

Understanding Biodiversity

A critical evaluation of the development of the biodiversity monitor for dairy farming in the Netherlands



(De Oude Molen, z.d.)

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Summary

This Master's Thesis about the biodiversity crisis starts with the question what biodiversity actually is. Therefore, this research starts with introducing the concept of biodiversity and the global biodiversity crisis. Since the question 'what is biodiversity?' is of course way too broad for a single Master's Thesis, this question is specified more in detail. This research makes use of a case study: the biodiversity monitor for dairy farming in the Netherlands. In 2014 in the Netherlands, research started with developing a so-called biodiversity monitor for dairy farmers. Simply explained, the main principle of the biodiversity monitor is the formulation of 7 Critical Prestation Indicators. One example of such an indicator is having a percentage of grassland as a dairy farmer. When a dairy farmer in the Netherlands 'scores well' on these indicators, he or she will be financially rewarded (e.g. by financial banks). The goal of this monitor is biodiversity restoration in the Netherlands. This Master's Thesis critically evaluates the process of the development of this biodiversity monitor. This critical evaluation consists of researching how inclusive this process was regarding including Critical Prestation Indicators and involving actors. Examples of involved actors are the Wereldnatuurfonds, FrieslandCampina, and the Rabobank (they initiated the project of the biodiversity monitor). The problem statement in this research concerns the limited inclusion of actors and indicators in the biodiversity monitor for dairy farming in the Netherlands.

This thesis makes use of two theoretical frameworks: the Actor-network theory and the Policy Arrangement Approach. The actor-network theory is applied to the global biodiversity crisis, where different philosophers and their thoughts are discussed, related to this crisis. The Policy Arrangement Approach is applied to the biodiversity monitor, where there is a focus on relevant actors and their power in the biodiversity monitor. Next to this extended theoretical chapter, the results chapter consists of a document analysis and interview analysis. Documents about the biodiversity monitor are analysed, where the development of the process of the monitor is researched. Next to this, 10 important actors of the biodiversity monitor are interviewed. These conversations are analysed in the interview analysis, where the different (and conflicting) perspectives of interviewees are explained. The conclusion of this research formulates an answer about the inclusiveness of the biodiversity monitor for dairy farming, regarding the inclusion of indicators and actors.

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1. Introduction to the research

'There's still time to stop one million of the planet's plants and animals from vanishing forever – but not very much'.

This alarming quotation is stated at the website of *Earthjustice*, a non-profit public interest organisation concerned with environmental problems. One of these environmental problems is the loss of biodiversity. To delve into the complex world of biodiversity and to understand the problems of this loss, it is primarily important to comprehend what biodiversity actually is. It was in 1916 when for the first time the term *biological diversity* was used. J. Arthur Harris used this term in a journal article called *'The Variable Desert'* (Harris, 1916). However, it was in 1985 when the term biodiversity (the combination of biology and diversity) was used in the article *'A New Plan to Conserve the Biota'*, written by Laura Tangeley (Tangeley, 1985). The term biodiversity is defined by the United Nations as *'the variety of life on Earth, including all organisms, species, and populations; the genetic variation among these; and their complex assemblages of communities and ecosystems'*. Biodiversity can be seen as a measure of variation at the genetic, species, and ecosystem level (United Nations, 2021). The emerging question now is: why is biodiversity so important? The United Nations argue that biodiversity provides substantial benefits to meet immediate human needs. Named examples of these human needs are a stable climate, clean water flows and protection from floods and storms (United Nations, 2021). Furthermore, it is stated that biodiversity provides functioning ecosystems that supply oxygen, clean air and water, pollination of plants, pest control, wastewater treatment and many ecosystem services (Cresswell & Murphy, 2018).

The first thing what becomes clear is that these explanations about the importance of biodiversity conservation are from an *anthropocentric* perspective. Explanations from a more *ecocentric* perspective emphasize that there exist also an *intrinsic value* of non-human life. It is argued that organisms have the same right of existence as that we as human beings do (Cresswell & Murphy, 2018). These intrinsic values of nature are not based on classical economic or instrumental values, since intrinsic values of nature are independent of human uses (Rea & Munns, 2017). Because of these important values of biodiversity (both anthropocentric and ecocentric), a loss of biodiversity can be regarded as problematic. In 2009, Swedish professor Johan Rockstrom and American chemist Will Steffen introduced the concept of *Planetary boundaries*. The idea is that our planet has certain environmental thresholds or boundaries. The Planetary boundaries concept argues that the 'environmental tipping point' of biodiversity loss is exceeded the most (Whiteman et al., 2012). According to *Earthjustice*, it is predicted that between one third and one half of all species will face extinction by the end of this century. This prediction is based on our current trajectory of global warming and habitat loss (Caputo & Cagle, 2021). Because of this rapid loss of species and degradation of ecosystems we live in a so-called *biodiversity crisis*.

1.1 Understanding the biodiversity crisis

However, this global biodiversity crisis is so overwhelming that we as human beings cannot completely understand this complex phenomenon. We are aware of all the alarming elements of the biodiversity crisis, but do we really understand them? What do we mean with 'environmental tipping points', 'degradation of ecosystems' and 'habit loss'? Do we really understand the 'intrinsic value' of nature, or is it also a social-constructivist value we assigned to nature? It can be questioned to what extent humans – as epistemologically limited beings – have real access to the objectivist truth of nature. Important here are the thoughts of English philosopher Timothy Morton. One important concept of Morton's thoughts is the notion of *hyperobjects*. According to Timothy Morton,

hyperobjects are objects that are massively distributed in time and space and transcend spatiotemporal specificity. In fact, hyperobjects are so complex and intangible that it is not possible to understand those objects. Morton names *global warming* as an example of an intangible hyperobject (Morton, 2016). I think the current biodiversity crisis is also an example of such an object, because of all its complexities. If we do not even understand what biodiversity actually is, how is it possible to understand the global biodiversity crisis? Of course there are different perspectives about our relation with these forms of nature and how we understand it. The Judeo-Christian legacy implies a certain human-nature dichotomy where nature can be seen as a more passive entity. The thought of '*dominate and subdue the Earth*' is a quite anthropocentric view based on the instrumental values of nature. This anthropocentric perspective is dominant in religious, economic and (rational) scientific reasoning. The human urge to control implies that we can understand and manipulate nature, where natural resources can be exploited (Marcuse, 2013).

However, more ecocentric perspectives reject this human-nature dichotomy and emphasize the importance of nature's intrinsic values. *Deep ecology* is an example of a social movement that recognizes these values of nature. Timothy Morton even argues that the ecosystem we are living in is so complex, that we do not comprehend the current global environmental catastrophes. Other thinkers with this view are for example famous French philosophers Gilles Deleuze and Bruno Latour (Lynch, 2019). I think it is indeed true that we cannot fully control and understand complex phenomena like the 'biodiversity crisis'. I believe we live in a biodiversity crisis while I also think we do not understand what such a crisis really is and mean to us as human-beings. These ideas may sound extremely pessimistic and hopeless. Is there nothing we can do in this ecological crisis with all its uncertainties and even apocalyptic threats? I think we can.

1.2 Operationalising biodiversity for dairy farming

Based on the literature (e.g. the thoughts of Timothy Morton), biodiversity is such a complex phenomenon which we, as humans, cannot fully understand. It is therefore not possible to just research and determine 'what biodiversity is' in a single Master thesis. However, the question of 'what is biodiversity?' can be specified more when focusing on operationalisation of the concept. In the Netherlands, it is tried to operationalise the concept of biodiversity by trying to make it *measurable*. By quantifying biodiversity, it is necessary to determine how biodiversity is understood. This understanding and operationalising of biodiversity is done for dairy farms in the Netherlands. Dairy farming can be seen as the raising of mammals to obtain milk from mother animals for consumption by humans. Mostly cows are used in dairy farms in the Netherlands, but also sheep, goats, horses and camels can be used in this livestock farming. In 2014, the *Louis Bolk Institute* (LBI) developed a conceptual framework for understanding biodiversity. The Louis Bolk Institute is an organisation who performs research and gives advice for the development of sustainable agriculture. Their conceptual framework was developed in order to contribute to the project '*Biodivers businessmodel melkveehouderij*', which means a biodiverse business model for dairy farming. This project was initiated by the *Wereldnatuurfonds* (WNF), *FrieslandCampina* and the *Rabobank*. The *Wereldnatuurfonds* is the Dutch part of the *World Wide Fund for Nature* (WWF), while *FrieslandCampina* is an internationally operating dairy cooperative, formed by dairy farmers in the Netherlands, Belgium and Germany. The *Rabobank* is a Dutch bank, which started as a collection of small farm loan banks at the end of the 19th century. The Louis Bolk Institute helped these organisations by formulating what biodiversity means for dairy farms and by developing the conceptual framework. The institute uses 4 so-called 'levels of biodiversity', these levels concern *functional agrobiodiversity*, *landscape diversity*, *specific species (diversity in species)*, and *sources areas and connecting zones*. Finally, the Louis Bolk Institute recommended in 2014 to work with so-

called *Kritieke Prestatie Indicatoren* (KPI), in order to be able to measure biodiversity for dairy farms. These KPI's mean literally 'critical prestatation indicators' (Erisman et al., 2014).

In 2016, the *Duurzame Zuivelketen* (DZK) started developing a monitoring system for mapping biodiversity on all dairy farms in the Netherlands. The Duurzame Zuivelketen (literally: the sustainable dairy chain) is a collaboration of dairy companies and dairy farmers in the Netherlands. For mapping biodiversity on all the dairy farms, they received help and recommendations from the Louis Bolk Institute and the *Wageningen University & Research* (WUR). The LBI and the WUR developed the critical prestatation indicators (KPI's) and advised which indicators should be included in the monitoring system for biodiversity. The Louis Bolk Institute and the Wageningen University did research about measuring biodiversity, which resulted in 10 KPI's which they formulated and recommended. The LBI and the WUR started with 98 indicators for biodiversity, although these were indirect indicators. One direct indicator for biodiversity can for example be the number of herbs on meadows, but the research organisations had not access to enough direct indicators. The 98 indicators were - with the help of a statistical factor analysis - summarised into 20 indicators, which with the help of 4 criteria were reduced into 10 indicators. These 10 indicators became the critical prestatation indicators. Not all of these indicators were directly measurable and feasible for the long term. In addition to the 10 KPI's, 4 more recommendations have been given for further research. One of these recommendations was to add indicators for water management and water use. However, one other recommendation concerned the challenge of reducing the current KPI's (Zijlstra et al., 2016).

In 2018, FrieslandCampina, the Rabobank and Wereldnatuurfonds developed the *Biodiversiteitsmonitor* (biodiversity monitor). In this monitor, 7 different KPI's are included which are related to one of the '4 pillars of biodiversity'. These 4 pillars of biodiversity are based on the 'levels of biodiversity' from the LBI in 2014, while the 7 KPI's are based on the research from the LBI and the WUR in 2016. The 4 pillars of biodiversity used in the monitor concern *functional agrobiodiversity, landscape diversity, diversity in species* and *regional biodiversity*. The 7 KPI's (where each is classified by one of the four pillars) are formulated as *greenhouse gas emissions, nitrogen soil surplus, ammonia emissions, share of permanent grassland, protein from own land, nature and landscape management, and herb-rich grassland*. All these 7 indicators are measurable with the help of different techniques. The methods and formulas for determining the outcome or value for each indicator are explained in the report about *Biodiversiteitsmonitor Melkveehouderij* (biodiversity monitor for dairy farming). It should be emphasized that the KPI's serve as the basis for revenue models and rewards for dairy farms (FrieslandCampina, 2018).

1.3 Thoughts on the biodiversity monitor

It became clear that the KPI's for the biodiversity monitor are a result of intensive and focused research on biodiversity. However, one arising question for me is to what extent the 7 KPI's in fact include the whole concept (or at least the relevant part for dairy farms) of biodiversity. I think it is interesting to think about why certain indicators (which were advised in 2016) are not included in the biodiversity monitor of 2018. Furthermore, it seems interesting and relevant to research which crucial elements of biodiversity were not at all recommended in 2016 and thus also not included in the current biodiversity monitor. Examples of ignoring parts of biodiversity can for example be animal welfare, which I think is crucial for dairy farming. It has to be emphasized that in 2014, the Louis Bolk Institute published an extensive report where they shortly indicated the importance of animal welfare (Erisman et al., 2014). However, this element does not return in the most recent reports in 2018 where the 7 indicators were presented. In the report in 2014, one recommendation for dairy farms was the reduction of grazing cows, which can lead to the reduction of greenhouse

gases. However, this reduction of grazing can be seen as something conflicting with animal welfare. Moreover, biodiversity in other countries (e.g. the Amazon) which serve as raw material suppliers is also an important part of the whole concept of biodiversity. It can be questioned too whether certain interests play a role in including KPI's in the monitor while consciously excluding specific indicators. I think it is remarkable that a financial bank contributes to the development of a biodiversity monitor, while there are no animal activists (or perhaps ecophilosophers) involved in this process. It is true that there are currently new KPI's developed and recommended by dairy companies, but I think these companies have certain interests with these indicators. Researching the motives and interests behind the KPI's can be relevant in order to understand the real reasons for including the indicators. Furthermore, what is noticeable is that in general the importance of biodiversity is continuously explained in terms of human (and especially agricultural) benefits.

1.4 Research problem statement

It becomes clear from the literature how important biodiversity is for both humans and non-humans (Cresswell & Murphy, 2018). Because of these (both functional and intrinsic) values of biodiversity, it is important to improve biodiversity on dairy farms with the help of a monitor and critical indicators. However, it can be problematic when crucial indicators for biodiversity are missing. Moreover, it becomes even more problematic when certain included indicators are used for interests which do not prioritize biodiversity. For example, when there is a critical indicator where a dairy farm can score relatively high on, this has beneficial effects for the revenue model of the company. The excluding of crucial indicators of biodiversity (e.g. animal welfare) in order to optimize revenue models for farms can have negative impacts for the 'real' or 'complete' biodiversity. Especially when the developers of biodiversity monitoring systems consist of a homogenous group of actors (e.g. only dairy farms), it can lead to problems when a complex concept like biodiversity is tried to operationalize. When the full concept of biodiversity and its complexities wants to be understood, it is necessary to involve more actors and indicators, while monitoring and operationalising biodiversity. The literature and documents show that in the current reality, limited indicators are included in the biodiversity monitor and only specific actors are involved in the development of this monitor (DuurzameZuivelketen, z.d.)

In the report *Biodiversiteitsmonitor Melkveehouderij* published in 2018, the next quotation can be found: *'Er is dus gekozen voor een integrale set van KPI's. Daarmee wordt het aantal KPI's beperkt. Dat betekent dat een aantal bruikbare KPI's niet is meegenomen'* (FrieslandCampina, 2018, p.15). Literally translated this means: 'An integral set of KPI's has therefore been chosen. This limits the number of KPI's. This means that a number of useful KPI's have not been included'. Moreover, in the report about the development of the KPI's published in 2016 by the Wageningen University and the Louis Bolk Institute, the following statement has been made: *'Het was de ambitie van de opdrachtgever om met een zeer beperkt aantal Indicatoren een beeld te schetsen van het onderdeel functionele agrobiodiversiteit op een melkveebedrijf'* (Zijlstra et al., 2016, p.35). This means in translation: 'It was the ambition to create an image of the functional agrobiodiversity component on a dairy farm using a very limited number of indicators'. In fact, the report contains four criteria for the selection of 'limited amount of representative indicators'. The third criterium is formulated as 'limiting the number of indicators' (Zijlstra et al., 2016).

The different documents about the development of the biodiversity monitor show some clear inconsistencies, or at least remarkable findings. One example of such a remarkable finding is the fact that in 2016 10 KPI's were recommended, while the published document in 2018 only listed 7 KPI's. Since these crucial choices are not explained or argued and because of some inconsistencies, I think

it is important to use a critical evaluation as an analysis of the development of the biodiversity monitor.

It is true that a limited inclusion of indicators and involved actors in the biodiversity monitor should not by definition be viewed as problematic. However, existing literature explains the importance of a more holistic approach to biodiversity (Díaz et al., 2015). One important organisation related to this approach is the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, known as IPBES. It is stated that this is an organisation for improving the interface between science and policy issues, related to biodiversity and ecosystem services (Díaz et al., 2015). This organisation developed a framework about biodiversity, known as the IPBES Conceptual Framework (picture 1.1). What becomes immediately visible in this framework is the broad approach and understanding of biodiversity. The framework provides benefits of biodiversity, while presenting how these are influenced by underlying drivers. What is interesting is that these benefits are not only focused on human wellbeing, but also on ecocentric values. The framework names for example *Living-well in balance and harmony with Mother Earth* as an element (Díaz et al., 2015). Based on the IPBES Conceptual Framework and their dominant way of reasoning, it can be concluded that they advocate a broad and inclusive approach to biodiversity.

The United Nations are involved in the IPBES Conceptual Framework, since in 2010 the United Nations General Assembly urged the United Nations Environmental Programme to establish the IPBES (Keping, 2013). The United Nations are also (indirectly) involved in the biodiversity monitor, since the first page of the in 2018 published document (the most recent one) about the *Biodiversity Monitor for Dairy Farming*, refers to the Sustainable Development Goals (SDG's). The document explicitly emphasizes that these goals are developed by the United Nations. It is stated that the biodiversity monitor can contribute to the 15th Sustainable Development Goal, namely 'recovery of ecosystems and conservation of biodiversity' (FrieslandCampina, 2018).

It is remarkable that the IPBES Conceptual Framework emphasizes the importance of a holistic approach to biodiversity, while the biodiversity monitor for dairy farming tries to reduce all the complexities of biodiversity. When the biodiversity monitor refers openly to the SDG's developed by the United Nations, it is also important to refer to the conceptual framework for biodiversity. When this is done, it becomes clear from the existing literature that a wider approach to biodiversity is needed. This wider approach related to the biodiversity monitor concerns including more actors and indicators.

It turned out how certain indicators – for example indicators about animal welfare – are missing in the biodiversity monitor for dairy farming. Based on the existing literature and the IPBES conceptual framework, it is problematic when only limited indicators and actors are included in the biodiversity monitor. This means the problem is that indicators that are of importance are not included in this monitor. This results in the following formulation.

Research problem: The limited inclusion of indicators and involvement of actors in the process of developing the biodiversity monitor for dairy farming in the Netherlands.

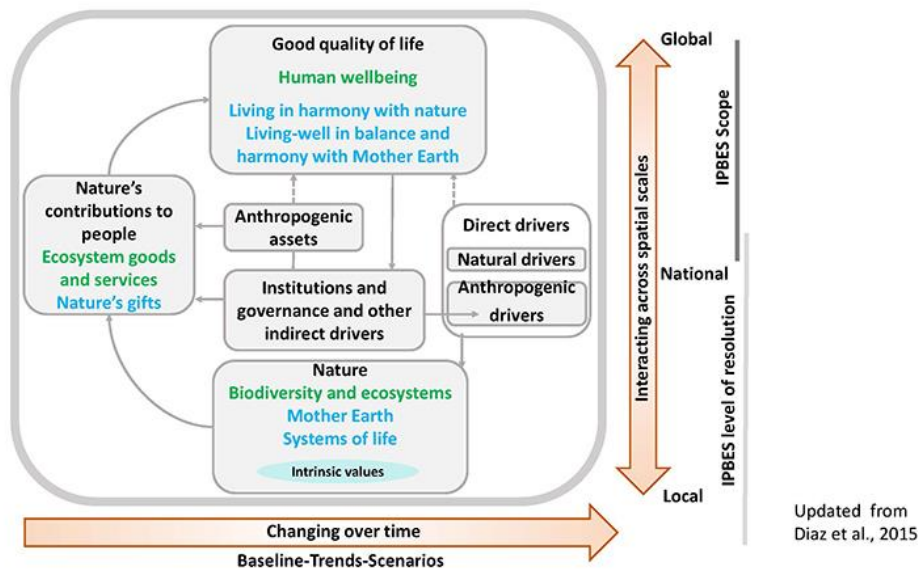


Figure 1.1: IPBES conceptual framework

1.5 Research aim and questions

It is important to emphasize that the goal of this research consists of critically evaluating the process of the development of the biodiversity monitor. This means the aim is to analyse how certain decisions has been made in developing the monitor, while focusing on the inclusion and exclusion of important actors and indicators. Since the problem can be seen as a lack of indicators and actors in the monitor, together with the goal of evaluating the development of this monitor, certain questions inevitably arise. These questions concern the rationales behind the inclusion of specific actors, and about the extent of missing indicators and actors. Based on these thoughts about problems, aims, and questions, the following formulations have been made.

Research goal: Critically evaluating the process of the development of the biodiversity monitor for dairy farming in the Netherlands, while getting insights about the inclusion and involvement of relevant indicators and actors.

Research question: Was the process of developing the biodiversity monitor for dairy farming in the Netherlands sufficiently inclusive to address a broad range of necessary indicators and actors?

Sub-questions:

- 1: What did the process of developing the biodiversity monitor look like?
- 2: What is meant with sufficiently inclusive?
- 3: Which related human actors, rules of the game, resources and power relations, and discourses can be identified, and which position do non-human actors take?

4: Which indicators and actors are missing, and how can this be explained by existing (non-)human actors, rules of the game, resources and power relations, and discourses?

