The Role of an Intermediary Actor in the Niche Development of Agroforestry in Sweden

A case study of Agroforestry Sverige

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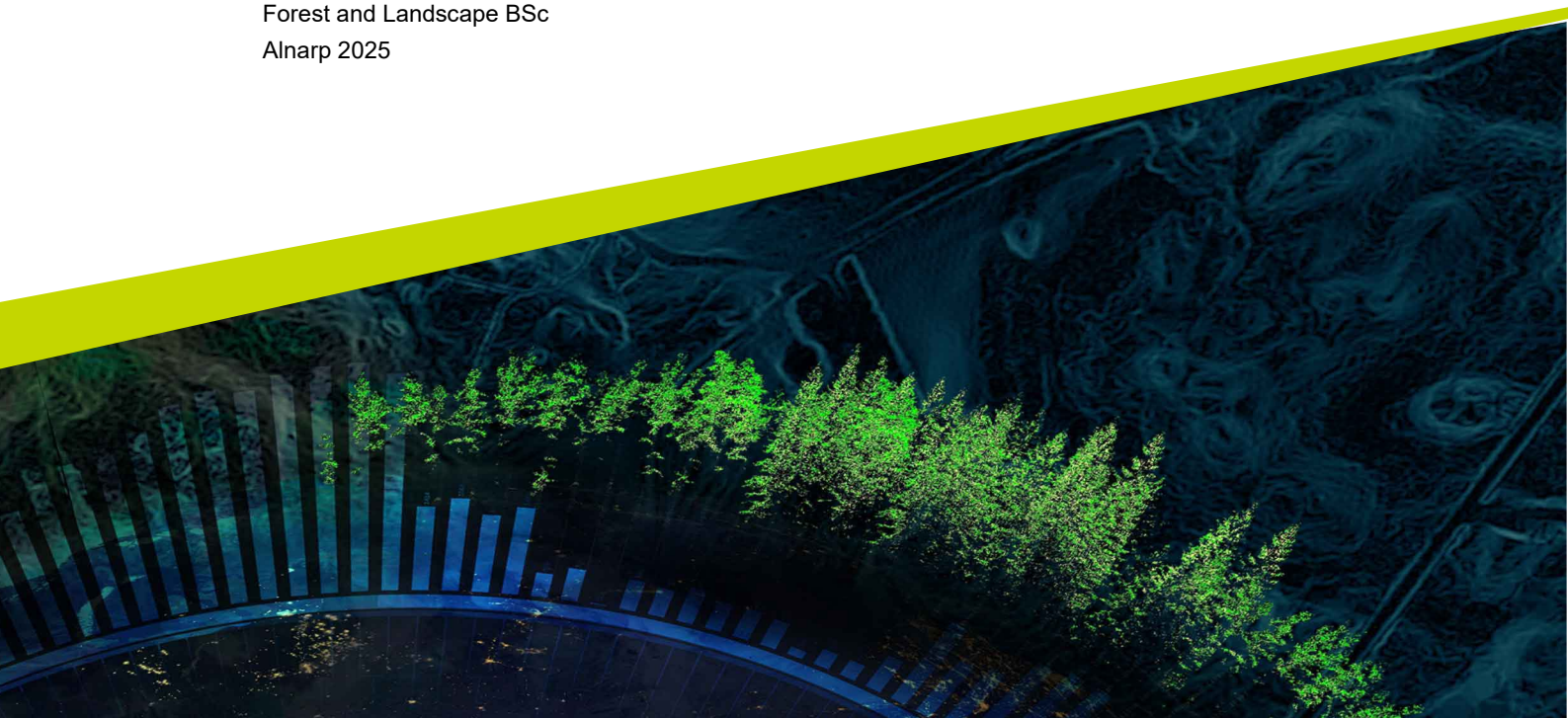

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Abstract

Agroforestry has great potential as a new mode of food production. There is, however, less development of agroforestry in Sweden compared to the rest of the European Union. The purpose of this study is to examine this phenomenon from the perspectives of intermediary actors, or those who are attempting to bring the practice of agroforestry into a more developed state. The organization Agroforestry Sverige works with practitioners, researchers, and policymakers to promote and develop agroforestry in the Swedish context. Semi-structured interviews were conducted with board members of Agroforestry Sverige to develop a picture of the networks and practices of the organization using the framework of niche-development theory. The interviews brought to light the barriers to agroforestry and positive developments which shape the future of food production and rural landscapes in Sweden.

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Abbreviations

Abbreviation	Description
CAP	Common Agricultural Policy
CIO	Collaborative Intermediary Organization
ELP	Established Local Practice
EU	European Union
EURAF	European Agroforestry Federation
NDT	Niche-Development Theory

1. Introduction

There is a growing awareness amongst policymakers for the need to transition to sustainable food systems (FAO n.d.; European Commission 2024). One of these systems is agroforestry, which is defined by the European Agroforestry Federation (EURAF) (2011) as "the integration of woody vegetation, crops and/or livestock on the same area of land". Many studies have highlighted the benefits of agroforestry such as improvements in soil quality, biodiversity, and cultural and aesthetic qualities (Santiago-Freijanes et al. 2018; Smith et al. 2022; Hart et al. 2023).

The two main branches of agroforestry are silvoarable (trees and crops) and silvopastoral (trees and livestock) systems (figure 1) (Augère-Granier, 2020), although these are not strict distinctions as an agroforestry system may use multiple practices and as such "can be considered more as an approach than as a single finished technology" (Mtaita, 2003). Silvoarable approaches include alley cropping, and orchard intercropping, and silvopastoral approaches being forest grazing and semi-natural pastures (EURAF, n.d.). Agroforestry has been a historically relevant principle throughout history prior to the development of conventional agriculture. In Europe, the oldest practices of wooded pastures may be about 4500 years old, with more modern concepts such as orchard intercropping developing throughout the Middle Ages (Nerlich et al., 2012).

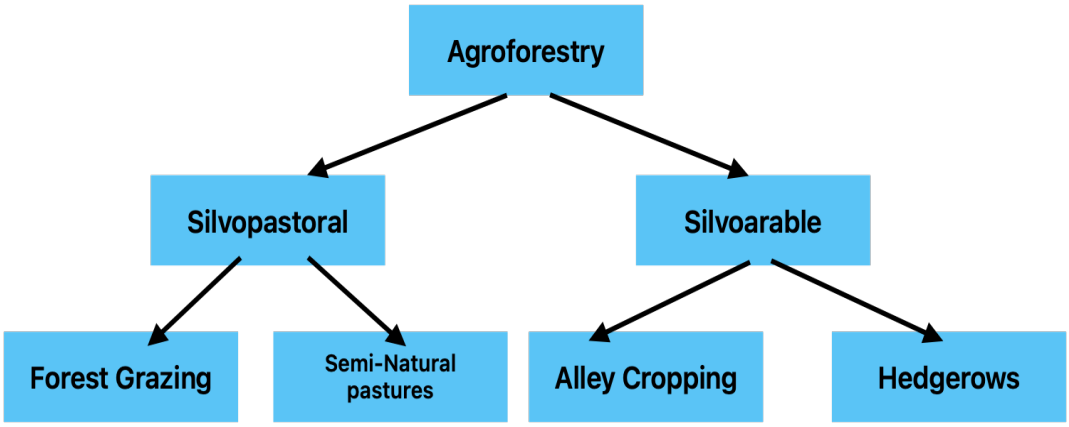

Figure 1: Examples of different types of agroforestry systems. This is not inclusive of all agroforestry systems, but categorizes the practices most relevant to the Swedish context. Adapted from Augère-Granier (2020) and Yang (2020)

There are several interlinking factors from the post-war era that are possible contributors to the decline of agroforestry practices in Sweden. Broadly speaking, the trend began at the beginning of the 1900s, as low economic yield became a cause of concern for "forestry representatives" (Kumm & Hessle, 2023). This was accelerated by mechanization of both forestry and agriculture, as well as the implementation of chemicals into production (Nerlich et al., 2012). Machines allowed higher productivity with fewer workers, and economy of scale became increasingly relevant

(Kumm & Hessle, 2023). While the amount of food that could be produced increased, the negative effects of monocultures, use of chemicals, and mechanization now pose a threat to global food security (Mondelaers et al., 2009). Additionally, agriculture and forestry have undergone a process of separation since the 1940s to a high degree in Sweden specifically (Kumm & Hessle, 2023).

