, this quickly became difficult as the data collection of regenerative farmers are limited as well as farmers practising regenerative agriculture is also limited and a lot of the farmers that I reached out to didn't answer or have time to participate. Therefore, I had to broaden the research scope to southern Sweden. Ideally, more respondents would have been found and efforts to do so was executed. I reached out to both the networks *Nordiskt Nätverk för Regenerativt Lantbruk* and *Regenerativt Sverige*, but without luck on gaining any more respondents. It was generally difficult to get in contact with RA farmers as well as for the respondents to find time for interviews.

The presented results have a strong focus on the personal and practical sphere without it being intentional. This limits the understanding of drivers for adoption as the political sphere is not mentioned. The questions in the interview guide might have limited this or the respondent's own focus in the interviews may also have directed this. The interviews and transcriptions are also conducted in Swedish and later translated to English which might affect the data as native meaning and understanding can be lost (Oliver, Serovich, and Mason 2005).

4.5 Data analysis

The interviews were recorded and later transcribed for the analysis. The transcribed data was analysed with the help of a thematic analysis where themes, or codes, were identified with the help of the study's focus as well as conceptual framework (Bryman 2016, 702). The analysis started with dividing the data into the theme of the study's aim, drivers of adoption of RA, which became the main theme. This theme later got divided into smaller and smaller themes to fit into the conceptual framework of frictions and tractions within the three spheres, the personal, the practical, and the political. Meaning that the data was divided into the more specific themes in the themes of spheres within tractions. The friction that is presented was analysed the same way.

5. Results

Here the results of the data analysis are presented with the goal of answering the research questions with the help of the conceptual framework of tractions and frictions within the three spheres, personal, practical, and political.

5.1 Traction - Personal Sphere

5.1.1 Sustainability and the climate

A theme that was mentioned by all the respondents as a driver for practising regenerative agriculture were the focus on sustainability and the climate. The findings show that every respondent some way or another described how they care about sustainability issues as well as care about the environment and nature When asked what The Advisor thought was the general driver of interest in RA amongst Swedish farmer, The Advisor said:

"*(...) but I still think that sustainability is probably the driving force, but sustainability is also economic sustainability. This whole sustainability with nature, owning a piece of land that you manage so that it is in the same or in even better condition than it was, how you look at biodiversity. So, I think the driving force is sustainability, but on many levels."*

In line with this, Farmer 6 said that the interest for the climate and for sustainability solutions had been an interest for a long time and therefore it came naturally to choose RA when starting farming. Farmer 7 on the other hand, works at a farm cooperative and expressed that it was never their plan to start a farm but the common interest in climate issues changed that:

"*(...) we were never really interested in starting a farm per se, but we, from being interested in like climate change and taking care of the earth in the best way, and then, through this we started with urban farming and then also became interested in how to do it in a larger scale and produce more food in a long-term, sustainable way.*"

Similar feelings were expressed by Farmer 2 and Farmer 4 as well, how practising RA was a way of acting on sustainability issues. Farmer 2 said:

"*I was also like a lot of people, so worried 'how the hell are we going to cope with the climate issues' and all that. But here I found the answer to how we can work*."

When asked what the biggest driver for Farmer 1 was to work with RA, they expressed similarly to Farmer 2, that today's agriculture is unsustainable and destroying our soil and that RA was a way to move away from that kind of agriculture. Farmer 3 also mentioned working with RA for climate reasons through the focus on soil health. Farmer 3 said:

"*(...)I thought we should reduce our climate footprint, that we should have a soil that, that increases significantly in humus content and that becomes more fertile.*"

The findings suggests that an interest in nature as well as sustainability and taking care of nature is important when practising RA. All the respondents expressed concern over the future and how this was an important driver that made them chose to practise regenerative agriculture.

5.1.2 Interest in nature and seeing a difference

Connected to the theme *sustainability and the climate*, is another more frequently mentioned traction among the respondents, which is the respondents' feelings towards nature. The findings show that the respondents in different ways expressed an interest in how nature works and how this interest have influenced their agricultural choices. The Advisor mentioned that this is a common feeling amongst the farmers that seek advice. The Advisor said:

"*Yes, I feel that it is farmers who have had quite a lot of interest in nature and sustainability issues in particular, who think that this is another step towards something that is more than ecological or KRAV or whatever it may be*."

The Advisor added that if the farmer doesn't have a genuine interest for nature and its natural processes, the chances of them being interested in RA is limited. Farmer 2 and Farmer 4 expressed their interest in nature by being very knowledgeable about how RA affects the environment and the natural processes on their farms. Farmer 2 compared RA to conventional farming and described them as opposites when it comes to caring for nature. Farmer 2 said:

"*(...) conventional agriculture is so soulless. It's sort of disconnected from, there is no connection to either the animals or nature other than a very technical one.*"

Connected to these feelings towards nature felt by the respondents where the emphasis on how working with nature and its natural processes are fun, exciting, and important. Farmer 3 and Farmer 7 both said that through the work with RA they could express their interest in nature and enjoyed working that way. Farmer 4 and Farmer 5 frequently mentioned throughout the interview that they enjoy working with RA by saying how much of what they were doing were exciting because they could see the difference it made in nature. Farmer 4 said:

"*And then there is also the fact that you stay and are passionate about it because we can see the effect. All of a sudden, you see how these biological processes work and can make different decisions based on these phenomena you see, and you see the results of your decision in a different way*."

Other respondents resonated with this feeling of being connected with nature and how you as a farmer feel good about being able to see a difference in the environment and realise you are a contributing factor. Farmer 1 and Farmer 6 expressed how this was an important aspect. Farmer 6 said:

"*(...) but the idea is that we should be able to follow it with simple means and see that we improve it. And that is all we really need, for ourselves to sort of know that 'okay, but we might regenerate the land' and that is all we want to do*."