1.6 Societal relevance

It became clear how the named examples such as a stable climate, protection from floods and storms, and clear air and water contribute to human well-being. It can be concluded that these 'benefits' like a stable climate and flood protection can contribute to society as a whole. This engages economic benefits (e.g. less storms cost less money), but also health benefits, where a stable climate and clear water contributes to human-health. This health can lead to more wealth or higher human productivity, which have finally clear advantages for society (Islam & Kieu, 2021). This makes clear it is important to research how biodiversity can be conserved or even improved. With this critical evaluation about the biodiversity monitor, it can be determined whether biodiversity in the Netherlands can be or even needs to be improved more. Because of the dominant role of dairy farming in the Netherlands, whole society is indirectly affected by this industry. Relevant outcomes of this research which indicate how biodiversity can be improved, or how dairy farming can perform in a more healthy way (both for humans as the environment), can have great contributions to society. High levels of biodiversity and a healthy climate can be seen as the basis for a vital societal community.

1.7 Scientific relevance

From an academic perspective, this research is especially relevant regarding the generation of knowledge about relatively new policy documents. Since these documents (e.g. *Biodiversiteitsmonitor Melkveehouderij*) are recently published, this information is relatively 'new' in the academic world. It is true that the biodiversity monitor and its critical prestatation indicators are even still developing and changing its contents. The fact that this biodiversity monitor finds its origins less than ten years ago and is nowadays operating, makes it especially relevant. The recent character of the biodiversity monitor explains certain lack of knowledge and scientific research about the processes, since this monitor is still developing (Erisman et al., 2014). Critically evaluating this process can generate new knowledge which can have important contributions to science. Especially for scientific institutes (like the Wageningen University & Research), this new knowledge is important. This can for example help to critically reflect on certain decisions about formulating critical indicators, together with the formulation and implementation of new indicators. This ultimately contributes to the further development of the scientific world. However, the most important scientific contribution is the usage of the Actor-network theory and the Policy Arrangement Approach which are applied to this research and case of the biodiversity monitor. Moreover, this contributes to further development of both theoretical frameworks, since these are applied to a specific case. It is for the first time both theoretical frameworks are applied to this specific case, which make this 'scientifically new'. These relevant frameworks will be explained in the theoretical chapter.

2. Methodology

2.1 Research strategy

Since this research is about a critical evaluation together with a holistic approach to the 'complexities of biodiversity', one linear and static strategy does not fit with this research. I want to emphasize that the strategy of this research should not be seen as a linear process where all the steps in the research are pre-defined. I prefer to describe the strategy more as a dynamic process of continuously learning and developing my own thoughts. However, as there is a specific focus in this research, it is needed to determine which strategies will be used. There are four main types of research strategies formulated, namely: case study, qualitative interviews, quantitative surveys, and action or action-oriented research (Cameron & Price, 2009). This research makes use of a case study and qualitative interviews as main research strategies. The case in this research contains the process and development of the biodiversity monitor of dairy farming in the Netherlands. This research strategy is helpful in answering the research question, since the process of the biodiversity monitor and the involved actors concern a societal phenomenon. Conducting interviews about this case will be useful in understanding the rationales behind these actors together with all other related societal aspects.

2.2 Research methods, data collection and data analysis

It is true that the basis for this research are my own thoughts and interest in this topic, but in order to address the research question, relevant data is needed. The methods of data collection for this research is mainly desk research and field research. This means that this research will be conducted in a qualitative way. Desk research concerns in this case the reading and analysis of non-numerical data like texts and video- or audio files. The analysis of these literature and documents will be partly based on the conceptual framework. This means there will be relevant theoretical concepts (like actors or power relations) identified out of the literature together with other forms of data. This data consists mainly of secondary literature like scientific articles and books related to biodiversity and dairy farming in the Netherlands. These used articles originate mostly from online websites and scientific papers. Other information relies on video material about biodiversity and the development of the monitor, with for example online lectures and fragments from news journals. Important here are the public documents and research publications about the development of the biodiversity monitor.

The primary data in this research is collected through interviews, where this is part of the field research. In order to find an answer to the research question, it is important to experience the thoughts of the relevant actors who are involved in the biodiversity monitor. With the use of interviews, it is possible to research why certain individuals or organisations decided to include certain indicators or made other crucial decisions. It is therefore necessary to conduct interviews with (individual) actors within organisations like the Louis Bolk Institute, Wageningen University, Rabobank, WNF, FrieslandCampina or the Duurzame Zuivelketen. Furthermore, since this research is about inclusion, other persons within organisations who are currently not involved in the biodiversity monitor (e.g. certain environmental NGO's) are needed in interviews. It is important to determine first which persons are relevant stakeholders or responsible for developments in the biodiversity monitor. These actors need to be addressed in a formal way in order to get their participation in useful interviews. These interviews will be semi-structured, which means there will be questions formulated in advance, although there is space for further questions which develop during an interview (Vandegrift, 2021). The aim is to conduct interviews with critical questions about why important decisions have been made in the process of the biodiversity monitor, e.g. about choices

for collaboration with specific organisations and the including of indicators. In optimal conditions, these interviews can be conducted in person and can be recorded.

The analysis of the secondary data (e.g. academic literature) was analysed and elaborated in this research before conducting the actual interviews. This understanding of the relevant literature is needed in order to be prepared for the interviews. Important in analysing the secondary data is comparing relevant literature, with for example comparing documents in 2014 about recommendations on the biodiversity monitor, together with the most recent document about the monitor in 2018. This comparison can lead to useful insights about the process and about inconsistencies between what is recommended and what is actually done in reality. This can be seen as an important part of the critical evaluation in this research. The primary data (the interviews) will be analysed in a different way. When it is possible to record interviews, these recordings need to be transcribed. After transcribing, it is possible to encode these transcripts (beside other secondary data) with specific programmes like Atlas.ti. During this encoding, it is important to focus on specific words and ways of speaking. For example, when an interviewed actor within the Rabobank uses a completely different terminology compared to a person within the Louis Bolk Institute, there can arise remarkable findings. These findings can be related to underlying discourses, which is an important part of the Policy Arrangement Approach (PAA). In addition to encoding and analysing transcripts, I aim for analysing uses of body language during interviews. The ways of making use of hand gestures or sitting positions can provide explanations of for example crucial (though not directly visible) power relations, which is also an important part of the PAA. These analysis of different forms of data should finally contribute to answering the research question.

2.3 Validity and reliability of the research

Crucial in this research is determining with interviews and desk analysis whether the process of developing the biodiversity monitor for dairy farming was sufficiently inclusive to address the needed indicators and actors. It is therefore important to indicate or measure which actors and indicators are included in the monitor and which are not. Thereafter, it is needed to determine which actors and indicators are actually needed in the development of the biodiversity monitor. The measurement about which actors and indicators are included is done by the analysis of the literature, while there will be a focus on the reasons behind the including with the help of the interviews. In terms of validity of the research, it can be stated that this research is valid to a certain extent, since what is actually analysed and measured overlaps with which needs to be measured (i.e. the including of actors and indicators). This is important regarding the (internal) validity of a research (Bashir & Marudhar, 2018).

In terms of reliability, it can be questioned to what extent a similar implementation of this research will lead to the same results. It is not possible to claim that a certain person will provide exactly the same answers in an interview, when the same interview is conducted for another time. Since human agency and the reasoning of people is subject to societal phenomena (which are continuously dynamic and shifting), people will not statically provide the same data during interviews. This is related to what is called 'social uncertainty', which means the degree of a person's uncertainty about their own future states, actions and outcomes (FeldmanHall & Shenhav, 2019). However, the analysis of the secondary data (literature and public documents) can be seen as more reliable, since this data will be less subject to societal shifts. The data in this literature will not change in a substantive way, though only the interpretation of the data can vary over time. It is of course true that the interpretation depends on the researcher who is analysing the data.

3. Reading Guide

This section will provide a short overview of the following chapters and how they are structured in this research. The theoretical framework consists of a short introduction chapter, followed by two more extensive chapters. The result chapter consists of a document analysis and an interview analysis of the biodiversity monitor.

Chapter 4: Theoretical framework: Introduction

This chapter will introduce the theoretical perspectives of the Actor-network theory and the Policy Arrangement Approach. It will be explained why these theoretical frameworks are useful for this research. Furthermore, this chapter will present the conceptual framework of this research.

Chapter 5: Theoretical framework: Actor-network theory on the Biodiversity Crisis

The Actor-network theory will be applied to the global biodiversity crisis. In this chapter, thoughts of different thinkers and philosophical movements will be discussed and analysed. There will also be a discussion and critique on these different thoughts.

Chapter 6: Theoretical framework: Policy Arrangement Approach on the Biodiversity Monitor

The Policy Arrangement Approach will be explained and applied to the biodiversity monitor for dairy farming. In this chapter, the concepts of the conceptual framework will be operationalised. This will be done by providing definitions of the elements out of the Policy Arrangement Approach

Chapter 7 Results: Document Analysis of the Biodiversity Monitor

The first results will be presented by analysing the documents about the biodiversity monitor. These relevant documents will be described and analysed in a chronological order. This chapter will end with reflections about these documents.

Chapter 8: Interview Analysis of the Biodiversity Monitor

The conducted interviews with actors involved in the biodiversity monitor will be analysed. This analysis will be based on the theoretical frameworks. This chapter provides an overview of the different perspectives of the interviewees.

Chapter 9: Conclusion

In this final chapter, there will be an answer formulated on the research question. This research will end with contributions to further development, recommendations for practice, limitations of the research, and my own reflections.

4. Theoretical framework: Introduction

4.1 Actor-network theory

Earlier discussed notions are the complexity of biodiversity and the thoughts of Timothy Morton where in complex ecosystems everything (both humans and non-humans) is interrelated with each other (Bricker, 2015). This including of non-humans relates to the discussed intrinsic values of nature and biodiversity. The relations between biodiversity in different countries and the extent of interdependence between them have all similarities with these ideas of relations between humans and non-humans entities. These thoughts can be found in the theoretical perspective of the *Actor-network theory* (ANT). It is stated that according to this theory, everything in the social and natural worlds exists in constantly shifting networks of relationships (Latour, 2005). It is furthermore argued that all the factors involved in a social situation are on the same level and that nothing exists outside those relationships. This means that objects and non-human entities are just as important in creating social interactions as humans. The Actor-network theory states that 'everything in the social and natural worlds interacts in shifting networks of relationships without any other elements out of the networks'. What is important is that this theory defines non-human actors equal to human actors (Davey & Adamopoulos, 2016).

I think these theoretical perspectives are especially relevant to the holistic approach of biodiversity where it is tried to understand what biodiversity actually is. When the Actor-network theory is used for analysing the critical indicators and the biodiversity monitor, it becomes clear that the indicators do not include all non-human entities. Furthermore, the monitor is not taking fully into account all the complex relationships engaged in the phenomenon of biodiversity. The Actor-network theory can help in understanding all the related parts (human and non-human) of biodiversity and finally in getting a better understanding of what biodiversity not only means to us, but to the entire ecosystem. Since the Actor-network theory encompasses a broad theory, this theoretical perspective will be in this research related and applied to so-called ecocentrism. In this philosophy, there is an ontological belief which argues there is no existential division between human and non-human nature (Milstein & Castro-Sotomayor, 2020). This Actor-network oriented ecocentrism will be explained in detail in further chapters.

4.2 Policy Arrangement Approach

It becomes clear that this research focuses on relationships between human and non-human actors. The actual meaning of 'non-human actors' is of course subject of debate, where the interpretations of non-human actors can vary widely. Beside non-human actors (e.g. plants or landscapes), it is also important to focus on perhaps even wider entities or non-human 'dimensions', which are strongly related to human actors. These dimensions which influence human actors can be underlying structures which play a crucial role. Such underlying structures can be for example structural power relations, or formal legislation which serve as guiding rules. Crucial here is the theoretical perspective of the *Policy Arrangement Approach* (PAA). Leroy and Arts define a policy arrangement as 'the temporary stabilization of the content and organization of a particular policy domain at a certain policy at a level or over several policy levels' (Leroy & Arts, 2006). In order to describe a policy arrangement (thus the temporary stabilization of a policy domain), four interrelated dimensions are used. These four dimensions are 1) the actors and actor coalitions involved in the policy domain, 2) the rules and regulations that play a role, 3) the division of resources and related power, and 4) the discourses that capture the view and narratives of actors involved. It is argued that one change in one of the four dimensions will consequently lead to changes in the other dimensions (Arts et al.,

2006). Shortly explained, this theory states that actors, rules of the game, discourses, and resources/power can help to understand certain policy. The key point is that these dimensions are interrelated, which for example means that actors are depending on power (e.g. knowledge or money) and restrictive rules, while these actors also shape these rules and control their own power.

This Policy Arrangement Approach can be applied to the biodiversity monitor for dairy farming in the Netherlands. The development and implementation of the biodiversity monitor can be seen as a certain policy. The goal of this policy is to develop a revenue model for dairy farmers in the Netherlands while improving biodiversity. It became already clear that lots of different actors are involved in this biodiversity monitor, with the example of the named organisations like the Duurzame Zuivelketen, FrieslandCampina, Rabobank, WWF, Louis Bolk Institute, Wageningen University, etc. Although all these actors (with their individual agents) are interrelated to each other, they are strongly influenced by underlying structures. The dimensions in the PAA – namely actors, power/resources, rules, and discourses – are visible in the policy arrangement of the biodiversity monitor. It is true that certain organisations have more power (and are thus more able to control other actors) than other relevant actors. One example is the Rabobank, who is due to access and control over money more powerful than small-scale dairy farmers in the Netherlands. National laws regarding farming (e.g. new rules as a result from the Dutch nitrogen crisis) are a clear examples of rules of the game which apply to dairy farmers. Perhaps the most crucial dimension of different discourses between actors plays an important role in this policy. It is true that actors are strongly influenced – whether unconsciously or not – by an underlying discourse. While commercial companies (e.g. the Rabobank, FrieslandCampina, or national dairy farms) are dominated by economic or even neo-liberal discourses where the main goal is profit making, this differs to other relevant actors. Research institutes (the Louis Bolk Institute or Wageningen University) can be influenced by a more scientific discourse, where the main goal is generating objective and usable knowledge. It becomes especially relevant when contradictory discourses interact with each other. One example is the economic discourse from commercial dairy farms, together with more ecocentric discourses from animal well-fare organisations or the WWF.

It has to be emphasized that in reality there are no such clear distinctions between ‘different actors or discourses’, but these are interwoven with each other (Leroy & Arts, 2006). The four dimensions should be seen as elements which can explain certain policy, and explain why this policy is implemented in a certain way (as consequence of power, rules, discourses etc.). This theory can help understanding the process of developing the biodiversity monitor for dairy farming. This concerns understanding why certain decisions have been made, for example why critical indicators have been included, as a consequence of power relations or guiding rules. In order to understand policy processes, the importance of these dimensions shows that it is necessary to expose crucial structures which underly societal phenomena, such as the operationalisation of biodiversity.

Both the theoretical perspectives of the Actor-network theory and the Policy Arrangement Approach can help in answering the research question. Since this research holds a perspective of a ‘more broad approach and understanding of biodiversity’, where the focus lies on interrelationships between humans and nature, the Actor-network theory is a suitable framework. Theories from this framework about interrelations can help in understanding the process about the biodiversity monitor. The Policy Arrangement Approach is especially suitable for this research regarding the involved actors in the monitor, together with their rationales behind the suggestions of indicators. This theoretical framework can help in identifying crucial (underlying) rationales such as discourses or power relations, in order to better understand the biodiversity monitor and its process.

4.3 Conceptual Framework

This research makes use of the concepts of the theoretical perspectives from the Policy Arrangement Approach and the Actor-network theory. The theoretical concepts of the PAA concern actors, rules of the game, power relations and resources, and discourses. The conceptual framework of this theoretical perspective shows that all four concepts influence each other (Leroy & Arts, 2006). This means for example that actors are subject to existing rules, power relations, and discourses, while these actors are also influencing these rules, power relations, and discourse. This existing conceptual framework from Leroy and Arts is used for this research. However, in this research one more theoretical concept is added to the conceptual framework: non-human actors. There are 'two arrows' in the conceptual framework, one 'short term influence' on non-human actor and one 'long term influence' of non-human actors. In the short term arrow, the (human)actors, rules, power relations, and discourses are influencing the non-human actors (and not vice-versa). However, in the long term arrow the non-human actors are influencing the (human)actors, rules, power relations, and discourses instead.

The idea behind these two different arrows or relations is that non-human actors are in first place subject to human actors and all other related institutions which are created by humans. One example is that nature and animals (as non-human actors) are not able to influence humans or existing discourses and power relations. However, the way of reasoning in this research assumes that in the long term, these non-human actors will bounce back. This means that in that situation, human actors and human-made institutions are not or limited capable of influencing and controlling non-human actors. Clear examples of these 'not controllable non-human actors' can be the consequences of climate change like heavy rainfall, floods risks, drought, storms, or other forms of environmental hazards (Solecki, 2001). Global pandemics derived from zoonoses (transmitted disease from animals to humans) can also be seen as a 'bouncing back' of non-human actors, since in that case animals are the non-human actors who are indirectly influencing the human world (Torrence, 2007). In the theoretical framework, real life examples of actors, rules, power relations and discourses related to the biodiversity monitor were already mentioned. Since non-human actors (like animals and nature landscapes in the Netherlands) are an important part of the biodiversity monitor, this theoretical concept from the Actor-network theory is also integrated in the conceptual framework. This conceptual framework is presented on the next page. This framework will be applied to this research in the way of focusing on the so-called 'agency' or 'capacity to act' of the non-human actors. This focus will be rooted in the underlying way of reasoning in this research, which assumes that humans cannot control nature and animals on the long term.

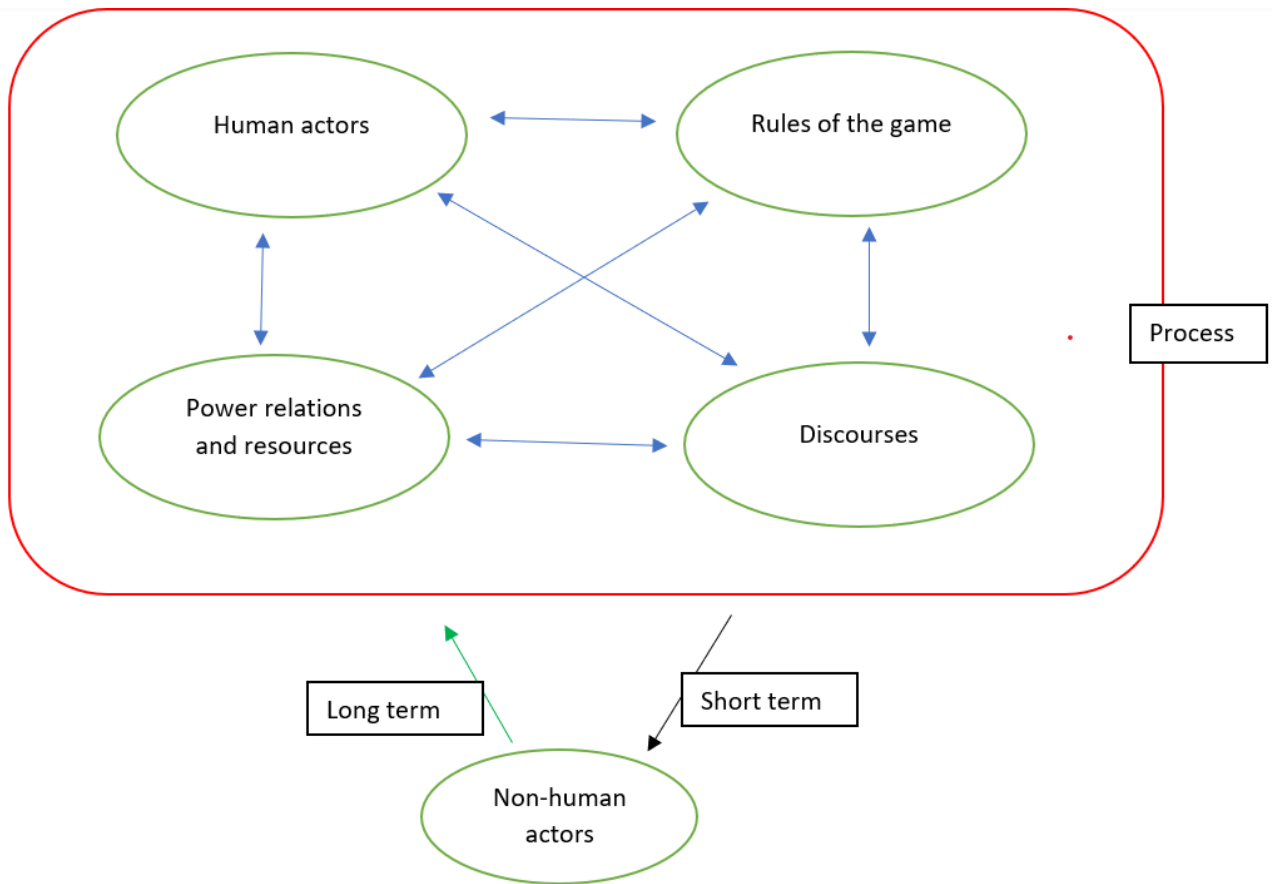


Figure 4.1 Conceptual Framework

5. Theoretical framework: Actor-network theory on the Biodiversity Crisis

'And that is what Mauritius is most famous for: the extinction of the dodo' – Douglas Adams

5.1 Introduction

This chapter will form an introduction to the biodiversity crisis. It will be first explained how biodiversity is defined and why we live a crisis of biodiversity loss. Although this chapter mentions shortly the general causes, consequences, and solutions of this crisis, there will not be a detailed focus on these elements. The main focus in this chapter will be on human's position towards nature, related to this biodiversity crisis. This chapter can be seen as explaining the view about these human-nature relations, while this perspective serves as a run-up to the empirical parts of this Master thesis. The perspective about humans and nature which will be formed in this chapter, will be the underlying way of reasoning during the later chapters in this research. Therefore, I decided to emphatically explain this important perspective. This will be done by making use of three different 'philosophical movements'. These concern the ideas of Max Horkheimer and Theodor Adorno (1944), Deep Ecology (1973), and Timothy Morton (nowadays). These three philosophies do not argue the same, but I think their main arguments build upon each other chronologically, while forming a new way of thinking about nature. However, in this chapter I will explain their ideas in reverse order, starting with Timothy Morton. Beside explaining their main arguments, I will also formulate critique on their ideas. Finally, there will be a focus and critique on the 'Anthropocentric solutions' of the biodiversity crisis.