Due to the multitude of positive impacts of agroforestry, government institutions in the European Union (EU) are beginning to prioritize it. Much of this comes from the Common Agricultural Policy (CAP), which is an EU framework that is then adapted to national conditions by the member states. CAP functions in a 5-year cycle, with the national adoptions generally requiring more time to implement (Mosquera-Losada et al., 2018). The EU plan was passed in December of 2020, with the Swedish national plan being accepted by the EU commission in October of 2022, as seen in figure 2 (European Commission, 2023). While Agroforestry is supported in the EU CAP, agroforestry specific measures have not been adopted in the Swedish national plan. Because of how CAP functions, the EU policy only provides "Member States with options and opportunities to support agroforestry systems", which again, Sweden did not take advantage of (Agroforestry Opportunities, 2023).

Figure 2: A timeline of the CAP adoption process for the current period in Sweden. Agroforestry measures were not adopted in the plan or either of the amendments. Taken from: European Commission

Despite the positive developments on the EU level, the modern agroforestry paradigm has been relatively slow to adoption in Sweden (Mosquera-Losada et al., 2018). The most prominent form of agroforestry in Sweden is summer farms and semi-natural pastures, specifically reindeer

herding in the northern regions (Augère-Granier, 2020; Kumm & Hessle, 2023), which are practices that have been retained due to historic importance and are still part of the cultural landscape. These permanent, semi-natural pastures are defined as Established Local Practices (ELPs) by the EU, allowing them special privileges in regard to funding (Mosquera-Losada et al., 2018).

Under CAP, funding falls under two pillars. Pillar I involves direct annual payments to farmers either in supportive investments, or to "stabilize farm revenues in the face of volatile market prices and weather conditions" (Sgueo & Tropea, 2016). Pillar I also funds the development of trade external to the EU and cohesion within the EU market. There is some support for agroforestry systems within Sweden, for example summer farms and semi-natural pastures, but they fall under other ecology-centered policies (European Agroforestry Federation n.d.; Yang 2020). Regarding the support available for agroforestry in Sweden, EURAF (n.d) states that "Projects or investments related to agroforestry are not specifically mentioned, but could potentially get support this way, if used creatively". The need for this "creativity" raises potential issues of increased pressure on farmers and foresters to be the drivers of what has to be a systemic shift in food production and land use. This also highlights exactly where the work of intermediary actors falls into place. Not only could these individuals have experience navigating bureaucracy, but also have been involved in various projects, and therefore have awareness of creative methods that others have used.

Intermediary actors play a very important role in sustainable transitions. While the exact definition of intermediary actors is contested, according to an analysis of intermediary actors in sustainable construction in Finland, "the commonly agreed upon characteristics is the ability of intermediaries to work across the often-impermeable boundaries between different actor groups, arenas of action, or geographical scales" (Vihemäki et al., 2020). While much of the pioneering studies in intermediary work has focused on who, there has been an increase in examining intermediation as a process rather than the intermediary actors themselves (Hernberg & Hyysalo, Vihemäki et al 2020).

The overarching purpose of this study is to investigate the phenomenon of why agroforestry in Sweden is behind the rest of the EU. Since this is a broad question, a case study approach was used to examine this phenomenon from the perspective of an intermediary organization, Agroforestry Sverige. Therefore, the first goal of this study is to materially qualify Agroforestry Sverige as an intermediary actor. The second is to analyze the state of Swedish agroforestry based on the experiences of these intermediary actors.

1.1 Conceptual Framework

The frameworks necessary for the type of analysis of this study have been applied in part to various aspects of sustainable developments such as energy (Vink, 2017), and construction (Geels & Deuten, 2006; Vihemäki et al., 2020) for contexts of industrialized countries in Europe, or in

agricultural contexts for developing nations in tropical regions. Therefore, it required the synthesis of several frameworks, which this section is set out to explain.

1.1.2 Transition Studies and Socio-Technical Systems

The field of Transition Studies is diverse and multi-disciplinary, and it looks to broadly study the complexities of transitions to more sustainable systems. It necessitates and allows for the examination of the relations between different sectors, and intermediary actors as those who enable and strengthen these relationships. While there are certainly disagreements within the field, there is "agreement that social change is non-linear and involves complex systems and multiple actors" (Keller et al, 2022).

Within Transition Studies, the most relevant framework for analyzing agroforestry in Sweden is as a socio-technical system, which examines the interconnectedness of the human and technological subsystems (Abbas & Michael, 2023). Throughout the second half of the twentieth century, socio-technical theory developed a new paradigm in how human labor is not subservient to mechanization, emphasized collaboration, self-regulating organizational structures, and mutual benefits (Abbas & Michael, 2023). According to Abbas & Michael, "the theory stipulates that the success of the socio-technical system is a product of the interactions between these subsystems". Socio-technical solutions take an approach that "highlights co-evolution and multi-dimensional interactions between industry, technology, markets, policy, culture and civil society" (Geels, 2012). To determine the progress of socio-technical changes, especially at a niche level, one can utilize the framework of intermediary actors as those who facilitate these interactions and therefore play a strong role in the successes and failures of the socio-technical system.

1.1.3 Intermediary Actors

Intermediary actors are individuals or organizations that facilitate dialogue between different actor groups (or socio-technical subsystems) such as science, technology, market and consumers, and policy. Kivimaa et al (2018) propose two descriptions of intermediation, one in which intermediaries shape and change knowledge being transferred, and one in which they do not and thus focus on building networks for the transfer of knowledge. Through this second definition, one can qualify an organization as a Collaborative Intermediary Organization (CIO), where the role of the intermediary actors focuses on establishing platforms and systems for direct communication between actor groups. (Hamann & April 2013, Kanda et al., 2020).

One additional framework that has been developed in connection with the concept of intermediary actors is the multi-level perspective (MLP) (Kanda et al., 2020). MLP considers the various systems where processes take place, and intermediary actors as those who catalyze collaboration (Kanda at el., 2020). This paper will utilize the specifics of MLP proposed by Kanda et al. (2020) which outlines three system levels, and one non-systemic level (figure 3). At the first system level (in-between, in network), intermediation aims to organize and develop possibilities

and options for future development, create and strengthen networks of actors, and support processes that contribute to shared development of knowledge and heuristics (van Lente et al., 2003). At this level, it will tend to be specific for one type of technological development which for this study is Swedish agroforestry. At system level 2 (in between networks), the intermediation can transcend geographical boundaries within the specific technology, in this case being international agroforestry organizations, or technological boundaries relevant to the socio-technical systems such as forestry and agricultural organizations and networks, or organizations which deal with sustainable food production or climate change mitigation. At systems level 3 (in-between networks and institutions), the intermediation occurs between level two and institutions, which "can be conceptualized as informal (norms, values, mental categories, etc.) and formal (laws, regulation, technical standards, etc.)" (Kanda et al., 2020).

