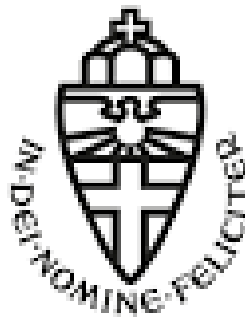


# Legitimacy construction within land-sparing and land-sharing practices and the consequences for biodiversity

Advocates of land-sparing and land-sharing in the Netherlands speak out



## Radboud Universiteit

Job Delhaes

Bachelor Thesis Geography, Planning and Environment (GPE)

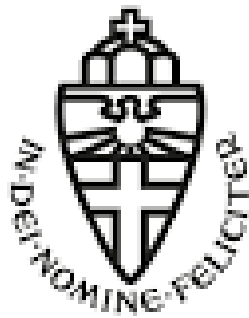
Nijmegen School of Management

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## Preface

In front of you lies the thesis that I wrote to complete my bachelor's degree in Geography, Planning and Environment at the Radboud University in Nijmegen. For the last few months, I dedicated myself to the subject of land-sparing and land-sharing and their consequences on biodiversity and how advocates of these agricultural practices are constructing legitimacy for these agricultural practices. Before I started studying, I took a gap year and went traveling through Australia and New Zealand. During this trip, I saw a lot of beautiful landscapes with stunning nature and rich biodiversity. I fell in love with wildlife and nature in general.

Unfortunately, I also read more and more about the loss of nature and biodiversity all over the world. Because of this, I developed an interest in how people interact with the environment. In my view, it is important to change the current way of interacting with the earth to create a more beautiful world for humans and animals. Not only for the present but also for the future. Because of this, I was sure that the subject of my thesis had to have something to do with human influence on biodiversity. I wanted to know how to ensure that we preserve the rich nature that the world has. Because agriculture plays a very large role in biodiversity loss, this is for sure a subject that requires attention. The food system is a very complex system. This raised a lot of questions for me. Why do we make the choices that we make? How can we reduce the impact on nature and biodiversity? How can we feed the world in a good balance with nature?

Although the beginning was very stressful and difficult, I became more and more interested in the subject as I wrote. I started to understand better how the food system works and how this has an impact on the environment. Once I got the hang of it, it became a smooth process. After some disappointing reactions, I was finally able to arrange a nice number of interviews. Interviewing these different people with different opinions and backgrounds in the agricultural sector was very nice and educational. To hear and see how people justify their ideas and visions was instructive and broadened my knowledge about this subject. Meetings with my supervisor Adam Calo were very supportive. These meetings gave me guidelines and confidence to write my thesis. I would like to thank my supervisor Adam Calo for his time, advice, and support during the entire process.

I hope you will enjoy reading my thesis,

Job Delhaes

Nijmegen, June 2022

## Abstract

Agriculture is the main driver of biodiversity loss. Also fertilisers and pesticides that are being used in agriculture have negative impact on the state of biodiversity. When the current decline of biodiversity will continue, the consequences for biodiversity will be devastating (IPBES, 2019; Godfray et al., 2010). Hence, we need to rethink our current food system. Two of the leading options for more sustainable and eco-friendly agriculture are land-sharing and land-sparing. Both forms have different pathways, but both are claiming to be the answer. This thesis tried to get a better look on how legitimacy is being constructed in the land-sparing and land-sharing practices in the Netherlands. By gaining more knowledge on what factors make land-sparing and land-sharing legitimate in the eyes of actors that are active in the agricultural sector, the researcher tried to answer the research question: *How is legitimacy being constructed in the land-sparing and land-sharing practices in the Netherlands and what are the consequences for the biodiversity?* Taking a critical look at those methods could contribute to a good transition to a more sustainable food production system that also protects biodiversity. Therefore also the quality and existence of human life. But whether land-sharing or land-sparing is adopted in the future, or maybe a combination of both, will not be determined by their scientific evidence bases. Instead, scholars argue that operationalizing either land-sparing or land-sharing will depend on political and ideological processes. A crucial driver of political acceptance is legitimacy (Benton & Harwatt, 2022). In this research a qualitative research method was used. Desk research and semi-structured interviews were used for data collection. Both actors that are acting in the land-sharing as in the land-sparing sector have been interviewed. This showed that legitimacy is being constructed by a lot of different factors. Beliefs, visions and assumptions all decide what people see as the norm and the accepted. When one sees an agricultural form as the norm and the accepted, it gains legitimacy. With this legitimacy agricultural practices become authoritative and credible. This legitimacy gives the agricultural practices space to exist and will allow widespread use of these practices. How people interpret or perceive definitions of biodiversity conservation or sustainability is key for constructing legitimacy. In the interviews emerged that there is a current trend towards land-sharing. There is more interest in land-sharing methods and policy is limiting the use of fertilisers and pesticides. This reduced use of fertilisers and pesticides will have positive outcomes for the biodiversity in the Netherlands. Because there is still a lot of legitimacy for land-sparing practices these will likely continue to exist and develop. This will have negative impacts on the biodiversity of areas where land-sparing is being practiced but will create high yields that allow other areas to be spared or used for land-sharing where the biodiversity can maintain. The consequences of land-sparing and land-sharing on biodiversity are dependent on the land use of the areas around the agricultural practices and the connectivity of those areas with other places with nature and biodiversity.

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# 1 Introduction

## 1.1 Background

The main driver of biodiversity loss is agriculture and if we continue like this, the consequences for biodiversity will be devastating (IPBES, 2019; Godfray et al., 2010). The world is still full of beautiful animals and plants. People travel all over the world to see the rich biodiversity of the earth. This diversity of life creates ecosystems, where there is an interaction between many species and organisms that all contribute to planetary processes. The biodiverse ecosystems provide clean water, air and soil for mankind. Next to that it also provides resilience to climate change and products that are crucial for human's survival such as food, fuel, medicine and shelter. But now the biodiversity that is so important for human and planetary health is declining faster than ever before in human history (Benton et al., 2021). The agricultural land area has a surface of approximately five billion hectares, this is 38 percent of the global land surface (FAO, 2020). This shows how much space we need for agriculture and with a rising population, a higher demand for food is expected. Whether this rising demand for food will actually lead to an expansion of agricultural areas, with the resulting consequences for biodiversity, is dependent on how and if we will meet this rising demand for food (Tilman et al., 2011). For those reasons the urge for making major reforms in the agricultural sector is enormous.

The agricultural sector emits a lot of greenhouse gasses. The total global contribution of agriculture, considering all direct and indirect emissions, is between 8500 million tonnes CO<sub>2</sub>-eq and 16500 million tonnes CO<sub>2</sub>-eq (Bellarby et al., 2008). This means that almost a third of the total emissions in the world come from the agricultural sector (Smith & Gregory, 2012). There are not many other sectors in the world that emit more greenhouse gasses than the agricultural system (IPCC, 2019). This is not only fuelling climate change, but this is also putting our food security at risk. Our food systems are extremely dependent on the right temperatures and the right rainfall. Climate change, which is being fuelled by our current food system, is influencing the temperatures and the patterns of rainfall drastically. These changes in temperature and precipitation will increase the likelihood of crop failures and are therefore declining the yield of agriculture in the long term. This can lead to more expansion of agricultural lands at the expense of natural habitats. Research shows that the developing countries which are already facing food insecurity are likely to be the worst affected (Smith & Gregory, 2012). Our food system is contributing to climate change and therefore also putting its own yield potential at risk. This makes it very clear that there is a strong need to change the way we produce our food to reduce the impact of agriculture on the environment.

Benton & Harwatt (2022) raise the question of what way we want to go with agriculture. How should we shape our policy on agriculture? In which forms of agriculture should we invest? What should the civil society see and support as sustainable? But also, how are we going to make this choice and why does that make sense in the Netherlands? Existing literature identifies different types of agriculture that can be sustainable and can contribute to biodiversity conservation. Two of the leading options for more sustainable and eco-friendly agriculture are land-sharing and land-sparing. Both forms have very different pathways, but both are claiming to be the answer. There is a long ongoing debate between scientists, farmers and politicians about whether land-sharing or land-sparing is the best form of agriculture that can feed the world now and in the future, and has at the same time the best outcomes for biodiversity (Kremen, 2015). Both of those forms have a strong ideological basis and assumptions on sustainability and the

future. Land-sparing assumes that the demand for food will grow because the world population is growing. For that reason, productivity growth is needed. The efficiency in production in land-sparing will allow areas with nature to be spared but also fewer resources, like for example water and energy, are needed. In this way, land-sparing assumes to contribute to sustainability (Benton & Harwatt, 2022). Land-sharing assumes that the demand for food can decrease if we adopt a more sustainable diet. This decrease in food demand enables us to use more nature-friendly agricultural practices. This will reduce the overall impact on nature and biodiversity and is therefore, in the viewpoint of land-sharing, sustainable (Benton & Harwatt, 2022).

But which narrative of sustainable agriculture will be adopted in the future, or maybe a combination of both, will not be determined by their scientific evidence bases. Instead, scholars argue that operationalizing either land sparing or land sharing will depend on political and ideological processes. A crucial driver of political acceptance is legitimacy (Benton & Harwatt, 2022). Land-sparing and land-sharing are founded on a set of explicit, or more rarely explicit assumptions. Those assumptions are frequently connected with a strong ideological basis (Benton & Harwatt, 2022). The values and ideologies are actually driving the land-sparing and land-sharing debate. Therefore it is really important to better understand the ideological process where values and assumptions construct legitimacy. Legitimacy means that people accept something and see it as authoritative and credible. Something is legitimate when it is socially accepted. Legitimacy is determined by the extent to which power is ethically justified, legally legitimate, politically recognized by all, and socially accepted by subordinates (Beetham, 1991). When a concept, such as a vision of agricultural sustainability gains legitimacy, it becomes more authoritative. By becoming more authoritative the society is consenting to their use and existence This ensures that this vision, and therefore the form of agricultural practice, can be put to practice (van Oers et al., 2018). In the realm of contested food system sustainability, Montenegro and Iles (2016) argue that the “thick legitimacy” of the industrial food systems paralyzes the development of land-sharing practices. This ensures that the industrial food practices will continue to exist and that other food practices will have difficulties to develop (Montenegro De Wit & Iles, 2016). However, legitimacy is not fixed. When norms and assumptions change, legitimacy can also change and eventually fuel change or transition. This development in the agricultural sector is important for the impact on the environment and the state of biodiversity. Therefore, it is important to better understand how legitimacy is being built up, because a changing legitimacy can strongly influence which form of agriculture will develop and which form of agriculture will stagnate in the future.

## 1.2 Relevance

### 1.2.1 Societal relevance

The current patterns of food production are considered to be unsustainable (Notarnicola et al., 2017). The total contribution of agriculture to greenhouse gasses is between 17 and 32% of all global greenhouse gasses emissions (Smith & Gregory, 2012). This means that the food system is one of the biggest greenhouse gas emitting sectors in the world (IPCC, 2019). Because agriculture plays such a big role in the emission of greenhouse gasses, the emissions must decrease in order to limit climate change. Next to that, the expansion of agriculture is the largest cause of biodiversity loss (IPBES, 2019; Newbold et al., 2015). Nature, including ecosystems and biodiversity, is very important for the existence of humans and their quality of life (IPBES, 2019). More encroachment of agriculture to nature will be disastrous to biodiversity (Godfray et al.,

2010). For the above-mentioned reasons, it is essential that the food system will become more sustainable in order to preserve nature and biodiversity to protect the quality and the existence of human life (Valenzuela, 2016). Next to that, the unsustainable food systems are partly responsible for the pollution of water and air (Kanter et al., 2020), the degradation of soils (Lal, 2019) and the emergence and spread of diseases, like as example COVID-19 (Amuasi et al., 2020). Given these occurring problems, it is very clear that a transition is needed towards a more sustainable and future-proof food system (Benton & Harwatt, 2022).

The global population is growing exponentially. A dominant argument suggests that by 2050, we have to feed a world population of 9 billion (Tomlinson, 2013). Tomlinson (2013) questions if this rising demand for food needs to be solved with an intensification of the food system because this possibly can increase climate change and problems in the food system. The argument suggests that we need to rethink our food system in order to feed the growing population and sustain the planet, instead of increasing the global food production to feed the growing world population. As part of this reconsideration of our food system, there is a debate on land-sharing and land-sparing because these are two methods that can have a contribution to a more sustainable food production. Taking a critical look at those methods could contribute to a good transition to a more sustainable food production system that also protects biodiversity. Therefore also the quality and existence of human life. This thesis focuses only on the situation in the Netherlands because the context in the Netherlands is very interesting. Of the total surface area of the Netherlands, 54 percent (2.2 million hectares) is used for agricultural practices (CBS, 2020). Despite national goals and international agreements, the Netherlands performs badly in terms of nature conservation and restoration. The loss of original nature in the Netherlands is considerably larger than the average in Europe (RFI, 2022). There is a lot to be gained in biodiversity conservation. This makes the Netherlands an interesting country to focus on.