5.2 Meaning of biodiversity

'If we pollute the air, water and soil that keep us alive and well, and destroy the biodiversity that allows natural systems to function, no amount of money will save us.'

This statement from the Canadian environmentalist David Takayoshi Suzuki confronts us with one of the biggest crisis humanity is facing today: the biodiversity crisis. The urgency of this crisis is heavily emphasized by environmental non-governmental organisations (NGOs) and by supranational organisations like the United Nations. In 2019, the Global Assessment Report on Biodiversity and Ecosystem Service of the United Nations argued that: *'Around 1 million animal and plant species are threatened with extinction – many with decades'* (UN report, 2019). One other example of an environmental NGO is *Earthjustice* (as already explained in the introduction), who argues that: *'There's still time to stop one million of the planet's plants and animals from vanishing forever – but not very much'* (*Biodiversity Defense Program*, 2022). The seriousness of this biodiversity crisis becomes clear with these alarming statements. In the introduction chapter, it was already explained which different definitions exist about biodiversity (e.g. the definitions from Arthur Harris, Laura Tangly, and the United Nations). It is true that different environmental organisations or governments use their own definition of this concept. However, when all these various definitions are compared to each other, one similarity becomes clear. In fact, all definitions of biodiversity in general concern: *the variety of life on Earth* (AMNH, z.d.) I want to use this notion of 'life on Earth' as a starting point for the following parts of this chapter.

5.3 Loss in biodiversity

In the introduction chapter, it became clear why biodiversity is important (because of a stable climate, clean air and water, pollination of plants, etc.), and thus why a loss of this can be seen as problematic. Moreover, the introduction explained there is actually a rapid loss in biodiversity, where the alarming examples of *Earthjustice* and the *Planetary boundaries* have been emphasized. This biodiversity loss is defined as: *'the worldwide extinction of different species, as well as the local reduction or loss of species in a certain habitat, resulting in a loss of biological diversity'*. It is also argued that: *'the current global extinction has resulted in a biodiversity crisis being driven by human activities which push beyond the planetary boundaries and so far has proven irreversible'*. There exist multiple causes which can be seen as drivers behind this biodiversity loss. Examples of these causes are change in land use (deforestation, intensive monoculture, urbanisation), pollution (air- and noise pollution), invasive species, overexploitation (fossil fuel and overfishing), and climate change (Tilman, 2000). In later chapters there will be a more detailed focus on these drivers behind the biodiversity crisis.

As a response to these problems of the biodiversity crisis, many organisations focus on conserving biodiversity or preventing this loss. Examples of these organisations or international agreements are the *Red List of Threatened Species* from the *International Union for Conservation of Nature and Natural Resources* (IUCN), or the *United States Endangered Species Act* (Nepal, 2021). As already named earlier in the problem statement of this research, one important organisation focused on biodiversity and ecosystem services is the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, known as IPBES. It was explained how this framework focuses on ecocentric values, instead of only human wellbeing (Díaz et al., 2015).

Another example is the earlier mentioned *UN Convention on Biological Diversity* which is focused on preventing loss in biodiversity. Moreover, conserving biodiversity is also one of the main goals of this multilateral treaty. It is stated that the international goals of this work are embodied by *Sustainable Development Goal 15 "Life on land"* and *Sustainable Development Goal 14 "Life Below Water"*. These two goals are part of the 17 Sustainable Development Goals (SDG's), set up in 2015 by the United Nations and intended to reach by 2030. According to the United Nations, these goals are designed to achieve a 'better and more sustainable future for all' (Halisçelik & Soytaş, 2019). Other examples of such goals are the so-called *Aichi Biodiversity Targets*. These 20 targets are also part of the *UN Convention on Biological Diversity*. For example, *Aichi target 1* concern: *'By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably'* (Ortiz, 2011). In addition to the 17th SDG's, one interesting concept is the so-called 18th *Sustainable Development Goal*, developed by Ingrid Visseren-Hamakers. The general idea behind this '18th SDG' which represents a goal which is missing in the other 17 goals is simple: the importance of animal welfare (Visseren-Hamakers, 2020). This importance of animal welfare – related to the current biodiversity crisis – will be later discussed in more detail. Beside this 'additional sustainable development goal', Visseren-Hamakers also emphasizes the importance of so-called *Transformative Change*. Transformative change can be defined as a 'philosophical, practical and strategic process to affect revolutionary change within society'. The core principle behind transformative change is that 'small or step-by-step changes' are not effective enough in approaching major global problems like the biodiversity crisis (Couvét & Prevot, 2015). It is argued that this transformative change 'must take place as large and as quickly as possible'.

All these examples of international action related to the biodiversity crisis, emphasizes the problematic character of this crisis which is threatening humanity. It became clear that we are aware of this crisis and that we understand its problematic consequences, together with having ideas of

how we can solve these problems. However, the real question is whether we really understand this biodiversity crisis. The next part will delve into this fundamental question.

5.4 Understanding loss in biodiversity

The previous sections focused on what biodiversity actually is, why there is a loss in biodiversity, why this loss can be regarded as problematic, and how international action has been taken. The problematic loss in biodiversity is why we live in the current biodiversity crisis (Aitken, 2011). After understanding the definition of the 'biodiversity crisis', there is one fundamental question: do we really understand the biodiversity crisis itself? Simply explained, we as humans are exposed to natural phenomena in our world, while assigning names and concepts to these phenomena. We observe a 'diversity of living organisms', we notice that this diversity is declining, we are aware that this decrease is problematic, and finally determine that we live in a 'biodiversity crisis'. I think it is a risky way of reasoning when claiming we find ourselves in a global biodiversity crisis. What I mean with 'risky' is that this way of thinking implies that we fully *understand* this crisis, and perhaps our whole ecosystems. Current information (e.g. from the United Nations) about this crisis shows exactly what biodiversity is, why there is a loss in it, and why this loss is problematic for humans (Min et al., 2014). It seems we as human-beings pretend to fully understand 'what is going on with our biodiversity', and we do even know how we need to solve it. As already explained in the previous paragraphs, the causes or drivers behind the biodiversity crisis are known in general. We know which are the main causes of this crisis and how we can change these causes (e.g. overexploitation, air pollution, climate change) (Simpson, 2002). However, I think the *main cause* of this biodiversity crisis is precisely this way of reasoning. I think knowing exactly 'what is happening and how we need to solve the problem' is perhaps the most fundamental driver behind this whole biodiversity crisis. This philosophy of understanding the problem and knowing the solution has everything to do with our *position towards nature*. This way of thinking implies a superior position of humans in our ecosystem with an unequal human-nature relationship (Lie, 2021). It is true that these thoughts may sound confusing to a certain extent. How can 'knowing the solution' be a fundamental cause of the problem? Why is controlling a problem and having solutions something which perpetuates the problem itself? For this, it is important to delve into the more fundamental aspects of this biodiversity crisis: the human-nature relation.

5.5 Timothy Morton

One thinker related to this part which cannot be ignored is the 54-years old English philosopher Timothy Morton (already named earlier in the introduction to this research). This section will not explain all works and ideas of Timothy Morton, but will focus on his main thoughts related to this biodiversity crisis. Simply explained, the main underlying philosophy of Timothy Morton is that 'we are not able to know it' (Vályi, 2020). Morton argues that we live in a complex ecosystem which makes it impossible for us humans to ever understand it. The returning idea in all works of Timothy Morton actually comes down to one point: our position in the ecosystem. Morton attacks the idea that humans own a superior position towards nature and that we can fully understand and control it. One interesting concept in his works is the idea of so-called 'hyperobjects'. According to Morton, hyperobjects are 'objects' which are massively distributed across space and time and impossible for us to fully understand (Bricker, 2015). Morton mentions global warming as an example of such a hyperobject, which we cannot comprehend because of all its complexities. We cannot see, smell, or touch these hyperobjects, and we are not directly confronted with it. We know that it exists, but because of its 'invisibility' we do not really understand it (Morton, 2016). The current biodiversity crisis can also be seen as an example of a hyperobject. We are aware that it exists, but we cannot feel it or pointing out where it is. We have no idea how the biodiversity crisis looks like or where we

can find it. Loss in biodiversity is something transcendental which is simultaneously everywhere but also anywhere. This occupying of hyperobjects in a higher-dimensional space makes it extremely complex for us to understand and control. Actually, the whole point of these 'massively distributed hyperobjects' is that humans are rationally limited to have an understanding of certain phenomena. We do not have ontological access to the real nature of such phenomena like the biodiversity crisis. This way of thinking that these hyperobjects or phenomena are too complex for us to understand, relates to Morton's idea about our position in the ecosystem (Gidal, 2011). It is stated by Morton that humans do not own a higher or superior spot in this system compared to other organisms like plants or animals. Moreover, this English philosopher goes even further by arguing we as humans are also not superior to *non-living* things. This reasoning creates an ecosystem where everything (living and non-living things) are related to each other without any form of hierarchal division (Harris, 2016). What is especially important about Morton's philosophy is his emphasis of all the complexity between these living and non-living entities in the ecosystem. However, it has to be noted that Timothy Morton is of course not the first or only thinker with these ideas about our position towards nature. His thoughts are strongly similar to an environmental philosophy with the name *Deep Ecology*.

5.6 Deep Ecology

It was in 1973 when the term 'deep ecology' appeared for the first time, in an article written by Norwegian philosopher Arne Naess (Howe, 2010). Again, this part will not explain all the ideas and principles of the deep ecology movement, but will only focus on its main element. It can be stated that in fact this is not difficult, since this underlying core principle is nothing more than criticizing again human's relation towards nature. Just like Timothy Morton, the deep ecology philosophy argues that all humans are equal with living and non-living entities in our ecosystem (Fellows, 2019). One important difference is that Timothy Morton focuses on complexities and the 'impossibility for us to understand or control', while deep ecology emphasizes the importance of 'intrinsic values'. Deep ecology namely states that all entities (living and non-living things) own an intrinsic value. The main idea behind this, is that these values are *independent* of human needs or interest (Attfield, 1990). For example, when I want to buy a jacket of 20 euros, the value of this jacket is exactly '20 euros'. This economic value of this non-living thing (the jacket) is determined by humans by creating a selling price. However, when I find in a forest a rock, this rock does not have any value. There is no price tag on it and nobody determined 'the value of this rock', so there is no value. Deep ecology would argue that this rock *does have* a value, irrespective of its value to humans. However, this value cannot be expressed in monetary units or quantitative entities. Again, these ideas about 'intrinsic values' and example of 'independent worthiness of a rock' may sound vague and redundant. However, what I want to make clear with these intrinsic values is all related to our view about the utility and instrumentality of nature, which can be seen as the more fundamental cause of our biodiversity crisis.

It is perhaps a strange idea when 'all living and non-living things' in our world own a value. Why does the rock which I found in the forest has a value, since I cannot use it for anything? This question can be seen as the root of our instrumental view of nature. When we humans can *use* something for our own needs, it has value. When we *cannot* use something for our own needs, it has no value. When we cannot use rocks, grains of sand, or leaves of a tree, we consider it as worthless. However, when it is possible to use certain elements for our own needs (e.g. raw material or minerals), it definitely owns a value (Elliot, 2005). It has to be emphasized that this valuation does not only apply to non-living, but also to living-things. When an animal produces something which we can use for our own needs (e.g. cows producing milk), these animals have a value. When these animals are not able

anymore to 'deliver their product', we do not need them anymore and consider them as *worthless*. It can be confronting, but this economic way of reasoning applies to humans too. When humans can 'produce or generate money', they have a value. When they are not able (anymore) to continue their production, they lose their economic value (Bernstein, 2019). What I want to make clear with these examples is that nature is viewed as a passive entity which can be used for human needs. This priority of 'serving human needs with natural resources' is one of the fundamental root causes of modern-day environmental problems. I think the dangerous aspect of 'worthless things in nature' (because we cannot use it), is that this thinking legitimatises the neglect or even destruction of these 'worthless things'. Imagine a part of a forest which cannot serve human needs. This forest does not own raw materials or does not provide access to other economic resources. This non-usable forest makes it a non-valuable entity, since it has not any (economic) function for humans. Because of the lack of value of this 'non-living thing', it is possible to destroy this forest (since no value is lost), in order to replace it for something that has value (e.g. a commercial shopping centre). When not taking into account the independent of human needs *intrinsic values* of nature, these destructive development tend to be legitimate.

It became clear that one similarity between the perspective of deep ecology and the ideas of Timothy Morton, is the non-superior position of humans in the ecosystem where all living and non-living things are equally interrelated to each other (Schoof, 2019). While Morton emphasizes the complexity of the relations in this ecosystem, deep ecology focuses on the intrinsic values of all living and non-living things. It turns out that these ideas form a critique on our 'economic values of nature' and instrumental view on these passive entities. However, deep ecology is of course not the first philosophy which is aware of this problematic human-nature relation. Two other important names which are impossible to ignore related to this are Max Horkheimer and Theodor Adorno.

5.7 Horkheimer and Adorno

The famous German philosophers Max Horkheimer (1895-1973) and Theodor Adorno (1903-1969) are well known for their book *Dialektik der Aufklärung* (in English, *Dialectic of Enlightenment*), published in 1944 (Lucero-Montaña, 2012). I think it can be argued this book forms a strong basis for the later ecological thoughts from Timothy Morton and deep ecology. This book does not mention the concepts of 'hyperobjects' or 'intrinsic values', but I think it takes an important run-up to these ideas. The main argument in Horkheimer's and Adorno's book is an intense critique on the Enlightenment, together with all the principles which derived from it. Shortly explained, Horkheimer and Adorno argue that the Enlightenment (originated in Western-Europe in the 17th and 18th century) broke up with powerful religions like Christianity. Before this Enlightenment, humans were dominated by religions which hold a strong overarching story about how the world works. However, during the 17th century in Western Europe, humans started to *understand* the world themselves. Humans no longer explained natural phenomena by 'assigning it to action of gods', but started to explain it by science (Adorno & Horkheimer, 2016). Horkheimer and Adorno stated that due to human's rationality and the rise of modern science, we started to understand nature. However, this capacity of understanding nature later led to the capacity of *controlling* and even *manipulating* nature. It is stated that the principles developed during the Enlightenment of human rationality, science, progression, economic growth, instrumentality of nature etc. are the root causes of the catastrophically environmental problems we are facing in the 21st century (Van Liere, 2014). According to Horkheimer and Adorno, the manipulation of nature derives from the so-called *human urge to control*. They claim this urge and desire of controlling the world is completely 'tripped', which leads to totalitarian regimes where this manipulating of nature also accounts for humans (Caraco, 2012). Though, it has to be realised their book was published in 1944 during World War II, at the time

of horrific events of manipulation of humans. However, I think most modern-day ecological thoughts are based on the early critique on modernity by Max Horkheimer and Theodor Adorno.

5.8 Discussion and critique

I made use of three different philosophies, namely the ideas from Timothy Morton, deep ecology, and Horkheimer and Adorno. One may ask now: how do these ideas relate to the current biodiversity crisis? I think the simple answer to this question concerns: our relation with nature. To understand this, it is important to first comprehend the relations between the three different philosophies and thinkers. The similarity between the thoughts from these philosophies is that a radical different understanding of our nature and ecosystems is needed. This similarity can be understood by a short summary of the main arguments. Horkheimer and Adorno argue that the human urge to control nature (expressed during the Enlightenment), lead to problems where we view nature only as instrumental entities which we can exploit and which are usable for our own needs (Duncan, 2020). The ideas from deep ecology build further upon these thoughts by arguing there exists an intrinsic value of all things on earth. When something is not usable for human needs, it is still valuable and should be respected because of its intrinsic value. Furthermore, it states that humans are not superior to other living and non-living things on Earth by emphasizing equal interrelationships in our ecosystem (De Jonge, 2017). Timothy Morton builds further upon these ideas about everything which is interrelated to each other in our ecosystem, by emphasizing the *complexity* of these interrelationships. Morton does not only criticize the human urge to control nature (like Horkheimer and Adorno), but he argues we are not even able to *understand* nature, let alone the capacity to control or manipulate it (Morton, 2009). All these ideas about a 'complex ecosystem where everything has a value and humans are equal with all entities', are completely in contrast to current economic beliefs about using nature as an exploitable resource. The ideas of Horkheimer and Adorno, the deep ecology movement, and Timothy Morton, are of great importance towards a radical new perspective about human-nature relations.

However, before applying these ideas directly to the biodiversity crisis, there also exists critique on this way of thinking. Although Horkheimer and Adorno focus on the Enlightenment (and the whole ideology which derived from it), this human urge to control did not just 'begin' during the Enlightenment. In fact, the instrumental view towards nature and perspective about exploiting natural resources is deeply rooted in religious beliefs (Moghissi, 1995). This can be explained by the famous Christian statement: '*Be fruitful, and multiply, and replenish the earth, and subdue it*'. This religious ideology about subduing the Earth has everything to do with a superior belief of humans who control the world. It can be stated that these powerful religions (dominant before the Enlightenment) were completely based on a belief where humans live in a 'controllable Earth and subordinate nature'. Humans had the 'task' to control nature and use it for its own needs. In these religions there was a strong hierarchical order where nature is fully subordinate to humans (Williams, 2019). I think the idea of an ecosystem where humans are equal to animals, plants, and non-living things, is completely incompatible with a religious ideology where not even men and women are viewed equally.

Nowadays it is often claimed that capitalism or neoliberalism are the real evil and causes of all environmental problems. The holy belief of capitalism in endless economic growth and single focus on profit maximalization at the detriment of nature are the real drivers of our current ecological crises (Faber, 2018). It is also argued that the Industrial Revolution (with the emission of greenhouse gases), was the beginning of all environmental problems like climate change and the biodiversity crisis (Malm, 2016). However, I think these problems started not just with the Enlightenment, capitalism, Industrial Revolution, or modern-day neoliberalism. I think these are all *symptoms* of something way more fundamental: our instinct to survive.

Our unequal relation can be found back already in prehistorical times. I think Horkheimer and Adorno's 'human's urge to control' are consequences of 'human's urge to survive'. In order to survive, humans collected food which goes at the detriment of nature. In fact, this is what all humans and animals do, trying to survive (Bezkorovainy, 1973). This 'surviving' almost goes together with consequences of nature, namely using food or taking in space, which is *destructive* for nature. This is not per definition a problem, however, it becomes a problem when there are *too many* survivors (Ananthaswamy, 2010). I think this happened with humans, related to our exaggerated reproduction and modern overpopulation. When humans decided to change their nomadic lifestyle to a sedentary lifestyle, humans started using nature differently. Therefore, it can be stated that this human-nature relation (about exploiting nature) started already with the *Neolithical Revolution*, with the beginning of agriculture in Mesopotamia (Morton, 2013). In fact, I think it can be argued that this human-nature relation already started *before* this agricultural revolution. There exists evidence of prehistoric humans who were extremely destructive for their living environment. Examples are Maya's in the Americas who cut all their trees with the consequence of running out of wood, or the Aborigines (the first invaders of Australia) who vanished all exotic animals and marsupials on the Australian island (Harari, 2019). Modern ecological thoughts often argue that Western capitalism is the driver behind ecological crises, while indigenous people have a stronger and even spiritual relation with their surrounding nature (Borie & Hulme, 2015). However, this example of the Maya's who destroyed their environment shows that these just followed their instinct to survive. I think this overusing of things until it runs out is inherent to our evolutionary primal instinct, which still dominates us.

What I want to make clear with this examples of 'destructive human populations' in prehistoric times, is that I do not state that our unequal human-nature relation started just with modern events like the Industrial Revolution or Enlightenment. I think this unequal relation has been there always since the existence of humans (due to our primal instinct), which is rooted deeply in our civilizations. This urge to survive led to powerful religions which encouraged us to control nature, and later led to an economical paradigm where this controlling and exploitation is further legitimated by the capitalistic ideology of economic growth and progression of humanity (Jasiński, 2018). Based on these ideological perspectives about using nature (animals, plants, and even humans) for human benefits, religions like Christianity and ideologies like capitalism look exactly the same. Both give us meaning in life and instruct us what we need to do in this complex world. Looking back at the 'religious statement': '*Be fruitful, and multiply, and replenish the earth, and subdue it*', I think this sentence symbolises exactly the ideology of capitalism. We are superior to nature.