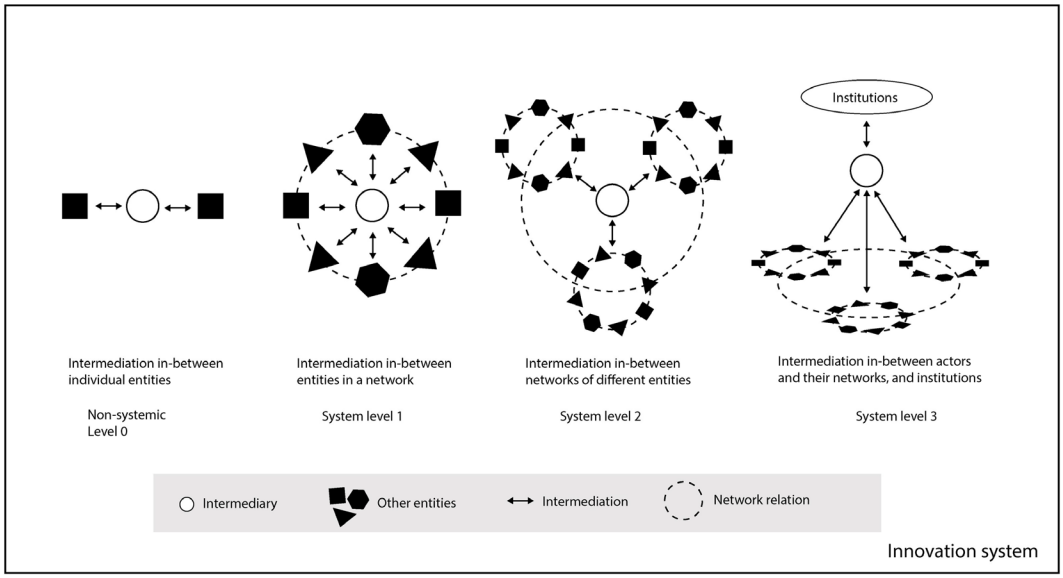

Figure 3: Intermediaiton processes of the multi-level perspective. Taken from Kanda et al., 2020

1.1.4 Niche-Development Theory

While the direct connection is somewhat contested, this paper adheres to the argument that within Transition Studies exists the idea of Niche-Development Theory (NDT) (Kivimaa et al. 2018). The development of niches (in the context of sustainable transitions) contrasts with the existence of a prevailing incumbent regime. Generally, niches exist in more local settings in the form of pilot projects or research and development, and incumbent regimes in a more static global context (Geels 2011). As niches develop, networks of global actors form, which tend to stabilize expectations, requirements, heuristics, and normative goals (Geels 2011). To analyze the factors influencing niche development and regime disruption for agroforestry, the framework developed proposes that exogenous shocks (catastrophic weather events, economic crises, war, etc.) and

endogenous processes (organizational changes, cognitive and normative shifts) are relevant to agroforestry (Knaggård et al., 2025). What both defines the incumbent regime and keeps the regime in place is the concept of lock-in mechanisms, which includes policy and subsidies, supply and production chains, and social attitudes and norms (Geels et al., 2011). These lock-in mechanisms have been identified as an issue in Sweden's climate adaptation, outside of the agriculture and forestry fields (Knaggaård et al., 2025)

A clear example of a niche that successfully overturned a regime is the case of energy. Coal, throughout the industrial revolution, replaced wind, water, and manual (horses/oxen/human) labor as the dominant source of energy until it too was replaced by oil and gas (Vink, 2017; Geels & Raven, 2006; Malm, 2016). More recently, "green energy", in its various forms, is replacing oil and gas, and has, in certain places, successfully destabilized the fossil fuel regime of energy production (Vink, 2017). Each of these existed at some point as a niche, before the incumbent regime was destabilized. One aspect of NDT is the non-linearity of developments, and in certain cases has a more cyclical trajectory (Geels & Raven 2006). The base of this cycle is local projects, and the outcomes of this feed into the processes of adjusting expectations, aggregated learning, and an increase in interest, which can then return to local projects in the form of resources or policy change (Geels & Raven 2006).

A critical aspect of niche development is the non-linearity of socio-technical changes, which includes a back-and-forth of cognitive rules and expectations (global level), and real applications (local practices), which relate to each other through multiple and dynamic systems, as seen in figure 4 (Geels & Raven 2006).

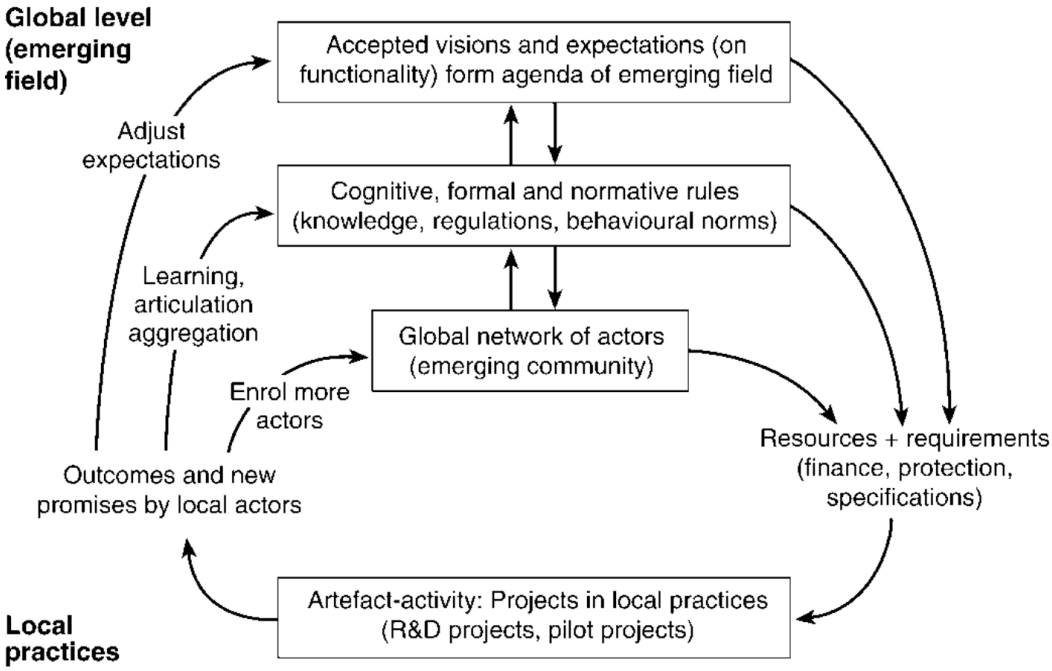

Figure 4: Dynamics of niche development. Taken from: Geels & Raven (2006)

2. Methods

2.1 Case study method

The objective of this thesis is to examine the state of the transition from conventional agriculture and forestry to agroforestry and explore the relationships that enable it to happen in the Swedish context. A case study method was selected as viable due to factors including an innate, but not necessarily clear, relation between context and phenomena, and due to "how" and "why" questions being used (Baxter & Jack, 2008).

Some organizations work explicitly with international programs or focus on specific types of agroforestry systems. Agroforestry Sverige was determined to have a broad perspective but focuses on agroforestry in Sweden. While a broad study would enable an analysis of the general state of agroforestry in Sweden, a case study was chosen because it can dive deeper into "why" from the perspective of those fulfilling multiple roles in the agroforestry transition.