The two forms of agriculture that are central to this research are land-sparing (high agricultural yields on a small land footprint) and land-sharing (agriculture with lower yields on a larger land footprint but more nature-friendly) (Kremen, 2015). These forms of agriculture are further elaborated in chapter 2, the theoretical framework. Both land-sparing and land-sharing are being practiced in the Netherlands. For example, greenhouse horticulture, a form of land-sparing, is a common form of agriculture in the Netherlands. Also, forms of land-sharing like agroecology, food forests and regenerative farming are being practiced in the Netherlands. But as the interest in changing food systems becomes more necessary it is not clear which policy will be implemented and in which direction the agricultural sector in the Netherlands will be heading. This makes the Netherlands an interesting research area.

As we see at the moment the farmers in the Netherlands are under pressure with regards to the nitrogen regulations the Dutch government is planned to take. The regulations are a result of the state of the nature in the Netherlands and international agreements. In the discussions on the regulations and if they are needed, also the form of agriculture is discussed. Legitimacy and the sustainability arguments as we see in this thesis are also used by the different advocates. So more than before there is a societal relevance in the Netherlands to better understand the relations between legitimacy, sustainability and the used agricultural practice.

### 1.2.2 Scientific relevance

The past has shown that legitimacy is a critical reason or requirement for transition. In short, legitimacy means that people accept something like knowledge or norms as plausible and widely express and practice it (Montenegro De Wit & Iles, 2016). As mentioned in the societal relevance there is a transition needed in the food system. With the power of legitimacy, this transition could be accelerated. Legitimacy has an enormous impact on which agricultural forms are seen as mainstream and are the most commonly used. At this moment industrial food practices are mainstream because of their “thick legitimacy” (Montenegro De Wit & Iles, 2016, p. 2). Because of this thick legitimacy for industrial food practices and the thin legitimacy for agroecological practices, the growth and development of agroecological practices are limited (Montenegro De Wit & Iles, 2016). In the theoretical framework, there will be a more extensive explanation of this thick legitimacy. Because of the major influence of legitimacy on agricultural practices, it is interesting to take a look at how legitimacy actually influences the agricultural sector. With more insights on how this process of influencing works, you can also take a look at the expectations about the state of the biodiversity due to the legitimacy. All-embracing this research can help to understand legitimacy formation in the agricultural systems and therefore contribute to the necessary transition.

### 1.3 Research objective and questions

#### **Research objective:**

The objective of this research is to get a better look at how legitimacy is being constructed in the land-sparing and land-sharing practices in the Netherlands. This research is trying to get more knowledge on what factors make land-sparing and land-sharing legitimate in the eyes of various actors or institutions. By gaining more knowledge of this situation it is possible to reflect on the agricultural system in the Netherlands. This also makes it possible to get a better view of what we can expect for biodiversity due to the current legitimacy of agricultural practices. These new insights are crucial because there is change needed in the food system, but the current legitimacies are holding back the growth of alternative agricultures like for example land-sharing (Montenegro De Wit & Iles, 2016). By doing this research, new knowledge is gained that can contribute to finding a way to facilitate the transition to a more sustainable food system in the Netherlands. So firstly, this research will help to get a better view of how legitimacy is working and how it is being built up in the agricultural sector in the Netherlands. Secondly, this research will paint a picture of the expected future of the agricultural sector in the Netherlands and its implications for biodiversity.

#### **Main research question:**

*How is legitimacy being constructed in the land-sparing and land-sharing practices in the Netherlands and what are the consequences for the biodiversity?*

#### **Sub-questions:**

- What does the academic literature suggest that the effects of land-sparing and land-sharing are on biodiversity?

- How are actors in the agricultural sector in the Netherlands constructing legitimacy about the sustainability of their operations?
- What is the expected future regarding land-sparing and land-sharing methods in the Netherlands and what will be the implications for biodiversity?

#### 1.4 Thesis outline

Chapter 2 of this thesis will consist of a theoretical framework. In the theoretical framework, the terms legitimacy, land-sparing, land-sharing and biodiversity, which are used in the research questions, are explained in more detail with the use of existing scientific literature. What is the definition of legitimacy, what dimensions does the concept consist of and how can it be operationalized? Thereafter the concepts of land-sparing and land-sharing are explained. Added to this are the assumptions and challenges for both forms of agriculture. Finally, this chapter further explains biodiversity. This research uses a qualitative research method, because this helps to get in-depth information regarding people's opinions, beliefs, thoughts and expectations. Chapter 3 of this thesis will explain more about that. This chapter also gives information about which research methods are used in this thesis. For example, reading and collecting existing scientific literature about legitimacy, land-sparing and land-sharing helped to get an overview of the current scientific knowledge about these topics. In this thesis, semi-structured interviews are used to gather information about how actors in the land-sharing and land-sparing value sustainability, what their assumptions are, and how they construct legitimacy. Also, the methods that are used to analyse the collected data and how this affects the reliability and validity are explained here. Chapter 4 consists of the results and the analysis of the collected data. This collected data consists of the answers given in the semi-structured interviews and the knowledge retrieved from existing literature. This data is containing information about the land-sparing and land-sharing practices and about how the legitimacy of those agricultural forms has been built up. The results here are included per sub-question. The conclusion is in chapter 5 where the main research question and the sub-questions are being answered. Lastly, chapter 6 gives a critical discussion and reflection on the research process, after which recommendations for possible future research are given.

## 2 Theoretical Framework

### 2.1 Legitimacy and Thick legitimacy

Various scientific disciplines have attempted to interpret and operationalize the concept of legitimacy. Lawyers more often equate legitimacy with legality or legal sustainability. This kind of legitimacy can be tested by higher legal bodies. Policies that are not legally legitimate are called illegal. In the spring of 2019, for example, the Council of State in the Netherlands ruled that the Programma Aanpak Stikstof (a policy framework about nitrogen) cannot serve as a basis for granting permits in areas that are vulnerable to nitrogen emissions (Buijs & Boonstra, 2020). Policies without legal legitimacy can therefore be declared invalid. The policy can then no longer be implemented. Philosophers on the contrary see legitimacy as the just, the right, the good or the rationally acceptable. So if you act without ethical legitimacy you are seen as unjust because you do not act according to the norms and values that we as humans use (Bokhorst, 2014). We see that social scientists operationalize legitimacy into social acceptance, support and trust. Whereas political scientists define legitimacy as a democratic power recognized by all. When a

political authority fails to have recognized democratic power, it ceases to be legitimate. This means that people do not longer feel the obligation to obey. This leads to a completely disrupted society (Peter, 2010). Governments need legitimacy to govern. Depending on the background of even the scientist we see here that different definitions are used. This is a signal of the complexity of the term legitimacy (Buijs & Boonstra, 2020). Conclusions and reasoning should always be placed within the context of the definition used. In the operationalization of legitimacy, there is often only one dimension included (Bokhorst, 2014).

Montenegro De Wit & Iles (2016) have the following definition of legitimacy: “Legitimacy, put simply, means that people accept something – knowledge, norms, customs, or technologies – as credible and authoritative, and express or practice it widely” (p.2). Legitimacy is the justified, legal, politically recognized and socially accepted right to exercise authority. Legitimacy is determined by the degree to which power is ethically justified, legally legitimate and politically recognized by all and is socially accepted by the society (Beetham, 1991). Beetham (1991) used the term legitimization to refer to both social acceptance (consent of appropriate subordinates) and political recognition (recognition by legitimate authorities).

With legitimacy your practices are seen as mainstream and as the norm, they are accepted. When the norm is changed, the legitimacy is also changing. Legitimacy also helps to maintain this situation where the practices are seen as mainstream. The concepts of legitimacy result from political sciences and sociology (Schoon, 2022). They help to understand a base of influence (Tedeschi, 2017). Legitimacy isn’t fixed it can change over time. Legitimacy can fuel transition because when something is the norm and is widely accepted, it has an opportunity to develop.

We speak of thick legitimacy when legitimacy is very high. In order to obtain thick legitimacy, you need to bundle multiple different means to create authority. Examples of those means are scientific, political, civic, legal, practical, and economic means (Montenegro De Wit & Iles, 2016). But also with credibility tests in multiple arenas, you can create legitimacy (see figure 1 below). This thick legitimacy is not easy to unravel because it is woven into knowledge-making, different institutions and embedded in social conventions (Montenegro De Wit & Iles, 2016).

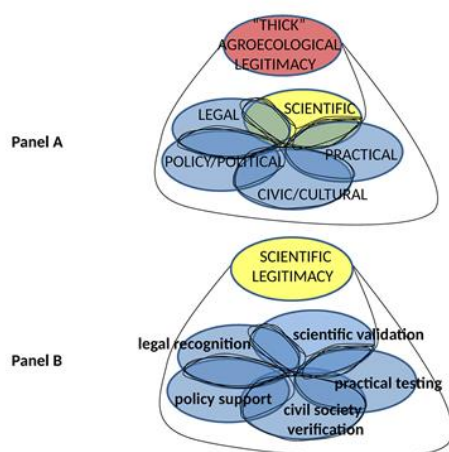


Figure 1: Different bases in which credibility tests take place. Meeting this credibility test can build (thick) legitimacy (Montenegro De Wit & Iles, 2016).

They argue that big industrial food practices have a very thick legitimacy. With this thick legitimacy, the industrial food systems are a barrier to other forms of agriculture such as agroecology, which can be seen as a form of land-sharing (Montenegro De Wit & Iles, 2016). If there will be more legitimacy for land-sharing, it has more space to grow. Montenegro De Wit & Iles (2016) offer three possible pathways that agroecologists and other advocates of alternative agricultures could take to improve their legitimacy. The 3 pathways are as followed: (1) Building from, but updating, the existing standards and practices of science in assessing rigor in agricultural research (2) Extending influence into policy, political, legal, practical, and civic arenas (3) Centring attention on the ethical legitimacy of food systems (Montenegro De Wit & Iles, 2016).

Van Oers et al. (2018) state that legitimacy is crucial for an organisation’s survival, and the way an organisation tries to obtain this legitimacy is known as the legitimation strategy. Because legitimacy is all about perception, it is possible to influence and shape it (van Oers et al., 2018). Legitimation can be seen as a process where actors within an organisation strive to obtain legitimacy in order to secure the organisation’s survival. The literature describes three legitimation strategies that organisations can use to increase their legitimacy. The first strategy is conforming to the environment. In this strategy, organisations align their practices with existing norms, values and standards. By doing so you garner a higher social acceptance and therefore legitimacy (Zimmerman & Zeitz, 2002). When an organisation is unable or unwilling to conform to the environment, organisations can try to select a favourable environment. In this second strategy, organisations try to seek a particular group that already is attracted to the organisation’s practices in the means of norms, values and standards. This is usually a matter of market research (Zimmerman & Zeitz, 2002). The last and third legitimation strategy is manipulating the environment in order to acquire legitimacy. In this strategy, organisations must actively disseminate ideas about what is legitimate. This can happen by advertising or persuading particular audiences (Zimmerman & Zeitz, 2002).

The survival of organisations as mentioned before, stems from the access to resources that organisations gain because they are seen as legitimate and thus have legitimacy. Those strategic resources can be financial capital, the quality of managers and of employees, access to technologies, and support from the government. All of those resources will promote the survival of the organisation (Zimmerman & Zeitz, 2002). In the figure below this process of legitimation in the agricultural sector is made visible. Using this as a theoretical framework could help to get a better view of how legitimacy plays a role in agricultural practices in the Netherlands. This will give an indication of how the agricultural system is influenced by legitimacy. Next to that, it will give more insights on how agricultural worldviews may develop in the future, because of how it maintains legitimacy, and thus what the effect will be on the biodiversity.