It seems thinkers like Timothy Morton try to break-up with these beliefs about superior humans living in a hierarchical ecosystem. While religions or ideologies give meaning to life and have a story about how the world works, Morton argues that we have no idea how our world works. According to him, we have no control at all over our plants, animals, and non-living things (Schoof, 2019). However, I think we also should be careful with Morton's ideas. At first sight, Morton's thoughts look completely different compared to religious or ideological beliefs where humans fully understand nature. However, looking deeper to his thoughts, his ideas about 'one big ecosystem where everything is related to each other', contain perhaps also characteristics of religious or even totalitarian thinking. What I mean with this, is that Morton in fact also has a story about 'how the world works', namely: we do not know. I think arguing that humans live in one big ecosystem while not having any idea how it is exactly working, has in fact strong similarities with religions. All religions and ideologies have some transcendental entities which are elusive and incomprehensible for humans. These transcendental entities are just how they are and determine in fact everything (Harari, 2019). It is for us not possible to understand or to see these entities, we just know that it exists. I argue for Christianity, this transcendental and incomprehensible entity is God. For capitalism,

this entity is the Free Market. For Timothy Morton, this entity is the hyperobjective Ecosystem. Although Morton's ideas are crucial for a radical different perspective towards nature, I want to make clear with my critique that all ideas should be viewed with a deeper look. The Christian idea of the impossibility to see or to understand God, looks the same as Morton's idea about the impossibility to see or to understand our ecosystem and hyperobjects like the biodiversity crisis.

Moreover, there is exists also critique on the core principle of ecological thinking, namely on their intrinsic values. It has to be noted that these 'intrinsic values' are also nothing more than social-constructivist concepts which are created by humans (Pfadenhauer & Knoblauch, 2018). It are the deep ecologist who decided to assign an 'intrinsic value' to nature, without even understanding what this value actually means. These values can be seen as *imaginary realities* created by humans, since we are the only ones who argue there exist intrinsic values in nature (Mishra, 2014). This critique can become difficult, since the main argument of intrinsic values is that it are values independent of humans. However, it are still humans who came up with the idea of intrinsic values, which means those values are in fact always dependent on humans to a certain extent. Perhaps non-living things has no value at all, while only deep ecologist believe this themselves (Grey, 1986), However, what I want to emphasize is that believing nature has no value, does not automatically mean nature can be just exploited or destroyed. In that case, one will end up at more nihilistic or even absurdist perspectives. According to nihilistic philosophies, there is no value in nature at all. Those perspectives argue that all living and non-living things have no meaning at all and are completely worthless (Stepenberg, 2020). Absurdist perspectives can be a way out of these perhaps pessimistic views towards humans and nature, by 'embracing the meaningless' of all living and non-living things (Gale, 2017). Though, it remains difficult to acknowledge intrinsic values of nature independent of humans, since humans came up with the idea of these values. Again, it are humans who determine how we should view nature and whether it has a value or not.

In short summary: the ideas of Horkheimer and Adorno, deep ecology, and Timothy Morton have been discussed and explained. I argued that these ideas are related and built upon each other, while I believe these crucial thoughts can form the basis for a new way of thinking about our relation with nature. However, I also formed some points of critique on the three different philosophies. First, the human urge to control started not just during the Enlightenment but can be found way back during dominant religions and also in prehistoric communities (Ananthaswamy, 2010). Second, Timothy Morton's way of reasoning looks completely 'new' compared to these religious beliefs, although his thoughts contain also religious characteristics due to his transcendental and elusive ecosystem. Third, it can be questioned to what extent deep ecologists are right in their argument about 'intrinsic values' of nature, since this is again an example of humans who assign an own created concept to natural phenomena.

5.9 Anthropocentric solutions

Going back to main topic: the biodiversity crisis. There is still no concrete answer on the question whether we really understand this crisis. However, whether we understand this crisis or not, there are lots of solutions formulated in order to solve the loss in biodiversity. It is important to notice that these solutions are mainly *Anthropocentric* solutions. This means that the problems of loss in biodiversity are expressed in problems for humans, which means the solutions are also meant for humans only (Reid, 2013). When referring to the quote at the beginning of this chapter: '*that keeps us alive and well*', the 'us' in this sentence does relate to humans, but not to plants, animals, or all other non-living things. One other point of critique on these anthropocentric based solutions, concerns the way how these are formulated. Based on the ideas of Timothy Morton, it became clear how complex and intangible the biodiversity crisis is for us human beings. Because of this complexity,

we are not able to understand the exact problem, nor are we able to have a concrete solution for this problem. However, I think all the possible solutions have one remarkable thing in common: *reducing complexity*. This relates to the famous quote '*The aim of science is always to reduce complexity*', formed by American philosopher William James (1842-1910). I think this is what happens with all models, graphs, and conceptual frameworks which explain the biodiversity crisis. For example, the IPBES conceptual framework implies that it has a complete understanding of this crisis (Joly, 2014). All the complexities of the biodiversity crisis are reduced into a simplified framework where everything is explained. We admit that we humans caused the biodiversity crisis, but we also know exactly how we will solve it. I think this claim of having an understanding of our entire ecosystem and arguing how it will be restored by humans, is an obvious example of human pride and our intervention in nature.

Moreover, I think this critique also relates to the graphs about transformative change. The problem with these graphs concern the idea that we know exactly where we are, where we need to go, and how we will go there. Enormous complex environmental problems are visualised in graphs with arrows which show us the right direction. The dominant idea behind the transformative change also concerns a change which has to be 'as quickly and on a large scale as possible' (Visseren-Hamakers et al., 2010). I think this priority of optimizing the 'speed and size' of this change, together with knowing the final destination, can be regarded as problematic. For explaining this problem, I will make use of the thoughts from Austrian-British philosopher Sir Karl Raimund Popper. One of the famous books from Karl Popper is *The Open Society and its Enemies*, published in 1945, one year after Horkheimer and Adorno's *Dialectic of Enlightenment* (Kierstead, 2019). One interesting argument from Popper in his book is his criticism on 'big plans which should be realised as fast as possible'. Popper strongly criticizes the phenomena of creating big and utopian plans, where radical system change is necessarily. Popper mentions this 'totalitarian thinking', which leads ultimately to dictatorial regimes (Popper, 2013). Again, it has to be noted that Popper wrote his book during World War II (just like Horkheimer and Adorno), which explains their critique on totalitarian systems. However, Karl Popper's point about the danger of large scale system changes, based on a clear end-vision, is still relevant today. Popper argues that these big transformations or revolutions (e.g. transformative change) eliminate all uncertainties in the social world (Birner, 2018). The ignorance of all these uncertainties (e.g. unexpected ecological crisis or pandemics like the Covid-19 crisis) can lead to vulnerable and problematic situations. I think the named Sustainable Development Goals or Aichi targets can be seen as clear examples of certain 'end goals' which will be finally reached. In this respect, I think there are clear similarities between the ideas of Karl Popper and Timothy Morton. In fact, both criticizes the idea of humans who live in a controllable world.

Another problem about the anthropocentric solutions for the biodiversity crisis, is the holy belief in technology's capacity to solve all problems for humans. One example of a movement which is based on this belief is called *Ecological Modernization* (Buttel, 2000). This movement argues that all environmental problems can be solved by technological solutions. Furthermore, ecological modernization states that economic growth and environmentalism are strongly compatible (Ewing, 2017). Of course, it is a promising and positive idea that humans are capable of solving environmental risks we are facing today. However, it has to be emphasized that humans are the ones who *caused* these problems. The difficulty is that we cause certain (environmental) problems, which we subsequently solve by ourselves. Since a problem is solved, we claim this as 'progression or growth', although in reality this can be seen as 'phantom or fake growth' (Heijne & Noten, 2020). Furthermore, most technological solutions cause new problems, which needs to be addressed again, and so on. I think the main idea behind ecological modernization about compatible

environmentalism and economic growth, concerns in fact a displacement from environmental problems out of our sight.

This anthropocentric view on the biodiversity crisis makes clear that we only consider something as a crisis, when it poses a threat to humanity. Based on the discussed ideas from deep ecologist and Timothy Morton (based on the early critique on modernity from Horkheimer and Adorno), we are not the only ones in the ecosystem. One challenging question is whether we can consider something as a crisis when it *does not* pose a threat to humanity. It is clear that we have the capacity to invent technological solutions and to realise economic growth, but do we also have the capacity to acknowledge crises which only affect animals, plants, or non-living things? I think 'real progression' would be a human civilization which care about nature's intrinsic values, independently of any human utility. It is clear the biodiversity crisis concerns an ecological crisis which affects 'the variety of life on Earth'. In this case, when we use this definition of 'life on Earth', we have to care about all life, also meaning all plants and animals. In fact, since the complete ecosystem is affected by this crisis, non-living things should be regarded as same importance compared to all 'living things'. Although the seriousness of the biodiversity crisis is more than clear, its problems (and benefits of biodiversity) are still expressed in only human interests (Reid, 2013). All the named 'ecological services' like fresh water, oxygen, or food, are anthropocentric benefits. In order to focus on more ecocentric based solutions for the biodiversity crisis, it looks a 'mental change of thinking' is necessarily. This change concerns a revision of our position in the ecosystem and of our relation with nature.

This relation is not only about viewing humans equal to all living and non-living things on Earth, but also on *respect* for nature and *connectiveness* with it. Beautiful landscapes or forests should not be seen as places or resources which can contribute to economic growth or human benefits which are expressible in quantitative units. Feeling a strong connectiveness with these beautiful places helps in a better and more balanced relation with nature (Ingerman & Roberts, 2015). Timothy Morton goes even further with his book *Ecology without Nature* (published in 2007), where he rejects the idea of 'nature'. In this book it is argued that the idea of 'nature' implies a human-nature dichotomy, where both are distinctive entities. Morton states that there is no human-nature relation at all, since humans *are part of nature*, or better formulated: part of one ecosystem (Morton, 2009). The thought that there is no difference between humans and nature is a confronting idea which is difficult to reconcile with our current beliefs about humanity (based on centuries of strong religions and ideologies). Moreover, the belief that humans are equal to animals is also an example of such a confronting idea (Cliteur, 2001). This relation between humans and animals will be discussed further in the interview analysis. However, centuries ago in Western-Europe there was a belief in a legitimate inequality between men and women (Thistlethwaite, 2009). While nowadays this inequality exists between humans and animals, should it not be possible to reach an equality between human and animals in a far future?

6. Theoretical Framework: Policy Arrangement Approach on the Biodiversity Monitor

6.1 Introduction

As explained earlier in the theoretical framework, the Policy Arrangement Approach (PCA) as a theoretical perspective will be used in this research. This chapter will focus on applying the theoretical framework to the biodiversity monitor. It became clear the PCA consists of four 'different dimensions', which are interrelated to each other. These different dimensions are described as the so-called *actors, discourses, rules of the game, and power and resources*. As the theoretical framework explained, these dimensions can help in understanding and explaining certain policy (Arts et al., 2006). Of course, the term 'policy' encompasses a wide concept, since in fact every 'practice of institutions' can be seen as a form of policy (Jones, 2005). Moreover, the notions *actors, discourses, rules of the game, and power and resources* also contain a strong multi-interpretable character, since their definitions are strongly subject to debate. However, it can be stated that the process of the biodiversity monitor is a certain policy, since it includes practices of different organisations (viz. steering or governing Dutch dairy farmers in order to realise biodiversity restoration). When it is tried to understand this policy – and thus the biodiversity monitor for dairy farming – the four dimensions of the PCA can help in understanding this. Therefore, it is necessary to *identify* the actors, discourses, rules of the game, and power and resources, which are related to the biodiversity monitor. However, before identifying these dimensions, it is primarily necessary to have an understanding of these dimensions. This chapter will give focus on the important definitions of these dimensions, together with applying these dimensions to the biodiversity monitor.

6.2 Actors

The definition of *actors* can be easily explained, since an actor can be seen as 'anyone who acts', thus having a certain agency or capacity to act (Allen, 2011). In this sense, all humans can be seen as an actor, since we are able to 'realise actions'. However, it becomes more difficult when we question what can be seen as 'acting'. At first sight, acting seems like something *dynamic* or something which consequences other actions. When a person talks or moves, this already can be seen as a form of action. It becomes even more difficult when it is questioned whether these actions should be made with 'consciousness' or not (Beloff, 1982). This chapter will not delve into the fundamental question how 'actors or acting can be understood', though there will be a closer look on different forms of actors (e.g. not only humans). Actors can be seen as individual humans (also known as 'agents'), while a group of these individuals can also be classified as actors. In this sense, the involved organisations in the process of the biodiversity monitor can be identified as actors. This means the most important actors concern FrieslandCampina, Rabobank, WWF, DuurzameZuivelketen, Wageningen University, and the Louis Bolk Institute, since these played a crucial role in the development of the biodiversity monitor (in the chapter with results there will be a more detailed focus on these actors). It is true that the agents within these organisations are also clear examples of (individual) actors. However, it has to be noted that these actors are related to the monitor since they are responsible for its process. In reality, there exist lots of more related actors, although they were not involved in developing the biodiversity monitor. It can be argued that in fact all Dutch dairy farmers are related actors, since their behaviour is influenced by the monitor (e.g. by the critical indicators). Based on this, it looks like two broad group of actors can be distinguished. On the one side, there are the actors who developed the biodiversity monitor (FrieslandCampina, WWF, WUR, LBI etc.), while on the other side, there are the actors who behave according to the principles of this

monitor (the Dutch dairy farmers). It looks like there exists a one-sided relation, as the developers of the monitor create the guiding rules, while the dairy farmers act according to these rules. As firstly the development of this monitor takes place, while secondly the dairy farmers follow these guiding rules, it seems the one-sided relation is even sequentially. However, in reality there is of course no one-sided sequential relation between the developers of the monitor and the dairy farmers. This can be argued by the dairy farmers who are also engaged in the process of the monitor, e.g. the involvement of the DuurzameZuivelketen (which consists of many Dutch dairy farmers). This means the policy and content of the biodiversity monitor are also subject to influences from these farmers, who play an important role in its process. The extent of this influence of farmers and the involved organisations, is heavily dependent on *power structures*. The importance of power will be explained in the following section.

6.3 Power

Despite its difficult definition, the dimension of power is perhaps the most crucial element in explaining the interrelations between the different dimensions. There exist lots of different definitions of power, while during history many philosophers tried to formulate a clear understanding of this phenomenon (Greene & Van den Berg, 2020). This chapter will not focus in depth on the idea of 'power', though the main understandings will be explained. For a long time in history, power was seen as a certain possession or 'something what you have'. This means it is for example possible to have power, to lose it, or to transmit it. It was English philosopher Thomas Hobbes (1588-1679) who argued power should indeed be seen as a transferable possession, where you can 'own power'. When people wanted for example more protection or security by a higher authority (e.g. a state or government), they could 'transmit their power' to these overarching bodies of power or political entities (Machamer, 2014). In contrast to these thoughts of 'power as a possession', it was the famous French philosopher Michel Foucault (1926-1984) who came with a radical different idea about power. According to Foucault, power is not a possession or just 'a thing', but always concerns a *relation*. This means power is about a relation between different actors, where there is a certain hierarchy between the actors. It is argued that one can speak about a power relation, when an actor can influence the behaviour of another actor (Ojakangas, 2005). For example: when the Dutch Ministry for Agriculture creates a law with restrictions for Dutch dairy farmers, it can be stated this ministry has a certain form of power. However, there exists in fact only 'power' when this power can be exercised on other actors. When there are no farmers anyway in the Netherlands who can behave according to this law, the 'power' of the Dutch ministry becomes meaningless. This shows there always exists a relation, since one actor is influencing the behaviour of another actor. One other crucial element related to power relations, is *legitimacy* (Franck, 2006). Using the same example of the Ministry for Agriculture, next to the importance of a relation (actors who are influenced), this power relation is only possible when the ministry is viewed as a legitimate political entity, otherwise the farmers will not follow the created laws.

It has to be admitted this sections focuses mainly on power as 'actors influencing other actors' behaviour'. However, power encompasses a more broader phenomenon and is way more complex than only 'influencing other's behaviour'. Influencing behaviour is perhaps a small part of a wider understanding of power, since exercising power also emerges in mental or non-consciousness ways (Brindisi, 2015). I think a more comprehensive understanding of power is fully related to *control*. I think power can be seen as the capacity to control, where this control can include almost everything in its most extreme cases. This capacity to control goes beyond 'steering behaviour of actors', but also affects actors' ways of reasoning, mental states, and feelings. Independently of these thoughts about power, it is for this chapter important to identify different power relations between the actors

in the biodiversity monitor. This identification is not easy, since it is not determined which actors 'are the most powerful or have the greatest capacity to control'. Therefore, it has to be noted that this identification of power relations is based on my own thoughts and can therefore of course not be regarded as absolute truth. I will not determine which actors 'are the most powerful and which are not', but I will focus on the different capacities to control based on available power resources, and how these power resources are used. Regarding the resource of power, two important resources inevitably arise: money and knowledge (Barnard et al., 2021). I think the Rabobank is the first actor who comes in mind, looking at the resource of money. It is a true a financial bank like the Rabobank own and controls the most extensive flows of money (compared to the other related actors). Concerning the resource of knowledge, the Wageningen University and Louis Bolk Institute look like the most powerful actors, since these research institutes generates knowledge. The reason why money and power can be seen as strong power resources, is because I think they are characterized by the fact they are 'attractive for other actors'. What I mean by attractive, is that these resources are useful and suitable for achieving certain goals. One simple example: a Dutch dairy farmer can have the goal of purchasing a bigger farm. This goal can only be achieved by having more money, which makes money an *attractive* and *valuable* resources which the farmer will try to obtain. The actor who is in possession of the money, has the capacity to give the money to the farmer. However, this 'money possessor' (e.g. the Rabobank) can ask the farmer to deliver certain services (e.g. following the rules of the biodiversity monitor), which leads to an influenced behaviour of the dairy farmer. In this case, there is a power relation because of three elements: there are at least two related actors (the Rabobank and the dairy farmer), the Rabobank is legitimate in the perspective of the farmer (the farmer is convinced he or she can obtain money), and there is a certain power resource, namely *money*. Because of the fact money is a valuable power resource, the power relation can actually exist. When there is a non-valuable resource, there is no power because the 'influenced actor' (the dairy farmer) will not change its behaviour, as there will no be valuable reward. In this way, it becomes clear how important power resources are for actual relations of power. Though, one important element which needs to be emphasized, is that the *value* of these resources is subject to societal structures. It seems logical money is a 'valuable resource', as in our modern-day world money is almost inherent to value. However, these thoughts about valuable money are deeply rooted in economic, cultural, societal, and political structures (Cooper, 2021). To have a better understanding about these structures and how they influence human's perception of legitimate power and valuable resources, it is necessary to take a closer look at *discourses*.

6.4 Discourses

Discourses can be defined as 'generalizations of the notions of a conversation to any form of communication', or as 'written or spoken communication or debate'. It can be argued the dimension of 'discourses' is perhaps the most difficult concept within the Policy Arrangement Approach. It is true the dimensions of for example actors and power contain multiple definitions, though the ideas behind this concepts are clear. However, the dimension of discourses contains not only different definitions, but it own a certain multi-interpretable understanding (Meân, 2012). When looking at the definition of discourses of 'written or spoken communication', it seems very clear. According to this definition, a discourse means nothing more than any form of communication. This communication can take place between actors, where the way of communication can be based on power relations between the actors. However, I think it has to be emphasized there is a more fundamental meaning behind 'discourses'. First of all, it becomes clear 'communication' is a crucial element within the dimension of discourses. When thinking about communication, first things where one thinks of are for example people talking with each other. Though, it should be emphasized that 'communication' goes way beyond only 'talking with each other'. I think one of the most important

elements of communication, concerns *interaction*. Looking at the term ‘interaction’, this consists of ‘inter’ and action’, meaning in fact ‘between action’. When ‘anyone who acts’ can be seen as an actor, ‘action’ can be seen as an activity from a certain actor. Interaction implies actually activities from different actors, which are related to each other, activities which *interact*. It becomes clear different actors are an essential part of interaction and communication, since different actions come together in communication. As explained, these different actions are not only about talking, but can be any form of ‘actions’ (Guerrero-Sole, 2020).

Of course, these explanations of ‘communication, interaction, and actions’ remain still vague and perhaps meaningless. However, what I want to make clear is that communication not only concerns ‘people talking or writing to each other’. Another important element is *understanding of actions*. This is related to a certain interpretation of actions, and how an actor *reacts* to this action (Daniels, 2012). This part of interpreting actions is important related to the dimension of discourses. In order not to get lost in abstract definitions of communication and discourses, one simple example can be provided. When a director of the Rabobank holds a conversation with a Dutch dairy farmer, while informing the farmer about the biodiversity monitor, there exists certain communication. The Rabobank director commits an action (informing about the monitor), and the dairy farmer commits an action (e.g. agreeing with the monitor). These different actions *interact* with each other, since the action of the farmer (the agreement on the monitor) is a reaction to the action from the Rabobank director. The dairy farmer interprets the information about the biodiversity monitor, understands it, determines his or her thoughts while subsequently giving a reaction to the Rabobank director. This reaction (and thus the communication), is driven by the existing power relations. When the Rabobank director was not capable or having the power of providing the farmer with financial rewards, the dairy farmer could decide not to agree with the biodiversity monitor. However, the farmer trusts the Rabobank, legitimates the director’s power, and is convinced he or she will be financially rewarded when following the biodiversity monitor principles. All these thoughts, assumptions, and trusts, are underlying the reaction of the dairy farmer. This means the farmer’s interpretation of the conversation, is driven by these thoughts and perspectives. This whole idea of different understandings and assumptions are strongly related to discourses. Referring back to Michel Foucault, this famous French philosopher describes discourses as ‘*ways of constituting knowledge, together with the social practices, form of subjectivity and power relations which inhere in such knowledges and relations between them*’. Foucault argues discourses are more than ways of thinking and producing meaning (Foucault, 1982). This definition already provides a way more complex and broad understanding, compared to ‘discourses as any form of communication’. The ‘social practices’ can be seen as the ‘activities from actors’, while the ‘way of constituting knowledge’ is related to the way of interpreting actions, giving meaning to actions, and subsequently giving reactions. All these understandings, interpretations, and power structures in interactions are driven by underlying knowledge. The way of constituting knowledge of an actor is crucial for these understandings and interpretations (Harvey, 2006). This actor’s knowledge has everything to do with one thing: *its understanding of the world*.