2.2 Background to Agroforestry Sverige

In their own words:

> *"Agroforestry Sverige is a non-profit association working to develop the possibilities for and spread knowledge about agroforestry in Sweden, from the small forest garden to plantations on arable land, in pastures or in the forest. The association also aims to be a platform for networking, locally, nationally and internationally. It was founded in 2016 and aims to create a network for agroforesters to share ideas and act as a supporting structure." (Medlem/Styrelse/Förening, 2021)*

The focus of their work is at the intersection of research and practice. They have collaborations with universities in Sweden such as Sverige's Lantbruksuniversitet (SLU) and Stockholm's Universitet (SU). This is a relatively young organization, having started only in 2016, but has already produced an educational brochure titled "Agroforestry for Swedish Conditions 2024", and participated in international collaborations in Latvia and Ukraine. On their website, they have frequent blog posts about the progress of these projects and further disseminate this through a Facebook page and a YouTube channel.

2.3 Data collection and analysis

2.3.1 Interviews

To collect data, semi-structured interviews were conducted with multiple actors within the organization Agroforestry Sverige, and qualitative data was collected. By utilizing semi-structured interviews, the intermediary work guides the questions, while allowing room to examine the specifics of, and differences in, the intermediary process. This led the focus of this study to be on Agroforestry Sverige's work as a network builder and conduit of information between practicing, academic, and policy groups.

The questions were first developed from issues in the agroforestry transition observed through personal experience (appendix A). As Agroforestry Sverige's processes and goals became apparent through the interviews, the questions were adjusted to reflect that, both within and between interviews. The basic questions were first to understand how the organization sees itself within the sustainable transition, and what inter-organizational processes happen prior to and during specific projects. Interviewees were then asked about their work, utilizing the framework of intermediation, and what projects they specifically worked on. Questions about needs for specialized machinery, policy work, research, and development of value chains was to investigate the interviewees perspectives on the aspects of the socio-technical regime and what might be responsible for the most stable lock-in mechanisms. These were questions developed from the frameworks put forth in Geels et al. (2011). Due to the semi-structured form of interviews, the interviewed actors brought up issues with Swedish agroforestry that had not been previously considered, and questions were developed to understand their methods of systemically addressing these issues. Questions were also asked about the internal organization of Agroforestry Sverige which proved to be useful in separating intermediary work done by actors which was outside of the organization, and the intermediary work done by the organization itself.

Only two interviews (lasting approximately an hour each) were conducted, which was under the goal for this study, but this limitation is addressed at a later point in more detail. They are referred to as "Interviewee A" and "Interviewee B" in this paper to retain anonymity. Agroforestry Sverige can be considered an intermediary actor, as the organization does intermediary work, but that does not necessarily mean that individual actors within the organization have the role of intermediary actor in all contexts. Actor-network theory stipulates that various actors play a specific role in heterogenous networks (Geels, 2010). Therefore, it cannot be assumed that all interviewed actors participate in the intermediary work that this study focuses on. Actor-network theory mainly assisted in limiting the scope of individual actors chosen to be interviewees and was only used in the analysis part of the study insofar as it is a critical part of the basis of intermediary frameworks, specifically the multi-level perspective. The selection of interviewees was also done with help from snowballing, where interviewees recommended other potential interviewees. Although this did not have a strong effect on selection, it can be assumed that it would if the scope

had included intermediary actors outside of the organization and therefore a higher number of interviews.

2.3.2 Coding

The data from these interviews was then coded into the different categorizations of support offered to agroforesters, such as knowledge transfer and exchange, project management, and network building. The open coding phase of this re-aligned expectations and found broader themes. Another aspect of coding is finding the interrelatedness of different actors, projects, and systems. To develop the coding system, three broad categories were formed based on the frameworks used in this study. The first is "intermediary work," which was then divided into the following subcategories:

Table 1: coding subcategories of "intermediary work"

Code title	Reason for code	Where code was derived from
Network building	Identifying how Agroforestry Sverige functions as a platform for networking for actors within the organization, and how Agroforestry Sverige networks with other intermediary organizations	Multi-level perspective - Kanda et al (2020)
Value chain development	Identifying if/how Agroforesty Sverige works to get agroforestry on the market, or alter consumer preferences, industry, or technology as lock-in mechanisms	Socio-technical systems - Geels (2011)
Knowledge transfer	Identify how Agroforestry Sverige gathers and disseminates knowledge of agroforestry between practitioners, scientists, and the general public	Intermediary actors - van Lente et al. (2003)
Consultancy	Identify if Agroforestry Sverige provides direct support for practitioners in the development of agroforestry systems	Intermediary actors - van Lente et al. (2003) Multi-level perspective - Kanda et al (2020)
Funding Support	Idendify if/how Agroforestry Sverige directly supports practitioners in navigating state bureaucracies for funding, or in acquiriring external or private support	Multi-level perspective - Kanda et al (2020)
Policy/institutional work	To identify how Agroforestry Sverige works with political actors to meet the needs and demands of practitioners	Multi-level perspective - Kanda et al (2020) Socio-technical systems - Geels (2011)

Some of these were added during the process of coding as they are dependent on the intermediary work that is done by the organization which could only be realized during data collection and analysis. The second framework used for the coding was “system levels” which was developed from the framework of Kanda et al. (2020). This framework has a more rigid structure, and therefore, the subcategories used were the three systemic levels of intermediation. The final section of the code was developed to organize the background information of the organization and the intermediary actors’ perceptions of the state of agroforestry in Sweden. This was to gain insight into the structure of the organization and the perspectives of the lock-in mechanisms that are most critical to the current regime. The “background information” section was organized as follows:

- Organizational background
- Internal processes
- Swedish Agroforestry
- Economics
- Positive developments
- Problems identified by intermediary actors

Interviews were recorded through Ableton Live 11 Suite, where the audio was analyzed using this coding method. All coding categories were created as audio track groups, and subcategories were created as audio tracks. When an audio segment was identified as applying to one or more subcategory, it was manually cut from the interview and pasted into the relevant tracks. It is important to note that audio segments are not restricted to a single category, and in some cases, by necessity, are in multiple. For example, quotes about the lack of state funding for agroforestry projects in Sweden would be characterized under “problem identified by intermediary actors”, “economics”, and “system level 3”.

3. Results

3.1 Barriers to Agroforestry in Sweden

The first important aspect of the interviews was discovering what the intermediary actors interpret as barriers to establishing agroforestry in Sweden, or lock-in mechanisms entrenching the current regime. The most prominent hurdles identified throughout the interviews are:

- A low number of pilot projects or systems for research to be conducted on in Sweden
- A high barrier of entry in terms of knowledge requirements

- Strong lock-in mechanisms of conventional agriculture in Sweden, specifically at system level 3

3.1.1 Lack of agroforestry systems for research

Agroforestry Sverige does not currently have any demonstration projects, although there was an application to establish one. While the organization did not win this application, they have connections through networks to the organization that did, so there is still a channel for it to be beneficial to the members of the organization.

A difficulty in establishing experimental systems in Sweden is the lack of financial support. This is compounded by the cyclical nature of research being required to give the state enough reason to invest in it, but research is made more difficult by the lack of investment. This means that it is dependent on pioneers to develop novel systems, and the key function of the organization is to assist these pioneers their development. By being part of a larger network, Agroforestry Sverige has the capability to connect researchers to existing systems, although there are not enough systems in Sweden to study local variations or a large variety of possibilities for different kinds of systems.