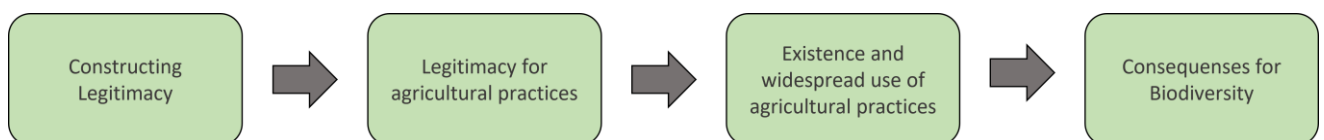


Figure 2: Legitimation process based on Zimmerman and Zeitz (2002:415) and van Oers et al. (2018:57)

Now that it is clear what legitimacy is and why it is important, legitimacy can be connected to agricultural practices. Many factors influence the farmer's decision for his form of agricultural practice. All those factors are connected with legitimacy. These factors influence how and whether farmers legitimize their agricultural practices, this is because these factors influence the

beliefs, assumptions and norms that the farmers have. These beliefs, assumptions and norms in turn contribute to legitimacy construction. According to Lastra-Bravo et al. (2015), these factors of influence can be grouped into the following 5 main factors:

- Economic factors (income, form of ownership of land, availability of manpower)
- Farm structure and characteristics (size of the company, location, intensity of business operations)
- Farmer's characteristics (education, age, gender)
- Farmer's impression about agricultural forms (personal experience, price interventions, complexity of agriculture)
- Social context (support and knowledge, trust in government, involvement in farmers' organisation, policy context)

## 2.2 Dimensions of Legitimacy

The definition of legitimacy as described in the previous paragraph consists of four dimensions. Those four dimensions are (Bokhorst, 2014):

1. Ethical Dimension: the extent to which the norms and standards are justified (moral law)
2. Legal Dimension: the extent to which the norms and standards are legitimate (formal law)
3. Political Dimension: the extent to which the norms and standards are recognised by all (recognised law)
4. Social Dimension: the extent to which the norms and standards are accepted by those to whom the standards apply (living law)

All those four dimensions are desirable and foundational to legitimacy. In a democratic constitutional state such as the Netherlands, the formal dimensions of political and legal legitimacy are necessary. The more informal dimensions of ethical and social legitimacy are desirable. It is important in the context of the adoption of laws that there are widely shared views on justice and social acceptance.

When you talk about the ethical dimension you talk about what is acting right, just and good. This is the human sense of what is just and what is not, so in other words what is morally right. In the legal dimension, legitimacy is the legal right to exercise authority. The right is both an instrument of power and the legitimisation of power. In the political dimension, you mostly talk about the recognition of political power. It is a kind of social contract between the people and the political representation. Political legitimacy is not obtained through coercion and manipulation, but it is important that the community sees the way of governance as just (Bokhorst, 2014). The social dimension is about the acceptance of power and authority. Through legitimacy, power is converted into authority. It is about how citizens and the other actors experience the legitimacy of the policy and whether they accept or not accept the results. Policies that are not socially legitimate, provoke social resistance. The social dynamics in which the legitimacy of policy is questioned by critical groups are called delegitimization (Bokhorst, 2014). This insight will give a better understanding of how legitimacy, also in the agricultural sector, works.

## 2.3 Operationalizing Legitimacy

The concept of legitimacy is widely used across multiple disciplines, but measuring legitimacy is still a persistent hard challenge. But clarifying the definitional properties of legitimacy to identify a

common set of criteria for its measurement has multiple benefits. Some benefits are for example methodological, theoretical, and substantive benefits (Schoon, 2022). When operationalization makes it possible to measure legitimacy, it will be possible to determine legitimacy in the land-sparing and land-sharing debate. Schoon (2022) lays out a framework that studies legitimacy. In this framework, legitimacy is about relationships between three empirical elements. Those elements are: an object of legitimacy, an audience that grants legitimacy and the specific relations between those two. These elements can be seen as a dyad with two single units and a tie (Schoon, 2022).

The paper of Schoon (2022) distinguishes three general approaches to operationalization. All the approaches recognize that legitimacy involves positive perceptions or evaluations, that need an audience. The first approach to operationalization assumes a relationship between indicators of an audience's orientation towards an object of legitimacy. In this approach, legitimacy can be assessed by identifying an entity or population, which can make legitimacy judgements. Here it can be assessed which assumptions, beliefs and perceptions the population has about the object or the relation to the object. Measures that fit this approach equate legitimacy with trust, acceptance, support, consent or perceived obligation to obey (Schoon, 2022). The second approach is based on establishing legitimacy by establishing a relationship between the object of legitimacy and a given set of norms and values. In measurements, norms, values or expectations can be made specific. Subsequently, it is tested whether the object of legitimacy meets that specification. In the third approach, legitimacy is established by specifying indicators of awareness or recognition. A measurement then consists of establishing the prevalence of an object of legitimacy or the lack of clear opposition to it (Schoon, 2022). The paper of Montenegro De Wit & Iles (2016) talks about gaining legitimacy by extending influence into the arenas where credibility tests take place. But it is important to learn how to meet the standards of knowledge-making in the policy, political, legal, practical, and civic arenas if you want to gain legitimacy. So when you are aware of the assumptions, beliefs, perceptions but also of the values and norms that prevail in the arenas in which credibility tests take place you are able to see how legitimacy is constructed. This eventually helps to operationalise legitimacy.

In agricultural contexts, the object of legitimacy corresponds to the form of agricultural practices. In this thesis, the agricultural practice would be either land-sparing or land-sharing. The second element, the audience that grants the legitimacy, is in this case the society that sees the agricultural practices as legitimate or not. The third empirical element in this agricultural context are the specific relations between land-sparing or land-sharing and the society that grants the legitimacy. In this thesis, legitimacy is being measured by combing the first two approaches that Schoon (2022) mentioned. So in the first approach, the people working in the agricultural sector will serve as the audience. Here there will be looked at the assumptions, beliefs and perceptions of the people working in the agricultural sector on two contrasting agricultural practices, namely land-sparing and land-sharing. This allows you to measure whether there is acceptance, support or trust for the before mentioned forms of agriculture. The second approach that will be used is about the relationship between the agricultural practices and norms and values. When the land-sharing and/or land-sparing meet the norms and values that the audience has, it can be determined whether the agricultural practices can be seen as legitimate.

## 2.4 Land-sparing & Land-sharing

Current literature often emphasises the need for transition in the agricultural sector. The agricultural sector has an enormous environmental impact and besides that, we have a lot more mouths to feed in the future because of the rising world population. The current food system plays a big role in climate change and biodiversity loss (IPBES, 2019; IPCC, 2019; Notarnicola et al., 2017; Smith & Gregory, 2012; Newbold et al., 2015).

Due to the urgency of these problems, there is a search for sustainable versions of agriculture. Two forms that are considered as sustainable and are central to this research, are land-sparing and land-sharing. Land-sparing focuses on agricultural intensification. This means that this form of agriculture is trying to increase the yields on a small land footprint, while minimizing the environmental impacts. The reduction of environmental impacts is mainly about using as few resources as possible and high efficiency of the agricultural production (Benton & Harwatt, 2022). By using land-sparing you have high yields on a small area, so you can “spare” other areas in order to let biodiversity flourish there (Kremen, 2015). Examples of land-sparing are greenhouses and agriculture with fields of monocultures. In the areas where land-sparing is practiced there isn't a lot of biodiversity. But then, theoretically, the reduced pressure of land use allows conservation elsewhere, like in for example native eco-systems that are associated with the highest levels of biodiversity (Benton & Harwatt, 2022). Land-sparing can contribute to the complete conservation of big areas of nature. These big areas of wild habitats are crucial for the survival of some specialized and area-demanding species. Those species cannot survive in more fragmented landscapes that are related to land-sharing practices, therefore land-sparing is needed in order to preserve those species (Kremen, 2015; Gámez-Virués et al., 2015). Another characteristic of land-sparing is that it focuses on efficiency. The use of technology helps to improve the efficiency by decreasing the inputs (labour, synthetic inputs and land) and by increasing the outputs (yield). This high efficiency put less pressure on the environment (Benton & Harwatt, 2022).

Performing land-sparing presents some challenges. When the agriculture is intensified in one region and the biodiversity of this region has decreased, it is important that in another region the biodiversity can remain in or return to its former state. To make this happen the region without agriculture must remain untouched for a long period of time in order to conserve or regenerate the biodiversity (Acton, 2014). This is a challenge because this time is far beyond the time span in which decisions about land use are usually made by policy- and decisionmakers (Acton, 2014). This dependency on environmental policies and formal declarations of protected areas makes it more complex to create well-functioning land-sparing practices (Kremen, 2015).

Land-sharing is focusing on agroecological approaches that have relatively lower yields on a larger footprint with lower environmental impacts. This makes the areas where land-sharing is practiced more nature- and wildlife-friendly. In fact, you “share” the agricultural areas with nature and wildlife (Benton & Harwatt, 2022). When speaking of land-sharing you can think of forms of agroecology and organic farms where agriculture and nature are combined. The biodiversity in these areas is therefore higher. An assumption of agroecology and land-sharing is that the fundamental change in the agricultural sector can only take place when we approach this challenge on three different fronts at the same time (Gliessman, 2018). The first front is about science. This means that we need to get more knowledge of the ecological relations among agricultural species and the physical surroundings but also the interactions with those species and the natural systems. This knowledge can be used to improve and manage sustainable agriculture

practices. Secondly, we need to approach the practice front. The practice front is about really acquiring sustainable and innovative systems on the ground that contribute to a food system that has less impact on biodiversity and the environment. The last and third approach that is needed, is about social movement. By this is meant that fundamental changes are needed in the way that humans relate to food and the whole food system in general. The need for change does not only advocate for changes that lead to a sustainable food system but also seeks for knowledge by which this change can be activated and sustained. All approaches to those three fronts are needed in order to create a momentum for the needed transition in the food system (Gliessman, 2018).

While performing land-sharing, also some pitfalls occur. Within land-sharing, there is a terrestrial land surface where multiple patches of small natural habitats remain. This can be a pitfall because some species can't survive in such fragmented landscapes (Gómez-Virués et al., 2015; Kremen, 2015). Next to this practice linked to land-sharing, it is also assumed that land-sharing has fewer outputs and to have lower yields (Benton et al., 2021; Kremen 2015). Next to that land-sharing is less good for other aspects of sustainability. Per unit of production, land-sharing practices generate higher negative externalities, like for example greenhouse gasses (Benton et al., 2021).

Both land-sharing and land-sparing take the future demand for food into account. This is therefore an important part of their substantiation of their practices. Both forms have different assumptions about how the demand for food will develop in the future. Land-sparing has the assumption that sustainable intensification is needed to meet the, in their eyes, inevitably increasing global demand for food. Land-sharing has the assumption that their way of agriculture approach is being enabled by the reduction of food demand through the adoption of healthy, sustainable and low-waste food consumption (Benton & Harwatt, 2022). The need for a change in diet in order to reduce our impact on the planet is described in several scientific papers. Because mainly our meat consumption has an enormous impact on the environment and with a change to a more plant-based diet we could reduce our environmental impacts and also reduce our land use for food production (Tomlinson, 2013; Jalil et al., 2019; The Lancet, 2019). But whether this change in our diet is really happening and will reduce our food demand is still not certain. As a result, it is difficult to make decisions in the field of agriculture because the future is very uncertain.

To be able to gain more knowledge on how legitimacy for the sustainability of agricultural practices is being constructed it is necessary to better understand the definitions or perceived definitions of the term sustainability. In the literature there can be found different definitions on sustainability. One of these is the Triple bottom line framework introduced by Elkington (1999). As is described below. The Triple bottom line is also known as People, Planet and Profit. Those three P's should all be combined to achieve sustainable development. This means that without taking all of those three P's into account you cannot act sustainable. When talking about People you talk about the society, think of social equity, health but also about affordability of services and products. In other words, the human living standards are important. The term Planet is used for the natural environment. Biodiversity, ecosystems and climate change are very important aspects here. The quality of the air, soil and water also play a role here. Profit is all about the economy. So this is about profitability and economic growth and the economic feasibility (Elkington, 1999). In the figure below the triple bottom line is visualized.

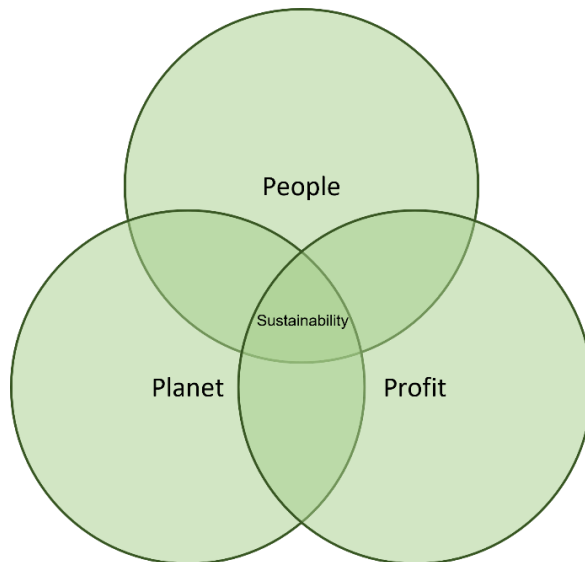


Figure 3: The Triple Bottom Line based on Elkington (1999)

It is important to think about what definition of “sustainability” is. The definition of sustainability can namely differ when talking about land-sparing and land-sharing (Kremen, 2015). For example, land-sparing can be seen as sustainable because they use the natural resources very efficient, and the yields are very high. On the other hand, you can see this as less sustainable, because land-sparing in the form of greenhouses have a big impact on the environment because there is almost no biodiversity left in the areas where land-sparing is practiced. Land-sharing can be seen as sustainable because there are usually no fertilisers or pesticides used. Besides, land-sharing practices live together with animals and nature. The yields within land-sharing are considered to be lower, so you need more land area for the same food production. Also the price for food produced with land-sharing is higher. This can be seen as less sustainable.