All the actor’s activities – leading to interactions – are driven by the actor’s understanding of the world. Taking again the example of money as a power resource in the biodiversity monitor, the entity of money is essentially meaningless. Money only owns a value because humans *assign* a value to it, we *interpret* money as something worthwhile (Galor, 2022). Dutch dairy farmers’ perspectives are subject to the assumptions we live in a world where money is a strong power resource. Since everyone believes in the value of money, Dutch dairy farmers are willing to change their agricultural companies, in order to receive a piece of paper with a number on it, which leads to an agreement. This agreement is fully based on the whole of beliefs, ways of constituting knowledge, assumptions,

thoughts, and understanding of the world. It can be stated this agreement is fully based on *discourses*. In this sense, discourses can be seen as certain paradigms with underlying structures which are influencing mental states of actors, and thus influencing their actions (Koller, 2009). The example of the interaction between the Rabobank director and the Dutch dairy farmer agreeing about the biodiversity monitor, was only possible because this interaction took place within the same discourse. Such an agreement looks really obvious, though this communication can not be taken for granted.

Imagine the same Rabobank director visiting a local indigenous farmer in Papua New Guinea. The first barrier in this conversation already concerns the use of language. These two human beings are not capable of communicating with each other, since they can not speak the same language. This already implies an impossibility of understanding each other. However, suppose the Rabobank director and the local farmer both speak English, and can have a conversation. The Rabobank director informs the local farmer about the global biodiversity crisis, the Aichi targets, and the Sustainable Development Goals regarding biodiversity restoration from the United Nations. The director argues the local farmer should move to a more sustainable form of farming, in order to meet the goals of biodiversity restoration. The Rabobank director presents a list of critical prestatation indicators, and explains the indigenous farmer will be financially rewarded when he or she meets the biodiversity indicators. First of all, the local farmer in Papua New Guinea probably has never heard about biodiversity, while having a completely different understanding of nature. Moreover, this indigenous farmer does not legitimate the Rabobank director's power at all, since he or she is not impressed by his authority. Furthermore, why should this farmer transform his or her way of living, in order to receive a piece of paper with numbers from a person in strange clothes? This piece of paper is worthless for the indigenous farmer, since all other actors in his or her environment also ignores the value of 'money'. It turns out there exists a clash between two different incompatible discourses.

Of course, I am aware this is an unrealistic example. However, what I want to make clear with this extreme example is how discourses are deeply rooted in our societal structures and ways of reasoning, which makes these taken for granted. I think the whole idea (and perhaps most important) behind discourses, is there exists *no objective reality* (Zahavi, 2003). The extreme example of a Western financial banker and a local Papuan farmer, emphasizes two completely different understandings of the world we are living in. I think it can be even argued a discourse can be seen as 'world with its own reality'. Different worlds (with each their own reality) can interact with each other, resulting in a clash between discourses .

While the ANT chapter focused on human-nature relations and nature's intrinsic values, there also exists the practical biodiversity monitor. I think there can be a certain *ecocentric discourse* and an *anthropocentric discourse* distinguished. As the names already suggests, the ecosystem is central to the ecocentric discourse, while human-beings are central to the anthropocentric discourse (Kortenkamp & Moore, 2001). One important thing to be aware of is that none of these are the *objective truth or reality*. I do not want to describe one discourse as the 'best or most suitable', but to emphasize the fundamental differences between the two different discourses. I think the biodiversity monitor falls within this anthropocentric discourse, where human-beings are prioritised. Though there is broad variety of different actors (FrieslandCampina, Rabobank, WWF, WUR, LBI, dairy farmers, animals, nature, etc.) and power relations and resources (Rabobank having money, WUR and LBI having knowledge etc.), I think there is one overarching discourse. I think all the existing power relations, valuation of power resources and solutions for biodiversity monitor are bounded by this anthropocentric discourse. This is mainly because of the final goal of the biodiversity monitor: namely the development of a revenue model for dairy farmers, and the restoration of biodiversity

(because of its functionality for human needs). At first sight, the solutions of the monitor for Dutch dairy farming for restoration of biodiversity monitor look quite clear and logical. By operationalising biodiversity, indicators can be created, while dairy farmers will be financially rewarded when they meet these indicators, which finally leads to biodiversity restoration. Though, the solutions are completely based on an anthropocentric discourse where humans tend to intervene in nature, while quantifying phenomena like biodiversity and rewarding dairy farmers with money. In an ecocentric discourse, dairy farmers should not be financially rewarded at all, but should be intrinsically motivated to respect the values of nature.

In the beginning of this chapter, it was stated the dimensions of the Policy Arrangement Approach can help in understanding the policy of the biodiversity monitor. It turned there are clear actors in the development of the biodiversity monitor (e.g. the involved organisations), while existing different power relations between the actors (e.g. one dairy farmer being less powerful than a financial bank) and different power resources (e.g. money and knowledge), and how these actors interact with each other, based on the relations of power. The complexity of these interactions (e.g. the interpretation of actions and the reactions) was explained by underlying thoughts, beliefs, and understandings of reality of different actors. It became clear how these different understandings and constitutions of knowledge were part of discourses. These discourses, power structures, and actors can explain how policy in the biodiversity monitor has been created. Though, there is one other dimension which is essential to the understanding of the biodiversity monitor, namely *rules of the game*.

6.5 Rules of the game

It can be argued these 'rules of the game' are holding the interactions between actors (based on discourses and power relations) together. Firstly, it can be questioned what can be seen as rules of the game. A rule can be defined as 'one of a set of explicit or understood regulations or principles governing conduct or procedure within a particular area of activity' (Cambridge Dictionary, 2022). This definition of rules immediately relates to actors, power, and discourses. The 'set of explicit regulations or principles' is mainly related to the behaviour or actions of actors. It can be argued that rules of the game are certain drivers behind actor's behaviour, since these rules apply to actors. Moreover, rules are strongly related to power, as certain rules apply differently to actors, based on power relation between the actors. Regarding discourses, the rules mainly derive from principles which are based on underlying discourses. This interrelation between rules, actors, power, and discourses can be explained with a clear example.

Since rules can be seen as 'guiding principles which drive actor's behaviour', the critical pre-emption indicators are an example of rules. One rule is when a Dutch dairy farmer has a certain percentage of grassland (and thus meeting one of the indicators), he or she will be financially rewarded. This rule is guiding the behaviour of the actor (namely the dairy farmer meeting the indicators). It seems logical, but without actors, rules become in fact meaningless, since inherent to rules are actors to whom the rules apply. Something becomes a principle or guiding rule, only when there are actors who are affected by this rule (independently whether they will follow this rule or not). These critical pre-emption indicators can be seen as rules, since they affect the Dutch dairy farmers. However, it is true certain dairy farmers are more affected by these rules, based on their positions of power. Dairy farmers owning a broad range of power resources (e.g. farmers with big companies having lots of money), are more powerful compared to small-scale dairy farmers. For these more powerful dairy farmers, it can be way easier to act according to the rules, since they own enough resources to easily meet the critical pre-emption indicators. On the other hand, it can also be argued those dairy farmers will not follow these rules, since they dispose of already enough money, while not needing the

financial rewards from the biodiversity monitor. These rules (the critical indicators) are strongly influenced by principles from the anthropocentric discourse, as these indicators serve as the basis for a revenue model and biodiversity restoration for human and agricultural needs. This example of critical pre-station indicators as a rule can be seen as a *formal rule*. It is determined how the indicators are formulated, and how dairy farmers are rewarded when they 'follow these rules'. Next to these formal rules, there also exist *informal rules* (Phillips, 2011).

The understanding of informal rules is more complex, since these are not clearly determined (or legally defined like formal rules). Though, this makes the notion of informal rules not less important. Again, these informal rules are strongly based on norms and values (which find their origins in principles influenced by discourses). One example of such an informal rule is the heritage or legacy of agricultural companies in the Netherlands. There exists the value within families where young farmers take over the farming company of their parents. It is not written down or there is no law which says 'all the children of Dutch farmers are obliged to follow up their parents and to take over their agricultural company'. However, there is the informal rule where these children are meant to become the later owners of farming companies (Bieleman, 2010). This informal rule leads to Dutch families who are dominating a farming company generation after generation, where the family's philosophy rules the organisational structures of the farming for decades. This is mainly because of the children of farmers (who become the later owners) are influenced by the norms, values, and way of reasoning of their parents. These norms and values are all part of bigger 'culture' in Dutch farming industry.

One crucial element regarding 'rules of the game' which needs to be emphasized, is the *consequences* of rules. As explained, rules can be regarded meaningless when there are no actors to whom the rules apply (while applying differently because of relations of power). However, rules also become meaningless when there exist no consequences of these rules (Bell & Cox, 2015). For example, a municipality can restrict a Dutch dairy farming for not allowing them to expand their company in area, since the municipality decided to use the surrounding of the farm for building houses. This restriction can be written down legally in a certain *Bestemmingsplan*, which makes it a formal rule. However, this rule becomes only meaningful when there is a consequence when the farm will *not follow* this rule of the municipality. In other words, the municipality (the actor) needs *power resources* which they can use against the dairy farm in the form of a punishment. In the Netherlands – and in the anthropocentric discourse – these punishments are mainly expressed in financial terms. When actors do not act according to formal rules, they are obliged to 'pay a bill' for not following the rules.

What is important to note, is that the disadvantages of the consequences, should *outweigh* the advantages of not following the rules. When this is not the case, actors will not act according to the rules, but there will be a situation where they can 'buy off' their behaviour (in the case of financial punishments) (Takarada et al., 2021). Next to actors and consequences, it is thus important for rules to have consequences which are strong enough to make the rules meaningful. When a dairy farmer will earn more money (because of profits) when not following the critical pre-station indicators (even when he or she will be financially rewarded when the indicators are achieved), this farmer will of course not adhere to these pre-station indicators. This is again depending on the financial- and power position of the farmer, whether these rules are really applying to them or not. This is a typical example of a situation in the anthropocentric discourse, since here farmers make a *rational consideration* (Lecouteux, 2016). When more money can be gained, farmers are stimulated to follow the critical indicators and thus contribute to biodiversity restoration, irrespective to the intrinsic

value of biodiversity. Based on an ecocentric discourse, different norms and values (and thus informal rules) will be taken into account within such decisions about following rules or not.

Based on all this information about actors, rules, power, and discourses, it turns out these dimensions are strongly interrelated to each other. It became clear how two different groups of actors can be distinguished, namely the actors who develop the rules of the game (the developers of the biodiversity monitor), and the actors who act according to these rules of the game (the Dutch dairy farmers), though this relation can be seen as a simultaneous reciprocal relationship. Next to these formal rules (the principles of the biodiversity monitor), there are informal rules which are driving the behaviour of actors. The meaning of these rules of the games is dependent on power relations (e.g. whether actors are affected by rules of the game and its consequences or not). The interaction between actors is also strongly influenced by these power relations, since these structures determine how actors understand and react to each other. These reactions are driven by ways of reasoning and constituting knowledge, being part of complete discourses. The existing discourses (based on its whole understanding of the world) explain how social interaction takes place between different actors.

7. Results: Document Analysis of the Biodiversity Monitor

7.1 Introduction

This chapter will be an analysis of the documents about the biodiversity monitor for dairy farming in the Netherlands. These include documents written by authors within the involved organisations like the Louis Bolk Institute, Wageningen University, FrieslandCampina, Rabobank, and WWF. These publications vary from documents written in 2014, to the most recent document about the biodiversity monitor in 2018. All these different documents contain detailed information about the development of the biodiversity monitor, together with suggestions about KPI's, levels of biodiversity, or conceptual frameworks. Because of the detailed and highly-densed information in these documents, I tried to select the most important and relevant parts of these writings. However, it has to be noted this chapter still contains highly-densed information. Therefore, the most part of this document analysis concerns these factual information out of the biodiversity monitor documents. After describing this information about the development of the monitor, I will give an analysis and reflection about these writings. This reflection will be performed with the help of the theoretical perspectives of the Actor-network theory and Policy Arrangement Approach.

7.2 Measurement of biodiversity

'Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt reverse land degradation and halt biodiversity loss.'

This is the official wording of the 15th Sustainable Development Goal (SDG) about *Life on Land*. As explained earlier in Actor-network Theory chapter, this is one of the 17 SDGs established by the United Nations in 2015. According to the United Nations, this 15th SDG has 12 targets to be achieved by 2030, while progress towards these targets will be measured by 14 indicators. One key element of this SDG are the last three words: *halt biodiversity loss* (Vira & Schneider, 2018). In order to achieve this goal of 'halting biodiversity loss', it is necessary to have an *understanding* of biodiversity. Without a clear definition or meaning of biodiversity, it is not possible to determine whether this goal of halting biodiversity loss is achieved or not. Therefore, biodiversity is operationalised which makes it a *measurable* concept. This becomes clear with the 12 targets and 14 indicators, developed by the United Nations. One example of such a target is *'integrate ecosystem and biodiversity in governmental planning'*. The related indicator to this goal is *Aichi Biodiversity Target 2* (mentioned earlier in the ANT chapter). It is stated that this Aichi target concerns *'having all biodiversity values integrated into national and local development by 2020, as well the incorporation of planning processes into national reporting system'* (De Souza Dias, 2015).

It becomes clear there is a certain goal of halting loss in biodiversity, while subsequently different targets and indicators are formulated. This operationalisation of biodiversity and development of indicators, make it possible to determine whether the goal is achieved or not (Lakićević & Srđević, 2018). However, it is true that these two sentences are completely in contrast with the main argument in the ANT chapter. These sentences namely concern the phenomena of claiming to have an understanding of biodiversity, reducing the complexity of biodiversity with indicators, and the focus on achieving goals and targets. The main argument in the Actor-network Theory chapter concerned the huge complexity of biodiversity, which makes it something incomprehensible and uncontrollable for humans. However, the SDG target of *'integrate ecosystem and biodiversity in governmental planning'*, implies there are just two entities of *'ecosystem and biodiversity'* which just need to be integrated. Although *'ecosystem and biodiversity'* are perhaps even one of the most

complex 'things', far beyond the reach of human reason, it looks we just have to pick these up and 'integrate them in governmental planning'.

However, I have to admit this way of continuously arguing that 'we do not understand biodiversity, so every attempt to restore or conserve biodiversity will fail', is a cynical way of reasoning which will not solve any problems. Of course, in order to solve these problems related to biodiversity, it is unavoidable - and even necessarily - to operationalise it while formulating goals and targets (Bennie et al., 2010). Though, these goals should not focus on only achieving the 'end goal', while ignoring crucial indicators as part of the operationalised concept. The ANT chapter already made clear there exist lots of different operationalisations and definitions of biodiversity. This also relates to the different relevance for organisations or governments, who are involved in developing these definitions. From now, this thesis will focus on a concrete case of such an operationalisation of biodiversity: *The Biodiversity Monitor for Dairy Farming in the Netherlands*.

7.3 Monitor for Dutch dairy farming

First of all, it is of importance to introduce this case of the Dutch biodiversity monitor. The main principle behind this biodiversity monitor is simple; this monitor created an operationalisation of biodiversity, in order to determine how Dutch dairy farmers 'score on biodiversity'. Primarily, dairy farming can be seen as the raising of mammals to obtain milk from mother animals for consumption by humans. Mostly cows are used in dairy farms in the Netherlands, but also sheep, goats, horses and camels can be used in this livestock farming. The biodiversity monitor for Dutch dairy farming is based on certain 'indicators of biodiversity'. With the help of these indicators, it can be determined how Dutch dairy farmers 'score on biodiversity'. For example, when a dairy farmer in the Netherlands meets all indicators (e.g. having a certain percentage of grassland) with his or her agricultural company, this farmer contributes to biodiversity. This contribution will be financially rewarded, which creates incentives for dairy farmers to score on these indicators, meaning having a positive impact on biodiversity restoration in the Netherlands (FrieslandCampina, 2018). Of course, the development of this biodiversity monitor with its related indicators requires thorough research. First of all, a clear definition of biodiversity for Dutch dairy farming is necessary, while subsequently a well-considered decision has to be made to determine which indicators should be developed and included. Furthermore, it needs to be considered which actors, consultancies, or organisations will be involved with their recommendations about the development of such a monitor. It is important to create a representative definition of biodiversity, while developing relevant and measurable indicators which also relate to this definition. It has to be noted that this development of the biodiversity monitor and indicators took several years (FrieslandCampina 2018). The following part will focus in detail on this development, while it will be explained which actors played a role in this development and how different steps have been taken. This detailed part will be explained in a highly dense informative way.

7.4 Development of the Biodiversity Monitor

As already explained earlier in the introduction of this research, it was in 2014 when a conceptual framework was developed for understanding biodiversity. This was developed by the Louis Bolk Institute, which contributed to the project of FrieslandCampina, Rabobank, and WWF. It became clear how the 4 'levels of biodiversity' have been formulated (*functional agrobiodiversity, landscape diversity, specific species and sources areas and connecting zones*), together with the suggestion about the Critical Prestation Indicators. The introduction also explained how the Wageningen University got involved, while contributing to the selection of the prestation indicators (from 98 indicators to 10 Critical Prestation Indicators). Furthermore, the introduction explained how in 2018

the '4 pillars of biodiversity' have been formulated (*functional agrobiodiversity, landscape diversity, diversity in species and regional biodiversity*), and how 7 Critical Prestation Indicators have been selected (*greenhouse gas emissions, nitrogen soil surplus, ammonia emissions, share of permanent grassland, protein from own land, nature and landscape management, and herb-rich grassland*).

7.5 Video and FAQ Biodiversity Monitor

On the official website of the Biodiversity Monitor for dairy farming, a video can be found which explains the main principles behind the monitor. In the video, it is stated that natural capital (as part of biodiversity) is needed for agriculture in order to produce enough food for now and in the future. Moreover, the video argues that the aim of the biodiversity monitor is 'to make nature stronger and farms more resilient'. Finally, in the video it is explained that the assumptions of the KPIs concern: mutually reinforcing coherence, measurability, user-friendliness and the possibility to achieve results in the short term. The video ends remarkably with the statement: 'In this way, biodiversity will become an important economic factor in the revenue models for dairy farming in the future.'

Furthermore, the official website of the biodiversity monitor for dairy farming contains a document named '*Frequently asked questions about the Biodiversity Monitor Foundation*'. This document explains the Biodiversity Monitor Foundation is a non-profit organization. It is stated that World Wildlife Fund, Rabobank and ZuivelNL (through the collaboration between LTO, NMV, NAK and NZO in the Sustainable Dairy Chain) established the Biodiversity Monitor Foundation on December 9, 2019. In this document, the 7 KPIs are also clearly presented. These indicators are named as:

1. Greenhouse gas emissions in grams of Co₂eq per kg milk or per hectare
2. Nitrogen soil surplus in kg per hectare
3. Ammonia emissions in kg per hectare
4. Percentage of protein from own land
5. Percentage of permanent grassland (as a share of the total farm area)
6. Share of nature and landscape management (as a share of the total farm area)
7. Share of herb-rich grassland (as a share of the total farm area)

The document further explains that: 'The biodiversity monitor is a system that makes it possible to measure and monitor the impact and performance of individual dairy farms on biodiversity over several years. The principle behind the biodiversity monitor is that there is an integrated focus on goals, instead of on measures or the improvement of what already exists. This provides dairy farmers insight into what is needed to achieve the goal, which is restoring biodiversity. By steering towards goals, dairy farmers have the freedom of enterprise about which measures they apply to achieve their goals.' One other remarkable finding in the document is that it is stated that: 'Due to the unambiguous way of measuring and working with the Biodiversity Monitor, the dairy farmer only has to make one effort, and stacked rewards can take place for his or her performance on biodiversity restoration' (*Biodiversiteitsmonitor Melkveehouderij, z.d.*).

It is furthermore explained that the starting point for biodiversity recovery in agriculture is to develop this via revenue models, and thus to be less dependent on available subsidies. A second principle is that the biodiversity-enhancing performance of dairy farmers, both with regard to biodiversity on their own farm and beyond, needs to be *measurable*. The document strongly emphasizes the importance of unambiguously measuring biodiversity results. Finally, it is argued that with the biodiversity monitor, dairy farming in the Netherlands can contribute to the realization of the 15th and 17th Sustainable Development Goals (*Biodiversiteitsmonitor Melkveehouderij, z.d.*).