One way to address the first hurdle is through international collaborations, the largest one being with the Ukrainian universities Ivan Franco University of Lviv and National University for Life and Environmental Sciences of Ukraine. The first part of this project was gathering multiple types of actors (practitioners, researchers, intermediaries, etc.) to put together a policy brief, which was done with the participants mentioned, along with the World Wide Fund for Nature (WWF), and with funding from the Swedish Institute (SI). This resulted in a policy brief, which was presented in the spring of 2024. The goal of this project focuses on the Ukrainian context, which in this case is “on the important role that small and medium-sized farms have played during the Russian invasion of Ukraine. It is about providing the country with food and creating meaningful social contexts for people to gather around” (Lindström Kling, 2024). As such, it is difficult to gauge the applicability of this research to the Swedish context, but Agroforestry Sverige hopes that Sweden can benefit from the research done in Ukraine. The potential benefits from this project for Agroforestry Sverige include experience in developing policy and connecting researchers to policymakers, as well as establishing new contacts and networks.

3.1.2 High barrier of entry for knowledge requirements

Due to agroforestry being a novel system without institutional support, a difficulty for practitioners is the high level of knowledge needed to manage trees on a farm.

One attribute of practitioners that has been observed is that “usually the pioneers are quite well-read, and they have a tendency to be bilingual” (Interviewee A). Therefore, a lack of research on Swedish contexts is a limit for potential practitioners, and the knowledge they can access. Directly connecting practitioners is a benefit of the structure of the organization, because farmers

who only speak Swedish have opportunities to be introduced through practice rather than research, which is especially important since "with trees its very local knowledge… and there's so many variables that the farmers and practitioners have to go through to see what is relevant to them" (Interviewee A). This is connected to the lack of systems in Sweden, but the limitation here is not on research, but a limit of exposure to the practice which is necessary because of the lack of research.

Production of educational material constitutes a large part of the work done by Agroforestry Sverige. This comes from university collaborations as mentioned previously, but one project was initiated with the purpose of creating material. From this, a brochure called *Agroforestry for Swedish Conditions* was produced. It was released in 2024 with both Swedish and English translations in the same version (so there is only one version, not separate Swedish and English versions). This was mostly done solely by Agroforestry Sverige with funding from the EU, and with permission, the rewriting of a chapter from the critically acclaimed author of Swedish permaculture books, Philip Weiss. The goal of this brochure was to create a well-referenced resource for the general audience who may have an interest in agroforestry, but lack the basic knowledge required. Raw information is not the only important aspect of it, and the creative/artistic side of the design of systems is seen throughout the brochure. This may be attributed to Agroforestry Sverige's goal of attracting more farmers to adopt agroforestry and enabling them to imagine what kinds of systems could work on their land. The final part of this project was an agroforestry conference, which took place in the fall of 2022 in Alnarp, Sweden.

One difficulty, according to Interviewee A, is that there is a high saturation of brochures, which makes it "harder for us than expected to measure the impact of our work specifically". The brochure, however, was not the only educational material produced through this project, and resulted in educational videos, which they have made accessible on their YouTube channel. Accessibility of information is an important aspect of all of Agroforestry Sverige's educational work, and that "usually we want to make information and inspiration available to anyone who's interested" (Interviewee B)

3.1.3 Strong lock-in mechanisms of conventional agriculture

While the intermediary actors have knowledge about the barriers, a one-time (but may be done again if needed) survey was sent out to members where the overwhelming responses were difficulty in funding agroforestry and the slow-moving political landscape which is a causation of the funding issue. As such, Agroforestry Sverige has done some work in political advocacy, although it is still in early stages and the organization is still in a process of learning and building networks.

One possible piece of critical information on the background of the political landscape is the lack of interaction between the agricultural agency (Jordbruksverket) and the forestry agency (Skogsstyrelsen), according to Interviewee A who stated that they "are two different worlds and

most of the time they don't know what the other side is doing." This is likely a result of the decline of agroforestry where rational-intensive methods become dominant in the post-war era, separating the two fields, and subsidization of monocultures became increasingly relevant. Currently, if a farmer is relying on subsidies from the Swedish state, and wish to have trees on the farm, "in practice you end up getting less money for the land in terms of support" (Interviewee A). This in part came to be because the climate change mitigation strategies were not part of the scientific consensus to the point of altering the course of policy as it could be considered to do now. Research will hopefully have the ability to convince policymakers that a combination of forestry and agriculture is better than an either-or approach, and Agroforestry Sverige hopes to do more to create these networks with the hope "that [developments in research] will enable those farmers who want to do it are allowed to do it without being punished economically" (Interviewee A). This was further elaborated on by Interviewee B, who stated "what we want to accomplish by getting the regulations in place is that [practitioners] can start experimenting with their knowledge and to come up with the solutions and to put their expertise into motion and see where this will go in Sweden".

While furthering policy on agroforestry has not been a primary mission of Agroforestry Sverige, there has been some work done in this area. On the national level, the organization created a policy brief and submitted a motion during the early stages of the development of the Swedish CAP policy starting in late 2020 (figure 2). From the side of the Swedish government, they conduct public investigations (SOUs) in order to shape policy, and Agroforestry Sverige was able to contribute to this process, although there was no sense of creating a real difference in the policy. The first step in this was to gather other actors in their network, the most significant being the Federation of Swedish Farmers (LRF) and organic farming associations. Then, using these collaborations, Agroforestry Sverige submitted a motion to the state during the SOU process (Interviewee B). As recommendations to adopt agroforestry measures came in from the EU to the member states, the Swedish Board of Agriculture (Jordbruksverket in Swedish) reached out to Agroforestry Sverige, providing an opportunity to sit in meetings and discuss agroforestry policy directly with the policymakers. According to Interviewee B, there was not a "sense of making a difference… until the [the] Swedish Board of Agriculture reached out to us to get input on how they should design their policy and their way of implementing the support system for agroforestry in Sweden". The fact that this specific part of policy development was initiated by the state shows a positive development in the government's interest in developing agroforestry in Sweden. However, considering that Sweden has not implemented an agroforestry policy as part of the national CAP plan, it is clear that Agroforestry Sverige is limited in its capacity to materially affect it.

Another lock-in mechanism is the lack of market demand for agroforestry products. In a market economy, a critical part of any business is the ability to sell the product, and the industry surrounding conventional agriculture is highly developed. Building these supply and value chains for agroforestry is not a direct goal of the organization but is done in very specific contexts

through projects. It was expressed, however, that agroforestry products currently are better suited for smaller scale farming operations and selling through gårdsbutiker (farmhouse stores) than through supermarkets where products often go through industrial processing. This means that the niche of local and organic/sustainable food production may have a stronger influence than agroforestry does in the market. Agroforestry Sverige has had collaborations with intermediary organizations in this niche and is an example of system level two networks that can benefit the development of agroforestry. One organization that was specifically mentioned by Interviewee B was Eldrimner, which is an organization that offers education in food crafts, specifically for small-scale producers. Agroforestry Sverige hopes to collaborate more in the future to get existing and novel agroforestry products onto the market.