Farmer 1 expressed their interest in nature as a driving force in a lot of aspects of their life and therefore when starting to farm full time and finding RA, that was the only logical choice. Farmer 1 and other respondents mentioned the need for something else, for another way of practising agriculture that had this connection between farming and caring for nature. Farmer 1 said:

"*(...) when I found regenerative and the concept and people who work with it, it felt more like coming home, like finally feeling like you have found a home. So, in a way it has been something that I have been looking for all along. Before when I had a farm and just grew a little in the garden and stuff like that. Still, it was always something like that* (RA)*, that I have been looking for*".

Throughout the interviews this passion for nature, the environment and seeing a difference were very present. It was presented differently in each interview and by each respondent, however they all had the sense of being passionate about how nature works and relating this to working with RA.

5.1.3 Holistic management

The framework holistic management was mentioned by a few of the respondents. It was often connected to how RA was a good way of working as a farmer. The Advisor mentioned that holistic management is common to use as an RA farmer in Sweden but not something that necessarily everyone is interested in. Farmer 2 was passionate about holistic management and the positives it could bring to one's life. Farmer 2 meant that every aspect of your life should be looked at to be sustainable, not just the agriculture. Farmer 2 said:

"*It is very difficult to have economic sustainability without, if it is to be long-term, looking at ecological and social, because you can have economic sustainability and ecological, but not social. If you have built a way of working that means you don't have time to hang out with your friends, then it is not socially sustainable in the long run even if you have a nice impact on the ecosystems and a good economy.*"

For Farmer 2, holistic management was an important part of RA and it helped to create a good working environment where you focus not only on work and finances but also the social aspects and well-being of the farmer. This resonated with a lot of the respondents and Farmer 1 said:

"*It's not just the farm and the animals and the crops, but it's also me and my family and how we live, and what kind of life we want and stuff like that, which provides a framework from which you make decisions, that is, on which you base your decisions. So, I think there is perhaps more awareness about the importance of health and feeling good. It's kind of built into the system to get ahead.*"

Farmer 4, Farmer 5, and Farmer 6 also mentioned holistic management and resonated with the idea that this framework is an important tool that helps you make reasonable decision with every aspect of your life included. Farmer 5 connected holistic management to the possibility for a decreased need to invest a lot of money and create a low-cost production:

"*When you start to go a little deeper into this holistic management, it's also - after all, it's a personal management of different decisions, because if you think this part is interesting, then you probably automatically choose not to invest super much, but you might have a more easily accessible production if possible, or a lower cost production*."

The general feeling from the respondents towards holistic management were positive and emphasises that it helps create a healthy work environment as well as helps you make decisions on the farm.

5.2 Traction - Practical sphere

5.2.1 Decreased need for inputs

The most mentioned theme in the practical sphere where financial and focused on how RA can help decrease the need for inputs. Many of the respondents resonated with this and mentioned that no matter if you are a conventional farmer

or ecological farmer, the biggest financial expense is always different kinds of inputs. Farmer 3 stated that:

"*I have tried for 70 years to run a farm in an industrial way, and I know of no one who has increased fertility or increased profitability radically in that way. But the only ones who make money are those who sell inputs. So, the farmers must support more and more people, but will not earn more.*"

Farmer 3 added that because of this, the biggest driver for Farmer 3 to choose RA were economic reasons, especially due to the need for less inputs which meant fewer financial expenses. When asked if Farmer 6 felt any general driver for the adoption of RA from other farmers, Farmer 6 also mentioned that the inputs have increased a lot in costs which makes farmers uncertain of their financial future which might affect their decision. Other respondents resonated with this and that working with RA means the need for less inputs. The Advisor also mentioned how this was connected to the practise by saying:

"You buy smaller quantities of feed or smaller quantities of fertilisers or pesticides or whatever it may be and then you only work with biological methods and if it's a bad year, you don't have that much money to lose when you haven't put in as much either."

Farmer 2 mentioned that even if it is not very common in Sweden yet, it is common in other places in the world that the farmer chooses RA because of profitability reasons and the decreased need for less input costs. The respondents especially mentioned the need for less fertilisers and pesticides in RA, but also diesel or petrol as machines are far less used or not used at all in RA. On this subject Farmer 5 agreed and emphasised that:

"You can say that we have a very small economic risk in relation to diesel prices doubling or something like that. It's not like our costs would be doubled because of that. And at the same time, we are not dependent on external inputs in any way."

Some of the farmers have other work commitments outside of farming and Farmer 4 and Farmer 5 explicitly said that this helps if anything on the farm would fail because the farm doesn't necessarily mean any big economic consequences. This was also a reason they felt they could try out and invest in RA. This feeling resonated with Farmer 1 and Farmer 6 as well as they also felt this safety net from having other work commitments.

5.2.2 Independence

The theme of independence was frequently described by the respondents as a positive consequence of practising RA. The nature of the independence varied where some respondents felt financial independence, and some felt work independence. Connected to the decreased need for inputs, some of the respondents felt that practising RA also decreased one's financial risk and therefore creating more financial independence. The Advisor said:

"*Well, in that way regenerative is about taking perhaps fewer financial risks. That you don't invest as much money in different inputs as you do in agriculture today."*

The Advisor added that by working with natural processes and not using pesticides, fertilisers, or diesel, if there is a bad year you don't have that much money to lose as you haven't invested much either. Farmer 4 and Farmer 5 resonated with this and Farmer 5 said:

We have the privilege of being able to test things because there are no major financial consequences for us to test it because we have other jobs. So that's also a thing, that you kind of don't have to worry about trying something new that might not succeed because our life doesn't depend on it."

Farmer 3 also mentioned decreased financial risks within RA but was the only respondent to also mention that RA is well in line with EUs agricultural policy and that by following the practice's principles, you can receive good financial support from the EU. Because Farmer 3 received this financial support, they also shared the feelings of increased financial independence.