7.6 Report Biodiversity Monitor

In the report *Biodiversity Monitor for Dairy Farming*, published in 2018 by FrieslandCampina, WWF, and the Rabobank, there is one interesting header about agriculture and biodiversity. This header is formulated as: 'Agriculture and biodiversity need each other'. It is argued that biodiversity is necessary for dairy farming and dairy farming for biodiversity for several reasons. It is stated that dairy farming is the largest user of the land area in the Netherlands. This means that the way in which dairy farming influences landscapes, strongly determines the habitat of animals and plants. Effective management of nature and landscape by dairy farmers can significantly increase the survival chances of species that depend on the agricultural landscape. Strengthening biodiversity also directly affects farming, since dairy farmers depend on natural resources such as fertile soil, sufficient and clean (ground) water, and the availability of minerals. The report argues that the stimulation (in particular) of functional biodiversity can contribute to a living and healthy soil (e.g. soil organisms). This allows optimal productivity to be achieved in a natural way. Furthermore, the report focuses on important causes of the decline in biodiversity. Named examples of these causes in agricultural areas are economies of scale, desiccation, eutrophication, and land consolidation, as a result of which small-scale landscape elements (such as hedgerows) have disappeared. In addition, it is explained that grassland is used more intensively. The grass is mowed earlier and more often, while the diversity of grass and herb types in the grassland is decreasing (FrieslandCampina, 2018).

The report also focuses on the so-called 'principles of the biodiversity monitor'. It is clearly emphasized that the biodiversity monitor for dairy farming measures the influence of an individual dairy farm on biodiversity on 'their farm and beyond' by means of Critical Performance Indicators (KPIs). It has to be noted that important principles in the selection of KPIs are *integrality* and *measurability*. This means the set of KPIs jointly measure the performance of dairy farmers in improving biodiversity in an integral manner. The report states that his concerns 'the biodiversity on the dairy farm and its immediate surroundings, in nature reserves in the Netherlands, and biodiversity outside the Netherlands'. In addition, it is important that the KPIs are measurable or can be made measurable in the short term. This makes it possible to compare dairy farms with each other and to compare farms over time. Moreover, it is important the biodiversity monitor is user-friendly by *limiting* the number of KPIs to as many as necessary. The report names different criteria the KPIs should ideally meet. Examples of two criteria are formulated as: 'The KPI must have a clear and demonstrable relationship with biodiversity', and 'the KPI must be measurable and (in the short term) available at all dairy farms' (FrieslandCampina, 2018).

One other important part in the report is named with the title: 'development of the biodiversity monitor'. Interestingly, the report names four different 'milestones' during the development of the biodiversity monitor. These achievements are named as:

- 1: The development of a conceptual framework for biodiversity for dairy farming, in which the concept of biodiversity has been operationalized for dairy farming.
- 2: An exploration of possible KPIs to measure the contribution of dairy farmers to enhancing biodiversity.
- 3: Further development and substantiation of the most promising KPIs.
- 4: Dialogue with stakeholders.
- 5: Development of prototype Biodiversity Monitor Dairy Farming.

It states that in 2014 (by Erisman et al.), the concept of biodiversity has been translated for dairy farming with a conceptual framework for biodiversity. In this context, the 4 pillars of biodiversity are explained, namely:

- 1: functional agrobiodiversity
- 2: landscape diversity

- 3: diversity of species
- 4: regional biodiversity.

After the development of the conceptual framework, in 2015 the Louis Bolk Institute conducted an exploration of KPIs that measure the performance of dairy farmers in their contribution to biodiversity for these pillars (Van Eekeren, et al.). Subsequently, the Louis Bolk Institute and Wageningen University started developing the KPIs for the first pillar. The development of the KPIs for Pillar 2 and 3 was carried out in a practical pilot in collaboration with four collectives (East Groningen, Noord-Friese Wouden, VALA and Water, Land & Dijken). Based on this, some advice has been drawn up for specifying KPIs and possible measures for the second pillar (landscape diversity) and third pillar (diversity of species). The document mentions that the fourth pillar will be further elaborated in the follow-up phase. It has to be noted that parallel to these investigations, a dialogue with stakeholders took place. At the start of the development process, regular consultations were held with advisors and dairy farmers of three agricultural nature associations, whereby the input was mainly aimed at testing the conceptual framework, assessing KPIs, and identifying measures that influence the KPIs. The final mentioned 'achievement' in the development phase of the Dairy Farming Biodiversity Monitor is a prototype. It is explained that the prototype graphically shows how the biodiversity monitor works (FrieslandCampina, 2018).

As explained earlier, the report strongly emphasizes the *integrality* of the critical prestaton indicators. The KPIs indicate how a company scores on biodiversity or whether a company is on track with regard to its objectives. It is argued that KPIs are not applied separately, but they should balance each other. For example: certain KPIs can be beneficial for biodiversity under a certain pillar, while on the other hand they can reduce biodiversity, which is then compensated with other KPIs. Therefore, an integral set of KPIs has been chosen. This limits the number of KPIs which means that some useful KPIs have not been included in the biodiversity monitor. However, this is 'compensated' by a strong indirect relationship with one or more KPIs from the complete selection. It is argued that an important consideration for whether or not to include KPIs is whether a KPI can *replace* other KPIs. Furthermore, the report states that for practical application, 'optimal ecological values' must be determined for each KPI. Optimal ecological values represent the most ideal situation from the perspective of biodiversity. These optimal ecological values will be further elaborated in the future research. This further research is part of the next steps in the development of the biodiversity monitor for dairy farming. The report names that an important part of the substantive development of the monitor is determining the value of the KPIs, whereby it can be related to an 'ecological optimum'. It argues that it is important to substantiate these values scientifically, with particular attention to the relationship between the KPIs. Finally, the applicability of the integral set of indicators also needs to be tested against its practicality for Dutch dairy farmers in practice (FrieslandCampina, 2018).

7.7 Conceptual Framework for biodiversity in dairy farming

It became clear that the report in 2018 about the *Biodiversity Monitor for Dairy Farming* is partly based on the in 2014 developed conceptual framework for biodiversity. This framework find its origins in the by Erisman et al. published report named: *Conceptual Framework for Biodiversity*. This report outlines a conceptual framework for the development of a business model for biodiversity in dairy farming. The report names that this will enable practical follow-up steps to be taken in the 'Biodivers dairy farming business model' project, which was initiated by the World Wildlife Fund, FrieslandCampina and Rabobank. Interesting in this report is the statement of: '*When assessing biodiversity, nature values are usually considered, such as the presence of rare and red list species, the decline in numbers of meadow birds and the stock of bees, butterflies, etc. We are insufficiently aware that these important species can only occur or survive if a certain basic level of biodiversity has been met on the farm. This 'basic biodiversity' is based on healthy soils, crops, and animals on the*

farm, and is functional.' Furthermore, the report focuses on the difference between a 'control model and adaptation model', together with formulation the four pillars of biodiversity. The four pillars which are formulated in this report (thus in 2014) are:

- 1: Functional agro-biodiversity
- 2: Landscape diversity
- 3: Specific species
- 4: Source areas and connecting zones.

The conceptual framework for biodiversity in this report mainly focuses on the fact that certain 'pressures or stress factors' are the problem. Therefore, it is explained that the solution is focused on reducing these pressures. The report argues there is a movement needed from a control model to an adaptation model and to strengthen biodiversity on the 4 pillars. It argues that biodiversity is essential for the food supply, since *'the more diversity the healthier the system'* (e.g. human nutrition). It is explained that natural processes and the associated biodiversity in the 'control model' have come under pressure, and these processes are no longer used optimally. With 'control model', it is meant that the 'control' to keep the agricultural system in balance leads to increasing dependence on external resources. Meanwhile, the 'adaptation model' makes optimal use of biodiversity and natural processes to increase resilience and reduce risks. According to the report, strengthening functional agrobiodiversity leads to lower impact of pressure factors, which thereafter leads to an increase of biodiversity on and outside dairy farms (Erisman et al., 2014).

7.8 Exploration Critical Prestation Indicators

These named 'pressure or stress factors' are clearly explained in report called *Louis Bolk Institute investigation Critical Prestation Indicators*, published in 2015. In this report, the *Sustainable Dairy Chain*-project (in Dutch: Duurzame Zuivelketen-project) describes specifically nine pressure factors for dairy farming which influence the living environment of organisms on and around dairy farms, which can lead to a decline in biodiversity. These nine pressure factors concern:

1. Energy
2. Land use
3. Emissions to air
4. Emissions to water
5. Landscape
6. Land use
7. Water use.
8. Substance Use.
9. Light and sound.

The conceptual framework for biodiversity (developed in 2014) assumes when strengthen the functional (agro) biodiversity and the specific landscape elements on dairy farms (pillars 1 and 2), the impact of pressure factors decreases and biodiversity on and outside dairy farms will increase. This also improves the adaptive capacity of the farms and creates a 'robust and resilient company'. The report from the Louis Bolk Institute states that a limited number of KPIs have been selected which contain seven different criteria. These criteria for the KPIs are formulated as:

1. Have a clear and demonstrable relationship with biodiversity
2. Be available from all dairy farmers
3. be reliable and preferably secured
4. Require minimal effort to obtain them
5. Preferably link up with existing measurement and control instruments in order to keep administrative burdens as low as possible.
6. Do justice to the need for integrality and coherence of underlying measures
7. Have a 0 reading or reference value (readily available).

Different recommended KPIs which are named are for example percentage of protein from own land, nitrogen soil surplus, phosphate surplus, percentage of permanent grassland, herb-rich grassland, grazing, etc. (Verhoeven et al., 2015).

7.9 Development of Critical Prestation Indicators

Another relevant report about the biodiversity monitor was published in 2016, by the Louis Bolk Institute and Wageningen University. This report also names the relevant pressure factors for biodiversity are as: energy (incl. CO₂ emissions), land use, emissions to air and water, landscape, soil use, water use, resource use, and light and sound (Zijlstra et al., 2016).

The report explains that a database was created which contained a group of 98 indirect indicators for the biodiversity monitor. With the help of a statistical method factor analysis, it was investigated whether and how the selected indicators could be grouped and whether one representative factor could be named per group of indicators. This analysis showed that the aforementioned 98 indicators were possible to summarize in 20 factors. In addition, the number of 98 indicators was reduced by using four criteria. The indicators to be chosen had to be related to functional agrobiodiversity and on the pressure factors for biodiversity. In addition, indicators were chosen that are also representative of other – correlated – indicators. According to the report, based on the selection in of the indicators, a list with 11 indicators remained (Zijlstra et al., 2016).

Finally, these indicators were tested against four criteria related to suitability for use in practice, namely:

- 1: Availability of basic data in existing administrations.
- 2: The need for additional calculations.
- 3: External assurance of data.
- 4: The availability of a baseline measurement.

After this review, 10 indicators remained that were recommended as KPIs for biodiversity.

However, the report argues that in the medium term, it is expected that more indicators can also be sufficiently guaranteed to be included in the monitoring. These indicators are:

- 1: Organic matter balance of arable land/forage crops It is also recommended to develop the following indicators for the longer term:
- 2: Indicator for tillage arable land/fodder crops
- 3: Environmental impact points per ha (impact of crop protection on the environment)
- 4: Indicator for the use of deworming and fly control agents.

For the further development of work on the monitoring of functional agrobiodiversity on dairy farms, some follow-up steps have been recommended, namely:

1. Ensure that the recommended KPIs are guaranteed.
2. Provide more insight into the relationship between KPIs and direct indicators for biodiversity.
3. Compare the applied method with other methods for monitoring functional agrobiodiversity on dairy farms.
4. Add indicators in the field of water management and water use.

The report states that: ‘In order to gain more insight into the impact of dairy farms on subsidence on peat soils and on reducing the desiccation problem around nature reserves, it is useful to include indicators that provide insight into this. This can also be combined with the formulation of one or more KPIs for the fourth pillar. It is also useful to investigate the possibilities of adding indicators for water consumption to the monitoring of biodiversity’ (Zijlstra et al., 2016).

7.10 Monitoring of Critical Prestation Indicators

One other report published by Zijlstra et al. (also in 2016), focuses on further recommendations for the development of work on biodiversity on dairy farms. There recommendations concern:

1. Embed the indicators in a stimulating approach.
2. Ensure that the recommended KPIs are guaranteed.
3. Provide more insight into the relationship between KPIs and direct indicators for biodiversity.
4. Respond to the rapid development of working on biodiversity on dairy farms.
5. Ensure concrete visibility of biodiversity.
6. Add water management and water usage indicators.

Beside these six recommendations, the report clearly shows how '98 key figures' have been reduced into 22 factors, which thereafter have been reduced in 11 KPIs and finally 10 KPIs.

One interesting statement in the report is: 'Its ambition to focus on the functional agrobiodiversity component on a dairy farm using a very limited number of indicators. If there is a need for a shorter list, it is recommended to further narrow the list in one or more of the following ways.

Measuring real biodiversity and correlations between KPIs and real biodiversity may still lead to insights for the omission of a KPI or the need for a KPI that has now been disregarded' (Zijlstra et al., 2016).

What is remarkable is that this report – in accordance with the other reports – also argues for 'more attention for water' in the KPIs. It states that in two interviews with representatives of the Netherlands Environmental Assessment Agency (PBL) and LTO Nederland, it was examined how they view working on functional agrobiodiversity on dairy farms and what this could mean for the choice of KPIs. From these discussions, water management at farms emerged as the most important missing point of attention. The assessment in this report shows that the following KPIs as an integral set can be used in the *short term* for the monitoring of biodiversity on dairy farms:

1. % grassland
2. % permanent grassland
3. % application of green manure after growing fodder crops
4. N-soil surplus per ha
5. NH3 emission per ha
6. % feed protein from own company

Furthermore, the report argues the following KPIs can be used in the *medium term* for the monitoring of biodiversity on dairy farms:

7. Organic matter balance of arable land/fodder crops

Based on the assessment in this report, the following KPIs can only be used in the longer term for monitoring biodiversity on dairy farms:

8. Indicator for tillage arable land/fodder crops
9. Environmental impact points per ha (crop protection)
10. Indicator for use of deworming and fly control agents

(Zijlstra et al., 2016).

All this theoretical information is based on the reports, documents, articles, etc. related to the development of the biodiversity monitor for dairy farming in the Netherlands. This information provides insights into the process of this development, different recommendations about further research, assumptions about definitions of biodiversity, aims of the biodiversity monitor, involvement of actors in the process, and rationales behind integration of critical prestation indicators. The next part of this chapter will focus on a reflection and discussion of this information about the biodiversity monitor.

7.11 Reflection on the Biodiversity Monitor

In this reflection, I will not focus in detail on all described elements as part of the development of the biodiversity monitor. It became clear lots of different recommendations and criteria have been formulated about the critical indicators or for the monitor itself. I will focus on the inclusion of indicators and involvement of certain actors, together with analyzing some remarkable statements from the documents. As explained, the video about the monitor states that: ‘the aim of the biodiversity monitor is to make nature stronger and farms more resilient, and: ‘In this way, biodiversity will become an important economic factor in the revenue models for dairy farming in the future’ (*Biodiversiteitsmonitor Melkveehouderij*, z.d.). I think there are some problems in the notions about ‘the aim is to make farms more resilient’ and ‘biodiversity will become an economic factor’. These statements imply biodiversity can be used as an economic instrument, which can contribute to profit maximization for dairy farms. In the reports about the development of the monitor, the benefits of biodiversity are continuously expressed in human or agricultural benefits. The published documents or reports do not mention ‘intrinsic values of nature irrespective of human needs’, but relate all biodiversity benefits immediately to human needs. It is strongly emphasized how biodiversity restoration can contribute to a better and more efficient dairy farming. Although the reports argue the main goal of the biodiversity monitor is to ‘restore biodiversity and to create revenue models for dairy farmers’, I think it can be concluded only the latter serves as the main goal. Based on the reports, it looks restoring biodiversity is just a means to an end, where the end is the revenue model for dairy farmers. The importance of restoring biodiversity is continuously argued by explanations about benefits for dairy farmers. When these impacts of restored biodiversity would not contribute or improve dairy farming, it looks these are not of importance. The notion of ‘biodiversity as an important economic factor’ strongly substantiates the idea where biodiversity restoration is just a tool in order to achieve the end goal: optimizing profit for dairy farms.

Other remarkable statements are: ‘The principle behind the biodiversity monitor is that there is an integrated focus on goals, instead of on measures or the improvement of what already exists’, and ‘Due to the unambiguous way of measuring and working with the Biodiversity Monitor, the dairy farmer only has to make one effort, and stacked rewards can take place for his or her performance on biodiversity restoration’ (*Biodiversiteitsmonitor Melkveehouderij*, z.d.). I think this ‘integrated focus on goals’ and ‘unambiguous way of measuring where the farmer only has to make one effort while stacked rewards can take place’ also contain some problematic elements. The notion about ‘focus on goals’ is in line with the idea of ‘achieving goals by means’, where the means are i.a. biodiversity restoration and the goal meeting indicators and thus gaining rewards. I think the principle of ‘unambiguous measuring and stacked rewards after one effort’ has everything to do with *efficiency*. Due to this simplified way of measuring and focus on handing out rewards, it looks the main goal is only to develop an efficient and quick-acting revenue model. The development of this revenue model is legitimized by the fact that at the same time ‘biodiversity in the Netherlands is restored’. In this sense, biodiversity is indeed used as an economic instrument and the long-term impacts of biodiversity restoration are just ‘positive externalities’ beside the main target of a revenue model for dairy farms.

This importance of efficiency for the biodiversity monitor becomes clearer with the statements: ‘It is important the biodiversity monitor is user-friendly by *limiting* the number of KPIs to as many as necessary’ and ‘The KPI must be measurable and in the short term available at all dairy farms’ (FrieslandCampina, 2018). Since the whole idea of biodiversity restoration has everything to do with ‘long-term sustainable impacts’, why does the biodiversity monitor emphasize strongly on the *short-term* availability of the indicators? The importance of ‘measurability of the KPIs and limiting the KPIs as many’, are fully in contrast with the discussed ideas about biodiversity in the ANT chapter.

Furthermore, the statement of: 'It is the ambition to focus on the functional agrobiodiversity component on a dairy farm using a very limited number of indicators. If there is a need for a shorter list, it is recommended to further narrow the list in one or more of the following ways', points up the importance of *reduction* of indicators. Although this limited integration of indicators is advantageous for creating an efficient revenue model for dairy farmers, this can be problematic for addressing a broad understanding of biodiversity restoration. One other remarkable example about the inclusion of indicators, is the several times recommendation about indicators related to water. However, these 'water-indicators' cannot be found in the final formulation of critical indicators. Beside these indicators, the report in 2018 stated that: 'Optimal ecological values must be determined for each KPI, which represent the most ideal situation from the perspective of biodiversity' (FrieslandCampina, 2018). These optimal ecological values would be further elaborated in future research. The findings of this future research would be interesting, since it looks these 'optimal ecological values' relates not to a human or agricultural perspective.

It can be questioned to what extent the biodiversity monitor was inclusive enough in including relevant indicators and involving actors in its development. One relevant indicator which I think is of importance – especially in dairy farming – concerns animal welfare. However, this importance cannot be found back anywhere in criteria, assumptions, or formulation of indicators. It was only in an extensive report by the Louis Bolk Institute back in 2014 where the importance of animal welfare was shortly indicated (Erisman et al., 2014). However, this element does not return in the most recent reports in 2018 where the 7 indicators were presented. In the report in 2014, one recommendation for dairy farms was the reduction of grazing cows, which can lead to the reduction of greenhouse gases. However, this reduction of grazing can be seen as something conflicting with animal welfare. Furthermore, it not argued why the recommended indicators about water are not integrated in the biodiversity monitor.

It is explained that the most important criteria for the KPIs are measurability and integrality, though I think there is actually one most important criterium: usability for the revenue model. When an indicator (e.g. animal welfare or water) cannot contribute to this revenue model, there is no need to include it, regardless of whether it contributes to biodiversity restoration or not. Moreover, it can be questioned if sufficient actors have been involved in the development of this monitor. Since the biodiversity monitor focuses on developing a revenue model for dairy farmers, it is remarkable the main actors behind this monitor are dairy farmers themselves (e.g. FrieslandCampina and Duurzame Zuivelketen). It can also be questioned why a financial bank should be involved in the development of a biodiversity monitor, while certain environmental NGOs or animal activists are ignored in this process. One the official website of the Rabobank about the biodiversity monitor, it is explained dairy farmers will receive rewards from the Rabobank when they score on the critical indicators. However, one of these 'rewards' is for example discount on a loan at the Rabobank (*Biodiversity*, z.d.). In this way, dairy farmers profit when they score on indicators (because of the financial rewards), while the Rabobank also profits since this leads to providing loans to the dairy farms. This means dairy farmers and the Rabobank have a disadvantage with critical indicators which are difficult or unrealistic to achieve, since this forms a problem in gaining more financial benefits. In other words: it is not beneficial for these involved actors in the biodiversity monitor to include critical indicators which are hard to achieve. When certain biodiversity related indicators are indeed difficult to achieve, they can be described as being 'unsuitable because of their immeasurability on the short term'. In this win-win situation where dairy farmers and the Rabobank strengthen each other financially, I think there is one loser: real biodiversity.

7.12 Importance of a broad inclusion

It can be questioned to what extent a broad inclusion of indicators and involvement of actors is really important for the biodiversity monitor. It is true a limited inclusion of actors and indicators does not have to be automatically regarded as problematic. However, there exist multiple literature which argue the importance of a broad understanding and approach to biodiversity restoration. One example is the so-called *Holistic Conservation*, this practice defined by *One Health* as: ‘recognizing the interdependence of environmental health, animal health and human well-being, known as One health – foundational to the lives and culture of local indigenous people’. The *One Health Initiative Task Force* (OHITF), defined One Health as: ‘an approach calling for the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment’. One key element of One Health is their specific focus on the interdependence of human health, animal health, and ecological change, where they view public health no longer in purely human terms (Yang, 2022).