3.2 Creating Networks

A primary function of Agroforestry Sverige is creating networks of practitioners and academics. Externally, the organization is a member of EURAF and the Agroforestry Network and receives funding and support from the EU and Erasmus+ for various projects. Internally, members have access to participate in visits to other agroforestry systems and knowledge exchanges with other practitioners. One of these is *Unhide Agroforestry,* which is a collaborative project with "Latvian Permaculture Association & MEŽA PROJEKTI/Silava Forest Research Institute with support from Erasmus+" (Lindström Kling, 2024a). As such, the intermediary work was not centered around the material in these visits, but in organizing the visits themselves. Besides the visits and knowledge exchanges, it resulted in a 20-minute "film portrait of the Latvian forest owner and forester Agnis Graudulis" (Lindström Kling, 2024a), which further disperses both knowledge of and inspiration for developing agroforestry systems.

One organization that was highlighted was Agroforestry Network, which is based in Sweden, but focused on international agroforestry, particularly in the global south. This collaboration focuses on directing interested actors to the right places, so a Swedish researcher wanting to study agroforestry outside of Sweden would be directed to Agroforestry Network, and an international researcher wishing to study Swedish systems would be directed to Agroforestry Sverige. This collaboration was especially fruitful with the Ukrainian Farm Force project. It was initiated by a member of Agroforestry Network and was relevant to Agroforestry Sverige at that time as the Swedish government was preparing an aid package to Ukraine. Both organizations then worked to include support for agroforestry to rebuild Ukraine's agricultural capacity.

One consideration that farmers must consider is having the right machinery. There is not a strong need for machines specific to agroforestry, partially because systems are so diverse, but generally machines that are developed for sustainable agriculture are suitable for agroforestry. Agroforestry Sverige then does not work with the development of new machinery but can assist practitioners in acquiring the right machines for their specific needs. This is mostly reliant on the

local networks of the practitioners, but it is generally not an issue to get the right machines to the right places, meaning that these networks are effective.

3.3 Internal Processes

While the internal structure is not the focus of this study, it is relevant to understand how it shapes the intermediary work. Generally, the board members work independently on a multitude of projects, then, through board meetings, discuss results and trajectories. It is therefore an important part of the internal work to get people with relevant networks and who are in the right organizations onto the board. Due to the autonomous nature of the board members, much of the intermediary work may not happen directly through Agroforestry Sverige but is done by intermediary actors within Agroforestry Sverige. For example, some board members teach courses at folkhögskolor (community colleges) on specific agroforestry systems, or maintain their own systems, which can be useful for supporting practitioners. The board's work ensures that the independent work done is united under common goals and allows for collaboration.

4. Discussion

The intermediation of Agroforestry Sverige occurs with a variety of actors on multiple system levels. While the focus of their work is at system level 1 within Sweden, their international collaborations have provided the organization the organization with useful tools to develop agroforestry within Sweden.

4.1 Analysis of Swedish agroforestry as a niche

When using a Niche-Development lens on agroforestry, the result that the economic benefits are behind the benefits to the ecological and social landscapes is hardly surprising. Both conventional agriculture and forestry have had decades to develop lock-in mechanisms of highly specific

machines, supply chains, and people with knowledge of the theory and practice (X, figure 5),

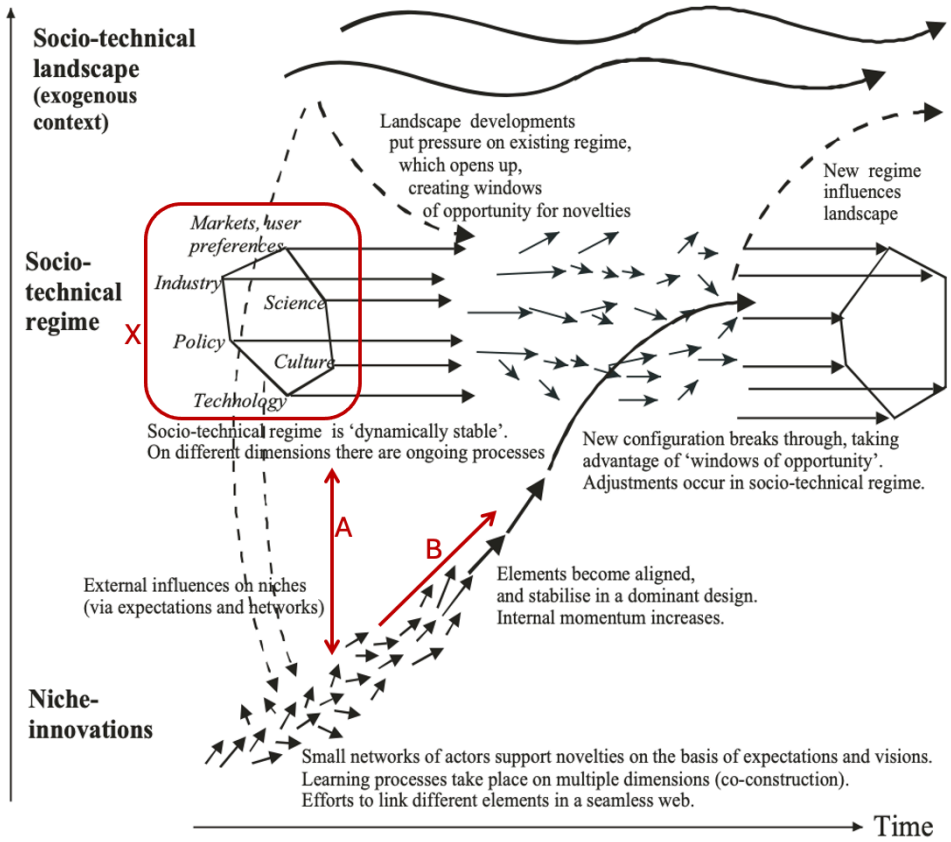

Figure 5: Visualization of the niche development of Agroforestry Sverige. Arrows A and B represent intermediary functions of the organization, and box X contains the various lock-in mechanisms Agroforestry Sverige interacts with. Adapted from Geels at al. 2011

which makes the niche-incumbent dichotomy very apparent. At the same time, conventional agriculture has *required* decades of development, and more importantly, subsidization. Agroforestry in Sweden is not at the point of being subsidized to a degree where substantial development can be made, in the sense that the lock-in mechanisms are still in place, supporting conventional agriculture without having been disrupted in the national CAP policy. The degree to which subsidization would be effective enough is unclear, but according to the concept of non-linearity within framework of NDT, this will be a gradual process and would likely provide a window of opportunity. In terms of state support for conventional agriculture, subsidies entrench a self-reinforcing path, which, in the lack of external disruption, requires gradual and incremental changes to induce a transition (Klitkou et al, 2015). Utilizing the criticisms that Klitkou et al (2015) provide, it is beneficial to characterize these lock-ins being more institutional, rather than technological, in Sweden. As expressed through interviews, there is not a strong need for new machines for agroforestry, and from data gathered from members of Agroforestry Sverige, the limitations to establishing agroforestry in Sweden are primarily institutional. Therefore, technology can be determined as a far less significant lock-in mechanism than others (X, figure 5).

The knowledge of these lock-in mechanisms is necessary as a part of intermediation to align elements of the niche actors, and NDT allows further analysis to both place the intermediary work within broader systemic change and make predictions about the future of the development. At the base, networks of independent actors pioneer novel developments in agroforestry where normative behaviors and expectations are co-created. This is influenced by external factors, which can be seen as positive outlooks in developments in policy. This policy is driven by even larger-scale external factors such as climate change and land degradation, which provide a reason for these developments. Returning to the niche-incumbent dichotomy, conventional, industrial agriculture is supported by the necessary factors to place it as the incumbent, which according to Geels (2011) is technology, science, policy, markets and user preferences, culture, and industry (X, figure 5). Currently, according to the analysis of the perspectives of the intermediaries, the science and cultural aspects are most responsible for destabilizing the incumbent regime, although due to non-linearity, it is difficult to assess if conventional agriculture is still a stable regime, but the properties of destabilization are beginning to emerge. Before a niche can synthesize a new configuration of a socio-technical paradigm, the niche elements must be aligned (Geels 2011).