Farmer 1, Farmer 2, and Farmer 6 mentioned more work independence than a financial independence through the practise of RA. Farmer 1, Farmer 2, and Farmer 6 don't work full time on their farms and they expressed how RA was less time demanding than other agricultural practices. This meant that they could have other work commitments as well as the farm without feeling overwhelmed. Farmer 2 said:

"*In many ways it does reduce my dependence. I don't need fixed installations, a lot of big barns and stuff, things like that. I don't need nearly as much machinery and consume much less diesel. I become less dependent on diesel deliveries (...).*"

Farmer 2 compared working with RA to other agricultural practices where the animals are stabled and how much time Farmer 2 saved from not having to move the animals or handling feed. Farmer 6 also expressed how RA was an easier agricultural practice as it decreased the need for compensation or constant overlooking.

5.2.3 Smaller farms

An aspect that some of the respondents mentioned as a traction was the size of the farm. Farmer 2, Farmer 4, and Farmer 5 felt that if you have a smaller farm or are just starting to farm, it is easier to get in the mindset of the principles of regenerative agriculture. The step from a big industrial farm to a regenerative farm is much larger than for smaller ones according to the respondents. Farmer 2 said:

"*I think those who are smaller farmers, they're more inclined to kind of look at something like this* (RA) *because the mentality of the smaller farmer and regenerative are much closer together. The large-scale mentality is much closer to something industrial that really has much to do with the landscape*."

Farmer 4 and Farmer 5 also agree with the idea that smaller farms, especially completely new farmers, probably has it easier to understand as well as adapt RA

as they haven't been indoctrinated with traditional agriculture. The Advisor agrees with this and has experienced that smaller farms sometimes are easier when adopting RA. The Advisor states:

"*Whereas if you have a smaller farm, you can think a little more about cycles and diversity and animal husbandry and like small streams of different things in a different way*."

The Advisor also mentioned that the midlands, where smaller farmers always have been more common, and big, industrialised thinking never really existed, is where the best conditions for regenerative agriculture are.

Both The Advisor and Farmer 2 mention that these big industrialised farms are increasing even though they think that a lot of us know we probably should move the other way and focus on more smaller farms instead. Farmer 6 added that research on agriculture always is done on industrialised farms or organic farms and that more research on farms that practise RA is needed.

5.2.4 Crisis management and resilience

Another theme within practical traction that a few of the respondents talked about is resilience and what would happen if there were to be a crisis. The Advisor specifically discussed that there was a press release from the Swedish government not long ago that brought up a preparedness plan in times of crisis in the food system. The Advisor felt that the press release focused a lot on what kind of fertilisers and chemicals we need to store in case of a food crisis whereas The Advisor meant that we should focus on what we can produce with what we already have, using the natural environment instead. The Advisor said:

"*But perhaps one should also sort of include in these reports that we need to implement more methods where we can produce with what is available and also manage to sort of live a little more independently from these large flows of inputs (...)"*

This idea about resilience for the future as well as being prepared for crisis were brought up by Farmer 2, Farmer 4, Farmer 5, and Farmer 6 as an explanation to the benefits of RA. Farmer 4 stated when talking about knowledge on RA:

"*Above all, it is a knowledge that is very valuable to have if there should be periods of crises in some way."*

Farmer 5 then followed up with that RA helps the farm to be less sensitive and exposed to external factors. Farmer 6 and Farmer 7 brought up similar ideas on how working with the natural processes through RA helps the farm be more resilient. Farmer 6 also stated that:

"*(...) you get these win-win solutions that give you, for example, a more resilient, a more resilient cultivation system at the same time that there is no need to receive external compensation."*

The respondents expressed that RA could help the farm to have a more resilient ecosystem that is equipped to handle different weather and storms as well as not needing to be dependent on inputs or other external factors.

5.3 Traction - Political sphere

5.3.1 Networks and social relations

The most mentioned traction within the political sphere were the theme of networks and social relations. The social networks within RA seem to have helped a lot of the respondents to find RA as well as staying with it.

Farmer 2 and Farmer 6 are themselves active in the organisation *Regenerativt Sverige*. An organisation that started as a Facebook group but now is a formal organisation with a website. The aim with the organisation is to connect regenerative farmers as well as being an organisation that can act and be part of research etc. They both say that the organisation was very important for them before they were active board members. Farmer 6 said specifically that these types of networks and social relations helped a lot in the beginning but also now,

especially since RA is still quite new and have limited spaces with information. Farmer 6 said:

"*No, in other words, what helped are precisely these networks. Because the research that exists, most of it is on conventional agriculture. Or it's organic, and usually it's some comparison between organic and conventional in a half-good way. But here in this grassroot movement, practitioners gather who can give each other tips and advice and support.*"

Farmer 2 often mentioned the importance of the social dimension of RA as well as how this organisation can help regenerative farmers, but also the importance of being an organisation that can act and affect things such as policies and research. Farmer 4 and Farmer 5 also expressed how social networks helped with practising RA. Farmer 1 could resonate as well and expressed how it got easier practising RA after finding different networks and other farmers, because of the ability to exchange experiences. Farmer 1 said:

"*(...) in the end I found the Nordiska Nätverket för Regenerativt Lantbruk.and that made it a little easier because then you suddenly have a whole bunch to exchange experiences with and yeah, ask others if the information is available somewhere, and stuff like that*."

5.4 Friction - Political sphere

As researching frictions wasn't the goal of this study, not a lot of questions or answers concerning frictions were mentioned in the interviews. However, one friction was brought up by several respondents which highlights the complicated relationship between frictions and tractions and how they are interconnected.