The science is unsettled with regards to which approach will lead to better outcomes for climate, health, and biodiversity. This is due to multiple reasons. One of those reasons is that there are a lot of different impacts that agriculture can have on the environment. The impact could for example be biodiversity and habitat loss, the pollution of water, air and soil and the emissions of greenhouse gasses. One measure to reduce the emissions of greenhouse gasses can have a negative impact on the biodiversity so this makes it very difficult to measure sustainability. A second reason is that the sustainability of agricultural practices is context-dependent. Because there are a lot of different climates and environments where the same agricultural practices in these different places could have a different impact on the sustainability of the operations. Next to that, the impacts of agricultural practices on the environment vary a lot with the scale of the practices (Benton et al., 2021). For example, a small farm with eco-friendly practices won't have a big impact on the environment, but when a bigger farm on a bigger scale uses eco-friendly practices, this could have a large impact on the environment. That is why it is difficult to determine the sustainability. The last reason that makes it difficult to agree on what makes agriculture sustainable is that agriculture is a market-driven system. This means that when in some areas the yields are reduced to decrease the environmental impact, there will be an increase in production in another place to still meet the demand of the market with the resulting consequences for the environment (Benton & Harwatt, 2022).

Those difficulties to figure out what sustainable agriculture is, suggest that the decision on what is sustainable and what is not, are strongly political and societal decisions. These political and societal decisions decide which form of agricultural practices will be carried out and where. With the norms, beliefs and values which are in the society, we decide what is sustainable. Because the choices we make are connected to what we see as the norm or the accepted, legitimacy plays a role. It therefore makes sense to examine legitimacy formation in order to better understand why certain choices are made, but also to make a change in the agricultural sector possible.

## 2.5 Biodiversity

There are multiple reasons for why there is a change needed in the agricultural sector. One of those reasons is that any further encroachment of natural habitats because of expanding agriculture will be disastrous for biodiversity on earth (Godfray et al., 2010). This thesis will take a look at how legitimacy is being constructed in agricultural practices and how this affects what the consequences of this will be for the biodiversity. Therefore, it is important to make the definition and importance of biodiversity clear. This paragraph will also help to understand how land-sparing and land-sharing aim to promote biodiversity conservations. The concept of biodiversity is about the diversity of species and the diversity within species and ecosystems (Pascual et al., 2021). In the 1992 UN Convention on Biological Diversity, biological diversity or biodiversity is defined as: “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” (UN Convention on Biological Diversity, 1992). Nature, including ecosystems and biodiversity, is very important for the existence of humans and their quality of life. Biodiversity plays an important role in providing food, energy, medicines and multiple materials that are crucial for human’s physical well-being (IPBES, 2019). Nature and biodiversity also absorb a lot of carbon emissions that can limit climate change. Biodiversity is not only important for non-material aspects for quality of life, but also for psychological experiences and inspiration. This helps to support identities and helps to create culture (IPBES, 2019).

Our current food system is the principal driver of biodiversity loss. This system has been shaped by many years of economic growth which was supported by increased food production. This thesis mainly focuses on land-sparing and land-sharing. That is why this section will look at the consequences of these two forms of agriculture on biodiversity. The impacts of agricultural forms on biodiversity depend on the scale and intensity at which they are practiced (Benton et al., 2021). Habitat uniformity is the main driver of biodiversity loss, because of these farms with smaller fields are associated with higher biodiversity (Benton et al., 2003). Farms where different crops grow and where different animals are farmed are also associated with more biodiversity. There is often a negative relationship between farming yields and biodiversity (Gabriel et al., 2013). This is because those higher yields mostly arise from intensification. This means the use of machinery, increased use of fertilisers or pesticides, more specialization and higher plant density. Those practices have a negative impact on the biodiversity but help to increase yields. On the other hand, some more nature-friendly farming systems tend to be lower-yielding (Benton et al., 2021). So research shows that at the field, farm and landscape level the intensive farming has more impact on the environment than more agroecological farms. But scale effect could lead to reverse conclusions (Benton & Harwatt, 2022).

Areas that have a rich biodiversity, are considered to have many species that contribute to a better working ecosystem. This ensures ecosystem services that are crucial for agricultural production. The two ecosystem services that are associated with biodiversity are biological pest control and crop pollination (Grass et al., 2019). For example, animal pollination can increase the yields of the world's most important crops by almost 75% (Klein et al., 2006). Despite the use of honeybees that are widely used as managed pollinators, the pollination still depends for a large part on wild pollinator species that depend on production areas that are outside the agricultural land like for example fields of wildflowers (Aizen & Harder, 2009; Garibaldi et al., 2013). Also, the biological control of crop pests is a very important ecosystem service for agricultural practices. Because of pests, it is estimated that about 35% of global crop yields are lost before harvest (Oerke, 2005). To fight these pests a lot of pesticides are being used. Those pesticides have a big impact on the human health and the environment. The direct handling or exposure to pesticides leads to multiple types of health problems. For example, cancer, diabetes, and various disorders and syndromes like for example Alzheimer's and Parkinson's (Rani et al., 2021). Next to the negative impacts on human health, pesticides also pollute the environment. Pesticides are used to kill target weeds and insects but by doing so they also pollute water and soil. This also kills other creatures like birds, fish and non-target insects and vegetation (Rani et al., 2021). When used regularly and for a long-time pesticides can result in bioaccumulation where even larger animals die because they build up the toxins in their bodies after eating many plants or animals which are also affected by the pesticides (Rani et al., 2021). This eventually has a negative impact on the biodiversity and will also lead to less animal pollination and reduced crop yields. There are also more sustainable and eco-friendly ways to fight pests. Namely the use of natural biological pest control. This means that you use natural enemies of the weeds and insects, that are seen as a pest, to fight the pest. The improvement of biological control in agricultural systems can provide economic, ecological and social benefits and can be achieved by increasing habitat heterogeneity within production systems (Sann et al., 2018). An agricultural approach where the conservation of biodiversity is integrated into eco-friendly agricultural practices will lead to a higher biodiversity. This higher biodiversity optimizes the provisioning of animal pollination and biological control to protect crops. In the long term, this will eventually lead to a higher agricultural yield (Pywell et al., 2015; Grass et al., 2019).

In the past decades, the importance of biodiversity and ecosystem services has gradually acquired greater recognition on international agendas. For example, the Sustainable Development Goals that were adopted by the United Nations in 2015 include multiple targets that aim for sustainable use and conservation of the biodiversity. Those targets are also connected to the agricultural sector. Besides these targets also other global assessments increased the awareness of the importance of biodiversity and its contribution to ecosystem services that are important for the human well-being. An example of those assessments are those done by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) but also global biodiversity frameworks, strategies and actions plans under the Convention on Biological Diversity (CBD) have contributed to better recognition of biodiversity in international agendas (FAO, 2022). This higher recognition ultimately led to the European Green Deal. The European Green Deal is a set of policy initiatives by the European Commission that helps to fight climate change and environmental degradation. It aims to be climate neutral in 2050, making it the first continent that is climate neutral (European Commission, 2019). The Farm to Fork strategy is an important aspect of the European Green Deal. This strategy should accelerate the transition

to a more sustainable food system in Europe. Next to that the strategy should protect the environment and preserve biodiversity. Some targets in the Farm to Fork strategy are that the use of (chemical) pesticides and fertilisers must be reduced (European Commission, n.d.). Policy initiatives like the European Green Deal and the Farm to Fork strategy will influence the transition towards a more sustainable food system and eventually will also influence the state of the European biodiversity.

## 3 Methodology

### 3.1 The qualitative and core characteristics of the research

If one wants to know about how legitimacy is being constructed, a qualitative research approach is best. To obtain in-depth information a qualitative research method is necessary (Vennix, 2019). This research is aimed at obtaining in-depth information regarding people's opinions, beliefs, thoughts and expectations. Therefore a qualitative research method is chosen in this thesis. In the interviews, questions are asked about why the interviewees, that are working in the land-sparing or land-sharing sector, choose for the agricultural practices they use or support. Other questions in the interviews made their assumptions, norms and beliefs about sustainable and nature-friendly agriculture and their visions and expectations about future transitions in the agricultural sector clear. By asking those types of questions the researcher was able to acquire detailed descriptions of people's ideas and visions about land-sparing, land-sharing, legitimacy and biodiversity. Another method that is used in this research is triangulation. This means that different data collection methods and different sources of data are used. This makes it possible to double-check the findings because the researcher can confirm her/his findings (Thurmond, 2001). Triangulation is used because this increases the reliability and the validity of the research (Vennix, 2019). This research can be seen as an inductive research, because after the data collection and data analysis a hypothesis is formed about the current and future influence of legitimacy on land-sparing and land-sharing practices and the consequences for biodiversity.

### 3.2 Data collection methods

#### 3.2.1 Desk research of academic literature on land-sparing, land-sharing and legitimacy

The desk research created a clear definition of legitimacy. Next to the definition of legitimacy, the desk research helped to create the questions used in the semi-structured interviews. Because of the desk research, the researcher knew what to ask for in order to find out how the interviewees construct legitimacy about the sustainability of their operations. So this method of data collection has helped to obtain theoretical scientific knowledge and contributed to a strong theoretical framework that serves as a basis for the entire thesis. Because many different scientific sources have been used, a broad and varied picture has emerged about land-sharing, land-sparing, the influence of legitimacy and the construction of legitimacy. In addition to scientific sources, European Union policy documents have also been used to explain the situation in the agricultural sector. This also helped to outline an expected future.

#### 3.2.2 Semi-structured Interviews about legitimacy construction

Semi-structured interviews were chosen because they are very useful to obtain the visions, norms and beliefs of respondents. Semi-structured interviews were also chosen because the researcher had the opportunity to ask further questions if a respondent has a lot to say about the essence of a certain topic that is important for answering the research questions. A number of questions are pre-structured so that specific questions are asked to in a sense directly answer the research question, but also to create a same structure in all interviews. For the interviews, an interview guide was made. This interview guide can be found in the appendix.

For the interviews, the choice was made to choose a quota sample. By doing so the researcher wanted to get three interviews with advocates/implementers of the land-sharing

concept and three interviews with advocates/implementers of the land-sparing concept. All interviewees were approached by email. A short explanation about the research was given in the e-mail. To get a higher response the researcher choose a personal approach for potential respondents. This means that all possible respondents were called a few days after they received an email from the researcher. The researcher asked whether the possible respondents received the email. In this telephone conversation, a short explanation was given about the research. Thanks to this personal approach, all interviews have been arranged. Eventually, five interviews were conducted. Two interviews with people working in the land-sparing sector and three interviews with people working in the land-sharing sector. Many possible respondents didn't want to cooperate with the research due to busy schedules, sometimes because of the current nitrogen issue in the Netherlands, or an upcoming vacation. Because of this, the researcher did not manage to arrange the sixth interview. More about the consequences of this on the reliability and validity is told in chapter 6, the discussion and reflection. The five interviews took place over a period of 2 weeks. In the table below an overview of the conducted interviews is given.

All interviews were conducted through Microsoft Teams. By the start of the interview, the interviewees were asked whether the interviewee agreed to an audio recording of the interview. All interviews were audio-recorded. During the interview, automatic transcription was performed. Each interview lasted from half an hour to three quarters of an hour. Notes were taken by the researcher during the interview. On the same day as the interview took place, the interview transcripts were transcribed in more detail with the notes of the researcher also because the automatic transcription mode wasn't flawless. Minor errors in the transcript were fixed here. The interviews took place on the basis of a predetermined method. Every interview started by asking a number of introductory questions. These questions are followed up by the pre-structured questions giving room for extra discussion. As a result of the answer to a pre-structured question, the researcher asked more often about the answer of the interviewee. Because all interviewees are Dutch residents, the interviews were conducted in Dutch. Because the interviewees could speak their native language, they were also able to articulate their ideas and visions as well as possible.

*Table 1: Overview of conducted interviews*

<b>Agricultural form:</b>	<b>Interviewee working for:</b>	<b>Date:</b>	<b>Interview code:</b>
Land-sparing	Glastuinbouw Nederland	31-05-2022	Interview 1
Land-sharing	Platform Natuurinclusieve landbouw Gelderland (PNLG)	01-06-2022	Interview 2
Land-sharing	Agro Ecologie Gelderland	02-06-2022	Interview 3
Land-sparing	Verify (co-initiator of World Horti Center)	03-06-2022	Interview 4
Land-sharing	Bodemzicht	06-06-2022	Interview 5

Because greenhouse horticulture is a common form of land-sparing in the Netherlands, the researcher reached out to Glastuinbouw Nederland and to the World Horti Center via their emails on their websites. Glastuinbouw Nederland is an organisation that is engaged in advocacy for farmers in the greenhouse horticulture sector. The World Horti Center is an innovation center, particularly for greenhouse horticulture. The researcher did not only choose those companies

because they operate in the greenhouse horticulture and therefore land-sparing but also because those companies overarch the entire sector. Because of this, they know what is going on in the sector. Glastuinbouw Nederland is an advocate for the greenhouse horticulture sector and can therefore speak for the entire sector. The World Horti Center really focuses on reaching sustainability with innovation, therefore this was an interesting organisation to speak to in order to find out how they construct legitimacy for the sustainability of their operations.