4.1.2 The window of opportunity

The comparison of the Ukrainian and Swedish contexts for agroforestry highlights the differences in development in the presence of exogenous and endogenous factors. The current war in Ukraine has destroyed many agroforestry systems, and much of the research and practical applications of the project are on how agroforestry can contribute to the reconstruction of small-scale farms and build value chains that can be more integrated into the rest of the European market. While the project is limited in size, we see a direct effect on exogenous disruptions in opening a "window of opportunity" (Geels 2011).

Sweden, on the other hand, is not as affected by exogenous factors outside of severe weather events and is therefore more reliant on endogenous changes for farmers or a broader social consciousness for the need for sustainable practices, which as a result of being more abstract, are harder to connect to the opening of these windows of opportunities. The political desire for sustainable systems, however, does not appear in a vacuum, and can be seen as a result of studies which predict negative outcomes for the climate if current socio-technical regimes are continued, or in other words, the threat of exogenous disruptions. This is reflected in two ways in the Swedish context. The first is Leduc and Hansson's (2024) conclusion that a farmer's intrinsic value for sustainable systems is the key driving factor in adopting agroforestry measures. The second, which is more abstract, is reflected in the normative developments that agroforestry can help farmers mitigate losses from climate change. This somewhat complicates the analysis, because it may be that a severe weather event (exogenous) creates a window of opportunity, but there is also a chance for the *threat* of a severe weather event to create changes in socio-political lock-in mechanisms as risk management or mitigation strategies, in which this window of opportunity

takes on an endogenous nature, and can be analyzed as already being somewhat open based on a desire for more sustainable land-use systems. At the same time, gradual climate change, such as increases in temperature or changes in precipitation, has undoubtedly put pressure on the existing regime of conventional agriculture, so there is certainly an exogenous aspect independent of a single event, such as in Ukraine. The conclusion here is that both endogenous and exogenous factors are at play according to the frameworks. Neither has opened a window of opportunity wide enough to reconfigure the regime, but they have contributed to the destabilization of the regime and likely influenced the adoption of agroforestry systems for individual practitioners. Therefore, through function A (figure 5), Agroforestry Sverige should continue and increase the incorporation of successes and failures of practitioners in climate change resilience for the scientific and political aspects of the regime. While Agroforestry Sverige's role in this project is best placed in system level 2 of intermediation, as they have a collaborative part in shaping policy developments within Ukraine, it can provide a learning opportunity for system level 3 intermediation in Sweden. Through this project, goals of European agroforestry will hopefully stabilize and assist in further development, although interviewees expressed that this has not happened directly as of the writing of this study.

The political work of Agroforestry Sverige is difficult to analyze, but an important thing to consider is that these developments began in 2020 under a different government, which was changed after the 2022 national elections. This introduces the possibility that the priorities surrounding agroforestry changes, but the more important analysis is that to be sustainable, there needs to be support for agroforestry that can survive a change in governments. This also means that the party or coalition in power is a determining factor in a political window of opportunity, and if future elections result in a party or coalition that seems more favorable to agroforestry, Agroforestry Sverige should be able to take advantage of this window. This may explain the partial contradiction in the positive outlook on policy development with statements of there not being any institutional support.

4.3 The intermediary functions of Agroforestry Sverige

Due to the non-linearity of niche development, it is important to keep in mind the promises made by agroforestry. By focusing on creating networks of interaction for practitioners, it allows an organic development of expectations, which is critical for the success of a transition to agroforestry (B, figure 5). If Agroforestry Sverige was to promote what they think the trajectory should be, it could result in negative outcomes if these promises and expectations are not realized, and it is possible, according to Geels and Raven (2006), that "faith in the new technology diminishes and expectations decline, followed by shrinking social networks and drying up of resources". The networks create systems of aggregate learning and the formation of positive outcomes, where "technical models, problem agendas and search heuristics can be made more

specific, parameters can be refined, and user preferences may become more articulated" (Geels & Raven 2006). By forming stable networks at system level 1, the articulations enable Agroforestry Sverige to bring more concrete suggestions to policymakers (system level 3), such as the contributions to the Swedish CAP policy in 2020, and to future Ukrainian policy through the ongoing project there (system level 2).

Through this analysis, the intermediary work of Agroforestry Sverige is concretely in the niche development stage. Through developing networks, a multitude of elements necessary for a transition are organized, co-development of expectations is developed, and aggregate learning can occur (B, figure 5). Through the organizations' external networks, these developments are further solidified and, more importantly, stabilized. Due to the autonomous nature of the intermediary actors within the organization, the internal stabilization occurs through internal board meetings. Even though the political advocacy work is currently limited, Agroforestry Sverige has opportunities to influence policy, which can then contribute to the niche development, and not only the destabilization of the incumbent regime, but these opportunities have hitherto not materialized in an actual change in policy. While there has not been a change in policy as a result of the work of Agroforestry Sverige, there is a divergence from Geels's (2011) model (figure 5), which can be seen as positive, and is likely a factor in the intermediary actor's positive outlook. This divergence is represented by function A in Figure 3 being a two-way arrow, which means that there is some interaction on the regime from the niche, and not only external interactions on the niche. Despite this, there is no permanent interaction, and it relies on small windows of opportunity, such as submitting a motion (niche to regime) or being invited to meetings (regime to niche), and Agroforestry Sverige should have the ability to take advantage of these small windows when they appear.

The trend seen in the academic research of agriculture and agroforestry is that there is a lot of research delineating the issues with conventional agriculture, but as expressed through interviews, not enough on the benefits of agroforestry in the Swedish context. Increasing the number of agroforestry systems in Sweden can allow more research to be done on solutions, and not only the problems, although, to reiterate, this will require better support from the state. This is an example of a lock-in mechanism that limits the development of agroforestry, although positive developments show a path for this to change. Agroforestry Sverige has been involved in this not only through attempts to direct policymakers, but also to potential practitioners through farmer-to-farmer networks and the production of accessible material for education and inspiration. A literature review of specifically Swedish agroforestry would help in this analysis but was not done as part of this study. Lui et al. (2019) conducted a literature review of agroforestry globally but only had results for the top ten countries by number of studies published, which did not include Sweden. Globally, there has been an increase in scientific papers between 1990 and 2018 (Liu et al., 2019), which is promising if global networks make use of this, but nothing can be concluded about studies on the Swedish context.

Despite this, the studies of Swedish agroforestry have been useful in the development of educational material, both through frequent blog posts and the brochure. The primary goal of the production of the brochure “Agroforestry for Swedish Conditions 2024” was to be a resource for people interested in agroforestry, for research or practice and is therefore difficult to place at a specific area of niche development but provides a good overview of agroforestry generally. It also does an excellent job in managing expectations, mostly in the chapters “Agroforestry in Swedish Politics” and “The Economy of Agroforestry Systems.” In the chapter on political aspects, there is mention of a lack of or difficulty in getting financial support from the government, complications in land classification, and historical limits on the number of trees arable land can have to receive subsidies. On the economic side, the brochure is clear about the investments needed, such as irrigation and fencing to prevent browsing damage, as well as the fact that the economic benefits will not be realized for several years.