5.4.1 Industrial agriculture

The friction that was brought up by several respondents was the friction of transitioning to regenerative agriculture from a previously big, industrial farm. The Advisor mentioned that one barrier when wanting to become a regenerative farmer is the size of the farm, as larger farms usually have invested so much

money in very intense productions that it is difficult to transition. Farmer 2, Farmer 5, and Farmer 6 also agreed with this and The Advisor said:

"*Yes, so it is more difficult, like the further to the industrial, huge agriculture you have come, the more difficult it is to bring in such mindsets, I would say*."

Farmer 2 also emphasises that bigger farms usually have invested themselves to a place where it is difficult to make a transition in the production and practice of the farm. Even if they would want to change, Farmer 2 meant that it is often difficult and sometimes the bank makes it difficult to get a loan for the transformation. Farmer 2 said:

"*I know this has happened several times where farmers in that situation have learned about regenerative and want to change their production to be more regenerative. Then they go to their bank and say, 'I would like to do this, I have counted on it and it should have a better profitability and blabla'. Then the bank officials say 'yes, I will discuss it with our agricultural expert' and then they come back and say 'No, no you can't borrow for that'. And then they are stuck like that (...)"*.

Farmer 5 and Farmer 6 also mention that in Sweden these bigger farms are very common and looked at as the only way to make money in the Swedish agriculture system. Farmer 4 mentioned that in Sweden, the way that RA works is as a low-cost production that have always been looked at as an agriculture that do not make money, instead you are encouraged to be industrial. Farmer 4 state:

"*(...) it is a fairly low-cost production, and it has always been a way, in Swedish agriculture, of not making money. What has been promoted generally in Swedish agriculture is this very intensive production for you to be able to earn money off it. And therefore, it is difficult for the people learning regenerative agriculture skills after that to think differently*."

The most unanimous friction that the respondents mentioned was this issue of larger, more industrialised farm's ability to transition or change to regenerative

agriculture. Frictions or barriers within RA weren't asked of the respondents to discuss but the one that was mentioned managed to be something many of them agreed on.

6. Discussion

The global agricultural system needs a change towards a more sustainable practice, one where we are trying to minimise harming the land, and the soil, and one that is resilient against climate change or changes in import production (Dennett, 2023). Regenerative agriculture is a misunderstood agricultural practice widely lacking in research and a practice that is important and that could bring a lot of positives to the agricultural system if used correctly and wisely (Gomerio, Pimental, and Paoletti, 2011). In a world that for the most part is ignoring the growing climate crisis and the consequences it is bringing and will bring, RA could bring important change with its focus on natural processes and functioning ecosystems. To understand how we can change the agricultural system, we need to understand what makes farmers want to change their practise, because farmers are the ones in charge of the change (Frankel-Goldwater, Wojtynia, and Duenas-Ocampo, 2024). Therefore, it is vital to understand what conditions or support is needed for a sustainable transformation. This study aims at understanding the drivers for adoption of RA amongst southern Swedish farmers and adding research to the field of knowledge as well as wanting to broaden the general knowledge on RA.

Most of the tractions that are presented in the analysis are focused on the personal and the practical sphere, as that is what the respondents chose to focus on. According to Gosnell, Gill, and Voyer (2019), the personal sphere is the most important in terms of transformation as one's personal values, morals, ethics, and identity often affect the other spheres. The lack of themes in the political sphere, such as for example government support or funding, is interesting but might also be a reflection on the focus of the research questions or what the respondents themselves felt were more important to mention. RA is, as stated, relatively new to Sweden and many respondents mentioned finding RA through networks, YouTube or searching online, rather than through the government or official records. The political sphere might also entail more barriers than drivers for the respondents and therefore it was less mentioned with the focus being on drivers.

The most mentioned driver for the adoption of regenerative agriculture in the findings were in the personal sphere and specifically in the themes *Sustainability and the climate* and *Interest in nature and seeing a difference*. Meaning that having a genuine interest in sustainability issues and in nature, seems to be the biggest driver for why the respondents chose to adopt RA as well as them wanting to continue practicing it. Working with RA, means working very much with nature, ecosystems and the natural function in nature as well as wanting to understand them (LaCanne and Lundgren, 2018), and therefore it makes sense how important it is for the respondents to find the core of the practice interesting and for them to choose to practice RA. An increasing awareness in climate and environmental issues have increased actors' actions in the agricultural sector to think and act more sustainably (Floeser, 2011). It has become important for farmers to live and act within their integrity and morals and these are becoming more and more connected to caring for nature and environmental and working more sustainably (ibid) which is reflected in the findings.

This is also in line with the results of Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) research on drivers of adoption for US farmers and with Gosnell's (2022) results on the research on farmers perspective on agrochemicals. The research of Dipu, Jones, and Aziz (2022) don't have the same results as they didn't present the care or interest for the climate and nature as a very important driver. Instead, they mentioned how only some of the farmers showed a stronger environmental ethic where the want to care for the environment where important. Dipu, Jones, and Aziz (2022) interviewed other respondents than farmers unlike this study as well as the research of Frankel-Goldwater, Wojtynia, och Duenas-Ocampo (2024) and Gosnell (2022). Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) presented that the farmers wish to have a wellbeing environment and ecosystems were important drivers as well as the farmers personal views, their morals, and their perspectives on the social-ecological relationship were also a big part of the motivation behind adopting RA. Gosnell (2022) presented that the farmers in her research cared for how the agrochemicals affected the environment and this feeling was an important driver for them wanting to transition from conventional to regenerative farming. The same feelings and ideas reflect in the findings were the focus on tractions in the personal sphere and how

their own perspectives and feelings on sustainability and climate issues and their own personal interest in nature, are important for the respondents reasoning behind choosing RA. This feeling of personal interest or feeling personal responsibility to act on climate change is a common reason behind why many acts on climate change issues (Frantz and Mayer, 2009).