Platform Natuurinclusieve landbouw Gelderland and Agro Ecologie Gelderland are initiatives that aim to make agriculture more sustainable in order to stop biodiversity loss and to limit climate change. Those companies respectively help a lot of farmers to become more sustainable by using nature-inclusive methods and agroecology, which can be seen as land-sharing practices. Because those two companies also have a strong ideology and vision about sustainability it is interesting to interview them about how they envision sustainability. Bodemzicht is a farm that uses regenerative agricultural methods. The reason to approach Bodemzicht for an interview is because this farm has only been in existence since 2020 and has therefore made a very conscious choice for land-sharing. This makes it interesting to find out which assumptions, visions, beliefs and so on made them make the choice for land-sharing. This gives an insight into how the legitimacy for land-sharing recently has been constructed.

### 3.3 Analysis of the interviews with coding

All interviews were conducted online through Microsoft Teams and were audio-recorded. Despite the fact that the interviews were immediately transcribed by Microsoft Teams, all transcripts were still checked to remove errors in the transcript. The transcripts have been read unbiased to get an impression of the interview. During the analysis of the data, reading the transcripts was a recurring process in order to become familiar with the data and then also be able to make connections. The coding of the interviews took place in Microsoft word. With open coding, the relevant text fragments were highlighted and connected to key words. Those keywords were placed in a code scheme. All the highlighted text fragments contribute to answering the research questions. Subsequently, axial coding was used. Here the keywords were reduced to overarching labels that were also placed in a code scheme. This code scheme can be found in the appendix. In the final stage of coding, selective coding is performed. In this form of coding, the answers from different respondents were compared to search for differences and similarities. Finally, these concepts were elaborated, connections were made between the answers of the respondents, and conclusions were drawn. The data analysis was done in Dutch because all the interviews and thus the data were also in Dutch. Because this thesis is written in English, all the findings and quotes from the interview were translated into English. These translations have been reviewed by a fellow student that is an English native speaker to check that there have been no mistranslations.

### 3.4 Reliability & Validity

#### 3.4.1 Reliability

Reliability is about how consistently a method measures something. When a research is done multiple times by using the same methods and with the same circumstances and the same result will come out, a research is considered as reliable (Vennix, 2019). So in other words, are the results of a research repeatable (Bell et al., 2019). In order to have to get this reliability, the questions in the interviews are formulated following an in-depth literature study. The structured questions resulting from the literature study, contributed to a higher reliability of the results. Because the methods in the interview were used consistently, each interview had the same setting. The researcher has had these questions reviewed by two fellow students of the study, so that interpretation or bias of the questions is excluded. During the interviews, the opinion of the researcher was asked multiple times about his preferences with regard to land-sparing and land-sharing. The researcher did not give his opinion during the interviews so as not to influence the answers of the interviewer and to maintain the high reliability.

#### 3.4.2 Validity

The validity of an research tells you to what extent the results really measure what you want them to measure (Vennix, 2019). While making the interview guide the research questions and the research objective were kept in mind. As a result, each possible interview question was tested to see whether it would provide answers or results that could answer the research questions. By doing so, the researcher made sure that the interviews really gave the measurable results that we want to measure. In qualitative research, it is sometimes hard to achieve external validity, so whether the findings can be generalised beyond the research context. This makes it crucial on how people and organisations are selected to participate in the research (Bell et al., 2019). To ensure the external validity of this research, the researcher choose to use a quota sample and tried to interview respondents from both land-sharing and land-sparing. By doing so, the researcher was sure that he got sufficient data from both groups (advocates for land-sparing and advocates for land-sharing) and therefore ensure the validity of the research.

## 4 Results and Data analysis

In this chapter, the results of this research are being discussed. In paragraph 4.1 the visions of supporters of land-sparing and land-sharing about biodiversity will be examined. For land-sparing, using as little land areas as needed with high efficiency is important, and by doing so they contribute to biodiversity conservation. For land-sharing the soil is a very important aspect for biodiversity conservation because the actors in the land-sharing sector see that soil as the beginning for a good biodiversity. The legitimacy in the agricultural forms for sustainability is being constructed differently because both agricultural forms put emphasis on different aspects of sustainability. The emphasis differs on people, planet and profit. Because the ideas, visions and beliefs differ in land-sparing and land-sharing, they also construct legitimacy differently. Paragraph 4.4 will examine at how actors in the land-sparing and land-sharing expect the future. Both actors see a trend going towards land-sharing but there are factors that can withhold this development. All results will be discussed in more detail in the following paragraphs.

### 4.1 How supporters of land-sparing and land-sharing see biodiversity conservation

Practisers of land-sparing have a different vision on biodiversity conservation than practisers of land-sharing. This difference in visions on biodiversity conservation arises from different norms and assumptions that they have and eventually influence the legitimacy construction for agricultural practices. In this paragraph the ideas and visions of practisers of land-sparing and land-sharing on the contribution of land-sparing or land-sharing to biodiversity conservation will be examined. This will create insights on how legitimacy is constructed in the agricultural sector. Land-sparing, for example, assumes that food production must grow in order to satisfy the growing demand for food. In land-sparing, the efficiency will grow primarily by using technology and innovation. For example, in an interview with an advocate for the greenhouse horticulture, the following was said about innovation:

*“In greenhouses, for example, you can absorb light and heat very well and thus extend the cultivation season enormously. This allows you to generate much more yields. As a result, the intensity in the greenhouses has steadily increased in recent years. The innovation in the greenhouses is therefore something in which a lot is invested by greenhouse owners. Huge achievements have been achieved here. In the 1950s, for example, 25 kilograms of tomatoes were grown on a square meter and today that is almost 100 kilograms”*  
(Interviewee 1).

With this high efficiency on a small area, other areas that are biodiversity-rich can be spared and protected from agricultural expansion. Also eco-systems on unused land can be restored to their native ecosystems with higher biodiversity as a result. These effects of land-sparing eventually also contributes to the legitimacy construction for the land-sparing practices. Because actors working in the land-sparing sector believe that this way of farming has positive outcomes for the biodiversity, they see land-sparing as justified and therefore legitimate. It is very important to take a look on whether this high yield actually leads to other areas being spared. This became clear in the following answer in one of the interviews with the innovation centre on the greenhouse horticulture:

*“If you want to create more space for nature or want to limit the further expansion of agriculture, you have to arrange it as a society or as a government in such a way that it is financially feasible. Because otherwise those areas will still be used for agriculture because it has financial benefits to expand.”* (Interviewee 4).

This quote from interviewee 4 shows that the land-sparing sector sees the society and government responsible for creating an environment where expansion of agricultural area isn't needed for farmers to make it financially feasible. Here, the responsibility for biodiversity conservations is placed outside the farmers, which legitimises their current practices because others are more responsible. It stays important that land-sparing will happen. Some unique biodiversity, like for example in tropical landscapes, can only live in undisturbed areas (Laurance et al., 2014). So the species that live here won't be able to live in a landscape used for land-sharing practices. Even land-sharing methods that try to conserve high species richness, face a populations decline when compared to the natural habitat (Phalan et al., 2011). In general the primary habitats are irreplaceable for biodiversity. Land-sparing therefore has a positive impact on biodiversity rich areas (Grass et al., 2019). But to really conserve those biodiversity rich areas, good governance and law enforcements is needed.

Because in land-sparing it is assumed that the demand for food will rise, they focus on producing more food per unit of area. The focus here is to increase the outputs but reduce the inputs as far as possible. These inputs are land, labour but also inputs like fertilizer and pesticides. The sector of the greenhouse horticulture also tries to contribute to a better biodiversity and tries lower their impact on the environment as emerged in an interview with Glastuinbouw Nederland:

*“We are using less and less pesticides for crop protection. We are now focusing very much on native insects as biological pest control. In addition, many plants are pollinated by bumblebees. These bumblebees and their queen all fly into nature after the season and increase biodiversity.”* (Interviewee 1).

Because the land-sparing sector tries to use as little resources as possible they are more environmentally efficient, because their impact per unit of production is lower, for example the kg emitted carbon dioxide per kg of the product is lower. Land-sparing gives priority to the market and is really focused on the supply side. So the supply has to grow more but also environment efficient so with minimizing the environmental footprint. One way to become more sustainable is to create a circular greenhouse, where everything is recycled and reused. This is also something that has already happened, according to the interview: *“Everything we do and produce in those greenhouses has to become circular. To a large extent this is already the case.”* (Interviewee 1). So the interviewee suggests that this reduced use of resources also releases some pressure on nature and therefore is important for biodiversity conservation. This could be positive for ecosystems and biodiversity. The interviewee says that the greenhouses are already circular and therefore thus sustainable. With this view on the sustainability of their operations, they construct legitimacy for land-sparing.

Land-sharing assumes that change in our current diets can reduce the demand for food. This reduction in demand for food will also reduce the pressure on land. This allows a widespread adoption of more sustainable and nature friendly farming such as agroecology and regenerative farming. Land-sharing doesn't see demand as a fixed variable set by the market, but they see it as a variable that can alter through reducing dietary consumption and the reduction of consumption

of products that have a very big impact on the environment (Benton & Harwatt, 2022). The criticism on land-sharing that those practices are too inefficient and can't feed the demand for food are being nuanced by their assumption that the growth of demand will reduce. This assumption legitimises the agricultural practices in land-sharing. As mentioned before agroecological approaches and regenerative farming, that can be seen as forms of land-sharing, have a smaller impact on the environment and biodiversity. The following was said in an interview about the contribution of land-sharing to biodiversity:

*“Through conscious soil management and using as little or no fertilizer and pesticides as possible, soil life becomes healthy. This healthy soil will contribute to more insects which in turn provide for more plants and birds. This creates an increasingly accumulative effect like a sort of inverted pyramid.”*(Interviewee 2).

Because this view of an inverted pyramid where conscious soil use and little use of fertilisers and pesticides have accumulating positive consequences for biodiversity, this way of farming is contributing fully to biodiversity conservation. Next to conscious soil management, also other interventions take place in land-sharing to improve biodiversity:

*“Other interventions also contribute to a higher biodiversity. Think of the flattening of waterways, which also creates a habitat for more insects, but also frogs. Sowing weeds and grassy field margins will attract more insects but can also be a shelter for birds and small mammals.”* (Interviewee 2).

According to actors that are active in the land-sharing sector, the aforementioned interventions are all very beneficial to biodiversity and ecosystem services like pollination and pest control. This is not only beneficial for the agricultural yields but also for biodiversity in the surrounding areas of the farming lands. Regenerative agriculture, also a form of land-sharing, contributes to biodiversity in the following way:

*“We try to support biodiversity by creating a rich web of connections of all kinds of living organisms and ecosystem processes. We do this by growing different types of crops side by side. This ensures more biodiversity and connections in the ecosystem. Ultimately, this also creates a more resilient system that is more resistant to pests, extreme temperatures and rainfall”* (Interviewee 3).

With a good working eco-system the soil is rich of nutrients for the crops to grow on. A good soil biodiversity is what those farmers want to achieve. They achieve this by not using pesticides or fertilisers to create a healthy soil. The following was said about soil biodiversity in an interview with a regenerative farmer: *“Fungi and microbes and worms that are all in the soil and those fungi are the most important, because they enter into relationships with the plants that grow. This ensures that there are sufficient nutrients in the soil and can ensure higher yields.”* (Interviewee 5). In the eyes of proponents of land-sharing, regenerative farming contributes to a biodiversity rich soil.

Land-sharing needs more space to have the same yields as land-sparing (Kremen, 2015). But in contrast to the areas where land-sparing takes place, there is room for biodiversity in the areas where land-sharing takes place. To have a successful management of nature conservation and biodiversity, it is important that the land-sparing and land-sharing are spatially well connected mosaics and connectivity landscapes (Grass et al., 2019). This connectivity is crucial for

success of land-sharing and land-sparing. This is because even large scale area where land is spared fail to sustain an ecosystem with high biodiversity in the long term when the surrounding area is lacking biodiversity and ecosystem services (Halley et al., 2016). So not only the local forms of agriculture influence the state of the biodiversity, but also to surrounding areas are very important for the consequences of the agricultural forms for biodiversity. Land-sparing and land-sharing are complementary. Land-sharing is mostly effective for maintaining ecosystem services in agricultural landscapes. Land-sparing is essential for conserving species that do not go with agricultural practices. But land-sharing can also be crucial for conservation of animals that live in farmlands. Land-sparing on the other hand can ensure specie communities with a high response diversity (Grass et al., 2019).