One other example of the importance of a broad approach to biodiversity, is the critique on the so-called (non-holistic) *fortress conservation*. This approach mentions an example about forests, where it is argued that this form of conservation ‘disregards the fact that humans are traditional residents of a forest, being directly dependent on forest resources for survival’. It is stated by biodiversity researchers that the fortress conservation approach sees forests as pools of capital, while failing to acknowledge forests are an area of coexistence of various species – including humans. These researchers argue that ‘biodiversity conservation has remained limited to individual projects lasting for short periods, thus outside the purview of policies that take a holistic view of biodiversity loss’ (Rai et al., 2021).

In 2019, Willem Lubbe and Louis Jacobus Kotzé published an article called *Holistic Biodiversity Conservation in the Anthropocene*. This article clearly stresses the importance of a broad approach to the biodiversity crisis. One example which is mentioned by the authors is *Earth-system science* (ESS). This is defined as: ‘Recognising the connectivity, non-linearity and complexity of socio-ecological processes, Earth-system science is concerned with the ‘study of the Earth’s environment as an integrated system in order to understand how and why it is changing, and to explore the implications of these changes for global and regional sustainability’ (Lubbe & Kotzé, 2019).

Based on these literatures, it becomes clear a broad approach to biodiversity is indeed of importance. However, these ideas about a holistic practice of biodiversity restoration are not directly relatable to the biodiversity monitor for dairy farming. The difference is that these ‘holistic approaches’ are concerned with the global biodiversity crisis, while the biodiversity monitor has its focus on a specific case, namely dairy farming in the Netherlands. Although this is an obvious difference, I still think it can be argued these holistic approaches are also applicable to the biodiversity monitor for dairy farming. Referring back to the FAQ document published on the official website of the biodiversity monitor, it was stated that: ‘This provides dairy farmers insight into what is needed to achieve the goal, which is restoring biodiversity’ (*Biodiversiteitsmonitor Melkveehouderij*, z.d.). When the goal indeed concerns restoring biodiversity (and not developing a business model for dairy farms), it turns out a narrow approach to biodiversity is irreconcilable with this purpose. Of course, when the goal is formulated as ‘restoring only the elements of biodiversity which can contribute to higher revenues for dairy farms’, then a broad understanding of biodiversity would not be desirable. However, as long as the purpose is concerned with biodiversity restoration and contributing to the 15th SDG ‘recovery of ecosystems and conservation of biodiversity’ (as explained in the report about the monitor in 2018), a broad approach is inevitable. This is in line with the earlier named problems of a limited inclusion of actors and indicators (e.g. the financial self-

interests of dairy farmers and the Rabobank, and the ignorance of animal or water-related indicators). This makes clear a broad inclusion of relevant indicators and involvement of actors is necessary in the development of the biodiversity monitor for dairy farming.

7.13 Interim conclusions

While the Actor-network Theory chapter was concerned with introducing the biodiversity crisis and strongly emphasizing human-nature relations, this chapter explained the specific case of the Dutch biodiversity monitor for dairy farming. The main argument in the ANT chapter stressed our position in the ecosystem and our relation towards nature, where humans are equal to plants, animals, and non-living things while not being capable of totally controlling nature. This position of humans towards nature was related to the problems of the biodiversity crisis. Meanwhile, this Document Analysis chapter focused on the operationalisation and measurement of biodiversity, together with human-based solutions for the loss in biodiversity. When these two chapters are compared to each other, profound differences become clear. In the Actor-network Theory chapter, all the ideas about 'controlling the biodiversity crisis, quantifying biodiversity, creating solutions only for human-interest, and reducing biodiversity's complexities' have been strongly rejected. This chapter, on the other hand, shows how a monitor for dairy farming operationalised the concept of biodiversity by creating a useful and measurable understanding of this concept. It is true this monitor for dairy farming contains positive elements regarding hopeful attempts for biodiversity restoration. However, when the development of the Dutch biodiversity monitor for dairy farming is viewed from the perspective about human-nature relations which is formed in the ANT chapter, clear problems arise. It looks like the solution of the biodiversity monitor is still a solution within the boundaries of the modern-day market-economic paradigm. In this sense, it can be argued there perhaps exists even *incommensurability* between those 'ecological and economic perspectives', since these are hardly reconcilable. In relation to this paradigmatic class between perspectives, I think we are confronted with a difference of underlying discourses. These discourses will be further discussed in the interview analysis.

8. Results: Interview Analysis of the Biodiversity Monitor

8.1 Introduction

This research started with introducing the concept of biodiversity, together with explaining the global biodiversity crisis. This explanation was followed by an introduction of the Dutch biodiversity monitor for dairy farming. After shortly clarifying the history and principles of this biodiversity monitor, the research problems and questions of this master's thesis were formulated. In order to research the inclusiveness of the biodiversity monitor regarding actors and indicators, the theoretical perspectives of the Actor-network theory and the Policy Arrangement Approach have been used. The Actor-network theory has been applied to the biodiversity crisis, while the Policy Arrangement Approach has been applied to the biodiversity monitor. After using these theoretical frameworks, there followed the chapter with the document analysis of the biodiversity monitor. In that chapter, the most related and important documents about the biodiversity monitor have been analysed. This analysis of documents serves as the basis for the next part of the results: the interview analysis. Based on the findings of the document analysis about the biodiversity monitor, questionnaires have been formulated for interviews. It is true that the analysis of documents is based on my own understandings and interpretations. Moreover, not all relevant information about the biodiversity monitor is published in the documents. It also has to be noted that certain text or parts in the documents are not explained further in detail. Because of these limited insights and information out of the document analysis, it is important to perform an interview analysis. When conducting interviews with relevant actors related to the biodiversity monitor, it is possible to gain additional information which builds further upon the findings of the document analysis. This additional information helps in clarifying certain uncertainties which arose from the analysis. This chapter will explain the conducted interviews and analyse the results of these interviews.

8.2 Conducted interviews

All the previous parts in this research concerned in fact theoretical chapters, where two theoretical frameworks and a document analysis have been used. The results part of this research consists of the document analysis and the interview analysis, which means this chapter is the second part of the results. It can be argued this analysis of interview is perhaps the most important part of this research. In this part, all the gained knowledge (based on the analysis of literature about biodiversity, the biodiversity crisis, and the biodiversity monitor) will now be used in 'real-life'. What I mean with real-life is having conversations and discussions with actors which are related to the biodiversity monitor. For this master's thesis, I conducted interviews with 10 different persons. The interviewed persons can be found in the following scheme:

Name	Function	Institute
Jan Willem Erisman	Professor Environmental Sustainability (and former Director of Louis Bolk Institute)	Leiden University
Jeen Nijboer	Theme Manager Sustainability Food & Agri	Rabobank
Jelle Zijlstra	Dairy Farming Economist	Wageningen University & Research
David Kleijn	Professor & Chair holder of Plant Ecology and Nature Management + Board member of the Biodiversity Monitor Foundation	Wageningen University & Research + Biodiversity Monitor Foundation
Ruth Ijspeert	Program Manager Biodiversity	FrieslandCampina
Mieke van den Hengel	Dairy Farmer	Organic Dairy Farm Groenhouten
Andrea Almasi	Police Officer Nature Inclusive Agriculture	Province of north Brabant
Ingrid van Huizen	Strategic Policy Advisor Public Affairs Agriculture and Food Production + Chairwoman of the Biodiversity Monitor Foundation	Province of Friesland + Biodiversity Monitor Foundation.
Daniel Nuijten	Policy Officer Invasive Alien Species	European Commission, Directorate-General for Environment, Unit D.2 Natural Capital & Ecosystem Health
Emiel Stam	Dairy Farmer	Dairy Farm Hof Zum Walde

Figure 8.1: List of interviewed people

This scheme makes clear the group of interviewed persons consists of two dairy farmers, two researchers at Wageningen University, the former director of the Louis Bolk Institute, a biodiversity manager at FrieslandCampina, a policy officer who used the biodiversity monitor for the provincial government, the chairwoman of the biodiversity monitor foundation, a manager at the Rabobank, and a policy officer at the European Union. Of course, all these persons are related in a different way to the biodiversity monitor. The people who are related to the *development* of the biodiversity monitor concern David Kleijn (Wageningen University), Jelle Zijlstra, (Wageningen University), Jeen Nijboer (Rabobank), and Jan Willem Erisman (Leiden University and Louis Bolk Institute). These persons are also (co-)authors of the analysed documents, for example:

Wageningen University, Louis Bolk Instituut, & Zijlstra, J. (2016). *Monitoring van functionele agrobiodiversiteit in de melkveehouderij: ontwikkeling van KPI's*.

Louis Bolk Instituut, & Erisman, J. (2014). *Biodiversiteit in de melkveehouderij - Investeren in veerkracht en reduceren van risico's*.

FrieslandCampina, Rabobank, & WereldNatuurFonds (2018). *Biodiversiteitsmonitor melkveehouderij*.

Three analysed documents (published in 2014 and 2015) have been written by Jan Willem Erisman, one document (published in 2016) by Jelle Zijlstra, and one document (published in 2018) partly by Jeen Nijboer. These persons contributed to the explorative research and development of the biodiversity monitor for dairy farming, concerning the period of 2014-2018. On the other side, there are also the persons who are using or working with biodiversity monitor nowadays. These are Ruth IJspeert (FrieslandCampina), Andrea Almasi (Province of Noord-Brabant), and Ingrid van Huizen (chairwomen of the biodiversity monitor foundation). These persons are not involved in the earlier development of the biodiversity monitor, but are related to its current usage. For example, it can be stated that researchers such as Jan Willem Erisman and Jelle Zijlstra developed the biodiversity monitor, while policy officers at regional governments like Andrea Almasi use the instrument of the biodiversity monitor nowadays. Beside these developers and users of the monitor, there also the dairy farmers like Mieke van den Hengel (organic dairy farm Groenhouten) and Emiel Stam (dairy farm Hof zum Walde) who are affected by the monitor. Finally, there is Daniel Nuijten from the European Commission who works on European biodiversity governance, which is the driver behind national instruments regarding biodiversity restoration.

8.3 Results of interviews

In this part I will provide a written analysis of the conducted interviews. It has to be noted that this written analysis is fully based on my own understandings and interpretations of the interviews I conducted. Of course I will try to present this analysis as objective as possible, although it can not be denied the findings will be provided in a subjective way, since I am the only one who interpret the interviews I conducted. First of all, it is important to explain I decided to make use of semi-structured interviews. This means I prepared relevant questions in advance, though these are not the only questions I asked during the interviews. Because of the semi-structured character of the interviews, I asked 'spontaneous' questions based on what has been said during the conversations. These questions serve as probing questions in order to better understand the interviewees. This means I did not have a fixed questionnaire where I asked all the beforehand prepared questions, while not asking further questions or reacting on what is being said during the interviews. In fact, I decided even to call the conversations profound discussions instead of 'interviews'. I preferred a profound discussion with experts over 'an interview' where I am 'the interviewer' and the other person is 'the interviewee'. I did not want to create a situation where I am the only one who asks questions, while the other person is the only one who gives answers to the formulated questions. Instead of such a one-sided monologue situation, I preferred a 'real discussion' where there is a dialogue. In this dialogue, I wanted to discuss, to share stories or experiences, to understand each other, to ask and answer questions, etc. The classic idea of an interview with a fixed interview guide and one 'interviewer and respondent' is different compared to a profound dialogue, where I decided to use the latter for this research. The reason for this decision is namely because of the aim to gain the most interesting and useful information. I am convinced the acquisition of this information is easier when there is a mutual understanding and trust during the conversations. I think this mutual understanding is more possible in a profound dialogue instead of a one-sided interrogation. As I already explained earlier in the reading guide, my goal of this research is not only formulating an answer to the research question, but to broaden my own knowledge. It has to be emphasized this goal also accounts to the conducted interviews. This means during the interviews I did not only ask the questions which contribute to answering the research question, but also asked some questions behind this theme, in order to broaden my own knowledge and to show interest and understanding.

Concerning the duration of the 10 conducted interviews, all conversations have a length between 30 and 60 minutes. All interviews lasted approximately 45 minutes, only the interviews with Ruth IJspeert (FrieslandCampina) and Jeen Nijboer (Rabobank) took 30 minutes, while the interviews with Daniel Nuijten (European Commission) and the two dairy farmers took a bit more than 60 minutes. Ruth IJspeert and Jeen Nijboer indicated to be available only half an hour, which explains the two 30 minutes interviews. One other important fact is that all interviews took place digitally, except the interview with Daniel Nuijten which was conducted in Brussels. Since I did not determine a length for the interviews, it is interesting to see how long the conversations lasted. The only determined length for interviews were the discussions with Ruth IJspeert and Jeen Nijboer, since they were only available for half an hour. All the other 7 interviewees indicated they had no time limit and just 'would see during the conversations' how long it would take place. Since there was no time limit agreed on 7 interviews, it is interesting 4 of them all lasted for about 45 minutes. What I think is even more interesting, is the fact that the interviews with FrieslandCampina and the Rabobank took 30 minutes, while the interviewees with the two dairy farmers took a bit more than 60 minutes. It became clear earlier the Rabobank, FrieslandCampina, and the WNF are the main initiators and developers of the biodiversity monitor. From all the 10 interviews, it are precisely the persons from the Rabobank and FrieslandCampina who are the only one who indicated they have a limited time being available. Moreover, it was the WNF who even replied not to be available for an interview about the biodiversity monitor at all. The WNF replied in an email they 'have finished the project of the biodiversity monitor and are not involved anymore', while they were part of the three main initiators and published in 2018 the document about the Biodiversity Monitor for Dairy Farming. On the other side, there were three interviewees who never heard about the biodiversity monitor at all. These concerned Daniel Nuijten, Mieke van den Hengel, and Emiel Stam (the two dairy farmers). Ironically, the three people who never heard about the monitor participated in the longest interviews. It is interesting how these interviewees took a way more open attitude during the interviews compared to the interviewees from FrieslandCampina and the Rabobank.

What is also interesting is how the different perspectives of the interviewees are related to each other. It is true all the ten interviewees are related to the biodiversity monitor in a different way. It can be stated the interviewees Jan Willem Erisman, Jeen Nijboer, Jelle Zijlstra, and David Kleijn, are part of the *development or process side* of the biodiversity monitor. On the other hand, it can be argued that Ruth IJspeert, Ingrid van Huizen, and Andrea Almasi are part of the *implementation side* of the biodiversity monitor. There are the dairy farmers Mieke van den Hengel and Emiel Stam who are affected by this biodiversity monitor, since they are owners of their dairy farms. Finally, there is Daniel Nuijten who is related to the biodiversity monitor in an overarching way, since he is working on European biodiversity governance (which is the driver behind instruments like the biodiversity monitor). In the following section, there will be an overview with the most interesting quotes per interviewee. Some quotes are marked with the colours yellow, purple, blue, green, or in bold. Each colour is related to the following themes.

Yellow	Unambiguity of the biodiversity monitor
Purple	Goal of the biodiversity monitor
Blue	Success of the biodiversity monitor
Green	Additional indicators
In bold	Interesting statements

Ruth IJspeert – Rabobank

“FrieslandCampina is a commercial party, we also have interests in making money”

“I think the 7 indicators are good for now, because you have to be able to measure them, you can't just put in more indicators”

“I think a farmer would not even say that there is a biodiversity problem”

“The first goal is biodiversity recovery, but the second goal is value creation”

Jelle Zijlstra – Wageningen University & Research

“FrieslandCampina has much more regulation with the farmer, they are the main driving force behind the initiative”

“The production of milk and feed often affects biodiversity because of more intensive agriculture”

“You may have to look at a period of 15 years if you want to see results on biodiversity”

“The most was that farmers felt that this was far away from what they experience as biodiversity, they lacked the real biodiversity in the country”

“Animal welfare is not in principle part of biodiversity, it is part of sustainable dairy farming, there it plays a major role, but not in the concept of biodiversity”

“I also see it more as that we are on the way to a better balance between nature and agriculture”

“But we're not there yet, it's still a long quest, biodiversity is declining further, there is still a lot to do”

Mieke van den Hengel – Dairy farmer

“More than 30 years ago you saw agriculture is reaching its limits”

“Even then biodiversity was declining, all agriculture has always been aimed at maximizing profit”

“The basis of a stable situation is diversity”

“The growth model is not the only model in which you can develop as a company, we do not want to grow, at least not in production volume”

Ingrid van Huizen – Chairwoman Biodiversity Monitor Foundation

“We ensure that there are more and more users who rate via the monitor”

“We need a piece of collectivity so that all farmers can be rewarded for the same”

“These are small steps, of course we want it to go faster”

“Actually the KPIs are more buttons that reduce environmental pressure, that is actually the point of the biodiversity monitor”

“We're not moving fast enough; we'd like to see the monitor with a lot more users”

“It's a crucial moment now, I also think that we still have to make progress”

Andrea Almasi – Province Noord-Brabant

“No party in the chain can do that transition alone, so parties have to join in”

“I think it is crucial we speak the same language”

“On the other hand, you want to reach agreement with the parties about what we are going to reward”

“I think you should also be able to give people that space”

Jeen Nijboer - Rabobank

“Measuring biodiversity should be objective”

“The overarching aim of the biodiversity monitor is to restore biodiversity, but the aim is also to create a revenue model”

“The 7 indicators will remain the same for the time being, because it must be checked whether the monitor will have an effect, so no additional indicators should be added or reduced”

“Most farmers will not be aware of the monitor, but are indirectly all involved in the monitor”

“Later on, more actors will also be involved, who will also work with the revenue model or who will use it”

Jan Willem Erisman – Leiden University

“The data on the effect of the biodiversity monitor for dairy farming in the Netherlands on biodiversity is managed by FrieslandCampina”

“Animal welfare is important, and there should certainly be an indicator for that”

“Many parties are involved in the development of the monitor, which makes it inclusive, but also difficult for decision-making”

“A social indicator may also be added, but that is of course very difficult”

Daniel Nuijten – European Commission

“The main focus is on economical elements, since intrinsic values are difficult to measure”

“A crucial point here is the trade-off between private interests and public interests. There is a clear tension here”

“The greatest risk is in production animals, which is of course strongly linked to the transmission of zoonosis”

“As the dominant species on Earth, we have a responsibility to restore and improve biodiversity”

“Biodiversity must be improved, but you should avoid creating social inequality”

“It is therefore preferable not to take radical measures, contrary to the ideas behind the so-called transformative change”

Unambiguity of the biodiversity monitor

Ingrid van Huizen: *"We need a piece of collectivity so that all farmers can be rewarded for the same"*.

Andrea Almasi: *"I think it is crucial we speak the same language"*.

Jeen Nijboer: *"Measuring biodiversity should be objective"*.

Goal of the biodiversity monitor

Ruth IJspeert: *"The first goal is biodiversity recovery, but the second goal is value creation"*.

Jeen Nijboer: *"The overarching aim of the biodiversity monitor is to restore biodiversity, but the aim is also to create a revenue model"*.

Success of the biodiversity monitor

Jelle Zijlstra: *"But we're not there yet, it's still a long quest, biodiversity is declining further, there is still a lot to do"*.

Ingrid van Huizen: *"These are small steps, of course we want it to go faster"*.

"We're not moving fast enough; we'd like to see the monitor with a lot more users".

"It's a crucial moment now, I also think that we still have to make progress".

Additional indicators

Ruth IJspeert: *"I think the 7 indicators are good for now, because you have to be able to measure them, you can't just put in more indicators"*.

Jeen Nijboer: *"The 7 indicators will remain the same for the time being, because it must be checked whether the monitor will have an effect, so no additional indicators should be added or reduced"*.

Jan Willem Erisman: *"Animal welfare is important, and there should certainly be an indicator for that"*.

"A social indicator may also be added, but that is of course very difficult".

Topic	Finding	Consensus
Unambiguity of the biodiversity monitor	Biodiversity monitor should be unambiguous and objective	Yes
Goal of the biodiversity monitor	First goal is biodiversity restoration, second goal is revenue model for dairy farmers.	Yes
Success of the biodiversity monitor	Biodiversity monitor has not succeeded yet, there need to be more progress.	Yes
Additional indicators	Majority argues for not adding more indicators	No

Figure 8.2: Consensus among the interviewed people

The selected quotations and overview per theme, show the interviewees agree on the goal, unambiguity, and the success of the biodiversity monitor. I asked all the interviewees about the goal of the biodiversity monitor (except the EU policy officer and the two dairy farmers), where all the interviewed persons answered the goal of the monitor is biodiversity restoration. However, all interviewees also argued there exists a second goal of 'creating a revenue model for dairy farmers'. This shows there is a certain hierarchy between these two different goals, where the main goal is restoration of biodiversity. As a reaction on all these same answers, I asked whether the biodiversity monitor resulted in fact in restoration of biodiversity or not. Again, all the seven interviewees responded in the same way: 'we do not know yet'. All interviewees answered it is not possible yet on this term to measure or determine whether there is indeed a restoration of biodiversity or not. I think this a remarkable finding, since it is continuously emphasized the main goal of the monitor is restoration of biodiversity in the Netherlands.

When I asked for the results of the biodiversity monitor up to now, no one could give an answer to this question.

I asked this question to Jan Willem Erisman, which turned out into something even more interesting. Jan Willem Erisman responded this is a very 'embarrassing question', since he argued FrieslandCampina is the only organization who owns the data with the results of the biodiversity monitor. Erisman answered he is very curious about these results, but unfortunately, he has no access to this data. Moreover, Jelle Zijlstra stated that FrieslandCampina is the main driver behind the initiative of the biodiversity monitor. When I finally reached someone from FrieslandCampina it was able to ask this question about the results of the biodiversity monitor. The response I received was a short answer arguing it is not possible to determine or measure 'improvement of biodiversity'. The conclusion is there are no results yet of the biodiversity monitor regarding restoration or improvement of biodiversity in the Netherlands.