In today's societies, acts on climate change are limited both by individuals, governments, and companies. In general, it is very uncommon to be able to notice climate change or change in nature, and this is also a root to why we are not acting more on climate change issues according to Frantz and Mayer (2009). If we were able to *notice the event*, as Frantz and Mayer (2009) explain it, there is a much higher chance to continue to act on climate change. As presented, the findings show how the farmers ability to see changes in nature from them practising RA were important for them which was presented in the theme *Interest in nature and seeing a difference*. Being able to see the change that they have help to create, motivated the farmers to continue practising RA.

Gosnell, Gill, and Voyer (2019) stated that the personal sphere is the most important sphere because transformation in the other spheres is dependent on the ethics, morals, values, and culture in the personal sphere. The respondents' strong feelings, values, and morals towards nature and the environment, which was the most common driver, show how the personal sphere is very important for the drive behind practising RA. The respondents are so strongly determined in their personal sphere that it affects their practical and political sphere as well as any frictions that would appear. The interrelation of these spheres is important, especially in the understanding of motivations behind sustainable agriculture because the lifestyle, the economic, the environment, and the practice itself is correlated and affects one another (Floeser, 2011). According to De Meyer et al (2020), the ability of being able to act on climate change needs to be integrated into more levels of one's identity and morals for real change to happen. By integrating acts on climate in the identity, people will find support for integrating it in their personal, professional, and social lives as well and it won't seem as difficult to act on sustainability issues as many feels it is today (ibid).

Other frequently mentioned drivers for adoption of regenerative agriculture by the respondents was presented in the practical sphere, in the themes of *Decreased need for input*, *Independence*, and *Smaller farms*. These three themes are intertwined and connected as they all touch on the subject of economy and financial aspects regarding regenerative agriculture. The findings show that the focus was mainly on how practising RA decreased the need for input costs and how this was a positive financial aspect. As the goal within the practice of RA is aiming at farming as natural as possible, the need to buy and depend on input, fertilisers, pesticides, as well as gas for machines, should decrease naturally and therefore the costs should also decrease. The feeling of financial independence from practising RA was also expressed by some of the respondents due to the lesser need for inputs and having to depend on them for a successful year at the farm.

The research of both Dipu, Jones, and Aziz (2022) and of Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) presents how their respondents mentioned that practising RA increased their economic viability. Dipu, Jones, and Aziz (2022) explicitly stated that the main drivers for their farmers to choose RA was that it was a pathway to economic viability due to the need for lesser input costs.

The need for future agricultural productions to be more sustainable is clear, however weather or not these changes will affect the financial status of the farmer is also an important aspect. The ability to increase economic viability and decrease the need to buy different products for the production when practising RA was an important driver for the respondents. The findings present that the input businesses are the ones increasing their financial status meanwhile the farmers will still struggle financially and at the same time being responsible for increased food production. To not be dependent on others seemed to be an important aspect for the farmers. Already in the late 1980s, Francis, Harwood, and Parr (1986) stated that future agricultural systems should be focused on being more regenerative and taking advantage of the resources on the farm to contribute to resource efficiency. Francis, Harwood, and Parr (1986) emphasised that this would lead to farmers being less dependable on external inputs and other external factors that the farmers can’t control. The economic viability of the farmer is an

important part of sustainable agriculture as sustainable agriculture is often connected to the idea of less economic viability. Therefore, the sustainable economic aspect should be given as much focus as the ecological sustainability aspect when trying to achieve sustainable agriculture (Velten et al, 2015). The need for less inputs in sustainable agriculture, especially RA, is an important economic aspect for farmers and should be given more attention to attract farmers to a sustainability transition within agriculture (Foelsen, 2011).

An interesting aspect that was shown in the interviews and presented in the analysis is that the financial aspects of RA was also mentioned as a friction by several respondents. It was not something that was asked of them but something they themselves mentioned when reflecting on RA and it is presented in the theme *Industrial agriculture.* I added this aspect as it is important to understand tractions and frictions together and how they are interconnected to increase the understanding of change and transformation (Gosnell, Gill, and Voyer, 2019). This friction shows the complicated side of the relationship between tractions and frictions and how one theme can be a driver for some, and a barrier for others. In this case how the theme of the financial aspect for smaller farmer differs from bigger farmers. The respondents recognised how larger or more industrialised farms that want to transition to RA will have difficulty doing so because of financial issues or having invested themselves stuck to their practice and production. By the respondents acknowledging this as a friction, they also acknowledge the agricultural norms and system in Sweden and how this is a barrier for transitioning to RA. The respondents also discussed the traction of *Smaller farms* and described how smaller farms usually have an easier time to adopt RA. They explained this notion by saying that RA is a more small-scale thinking practice and again they touched on the issue of larger farms being further away from RA and how the current Swedish agricultural system and the agricultural financial support is not built for RA to be adapted on larger farms. This conflict between larger and smaller farmer highlights how different tractions and frictions can look and highlights an aspect for further research on drivers for adoption of RA on larger farms, and research on how RA could be applied to larger scale agriculture and what conditions are needed for this transition to happen.

The Swedish government have expressed the need for an increased use of sustainable agricultural practices that is resilient (Regeringen, 2024). However, to transform the current Swedish agricultural system, multiple changes is needed (Sellberg et al, 2022). The expressed feelings of the need for more smaller farms and the issues that larger farms entail when talking about sustainable agriculture is an interesting aspect that could be more explored. The idea that RA can have the ability to increase farmers economic viability could be used to encourage farmers in Sweden to transition to RA, especially since the Swedish agricultural system needs a transformation in several dimensions and this could be a way to attract more to transform their farms, as the current system is economically favourable for the input companies instead of the farmers (ibid).