## 4.2 Constructing legitimacy about sustainability in the agricultural sector

The interviews had contrasting views on what sustainability means. This paragraph will focus on the claims to sustainability of the interviewees. By doing so, one can observe how their preferred model is coded as legitimate. The following perceived definition of sustainability came up in an interview with an proponent of land-sharing :

*“Sustainability is about something that can be sustained. This implies a way in which farmers can continue in the current way of working for the next 10 or 20 or even 100 years without draining the natural resources disproportionate. You also must take into account that it is sustainable in terms of the environment, social aspects, but also that it is economically sustainable.”* (Interviewee 2).

In this interview with a land-sharing proponent, the interviewee also said the following: *“A part of sustainability also relates to the quality of soil, water and air that contribute to biodiversity, to which you as agricultural sector can contribute to.”* (Interviewee 2). Here you can notice that land-sharers really focus on a broad range of aspects when talking about sustainability. These aspects are connected to the earlier mentioned Triple Bottom Line where something is sustainable when people, planet and profit are taken into account. In this quote from interviewee 2, there is an emphasise on the environment and the natural resources. So acting in a way that is sustainable for the environment and that doesn't disproportionately drains natural resources are seen as sustainable and therefore legitimate.

In land-sparing, the visions and ideas emphasize other aspects of sustainability. An actors working in the greenhouse horticulture, and therefore linked to land-sparing, spoke of sustainability in the following way:

*“Sustainability in a circular greenhouse, means that we reuse everything. For example, the rockwool were we grow our crops on is recycled, residual crops are reused for insulation material. In essence sustainability is very much reflected in the greenhouse horticulture.”* (Interviewee 1).

If you compare this quote with the previous quotes, you can already see that there are differences in the interpretation of the concept of sustainability. Whereas the interviewee 2 is taking sustainability in a brother context, like still existing over many years and having effect on natural resources and economics but also the importance of biodiversity for sustainability.

Interviewee 1 is putting sustainability in a context of circularity within the greenhouse itself. Because of these different approaches to sustainability, the legitimacy is being constructed differently.

Economic sustainability is something that comes back in both land-sparing and land-sharing. So for both agricultural practices the affordability of food and the financial feasibility for farmers are important for something to become sustainable. For example, an interviewee working in the land-sharing sector said the following:

*“Sustainability also has an important pillar in the economy, because if the chosen way of carrying out agriculture eventually leads to, or even quickly leads to everyone going bankrupt, then it is apparently also unsustainable.”* (Interviewee 2).

This quote shows that agricultural practices must be profitable in a way that the farmers don't go bankrupt. This vision can contribute to the legitimising of land-sparing practices. The following was said by an interviewee working in the land-sparing sector:

*“Sustainability also means ensuring sufficient yields, so that it is also affordable and of good quality for everyone. Sustainable food security ultimately ensures food affordability. So people must be able to buy affordable food, but the farmers must also be able to earn enough money with it”* (Interviewee 4).

Here ensuring sufficient yields are part of sustainability. Interviewee 4 says that a sustainable food security will ensure food affordability for everyone. This view on agriculture will legitimise land-sparing because in this agricultural form there is an aim for high yields. In the land-sharing sector there are different views on this economic sustainability. An interviewee, also a proponent of land-sharing, said the following about this:

*“Yes, the food will be a bit more expensive, but that's the way it should be, because it takes a lot of effort and energy to produce this food. Pay just a little more for your food and make the world a better place as it once was, said in terms of nature and biodiversity. That is what you should want as humanity, that is also sustainability.”* (Interviewee 5).

According to this interviewee's beliefs, it will cost something to be or to become more sustainable. To be more sustainable is perceived by the interviewee to come with more economic costs. In the point of view of the interviewee, this is the case: *“The needed pathway towards a more sustainable world isn't the cheapest way.”* (Interviewee 5). Both used definition of sustainability are using an economic component as a strong point within sustainability. There is a difference within the way the economic component is used. Whereas one is using a broader, more macro economics, definition “Affordable for everyone”. The other is using a narrow, more micro economics, definition “Comes at a price”. Basically, we see a society oriented used definition versus a company used definition. Because in both examples there is a different perceived definition of economic sustainability the interviewees both see their preferred agricultural form as legitimate.

Another definition of sustainability that wasn't found in the literature came from the interviews. A definition of sustainability from an interview came with someone working in agroecology:

*“You could place sustainability on a scale of action. On the one hand you have degenerative acting where we exhaust the nature, mainly focused on control, extraction and dominance. On the other hand, you have regenerative acting. That is about what you can add, what you can build yourself, how you can strengthen the ecosystem, make it richer and where life will support even more life. In the middle of this scale is sustainability where you try to create as little damage as possible for the environment.”* (Interviewee 3).

This vision also prefers not to strive for sustainability only, but rather to go a step further and therefore act regeneratively. This is also apparent from the following quote from the same interviewee: *“Sustainability is a kind of social concept. We must indeed come a long way, but we should actually strive for regenerative acting”* (Interviewee 3). This is an example of a broader society as whole used definition. Because this view that we as a society must take a step further and also try to contribute to the environment, regenerative farming becomes legitimate for interviewee 3. Also another interviewee working at an regenerative farm said the following:

*“In my view, sustainability does not cover the load well enough. Being regenerative, that's what we must do. We must make the world a better place, not that we are trying to be less bad, because this means that there are still bad things going on. So acting regenerative instead of making it more sustainable”* (Interviewee 5).

#### 4.3 Legitimising agricultural practices: Tradition, feeding others and contributing to nature and biodiversity

In this research it was mentioned before that Montenegro De Wit & Iles (2016) have the following definition of legitimacy: *“Legitimacy, put simply, means that people accept something – knowledge, norms, customs, or technologies – as credible and authoritative, and express or practice it widely”* (p.2). In this paragraph it is examined which beliefs, visions and assumption are creating legitimacy for the choice of the actors to choose for land-sparing or land-sharing practices. Why do they see their form of agriculture as the norm and the accepted? There are many factors that influence the farmer's decision for his form of agricultural practice. All those factors are related to legitimacy. These factors influence how and whether farmers legitimize their agricultural practices. This paragraph will connect the factors of influence mentioned in the theoretical framework to the given answers by the interviewees. At first we will take a look on how the actors working in the land-sparing sector see their operations as legitimate. Someone working in the greenhouse horticulture said the following about the economic factors:

*“You can see that the costs are increasing in the sector, for example the cost of energy. But the yield remains the same. Then you must produce more and expand. Governments are of course always encouraged to keep food cheap. Because if you actually calculate it, a carton of milk should already be € 10. But that is socially unacceptable and so you must work on a larger scale to lower the cost price per unit.”* (Interviewee 1).

This quote shows how the expansion and increases in intensity in the agriculture are justified. The actors that are active in the land-sparing see high prices for food as socially unacceptable. Therefore they need to intensify their operations in order to maintain the low prices for food. This expansion is not only taking part because the food prices must stay low with an eye on the

society, but also for farmers to get by economically. This view on the food-system plays a role on legitimising the agricultural sector because farmers see it as a must to expand and intensify their practices because of social and economic pressure. Also, the following quote ties into the same economical factor: *"We will soon have 10 billion people to feed. That is a huge task. So, I am firmly against forms of extensive farming because only a small group can afford it. But people with a lower income should also be able to buy healthy food at affordable prices."* (Interviewee 4). This appeal to feeding the world signifies that farmers have to use intensive agricultural practices in order to produce healthy food at affordable prices. Because this is seen as the norm, it also legitimises land-sparing. The actors in the land-sparing practices also feel a need to produce food for the world. This is evident from what was said by interviewee 1, an advocate for greenhouse horticulture that is a form of land-sparing:

*"The motivation for this form of production is also that it contributes to a primary need for life. Food is a primary necessity of life. In some countries people are hungry or even worse starving by a lack of food, we can't imagine that here. With this food production, you can contribute to the lives of others. That's really essential"* (Interviewee 1).

The practices that farmers use are strongly linked to tradition and habits, appears from the following: *"Traditions are very big in agriculture. Often you simply work on the basis of what you have learned over time from your father and mother. Those traditions go on for a long time."* (Interviewee 4). This big influence of tradition on the agricultural practices justifies the way they operate. The farmers see their practices as the norm and the accepted because this is what they have learned. It is mainstream for them. People from the land-sparing sector believe that they are growing the most sustainable food. This strong belief in the sustainability of their operations is based on assumptions and an important driver for the legitimising process of land-sparing. Despite this belief the actors in the land-sparing sector don't feel the confidence of the citizen, as can be seen from the following:

*"It would be nice if the citizens had a little more confidence in the farmers. They often talk about the use of crop protection products. But we are very subject to strict rules on the use of crop protection products. But what they forget is that we grow the cleanest and most sustainable food here."* (Interviewee 4).

We can see that the factors that influence the farmers choice for their agricultural form used by Lastra-Bravo et al. (2015) and explained in paragraph 2.1 are coming back in different phrases of the interviewees words quoted above. These factors influence the vision of farmers on what is the norm and the accepted and therefore these factors help to construct legitimacy:

The economic factors are coming back in the following phrases of the interviewee:

- *"Cost are increasing", "If you actually calculate ...", "To lower the cost price per unit", "people with a lower income should also be able to buy healthy food at affordable prices"*

The Farm structure is referred to by the following phrases:

- *"Yield remains the same", "produce more and expand", "work on a larger scale"*

The Farmer's characteristics, connected to their beliefs, can be seen in the phrases:

- *'The motivation for this form of production is also that it contributes to a primary need for life.', "I am firmly against forms of extensive farming", "Traditions are very big in agriculture. Often you simply work on the basis of what you have learned"*

The Farmer's impression is referred to by the following phrases:

- *"It would be nice if the citizens had a little more confidence in the farmers."*

The Social context is mentioned in the phrases:

- *"Governments are of course always encouraged to keep food cheap ", "socially unacceptable", "it contributes to a primary need for life. Food is a primary necessity of life"*

Now we will take a look on how the actors working in the land-sharing see their operations as legitimate. Because the land-sharing sector has different beliefs, assumptions and norms they also create legitimacy differently than the land-sparing sector. A proponent of agroecology, a form of land-sharing, said the following:

*"Agroecology is away of farming where the agriculture contributes maximal to nature and nature contributes maximal to the farmer's business. In this way we can take care of nature and at the same time we can also ensure that the farmers will earn enough to live from it "* (Interviewee 2).

This quote shows that land-sharers believe that the way of farming they use is contributing maximal to nature and the farmer's business. This positive assumption about land-sharing creates legitimacy for land-sharing. According to interviewee 2, there is a need for farmers to follow social trends in order to survive. In this interviewee's eyes there is a trend ongoing towards land-sharing. This also legitimates land-sharing because land-sharing practices like agroecology are accepted by the society and seen as the norm:

*"With agroecology you also try to involve people more and make them aware of agriculture. Farmers are now often seen separate from the society and often designated by politicians as part of, for example, the nitrogen problem. While the farmers are the solution. Ultimately, the farmers are the producers of food. But you can only continue to do so if you are accepted in the environment in which you make it. If you don't adapt to the social trends you know for sure that you have no long term possibility to sustain and the current trend is land-sharing."* (Interviewee 2).

The interviewee then also explained why this trend is so important:

*"We need biodiversity for human survival. We are convinced of that. We are also part of the entire pyramid, and if biodiversity as a basis is disappearing. Then it won't work out for us either. The realization also threatens to lose that you are part of an ecosystem and do not exist next to an ecosystem. If you see that sustainability is very important for biodiversity. And you see that biodiversity takes place and starts with the soil and you see that agriculture uses a lot of the soil. Then the connection is quickly made and with land-sharing you can make a very large contribution to biodiversity and thus to the survival of the planet and humans."* (Interviewee 2).