This is appropriately contrasted with silver linings on positive developments, such as an increase in interest in agroforestry from the Agricultural Board, and methods on how to be creative to mitigate economic losses from a decrease in annual crops. The brochure suggests starting small, building the system gradually, and supplementing the trees with perennial and annual crops before the trees reach maturity. The realism presented is important for managing expectations of prospective practitioners, but the optimism expressed is important for the engagement of potential new practitioners. The perception of technological trajectories is an important aspect because belief in the persistence of development creates the persistence itself (Geels & Raven 2006). There is further insurance against broken promises because it is not a goal of the organization to go out and convince farmers to convert their farms to agroforestry systems. Instead, the work is focused on supporting practitioners through research and policy, which ensures more realistic promises and adequate adjustments of expectations.

5. Conclusion

The successes and failures of niche development can be difficult to pinpoint, but it is also not the entire point of this type of analysis. It is easier and more fruitful to look at the individual points, such as pioneer projects, studies, and material changes in the landscape and policy, to gauge the direction that a niche such as agroforestry is headed in. This study was able to see successes in building networks of practitioners and a higher level of interest from policymakers and institutions. The fact that Agroforestry Sverige was invited to meetings with policymakers as a small organization shows that there is a drive to establish agroforestry systems. There is, however, a clear disconnect in the economic needs of practitioners, and the institutional work is far from over. In the Swedish context, practitioners are few/limited and therefore hold little power to change policy. By partaking in the intermediary work of building networks and consequently

solidifying needs and demands, institutions are more able to address these demands. As of yet, these demands have not been met, and financial support to establish agroforestry systems is still severely lacking in Sweden, and pioneers are still reliant on external sources for financing or need to be creative to get state support through other means.

The most difficult time for an agroforestry system economically is in the establishment phase, as trees take multiple years to bear fruit, and even longer if the system is designed more for timber production. At the same time, there needs to be more research on the economic viability of agroforestry in Sweden, as has been done in France (Dupraz & Ligare, 2008), to prove to the state that these investments will pay off. However, conventional agriculture is already subsidized, so it may not require any novel approaches to subsidizing food production, just a shift in priorities in what production systems get those subsidies.

Next to economic threats, climate change also brings ecological risks to conventional agricultural systems. Agroforestry has the potential to protect farms, and therefore both the livelihoods of farmers and food production. The monetary investments in agroforestry systems can result environmental sustainability, which may be worth the investment regardless of the economic benefits. Climate resilience is a priority of the EU and its member states, and agroforestry provides a viable alternative to less resilient systems.

Another aspect that requires further development is the reintegration of forestry and agriculture. Firstly, there is little interaction between the government agencies responsible for the two, as expressed by the interviewees, and that makes it hard to place agroforestry as a true combination of both. In the Swedish context, it is currently limited to agriculture with elements of forestry, and forestry with agricultural elements is not something Agroforestry Sverige interacts with, which could mean that it simply does not exist, or that it exists outside of the niche. Because under these contexts, agroforestry is seen predominantly as an agricultural practice, it is important that more forestry elements and knowledge be brought into the niche, especially with how developed forestry is as an industry in Sweden. The lack of foresters and forestry knowledge is the second reason to increase integration of the two fields and can help to develop an even higher diversity of agroforestry systems. This can also limit the development of agroforestry because there is now a necessity to engage in two socio-technical regimes,

Swedish agroforestry, as a niche, is still in the early stages of development. The intermediary work, at its core, aims to facilitate a positive feedback loop of increasing resources for its development, and translating those resources into research, and active systems for the research to take place in. This research must then be translated into forms which help practitioners (both current and potential) to establish systems, and to policymakers to then increase the number of resources available. Research and practice should continue to formulate reasonable and achievable promises to institutions; to allow these promises to be realized by practitioners.

5.1 Limitations of the study

Despite the successful application of the frameworks to the subject of the study, this thesis has several limitations. The first is a personal lack in background of the social science frameworks, which required lots of reading to develop the background information necessary to even develop the questions, and due to the time constraints of a bachelor's thesis, it was an influencing factor on the low number of interviews. The second part of this limitation is that even amongst social scientists, there is no single ontology of the frameworks used, and this required making decisions on what the most applicable ones would be for this study, which was difficult. Returning to the low number of interviews, this is an aspect of this study where the effects are unclear. Agroforestry Sverige is a small organization, and as such, there was likely not going to be a high number of interviews (although this is, of course, relative). This also means that, in my own interpretation, most of the potential interviewees would have some idea of what the organization was doing at any given time. This was somewhat seen in the two interviews conducted, as in Interviewee A provided information on their involvement on a project, and when Interviewee B was asked about their involvement in the same project, provided some further information, but recommended speaking to Interviewee A. Additionally, both interviewees provided similar answers on intermediary functions such as network building.

This study was focused on one intermediary actor within the niche, and as such gives a partial view of the niche, and some of the analysis may be too conclusive, and are therefore suggestive rather than definitive. To get the entire view, it would require studying or interviews of practitioners, policymakers, scientific experts, and the other organizations which Agroforestry Sverige is involved with. To get more conclusive results, these would have to be further examined. The positive however, is that this research, and application of these frameworks to Swedish agroforestry, can provide a basis for future studies on the development of agroforestry where the entirety, or single aspects, of the socio-technical regime and the niche can be examined. The additional caveat is that as intermediaries, Agroforestry Sverige interacts with many aspects of the niche and regime, and therefore can provide a valuable perspective. However, without being able to verify these many aspects, it is difficult to make accurate conclusions.

The final (and most acute) limitation is that the computer used for storing data broke, and for approximately two weeks, the raw data was completely unavailable. While some of this data has been restored, the combination of this and the time constraints of a bachelor's thesis made the writing of the results and analysis much more difficult, although a majority of these sections had already been written by that point.

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7. Appendix

Questions:

1. Position in Organization
2. How many years in organization
3. What experience in agroforestry do you have
4. Approximately how many members are in the organization - (rephrase around relativism to organizational capacity and active membership?) - is there more need/want for resources than the organization has capacity for
5. What kinds of agroforestry projects are part of your organization?
6. What type of support do you offer for agroforestry? (education, navigating subsidies or legislation, sourcing/production chain)
7. Do the needs differ if agroforestry is being done on agricultural or forestry land?
8. Do you (or the organization) interact with institutions?
    1. In what ways does this impact your work with practitioners
9. In what ways does the organization interact with other organizations involved in the sustainability transition?
10. Who decides or creates the vision for agroforestry in your organization?
11. What (if any) are the local impacts of the agroforestry projects?
12. How do you manage the practitioners' expectations about agroforestry?
13. What resources are most difficult to provide for the practitioner?
14. How often and/or in what ways do you interact with external networks or emerging 'technologies'
15. Do you facilitate dialouge between practitioners and other actor types (academics, businesses, politicians)
    1. If so, in what ways?
16. How do you (or the organization) attempt to foster a feeling of community?
17. How do you (or the organization) work to create direct ties with the practitioners and the market?
18. What role do you play in the decision making process of the practitioners?
19. What typically motivates landowners to implement agroforestry practices?
20. How do you balance these motivations and/or expectations with your experiences
21. Do landowners tend to have pre-existing knowledge about agroforestry?
22. Do you (or the organization) collaborate with local sustainability initiatives?

Appendix A: Questionnaire list

X YES, I, Thomas Hubbard, have read and agree to the agreement for publication and the personal data processing that takes place in connection with this

☐ NO, I/we do not give my/our permission to publish the full text of this work. However, the work will be uploaded for archiving and the metadata and summary will be visible and searchable.