As presented in the theme *Smaller farms*, the respondents expressed how we should try and move away from the idea of these very big, industrialised farms and that research on agriculture usually is done on these farms or organic farms, and very rarely on RA farms. Daverkosen et al (2022) also pinpointed the need for research to be done on farms that have been practising RA instead of test-farms, as the change in nature and the environment that RA can create need some time to be noticeable. Dipu, Jones, and Aziz (2022) presented in their research that the farmers felt a lack of knowledge on RA in their local environment and Frankel-Goldwater, Wojtynia, and Duenas-Ocampo (2024) also emphasised the need for more research on RA as it is a good sustainable agricultural practise, but it needs more attention to grow. A continued growth on research on RA would be desired, especially in a Swedish context where the research is especially limited. Further research on what changes in the Swedish agricultural system could facilitate change towards more sustainable agriculture, specifically RA, could be interesting for further understanding beyond this study.

7. Conclusion

From the growing climate issues and an increasing population that need nutritional food, sustainable agricultural practices have risen (Brown, Schirmer, and Upton, 2021). Regenerative agriculture is one sustainable agri-food practice that have gained more traction in recent years but that at the same time the practice has limited research and information done on it (Giller et al, 2021). The aim of this study was to gain understanding on the drivers for adoption of RA for farmers in southern Sweden as well as add research to the general literature on RA, but more specifically add to Swedish literature on RA. This was done through semi-structured interviews with self-proclaimed RA farmers in southern Sweden. 7 interviews with 8 farmers were conducted and the data was analysed with a conceptual framework of tractions and frictions in the three spheres: personal, practical, and political.

The results showed that the main drivers for adoption of RA are the farmers personal interest in sustainability issues and nature. RA contributing to a better workplace through more work independence and the use of holistic management as well as RA contributing to decreased input costs and more financial independence was also big drivers for the farmers. The research has limitations and should therefore be interpreted with caution due to the smaller sample size and the qualitative nature of the study where the findings are connected to the specific context. However, even with the limitations the research still contributes to insights on regenerative agriculture in a Swedish context and more specifically from a southern Swedish perspective, which both are very limited in existing research. The results also contribute to the understanding of how regenerative agriculture is perceived by farmers practising it, as well as add to the limited research field on drivers of adoption for regenerative agriculture.

This study focused mostly on the personal and the practical sphere without it being intentional. Further research on the political sphere or aspects that relates to it, such as how laws, policies, government funding, institutional arrangements, and customer choices, affect the adoption of RA could be useful and offer more

insights beyond this study. Further research on larger, more industrialised farms is another aspect for further understanding of RA. As pointed out by both the respondents and by published literature (Bless, Davila, and Plant, 2023; Dudek and Rosa, 2023; Frankel-Goldwater, Wojtynia, and Duenas-Ocampo, 2024; Sellberg et al, 2022) general research on RA is limited and the need for more research on regenerative farms with regenerative farmers are important for further understanding of the practice and for future development of sustainable agriculture.

Bibliography

Ahrne, Göran., Peter, Svensson. 2015. 2. Handbok i kvalitativa metoder. Liber AB.

Alexanderson, Mathew S., Hanabeth, Luke, David J. Lloyd. 2023. Regenerative farming as climate action. *Journal of Environmental Management* 347(119063) https://doi.org/10.1016/j.jenvman.2023.119063

Alj, Max. 2021. A people's green new deal. Pluto Press.

Asplund, Therese. (2016). Natural versus anthropogenic climate change: Swedish farmers joint construction of climate perceptions. *Public Understanding of Science* 25(5): 560-575. https://doi.org/10.1177/0963662514559655

Benton, Ted., Ian, Craib. 2011. Some problems of empiricism and positivism. *Philosophy of social science*: 28-49. http://dx.doi.org/10.1007/978-1-137-28521-8_3

Bless, Anja., Federico, Davila., Roel Plant. (2023). A genealogy of sustainable agriculture narratives: implications for the transformative potential of regenerative agriculture. *Agric Hum Values* 40: 1379-1397. https://doi.org/10.1007/s10460-023-10444-4

Brown, Kimberly., Jacki, Schirmer., Penney, Upton. 2021. Regenerative farming and human wellbeing: Are subjective wellbeing measures useful indicators for sustainable farming systems? *Environmental and Sustainability Indicators* 11(100132) https://doi.org/10.1016/j.indic.2021.100132

Bryman, Alan. 2016. Samhällsvetenskapliga metoder. Oxford University Press.

Butterfield, Jody., Sam, Bingham., Allan, Savory. 2019. *Holistic management handbook, third edition: Regeneration your land and growing your profits*. Island Press.

Burton, Rob J.F. 2014. The influence of farmer demographic characteristics on environmental behaviour: A review. *Journal of environmental management* 135: 19-26

Danermark,Berth., Mats, Ekström., Jan, Ch Karlsson. 2019. *Explaining Society – Critical realism in the social sciences*. Routledge.

Daverkosen, Lærke., Alena, Holzknecht., Jürgen K, Fridel., Thomas, Keller., Bjarne W, Strobel., Annelie, Wendeberg., Sabine, Jordan. 2022. The potential of regenerative agriculture to improve soil health on Gotland, Sweden. *Journal of plant nutrition and soil science* 185(6): 901-914. https://doi.org/10.1002/jpln.202200200

De Meyer, Kris., Emily, Coren., Mark, McCraffrey., Cheryl, Slean. 2020. Transforming the stories we tell about climate change: from 'issue' to 'action'. *Environmental research letters* 16(1). https.//doi.org/10.1088/1748-9326/abcd5a

Dennett, Carrie. 2023. Regenerative – Can the right farming practices improve the environment? *Today's dietitian* 25(6): 28-31.