This quote shows the influence of the factors in the field of social context and the farmer's impression about agricultural forms. You can also connect these visions and ideas to the earlier mentioned dimensions of legitimacy. The ethical dimension where this farmer justifies his practices by saying it is needed for human survival and therefore morally just. This acting connected to the ethical dimension of legitimacy is also emphasized in the following quote:

*“My motivation was love and care for the future generations. And that's really all I want to do. I believe that money is unimportant. I think that everything else is unimportant, but to leave a world behind for the people that I love and all the people who resembles them, but also for the animals and the plants.” (Interviewee 3).*

This interviewee thus believes that land-sharing is an option to act sustainable and create a good future for the generations to come. This is connected to the ethical dimension of legitimacy, because it is moral just to act sustainable and create a good future for future generations. As a result, legitimacy is constructed through the ethical dimension of legitimacy. The belief behind the form of regenerative farming goes one step further as can be seen from an earlier cited quote:

*“In my view, sustainability does not cover the load well enough. Being regenerative, that's what we have to do. We have to make the world a better place, not that we are trying to be less bad, because this means that there are still bad things going on. So acting regenerative instead of making it more sustainable” (Interviewee 5).*

Here it becomes clear that the vision from this interviewee is that there is a need to make the world a better place. This could be possible by using regenerative farming, a form of land-sharing. Because of this strong belief regenerative farming is being legitimised. Not only sustainability reasons are mentioned for the choice for land-sharing, health reasons due to nutrition also play a role:

*“That is food from regenerative agriculture (a form of land-sharing) has a much higher nutrient density than food from conventional agriculture like monocultures. And the reason for that is that with regenerative farming you leave the soil alone, you don't plow, you don't disturb to soil so to speak. As a result, a kind of fungal network builds up and a gigantic universe of soil life. That soil life ensures that plants can optimally absorb nutrients and you see that reflected in the food. This makes the food much healthier. People become healthier when they eat regenerative foods. That's just a fact.” (Interviewee 5).*

This reason for their choice for the form of agriculture they are practicing is connected to the social factors because this is connected to the (social) knowledge of the farmer. The belief of interviewee 5 is that food from regenerative farming is healthier than food produced by land-sparing practices. Because of this belief, legitimacy for land-sparing is being constructed.

#### 4.4 How land-sparing and land-sharing see the future development in agricultural practices and therefore biodiversity

This paragraph will take a look at the expected future of land-sparing and land-sharing practices. How will legitimacy steer towards development of either land-sparing and land-sharing? And what will the consequences of these developments be for biodiversity in the Netherlands? In the interviews it has become clearer how legitimacy is being constructed in the agricultural sector. The influence of other factors has also been taken into account in the expected future. Because of the literature review, the effects of land-sparing and land-sharing on biodiversity has become more clear. Therefore it is possible to estimate how legitimacy will influence the future

development of agriculture and therefore on biodiversity. Several interviews have shown that the interest in land-sharing has grown in the last decade:

*“Twelve years ago, I started working on regenerative agriculture. At this moment there is already much more knowledge in this area than twelve years ago. When I started, everyone gave me a blurry look when I mentioned this. But now the knowledge about this and the importance of these forms of agriculture are starting to get through to many more people... Right now the conventional agriculture is the norm and most accepted, but at this moment there is a shift going on, you notice that in everything”* (Interviewee 3).

This change is also apparent from the following quote: *“I see that social trends are changing. The farmers want to change, but sometimes they don't know how. And the available rewards for this type of activity are also poorly developed. So there are still things that can be improved”* (Interviewee 2). These quotes imply that there is a shift towards more legitimacy for land-sharing happening. When land-sharing gets more space to develop it could have positive effects on the environment. These effects will also reinforce each other and can create multiplier effects according to interviewee 3: *“If there is more space for ‘land-sharing, we will have an enormous effect on biodiversity and climate adaptation and on cleaner water and better soil. This gives us a kind of multiplier effects, this will strengthening each other on many fronts.”* (Interviewee 3).

Laws and regulations are becoming stricter in agriculture in order to protect the nature and his biodiversity. One example of policy where laws and regulations are becoming stricter is the Farm to Fork Strategy. In this strategy the use of pesticides and fertilisers must decrease drastically. This legislation has a huge impact on land-sparing practice according to interviewee 4:

*“All kinds of new legislation, such as the Farm to Fork Strategy, limit us very much. If we really need to follow this strategy we will simply produce half as much because the strict rules about fertilisers and pesticides. Here they say that we have to use half less crop protection by 2030, 20% less nutrient losses and 20% less use of fertilisers and that much percent more organic cultivation and that much percent less use of antibiotics. But you do need time for this transition if you want it to happen in a proper way. Alternatives must also be sought ”* (Interviewee 4).

According to this quote there is a trend in agricultural policy towards a more sustainable and nature-friendly sector. This trend can be beneficial for the environment and biodiversity when farmers are able to meet the goals that are set in this legislation. But as you can see in this quote this also brings some adaptation problems for the farmers. This change in policy is also confirmed by actor working in the land-sharing practices: *“If you see politics as a good reflection of society, you can conclude that there is an increasing interest in land-sharing. So we are moving along with the social trend towards more sustainable agriculture.”* (Interviewee 2). Because both proponents of land-sharing as well of land-sparing see this trend, this trend actually seems to happen.

In the land-sparing sector the farmers are looking to reduce their impact on the environment. At this moment the greenhouse horticulture uses gas to heat up their green houses. Burning gas for the heat emits carbon dioxide and is therefore playing a role in climate change. The sector is trying to move away from using fossil fuels:

*“We also want to get rid of fossil fuels. We've wanted that for years. But we then need permits from the government to be able to drill for geothermal energy, so that you can*

*still bring heat into the greenhouse with geothermal energy. Due to Dutch law and regulations, it is very difficult to lay the pipes for this. There is also a lot of pressure from society for more sustainable business operations, but this is made difficult by the Dutch government because they don't give permission to lay the pipes.” (Interviewee 1).*

The answer of the interviewee makes it clear that there are plans to make the land-sparing practices less polluting. This decrease in pollution could be beneficial for the biodiversity but due to lack of permission from the government this didn't happen yet. Whether the government will give these permissions with less pollution as a result is difficult to estimate.

The legitimacy change is still difficult to see in the supermarket because the buying behaviour is not changing a lot.:

*“Unfortunately, the average citizen is too little concerned with how food is produced. Everyone says that they always want sustainable and organic food. But the sustainably grown Dutch tomatoes are more expensive than the less sustainable Spanish tomatoes. So all say that they want sustainable food, but they often opt for the cheaper alternative.” (Interviewee 1).*

The price of a product has a lot of influence on the buying behaviour. Without change in the buying behaviour, actual change in the agricultural system is difficult. The quote from interviewee 1 claims that this change in legitimacy is not changing the buying behaviour before food that has been produced with land-sharing becomes cheaper. Also interviewee 4 believes that this change in buying behaviour is dependent on the affordability:

*“As a member of society, everyone chooses food from agroecology. That is because it sounds good, it is good for the environment and animals. But as a consumer, someone makes different choices. Because 80% will still choose the cheapest product. This also makes it difficult to sustain forms of land-sharing economically.” (Interviewee 4).*

The economic factors therefore limit the development of land-sharing practices because those products are more expensive. By connecting these insights about predictions of the future and the known effects of land-sharing and land-sparing on biodiversity, you are able to make a prediction of the consequences for biodiversity.

The interviews show that the interviewees see a future where land-sparing and land-sharing can exist along side each other. The most future-proof implementation of the agricultural sector is not an agricultural sector where only land-sharing or only land-sparing takes place. The following interviewee says the following about this:

*“I think the biggest mistake we can make is to define how each farmer should farm. And then maybe find out in 50 years or more that maybe that wasn't such a good idea after all. We have an interest in diversity in our food production, because we simply do not know how the future will unfold. We're just really bad in predicting the future. So by the different agricultural practices we use, we can also absorb unexpected events.” (Interviewee 2).*

Another interviewee working in the land-sharing sector had the same vision about land-sparing and land-sharing existing next to each other:

*“That's what we all want, to leave behind a better world. I think also land-sparing could also coexist next to land-sharing for a time. This coexistence of land-sparing and land-sharing could also lead to very interesting cross-pollinations. So I don't think one is necessarily bad or the other good. I think it is just important that you could almost see that as a kind of socio-economic diversity that it at least has the possibility to develop fully and not that we can use all kinds of agricultural subsidies to help to develop only one agricultural system like we did in the past with land-sparing..... I think we are now in fortunate circumstances where the government does not exactly know where to focus on regarding subsidies for land-sparing or land-sharing. So I believe that for both land-sparing and land-sharing money is becoming available to possibly support the sector.”*  
(Interviewee 3).

The answer of this interviewee also shows that the current policy of the Dutch government isn't particularly steering towards land-sparing or land-sharing. This is also very important to take into account when trying to predict the agricultural practices that will be used in the future and eventually their consequences for the biodiversity.

## 5 Conclusion

The main research question in this thesis was: *How is legitimacy being constructed in the land-sparing and land-sharing practices in the Netherlands and what are the consequences for the biodiversity?* In this chapter the main research question and the sub-questions will be answered by using the analysed data and results from the interviews and the theoretical framework. In the literature there is no unambiguous definition of the concept of legitimacy. In this thesis the researcher has used the following definition of legitimacy: “Legitimacy, put simply, means that people accept something – knowledge, norms, customs, or technologies – as credible and authoritative, and express or practice it widely” (Montenegro De Wit & Iles, 2016).

In the first sub-question the effects of land-sparing and land-sharing on biodiversity stood central. In the data collected from the literature research and from the interviews different effects of land-sparing and land-sharing emerged. Land-sharing is very important for provisioning the ecosystem services in the agricultural areas, but also in the surrounding areas. Two important ecosystem services are animal crop pollination and biological pest control (Grass et al., 2019). Different practices as agroecology and regenerative farming have a positive impact on the complex biodiversity in the soil. The combination of the high soil biodiversity and the ecosystem services, creates a resilient ecosystem with a higher biodiversity. There are some species that can't live in agricultural landscapes and therefore can't live in areas with land-sharing. This can be a pitfall because for the same yield within land-sharing you need more land area. Land-sparing expels almost every organism from the farming fields and extract a lot nutrients from the soil that can't be generated in this form of agriculture. But because of the high yields in the land-sparing sector, other areas of land can be spared. Unused land can be restored to their native ecosystem and further expansion of agriculture into biodiversity rich areas can stop (Benton & Harwatt, 2022). In land-sparing, fertilisers, pesticides and machinery are more common to use. The use of this has negative impacts on biodiversity because for example pesticides will kill more than only the target species. The pesticides can eventually accumulate within organisms and damage the state of biodiversity. It is very important to keep in mind that the effects of land-sparing and land-sharing on biodiversity are dependent on the scale of the practices and the land use of the surrounding areas. For a good and healthy biodiversity, there is connectivity needed between areas with biodiversity and nature.

The second sub-question focused on how actors working in the land-sharing and land-sparing sector constructed legitimacy about the sustainability of their operations. Many different factors emerged in the interviews that the farmers used to legitimise their agricultural operations. Some reoccurring factors were law, tradition, personal motivations but also economic factors played an important role. Those factors play a role in legitimacy construction and contain all assumptions, visions and norms that farmers have. The factors can be groups in economic factors, farm structure and characteristics, farmer's characteristics, farmer's impression about agricultural forms and finally the social context. In the interviews, it became clear that the respondents had many different perceived definitions of sustainability. Because of these different definitions of sustainability, the actors were able to legitimise the sustainability of their operations in different ways based on their assumption, visions and beliefs. For people working in the land-sparing sector, economic sustainability is very important. Because land-sparing practices have very high yields with relatively low costs, they are able to produce cheap food and can thus guarantee economic sustainability. This affordable food is necessary because actors in the land-sparing sector see higher prices for food as socially unacceptable. This view legitimises their practices

because they say that higher production can ensure low food prices. The actors in the land-sparing sector feel a need to feed the world. A sustainable food system is in their eyes producing sufficient yields so there will be affordable food available for everyone. This view is also connected to the social side of legitimacy. These ideas about social and economic sustainability justify the practices used in land-sparing and thus create legitimacy. The importance of economic sustainability also applies to the farmers themselves in order to survive economically and don't go bankrupt. Also, the use of as little as possible resources seemed to be very important for people working in the land-sparing. This importance for efficiency is connected to their interpretation of sustainability. These assumptions, beliefs and norms are important drivers for legitimacy construction. Tradition is an important factor for legitimising agricultural practices in the land-sparing sector, because farmers use the same practices for years because that is what they have learned. Farmers see their own practices as the norm. This big influence of tradition on the agricultural practices justifies the way they operate and therefore creates legitimacy.

People working in the land-sharing sector had different definitions of sustainability. A lot of the actors that are active in the land-sharing sector also included the conservation of nature and biodiversity as a crucial part of sustainability. The agricultural practices used by land-sharing have a positive impact on the local biodiversity even though they need more land to have the same yields as land-sparing. This made their way of agriculture sustainable in their eyes and therefore legitimate. Some actors in the land-sharing sector even want to go a step further than sustainability. They perceive sustainability as a concept where you try to minimise the negative impacts on nature and the environment. These actors believe that we need to do more. In their view we must make the world a better place and also try to look at what we can add to the nature and the environment instead of looking what we can extract. Here the ethical dimension of legitimacy is playing a big role in constructing legitimacy. Actors in the land-sharing see their practices as the moral just and therefore legitimate.

The third and last sub-question was about the expected future of land-sparing and land-sharing and their consequences for biodiversity. In the interviews emerged that actors notice a change towards more sustainable forms of agriculture. In the last few years the interest in land-sharing practices grew. This trend is expected to continue. When this happens the soil will become healthier. With the assumptions of the actors in land-sharing that a healthy soil is the basis for a high biodiversity, this will have a positive impact on the environment and the biodiversity. By emphasising cyclical and not extractive processes, we can create conditions for land-sparing where it can be seen as the new normal. Next to this growing interest in land-sharing the policy for the agricultural sector becomes stricter. Because of those strict laws and regulations farmers are forced to use less fertilisers and pesticides. This also indicates that there is a shift in legitimacy towards land-sharing practices. But there are some circumstances that might limit this legitimacy shift from developing. This has everything to do with economical aspects. People tend to buy the food as cheaply as possible. When a product grown with land-sharing is more expensive than a product grown with land-sparing, most people will buy the cheapest product even though their vision might better fit with land-sharing. The price of a product has a lot of influence on the buying behaviour. Land-sharing practices will be difficult to sustain economically, when legitimacy change won't lead to a change in buying behaviour. Actors of both land-sparing and land-sharing believe in a coexistence between those two forms of agriculture. This could even lead to very interesting cross-pollinations. So a future where only land-sparing or land-sharing will develop and exist is unlikely.

Now we go back to the main research question of this thesis: *How is legitimacy being constructed in the land-sparing and land-sharing practices in the Netherlands and what are the consequences for the biodiversity?* Legitimacy is being constructed by a lot of different factors. Beliefs, visions and assumptions all decide what people see as the norm and the accepted. When one sees an agricultural form as the norm and the accepted, it gains legitimacy. With this legitimacy agricultural practices become authoritative and credible. This legitimacy gives the agricultural practices space to exist and will allow widespread use of these practices. The way how people interpret or perceive definitions of biodiversity conservation or sustainability is key for constructing legitimacy. When people for example lay more emphasis on the economic sustainability instead of social or environmental sustainability, a complete different agricultural form can become legitimate.

This can also be connected to the dimensions of legitimacy. The differences in beliefs, visions and assumption will decide the extent to which the norms and standards are justified (ethical dimension), legitimate (legal dimension), recognised (political dimension) and accepted (social dimension) by all. So this means to what extent for example tradition, the need to produce affordable food for everyone and the level of contribution to nature and biodiversity are being justified and seen as legitimate. With the current trends in agricultural practices it seems that land-sharing is becoming more mainstream. There is more interest in land-sharing methods and policy is limiting the use of fertilisers and pesticides. This reduced use of fertilisers and pesticides will have positive outcomes for the biodiversity in the Netherlands. This will create a healthier soil and can also improve biodiversity. Because there is still a lot of legitimacy for land-sparing practices these will likely continue to exist and develop. This will have negative impacts on the biodiversity of areas where land-sparing is being practiced but this will create high yields that allow other areas to be spared or to be used for land-sharing where the biodiversity can maintain. But as mentioned before the consequences of land-sparing and land-sharing on de biodiversity are still dependent on the land use of the areas around the agricultural practices and the connectivity of those areas with other places with nature and biodiversity.

Based on the literature review and the interviews, we can see that there is a slight change towards more legitimacy construction for land-sharing. The legitimacy construction for agricultural practices should be always viewed with the background of the actors in the agricultural sector. Because people use their own interpretations of different concepts like biodiversity and sustainability, they legitimate agricultural practices in a different way. By doing so they also create legitimacy for different agricultural forms. However, understanding these different interpretations, assumptions, norms and beliefs and their influence on legitimacy construction can lead the way to a more sustainable agricultural system.

## 6 Discussion and reflection

In this chapter will reflect on the research process by taking a look to what went well and made the research strong but also by taking what could have been improved. The advantage of this qualitative research by means of using semi-structures interviews is that the researcher was able to further refine the questions during the research. This made is possible to ask more questions when the interviewee said something useful for the research. By doing so a lot more useful data had been collected. In this research there was only one person that conducted the interview and analysed the data. This could have led to some biases on the part of the researcher influencing the research. The reliability may have decreased as a result. But this bias has been reduced by formulating some pre-structured questions. When someone else redid this research, this researcher bias could possibly led to different results. Only having one researcher also had some advantages. The advantage is that the researcher approached all the interviews in the same way and asked the same type of questions. Next to that the interviews were analysed the same way. This means that there is no difference in the way the interviews were held and analysed.

Because the quota sample consisted on only eventually only 5 respondents in total it is difficult to generalise the assumptions, beliefs and visions that contributed to constructing legitimacy over the whole population. The amount of interview is to limited for that. But the insights that have emerged from this relatively small sample do provide enough leads to do further research on this subject. The researcher has noticed that not all respondents are following the land-sharing and land-sparing practices as described in the literature. The form of agriculture where the respondents were working in can be categorised in land-sharing or land-sparing so that did not cause any problems. The respondents did not all made a conscious choice for land-sparing or land-sharing. The form of agriculture is sometimes determined by the type of product. For example, in the Netherlands you are almost not able to produce every kind of fruits or vegetables outside a greenhouse. It is important to take this into account in the selection of respondents in a follow-up study. The researcher approached many potential respondents. For various reasons, as described in the methodology, potential respondents did not participate in the research. Because of the low willingness to participate in this thesis, only five interviews were conducted instead of the preferred six interviews. Because the researcher only got answers from two actors that are active in the land-sparing sector, it became more difficult to generalise the findings over the rest of sector. Therefore the external validity of this research could have reduced. It may be that the respondents who took part in the research have an explicit opinion regarding the purpose of this research and want to express their vision and beliefs it. It is possible that this opinion is overrepresented in the group of respondents. On the other hand, it may also be that respondents have thought less about it and may not have formed a clear opinion yet and are trying to obtain this through the research. It is unclear to what extent either target group is overrepresented in this study.

The literature is not giving an universal definition for sustainability. Also in the interviews we see that many different answers were given to the question of how they saw sustainability. This makes it difficult to take solid conclusions on the answers from the interviews. The answers should always be seen within the context of the interviewee's perceived definition of sustainability. Coming back to land-sparing and land-sharing it is seen that their supporters both see their way of carrying out agriculture as sustainable and good for the environment. This raises some questions as both forms of agriculture are extremely different and can also be seen as opposites. What is the definition of sustainability for both forms of agriculture? And how does this

construct legitimacy for the sustainability of their operations? Next to the perceived definition of the interviewees of sustainability, legitimacy also influences peoples view about sustainability. This is because legitimacy can set norms or influence what is mainstream. The values people have about sustainability influence the behaviour of those people and the choices they make. When the group of people having the same values of sustainability comes to a certain size, this will eventually influence policy- and decisionmakers and farmers. Influencing policy- and decisionmakers will lead to new regulation supporting the way people look at sustainability. It is clear that the values about sustainability influence the agricultural practices and influences the legitimacy. There is an interdependency between sustainability, legitimacy and how these terms are perceived by groups within the public and the agriculture. From the interviews themselves it is indeed very clear that the interviewees used different definitions when answering the questions. This study as such is not representative enough to make these solid conclusions. Still there is a tendency visible to take some conclusions on how people are constructing the legitimacy and see sustainability in the agriculture sector.

Further research could also include quantitative data to measure the effects of land-sparing and land-sharing on the biodiversity in the Netherlands. This will give a better view on the numerical effects of those types of agriculture on the biodiversity. Next to that it is important to do some further research on whether forms of intensive farming actually lead to land being spared in other areas. Because the Netherlands export a lot of agricultural products is also possible that land is being spared in other countries than the Netherlands. This was not included in this research because this research only focused on the agricultural practices and the biodiversity in the Netherlands. An important thing to consider is that the areas where land-sparing is practiced there is very little biodiversity. The big fields with monocultures and greenhouses expel almost every other species from living in this area. So land-sparing has a huge negative impact on biodiversity in the places where it is carried out, but with good governance it can lead to the necessary preservation of places with a high biodiversity. All the actors that were working in the land-sparing sector were not aware of any land being spared because of their intensive high yielding forms of agriculture. It is important to investigate this further because it has a huge influence on the effects of land-sparing on biodiversity. Without land being spared, the whole idea of land-sparing practices is gone.

In the theoretical framework emerged that land-sparing and land-sharing both have a strong assumptions about the demand for food in the future. Land-sharing has the assumption that the global demand for food will rise. Because of this the land-sparing practices are justified and legitimised because the high yields in land-sparing will cover this rising demand for food. Land-sharing has the assumption that we can reduce the demand for food by adopting more healthy, sustainable and plant-based diets. With this assumption the lower yielding land-sharing practices can be justified and legitimised. Further research can look at which future scenario is the most realistic because this is very important for success of these agricultural practices. When it is clear which assumption is the most realistic for the future, this could also play a huge role in constructing legitimacy for land-sparing and land-sharing. This knowledge is important because it can influence the legitimacy and therefore has consequences for biodiversity.

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## Appendix 1

### Interview guide

<p><b>Interviewer:</b> Job Delhaes</p> <p><b>Type interview:</b> Semi-structured interview</p> <p><b>Subject:</b> Legitimacy construction in land-sparing and land-sharing and the consequences for biodiversity</p>	
<b>Introduction</b>	
<ul style="list-style-type: none"> <li>• Mijn naam is Job Delhaes en studeer Geografie Planologie en Milieu aan de Radboud Universiteit in Nijmegen. Op dit moment ben ik bezig met het schrijven van mijn scriptie over de opbouw van legitimiteit en de ontwikkeling van twee verschillende soorten van landbouw, namelijk "land-sparing" en "land-sharing". Met legitimiteit bedoel ik hoe bepaalde aannames, normen en overtuigingen iemand zijn keuzes rechtvaardigt. Bij land-sparing spreken we over vormen van hoogproductieve landbouw waar dat op een relatief klein oppervlak wordt verbouwd, zoals glastuinbouw Bij land-sharing spreken we over vormen van landbouw die een lagere productiviteit hebben op een relatief groter gebied zoals bijvoorbeeld agro-ecologie waar meer aandacht wordt besteed aan biodiversiteit.</li> <li>• Het interview zal ongeveer een half uur tot 45 minuten duren. Als u geen bezwaar heeft neem ik het interview graag op.</li> <li>• Heeft u nog vragen?</li> </ul>	
<b>Central questions</b>	
Choice for agricultural form	Kunt u de vorm van landbouw die u bedrijft of waar u zich mee bezig houdt beschrijven?
	Wat is uw persoonlijke motivatie voor dit werk?
	Waarom kiest u voor deze vorm van landbouw? (wetten, traditie, persoonlijke ervaring en ervaring van anderen ,wetenschap)

15 min	Wat is de invloed van de wetten en regelgeving op uw keuze voor deze vorm van landbouw?
Assumptions, beliefs and norms	Wat verstaat u onder duurzaamheid
	Wat maakt deze vorm van landbouw duurzaam?
	Hoe draagt deze vorm van landbouw bij aan behoud van biodiversiteit? (of wat is de invloed van deze vorm van landbouw op de biodiversiteit)
	Is deze vorm van landbouw in uw ogen duurzamer dan een andere vorm van landbouw en waarom?
	Welke vorm van landbouw heeft in uw ogen de meeste legitimiteit (meest geaccepteerd in de maatschappij, de norm) en waarom?
15 min	Hoe kijkt u aan tegen land-sparing (of land-sharing)?
Expectations for the future	Door welke factoren denkt u dat de keuze voor de vorm van landbouw wordt bepaald in de toekomst?
	Wat is uw visie over de transitie naar een duurzaam en toekomst bestendig landbouw systeem?
10 min	Wat voor een effect zullen de ontwikkelingen in de landbouw hebben op de biodiversiteit in Nederland?
<b>Closing</b>	
<ul style="list-style-type: none"> <li>• Dit waren alle vragen die ik voor u had dus ik wil het interview afronden. Heeft u nog vragen of opmerkingen?</li> <li>• Dan wil ik u hartelijk bedanken dat u de tijd heeft genomen voor dit interview en mij te helpen bij mijn bachelor scriptie. Ik wens u nog een fijne dag.</li> </ul>	

## Appendix 2

### Code scheme

Code Group	Codes
Dimensions	Ethical dimension
	Legal dimension
	Political dimension
	Social dimension
Perception Sustainability	People
	Planet
	Profit
Legitimacy construction	Tradition
	Law
	Personal experience
	Assumptions
	Visions
	Norms
Effects for biodiversity	Negative impact land-sharing
	Positive impact land-sharing
	Negative impact land-sparing
	Positive impact land-sparing
Factors that influence farmers choice for agriculture	Economic factors
	Farm structure and characteristics
	Farmer's characteristics
	Farmer's impression about agricultural forms
	Social context