Dipu, Mokaddes A., Natalie A, Jones., Ammar A, Aziz. 2022. Drivers and barriers to uptake of regenerative agriculture in southeast Queensland: a mental model study. *Agroecology and Sustainable Food Systems* 46(10): 1502-1526. https://doi.org/10.1080/21683565.2022.2114120

Dowd, Anne-Maree., Nadine, Matshall., Aysha Fleming., Emma Jakku., Estelle Gaillard., Mark, Howden. 2014. The role of networks in transforming Australian agriculture. *Nature climate change* 4: 558-563. https://doi.org/10.1038/nclimate2275

Dudek, Michal., Anna, Rosa. 2023. Regenerative Agriculture as a Sustainable System of Food Production: Concepts, Conditions, Perceptions, and Initial Implementations in Poland Czechia and Slovakia. *Sustainability* 15(22). https://doi.org/10.3390/su152215721

Fedele, Giacomo., Camila I, Donatti., Celia A, Harvey., Lee Hannah., David G, Hole. 2019. Transformative adaptation to climate change for sustainable social-ecological systems. *Environmental science & policy* 10:116-125. https://doi.org/10.1016/j.envsci.2019.07.001

Fleming, Aysha., Sarah E, Park., Nadine A, Marshall. 2015. Enhancing adaptation outcomes for transformation: climate change in the Australian wine industry. *Journal of wine research* 26(2): 99-114. https://doi.org/10.1080/09571264.2015.1031883

Floeser, Kimberly. 2011. Farmer's motivation to practice sustainable agriculture. Union College. https://digitalworks.union.edu/cgi/viewcontent.cgi?article=2036&context=theses

Food and Agriculture Organization of the United Nations (FAO). 2022. *Agricultural production statistics 2000-2021*. https://www.fao.org/3/cc3751en/cc3751en.pdf. Accessed: 2024-01-31.

Francis, Charles A., Richard R, Harwood., James F, Parr. 1986. The potential for regenerative agriculture in the developing world. *American journal of alternative agriculture* 1(2): 65-74. https://www.jstor.org/stable/44506928

Frankel-Goldwater, Lee., Niko, Wojtynia., Sebastián, Duenas-Ocampo. 2024. Healthy people, soils, and ecosystems: uncovering primary drivers in the adoption of regenerative agriculture by US farmers and ranchers. *Frontiers in Sustainable Food Systems* 7. https://doi.org/10.3389/fsufs.2023.1070518

Frantz, Cynthia M., F Stephen, Mayer. 2009. The emergency of climate change: why are we failing to take action? *Analyses if social issues and public policy* 9(1): 205-222. https://doi.org/10.1111/j.1530-2415.2009.01180.x

Giller, Ken E., Renske, Hijbeek., Jens A, Andersson., James, Sumberg. 2021. Regenerative Agriculture: an agronomic perspective. *Outlook on Agriculture* 50(1):13-25. https://doi.org/10.1177/0030727021998063

Gomerio Tiziano., David, Pimental., Maurizio G, Paoletti. 2011. Is there a need for a more sustainable agriculture? *Critical reviews in plant science* 30(1-2): 6-23. https://doi.org/10.1080/07352689.2011.553515

Gosnell, Hannah. 2022. Regenerating soil, regenerating soul: an integral approach to understanding agricultural transformation. *Sustain Sci* 17: 603-620. https://doi.org/10.1007/s11625-021-00993-0

Gosnell. Hannah., Nicholas, Gill., Michelle, Voyer. 2019. Transformational adaptation on the farm: Processes of change and persistence in transitions to 'climate-smart' regenerative agriculture. *Global Environmental Change* 59:101965. https://doi.org/10.1016/j.gloenvcha.2019.101965

Gordon, Ethan., Federico, Davila., Chris, Riedy. 2022. Transforming landscapes and mindscapes through regenerative agriculture. *Agric Hum Values* 39: 809-826. https://doi.org/10.1007/s10460-021-10276-0

Head, L., C, Farbotko., C, Gibson., N, Gill., G, Waitt. 2013. Zones of friction, zones of traction: the connected household in climate change and sustainability policy. *Australasian Journal of environmental management* 20(4): 351-362. https://doi.org/10.1080/14486563.2013.835286

Johansson, Emma Li., Sara, Brogaard., Lova, Brodin. 2022. Envisioning sustainable carbon sequestration in Swedish farmland. *Environmental science & policy* 135:16-25. https://doi.org/10.1016/j.envsci.2022.04.005

Jordbruksverket. 2020. *Jordbruksmarkens värde*. https://jordbruksverket.se/jordbruket-miljon-och-klimatet/jordbruksmarkens-varden. Accessed: 2024-02-15

Jordbruksverket. 2022. *Sveriges handel med jordbruksvaror och livsmedel 2022*. https://jordbruksverket.se/download/18.edeab901874a01d51fcfb9/1680615371069/Utrikeshandel-arssammanstallning-2022-tga.pdf. Accessed: 2024-05-10

Kates Robert W., William R., Travis., Thomas J, Wilbanks. 2012. Transformational adaptation when incremental adaptations to climate change are insufficient. *PNAS* 109(19):7156-7161. https://doi.org/10.1073/pnas.1115521109

LaCanne, Claire E., Jonathan G, Lundgren. 2018. Regenerative agriculture: merging farming and natural resource conservation profitability. *PeerJ* 6. https://doi.org/10.7717/peerj.4428

Lantbrukarnas Riksförbund. 2022. *Försörjningsgrad*. https://www.lrf.se/las-mer/forsorjningsgrad/. Accessed: 2024-02-08

Lantmännen. n.d. *Lantmännen är störst i Sverige på spannmålsexport.* https://www.lantmannenlantbrukmaskin.se/spannmal/spannmalsexport/. Accessed: 2024-04-05

Länsstyrelsen Skåne. 2023. *Yttrande om EU-kommissionens förslag till direktiv om övervakning av jordhälsa och resiliens.* https://www.regeringen.se/contentassets/928c04be90a14d8eaf6a7d1c6ad70a5b/lst-skane.pdf. Accessed: 2024-02-10

Montgomery, David R., Anne, Biklé., Ray, Archuleta., Paul, Brown., Jazmin, Jordan. 2022. Soil health and nutrient density: preliminary comparison of regenerative and conventional farming. *PeerJ* 10. https://doi.org/10.7717/peerj.12848

Newton, Peter., Nicole, Civita., Lee, Frankel-Goldwater., Katharine, Bartel., Colleen, Johns. 2020. What is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes. *Frontiers in sustainable food systems* 4. https://doi.org/10.3389/fsufs.2020.577723

O'brien, Karen. Linda, Sygna. 2013. Responding to Climate Change: The Three Spheres of Transformation. *Proceedings of Transformation in a Changing Climate, University of Oslo*. 16-23.

O'Donoghue, Tom., Budiman, Minasny., Alex, McBratney. 2022. Regenerative agriculture and its potential to improve farmscape function. *Sustainability* 14(10). https://doi.org/10.3390/su14105815

Oliver, Daniel G., Julianne M, Serovich., Tina L, Mason. 2005. Constraints and Opportunities with Interview Transcription: Towards Reflection in Qualitative Research. *Social Forces* 84(2): 1273-1289.

Savory Institute. n.d. A framework for managing complexity – holistic management. https://savory.global/holistic-management/. Accessed: 2024-04-14.

Schlesinger, William H. 2022. Biogeochemical constraints on climate change mitigation through regenerative farming. *Biogeochemistry: An International Journal* 161(1): 9-17. https://doi.org/10.1007/s10533-022-00942-8

Schreefel, L., R.P.O, Schulte., I.J.M, de Boer., A, Pas Schrijver. H.H.E, van Zanten. 2020. Regenerative agriculture – the soil is the base. *Global Food Security* 26(100404)
https://doi.org/10.1016/j.gfs.2020.100404

Sellberg, My., Jenny, Norrby., Aleksander, Nowak., Linnéa, Rönnquist., Per, Olsson., Garry, Peterson., Alexander, Alvsilver. 2022. Rapid Transition Lab: Att ställa om mot hälsosamma, hållbara och rättvisa livsmedelssystem i kristider. Stockholm University. https://doi.org/10.17045/sthlmuni.21287853.v1

Raven, Matt. 2020. Regenerative Agriculture and Implications for Agriculture, Food, and Natural Resources Education. *Journal of Agricultural Education* 61(1): 1-12. https://doi.org/10.5032/jae.2020.01001

Rickards, Lauren., S.M, Howden. 2012. Transformational adaptation: agriculture and climate change. *Crop and pasture science* 63:240-250. http://dx.doi.org/10.1071/CP11172

Rydberg, Ingrid., Ann, Albihn., Helena, Aronsson., Gunilla, Berg., Christian, Hidén., Tomas, Johansson., Magnus, Stark., Hulda, Wirsén., Lotta, Rydhmer. 2019. Jordbrukets klimatanpassning. *SLU future food*. https://www.slu.se/globalassets/ew/org/centrb/fu-food/publikationer/future-food-reports/ff-report-9-jordbrukets-klimatanpassning.pdf

Regeringen. 2024. *En livsmedelsstrategi för jobb och hållbar tillväxt i hela landet*. https://www.regeringen.se/regeringens-politik/en-livsmedelsstrategi-for-jobb-och-hallbar-tillvaxt-i-hela-landet/. Accessed: 2023-03-10

Velten, Sarah., Julia, Leventon., Nicolas, Jager., Jens, Newig. 2015. What is sustainable agriculture? A systemic review. *Sustainability* 7(6): 7833-7865. https://doi.org/10.3390/su7067833

Wiles, Rose. 2013. *What are qualitative research ethics?* Bloomsbury. https://library.oapen.org/viewer/web/viewer.html?file=/bitstream/handle/20.500.12657/58724/9781849666534.pdf?sequence=1&isAllowed=y

Wivstad, Maria., Eva, Salomon., Johanna, Spångberg., Håkan, Jönsson. 2009. Ekologisk produktion: möjligheter att minska övergödning. *Centrum för uthålligt lantbruk - Sveriges lantbruksuniversitet.* https://publications.slu.se/rb/?file=publ/show&id=28503

Whyte, Courtney. 2020. Why Regenerative Agriculture? *The American Journal of Economics and Sociology* 79(3): 799-812 https://doi.org/10.1111/ajes.12334

Wästfelt, Aanders., Camilla, Eriksson. 2017. Det svenska lantbrukets omvandling 1990–2014 – Exemplet Uppsala län. *SLU, Framtidens lantbruk – djur, växter och markanvändning*. https://www.slu.se/globalassets/ew/org/centrb/fr-lantbr/publikationer/lantbrukets-omvandling_2017_webb.pdf

Ödman, Anja., Henrik, Smith., Marianne, Hall., Åsa, Kasimir., Georg, Andersson., Tina, D'Hertefeldt., Karin, Ercisson. 2015. Jordbruk. *Klimatsäkrat Skåne* 2:91-108. https://lup.lub.lu.se/record/4991633

Appendix 1

Interview guide

Start with:

- Explaining the study and how the interview will happen
- Ask for consent for recording
- Ask if they want to be anonymous
- Inform that it is okay to end the interview whenever as well as its okay not wanting to answer everything

Background questions

- Who are you?
- How long have you been a farmer and how did it start?
- Any other work commitments?

Regenerative agriculture

1. What is regenerative agriculture according to you? How is it used/integrated on your farm?
2. How did you find RA?
3. Why have you chosen to practice RA on your farm?
    a. If you have switched from other practices – why?
4. What is driving your interest in practising RA?
    a. (economy, sustainability, socially, employment etc)
5. Opposed to other sustainable agriculture practices, why RA?
6. Are there any socioeconomic factors influencing the adaptation/success/decision to practice RA? (income, education, funding, support, etc)
7. How is the attitude from other people towards RA? (other farmers, family, costumers etc)
8. How is the knowledge about RA spread?