Related to the success and goal of the biodiversity monitor, there is one other 'homogenous answer' all the interviewees formulated. The interviewees responded the aim for now is to make sure there will be more users of the biodiversity monitor. It is stated those users of the monitor are especially provinces, water authorities, or financial institutes. The aim is these organizations will use the biodiversity monitor, which actually means they will determine how farmers score on the monitor while rewarding them. All interviewees argued there are more and more users of the monitor, though the goal is to extend even wider. This makes clear 'biodiversity monitor users' are thus not the dairy farmers themselves, but organizations who *reward* the dairy farmers.

Between all the interviewees, there exist also agreement on the unambiguity and objectiveness of the biodiversity monitor. It is argued measuring biodiversity should be objective, together with rewarding all the dairy farmers in the same way. All the interviewees answered this of great importance for the effectiveness of the biodiversity monitor, otherwise the revenue model of the monitor will not work. However, there is one element where there is no agreement between the different interviewees: addition of indicators.

Most interviewees argued there should not be more indicators added to the biodiversity monitor. The returning arguments for this statement is that it is of importance on the short term to determine whether the biodiversity monitor is effective or not. When at this moment new indicators are added, it becomes more difficult to determine the success of the monitor. The interviewees argue (especially Jeen Nijboer and Ruth IJspeert) the 7 Critical Prestation Indicators are good for now, since adding new indicators will make the biodiversity monitor more complex.

However, Jan Willem Erisman strongly argues the biodiversity monitor does need more indicators. According to Erisman, animal welfare is an important part of dairy farming, meaning there certainly should be an animal welfare indicator included in the biodiversity monitor. Erisman goes even further by arguing it is perhaps important to include a 'social indicator' in the biodiversity monitor. Next to Jan Willem Erisman, there was only one other interviewee who shared this thought about adding more indicators, which is Andrea Almasi from the Province Noord-Brabant. Andrea Almasi is one the users of the biodiversity monitor and revealed an interesting finding. This concerns the fact that the biodiversity monitor for dairy farming which is used by the Province of Noord-Brabant, makes use of 10 Critical Prestation Indicators. Although all the interviewees emphasized the monitor should be 'objective and unambiguous', the Province of Noord-Brabant (one of the main users of the monitor) included three additional indicators. Andrea Almasi explained organizations like FrieslandCampina and the Rabobank are not 'pleased' with these additional indicators. Almasi explained it is important to 'give dairy farmers enough space' and to 'reach agreement about the rewarding of farmers'.

Another important question which has been asked during the interviews, is to what extent dairy farmers are in fact familiar with the biodiversity monitor. Again, all the interviewees answered the same: most dairy farmers have never heard about it. For example, Jeen Nijboer from the Rabobank explained: *"Most farmers will not be aware of the monitor, but are indirectly all involved in the monitor"*. The farmers are indirectly involved because they are rewarded via the monitor, though they do not all know it. The two interviewed dairy farmers also indicated they have heard of the monitor once, but are not aware of it. They both explained this accounts too for their 'dairy farm colleagues', since the biodiversity monitor is not well known by Dutch dairy farmers. Concerning the results of the biodiversity monitor and awareness among dairy farmers, this results in the following.

What are up till now the effects of the biodiversity monitor on restoration of biodiversity in the Netherlands?	No one knows yet.
How well-known is the biodiversity monitor by Dutch dairy farmers?	Most dairy farmers are not familiar with it.

8.4 Inclusiveness of actors and indicators

During the interviews, when I asked about the inclusiveness of actors and indicators included in the biodiversity monitor, all relevant interviewees answered they think 'it is inclusive enough'. All interviewees explained there has been intensive work and research down between financial organizations, financial institutions, non-governmental environmental organizations, and dairy farmers. Furthermore, intensive scientific research has led to the collection of the 7 Critical Prestation Indicators. However, I think the inclusiveness of indicators can be questioned, since the document analysis made clear it is continuously emphasized to reduce the amount of indicators. Moreover, in the interviews it turned out that Jelle Zijlstra, David Kleijn, Jeen Nijboer, Ruth IJspeert, and Ingrid van Huizen, all explained we should not add more indicators, in order to avoid 'too many complexities'. There is a clear majority of interviewees who agree on this limited use of Critical Prestation Indicators. Regarding the inclusiveness of actors, I think it is remarkable that most of the Dutch dairy farmers do not know about the biodiversity monitor, together with the fact that FrieslandCampina is the only actor who owns the data about the results of the biodiversity monitor. It looks there is a clear hierarchy between the actors, and there exists certain intransparency.

8.5 Quotations interviewees

From each interviewee, I decided to select the most important quote which symbolizes his or her perspective and position towards the biodiversity monitor for dairy farming. These are the following:

Ruth IJspeert - FrieslandCampina: *“FrieslandCampina is a commercial party, we also have interests in making money”*

Jelle Zijlstra- WUR: *“I also see it more as that we are on the way to a better balance between nature and agriculture”*

Mieke van den Hengel- Dairy farmer: *“The growth model is not the only model in which you can develop as a company, we do not want to grow, at least not in production volume”*

Ingrid van Huizen – Biodiversity Monitor Foundaiton: *“We need a piece of collectivity so that all farmers can be rewarded for the same”*

Jeen Nijboer- Rabobank: *“Measuring biodiversity should be objective”*

Andrea Almasi – Province Noord-Brabant: *“I think it is crucial we speak the same language”*

Jan Willem Erisman – Leiden University: *“Animal welfare is important, and there should certainly be an indicator for that”*

Daniel Nuijten – European Commission: *“As the dominant species on Earth, we have a responsibility to restore and improve biodiversity”*

Based on these quotations, the following scheme can be made regarding the Policy Arrangement Approach. These actors will be related to the so-called Anthropocentric Discourse and the Ecocentric Discourse, which have been discussed earlier in the chapter about the Policy Arrangement Approach. The discourses are presented horizontally, while the actors are presented vertically.

	Anthropocentric Discourse	Ecocentric Discourse
Wageningen University & Research		X
FrieslandCampina	X	
Leiden University		X
European Commission		X
Biodiversity Monitor Foundation	X	
Province Noord-Brabant	X	
Rabobank	X	
Dairy farm Hof zum Walde		X
Dairy farm Groenhouten		X

In the following scheme, it is showed how the actors owns different power resources based on the findings of the interviews.

	Power Resource
Wageningen University & Research	Knowledge
FrieslandCampina	Financial instruments
Leiden University	Knowledge
European Commission	Supranational biodiversity governance
Biodiversity Monitor Foundation	Management of the biodiversity monitor
Province Noord-Brabant	Ability to use the biodiversity monitor
Rabobank	Financial instruments
Dairy farm Hof zum Walde	Control over their own dairy company
Dairy farm Groenhouten	Control over their own dairy company

The summarized transcriptions of the interviews have been analyzed and coded with Atlas.ti. Five codes have been created, namely actors, power, discourses, rules of the game, and non-human actors. The summarized transcriptions of the interviews (about one and a half page per interview) have been set together, whereafter the relevant statements or keywords have been linked to one of the five formulated codes. When for example one of the interviewees talks about the importance of animal welfare, this is coded as non-human actors. When it is for example stated how FrieslandCampina owns data about the results of the monitor, this is coded as power. The coding of the relevant words and phrases out of the summarized transcriptions resulted in the following.

Name	Grounded	Density	Groups
Actors	27	0	[Actors]
Discourses	28	0	[Discourses]
Non-human act...	13	0	[Non-human actors]
Power	13	0	[Power]
Rules of the game	20	0	[Rules of the game]

Figure 8.3 Codes

This shows how there is a clear difference in the number of times when the interviewees talked about actors and discourses, compared to power and non-human actors.

8.6 Policy Arrangement Approach

In the previous chapters, relevant actors, discourses, power resources, and rules of the game related to the biodiversity monitor have been identified. This identification was mostly based on the public documents about the development of the monitor. Based on the interview analysis, the interviewed actors are clear. The individual interviewees are working for or part of the Wageningen University & Research, Rabobank, Biodiversity Monitor Foundation, Leiden University, Province of Noord-Brabant, European Commission, FrieslandCampina, or owning a dairy farm. It can be stated these are the *actors* of the biodiversity monitor. However, these are of course not all actors which are related to the biodiversity monitor. For example, the document analysis made clear the Wereldnatuurfonds (WNF) is also one of the main drivers behind the monitor. However, it was not possible to conduct an interview with someone from WNF, since they argue they ‘finished the biodiversity monitor project’. Furthermore, it became clear how the Province of Noord-Brabant is an important actor (they use the monitor), though there are of course more actors who use the monitor such as provincial governments or water authorities. This accounts too for the two interviewed dairy farms, which are of course not the only dairy farms in the Netherlands who can be seen as ‘actors of the biodiversity monitor’. Although I did not interview all these actors, they can be identified as actors since they are described in the public documents or mentioned during the interviews.

However, there exist also the *not described or mentioned* actors. Based on the interviews, it looks like there are in fact 3 main actors in the biodiversity monitor: financial institutions (Rabobank, FrieslandCampina), scientific institutions (Wageningen University, Leiden University), and users of the monitor (provincial governments). I think there is one main actor missing here, namely *environmental organisations*. The only environmental organisation which was involved as an actor in the biodiversity monitor, was the WNF. Based on the document analysis and interview analysis, there are no other environmental organisations in the monitor. All the interviewees continuously emphasized the main goal of the monitor concerns biodiversity restoration. Meanwhile, there are no environmental NGO’s or environmental institutions involved in this monitor. I think this can be seen as a missing actor. As explained earlier in the conceptual framework and the theoretical perspective of the Actor-network theory, this research focused on non-human actors. The conceptual framework made clear non-human actors can influence and put pressure on the elements of the Policy Arrangement Approach. When I asked all the interviewees about non-human actors (such as nature and animals), only few had thoughts about this. As mentioned before, Jan Willem Erisman clearly advocates for an *animal welfare-indicator* in the biodiversity monitor. Moreover, David Kleijn emphasized the importance of intrinsic values of nature, related to ‘subjective beauty of nature’. However, most interviewees could not say much about non-human actors, with the main reason of *immeasurability* of these actors. Daniel Nuijten explained the importance of intrinsic values of nature in biodiversity governance, though it is hardly possible to take this into account, since it is not measurable. As explained earlier in the Actor-network theory chapter, it can be seen as a problem when intrinsic values and non-human actors are not taken into account, just because it is not able to express them in a quantitative entity.

Based on the existing rules of the game and distribution of power resources, it became clear how the actors differ in power positions. The most powerful actors (owning resources such as money and knowledge), determine for a large part which actors are involved in the biodiversity monitor. During the interviews, Jelle Zijlstra explained how FrieslandCampina is the main driver behind the initiative of the monitor, while Jan Willem Erisman states how FrieslandCampina is the only actor who owns data of the results of the monitor. These findings are all related to existing rules and power structures. In this case, owning data can be seen as a powerful resource.

8.7 Interim conclusions

I think the main conclusion of this interview analysis, are the different perspectives of the interviewees. It is interesting all the interviewees talk about the same topic – namely the biodiversity monitor for dairy farming – though they all speak in a clearly different way. One of the main examples are certain actors arguing for more Critical Prestation Indicators, though other actors make clear there should be no more indicators included. Moreover, it is interesting how different actors have their understandings of the concept of biodiversity. While certain interviewees emphasize how biodiversity should be measurable and usable, other interviewees like Mieke van den Hengel argue for a broader understanding of biodiversity. These different perspectives make clear how each actor or organization have their own interests in the biodiversity monitor. I think the most important findings out of the interview analysis, concern the publicity among Dutch dairy farmers and the results of the biodiversity monitor. I think it is remarkably there are no results of the biodiversity monitor yet, which means it can be concluded whether the monitor is successful or not. Furthermore, I think the fact that most dairy farmers in the Netherlands are not aware of the monitor, can be regarded as problematic. Continuously it is emphasized the main goal of the monitor is restoration of biodiversity (especially at Dutch dairy farmers), though most farmer do not know the monitor. In the interviews, it became clear how the focus lies on *extending the users* of the biodiversity monitor, as explained by Ingrid van Huizen (chairwomen of the biodiversity monitor foundation). During the conversations, no one could inform whether biodiversity actually improved as a consequence of the monitor. At the same time, the interviewees could exactly tell how there developed more users of the monitor (and how the goal is to extend this even more). Based on the interviews, it became clear how creating more users of the biodiversity monitor in the future (e.g. provincial governments and water authorities) is prioritized.

Instead of continuously looking to the *future*, I think for the biodiversity monitor it is important to look at *the past*. I think a certain moment of reflection is important, where it is researched whether the monitor actually contributed to biodiversity restoration or not. This moment of reflection is also about determining to what extent the use of Critical Prestation Indicators is the right way. Next to extending the users of the monitor, I think it is necessary to focus on extending awareness among dairy farmers themselves. It turns out the biodiversity monitor is a project where all related actors should work together, also the non-human actors. Ending with a quote from the interviewed Jelle Zijlstra:

“I see the biodiversity monitor more as a way to a better balance between nature and agriculture”

9. Conclusion

This is the first part in this thesis, where there will be an answer formulated on the research question. In the introduction to this research, this main research question has been formulated:

Was the process of developing the biodiversity monitor for dairy farming in the Netherlands sufficiently inclusive to address a broad range of necessary indicators and actors?

As already explained earlier in the reading guide of this master's thesis, this research should be seen as a scientific journey, where the goal is not only collecting data and simply answering the research question. As explained earlier, this complete research should be seen as a broader journey full of adventures. These adventures came alive in for example the interview at the European Union in Brussels. Furthermore, this thesis made some 'academic outings' in especially the chapter about the Actor-network theory. Multiple philosophers and theories have been discussed, in order to have a deeper understanding of biodiversity and human's position in the entire ecosystem. In fact, these literature studies did not contribute directly to the research question. Only in the later chapters of the document analysis and interview analysis about the biodiversity monitor, this research question has been addressed more directly. In the chapter of the document analysis, it has been explained what is meant by 'sufficiently inclusive' and why an inclusive process of the biodiversity monitor is important. In the interview analysis, it became clear how there is a lack of involvement of environmental NGO's or animal welfare organisations in the development of the biodiversity monitor. It turned out how FrieslandCampina was the main driver behind the initiative, while they are still one of the most powerful actors in the biodiversity monitor. Regarding the inclusion of Critical Prestation Indicators, both the document analysis and the interview analysis show how it is continuously emphasized to reduce the amount of indicators, or at least not to extend them. Only a clear minority argued for additional indicators which would be necessary for the biodiversity monitor (e.g. the animal welfare indicator). However, the interviewed persons argued the development of the biodiversity monitor has been sufficiently inclusive, especially since lots of different actor have been involvement (e.g. dairy farmers and scientific institutions).

Based on my own prejudices, literature research, analysis of documents about the biodiversity monitor, ideas about biodiversity and nature, conduction and analysis of interviews, development of my own thoughts and the writing of this Master's Thesis;

I argue the process of developing the biodiversity monitor for dairy farming in the Netherlands was *not* sufficiently inclusive to address a broad range of necessary indicators and actors.

This final conclusion is actually based on two main findings: the lack of environmental organisations and the unfamiliarity of the monitor by dairy farmers. When I think about the biodiversity monitor for dairy farming, there are two main elements: *biodiversity* and *dairy farming*. I am convinced biodiversity is strongly related to environmental or nature conversation organisations, while dairy farmers is strongly related to – indeed – dairy farmers. When de WNF is the only environmental organisation involved in the development of the monitor (and is nowadays not involved anymore), together with the fact that most dairy farmers in the Netherlands have not even heard about the biodiversity monitor once (even the main actors of the monitor admit this), I think it is impossible to claim there has been a sufficiently inclusive development. In my view, environmental organisations and dairy farmers are the most important actors of the *biodiversity monitor*, and therefore necessary to involve. Moreover, when it is continuously emphasized in the public documents about the biodiversity monitor to reduce the set of Critical Prestation Indicators, I think this is incompatible

with arguing there exists a broad inclusion of indicators. This finding became once again clear in the analysis of the interviews. As explained, this journey does not end now after answering this research question. In fact, this journey will continue even more from now. The literature research and interviews showed the importance of biodiversity and the urgency of the biodiversity crisis. I think the biodiversity monitor for dairy farming is a step in the right direction, though this direction will not work for the long term. I think this step should be seen as run-up to a radical transformation where humans will revise their position in the ecosystem, and to finally live in harmony and balance with nature. I want to finish this Master's Thesis' conclusion with the quote which it started.

'There's still time to stop one million of the planet's plants and animals from vanishing forever – but not very much'.

About this alarming quotation, I think it is of great importance for us as human beings to realise we are part of these plants and animals. The time is now.

9.1 Contribution to further development of theory and recommendations for practice

In the scientific relevance of this research, it was explained how this thesis can contribute to further development of the theoretical frameworks. Of course, I can not claim I further developed the theoretical frameworks of the Actor-network theory and the Policy Arrangement Approach, since I am not convinced that is the case. However, I think it can be seen as a contribution that those 'different kind' of theoretical perspectives are combined and applied to the same case. With 'a combination of different theoretical perspectives', I mean the combination of an ecocentric perspective focused on non-human things, together with a more anthropocentric perspective focused on humans and human-made institutions. I think the theory of the Policy Arrangement Approach is still human-oriented, although the framework is applied to environmental cases. Therefore, I think this thesis can contribute to a more ecocentric Policy Arrangement Approach. Such a theory can be useful for further environmental related research in the future.

Next to these developments of scientific theories, there is of course the 'real-life world' about the biodiversity monitor. The recommendations for this biodiversity monitor are clear; namely integrating more relevant actors and indicators. The main recommendation for practice which derived from this research, is the inclusion of dairy farmers in the biodiversity monitor. I think they are one of the most important – yet less involved – actors related to this monitor. It seems like an important and achievable aim to transparently involve more dairy farmers in the upcoming future.

9.2 Research limitation

Of course, there are multiple limitations of this Master's Thesis. I think the most important limitation is my own bias about biodiversity and the biodiversity crisis. Since every researcher already holds a certain perspective, I am no exception. Because of my own perspective about biodiversity, it can not be argued this research is completely neutral and objective. On the contrary, this whole thesis is based on my own thoughts and selective collection of data. Since I tried to collect as most and relevant data as possible, this is also limited. I do not have access to all documents about the biodiversity monitor, which is a limitation for my findings out of the document analysis. Regarding the interviews, it is true I only interviewed 10 people, which means this is of course not enough to completely understand all the actors of the biodiversity monitor. In fact, 10 interviewees do not come even close to encompassing the relevant actors of the monitor. Next to this, I was not able to interview people from relevant actors such as the Wereldnatuurfonds or other environmental organisations, which is also one of the limitations. I am aware the findings which derived from the analysis of the interviews are also subject to my own interpretations and thoughts about the monitor, which makes it not possible to fully develop an objective conclusion.

9.3 Reflection

I need to emphasize that this research was not only about formulating a research question, collecting data, analysing data, giving an answer to the research question and then claiming 'the research is finished'. This research should be more seen as a journey where I develop my own thoughts about this theme. The underlying aim in this research is to broaden my own knowledge and to get useful insights. Because of this reason, I decided to delve into the biodiversity crisis and theories about human-nature relations in our ecosystem. These thoughts are explained in the Actor-network Theory chapter. It can be stated that the practical research goal is indeed 'critically evaluating the process of the development of the biodiversity monitor', though the overarching goal in this research includes a broader approach. This approach goes way beyond 'answering a research question with collected data, and finally formulating a conclusion'. This research is a ship which keeps sailing and discovering the world. The research aim and question only serve as the direction for this ship, though this ship does not stop when the research question is answered. It keeps sailing, discovering, and being fascinated by the world, which I think is the beauty of science.

10. Annex

List of interviewed people

Name	Function	Institute
Jan Willem Erisman	Professor Environmental Sustainability (and former Director of Louis Bolk Institute)	Leiden University
Jeen Nijboer	Theme Manager Sustainability Food & Agri	Rabobank
Jelle Zijlstra	Dairy Farming Economist	Wageningen University & Research
David Kleijn	Professor & Chair holder of Plant Ecology and Nature Management + Board member of the Biodiversity Monitor Foundation	Wageningen University & Research + Biodiversity Monitor Foundation
Ruth IJspeert	Program Manager Biodiversity	FrieslandCampina
Mieke van den Hengel	Dairy Farmer	Organic Dairy Farm Groenhouten
Andrea Almasi	Police Officer Nature Inclusive Agriculture	Province of north Brabant
Ingrid van Huizen	Strategic Policy Advisor Public Affairs Agriculture and Food Production + Chairwoman of the Biodiversity Monitor Foundation	Province of Friesland + Biodiversity Monitor Foundation.
Daniel Nuijten	Policy Officer Invasive Alien Species	European Commission, Directorate-General for Environment, Unit D.2 Natural Capital & Ecosystem Health
Emiel Stam	Dairy Farmer	Dairy Farm Hof Zum Walde

Interview guide

Wat is het verhaal achter Zuivelboerderij Groenhouten? (korte introductie)

In hoeverre bent u bekend met de Biodiversiteitsmonitor voor Melkveehouderij?

In hoeverre bent u bekend met de Kritieke Prestatie Indicatoren van de Biodiversiteitsmonitor?

In hoeverre bent u bekend met FrieslandCampina, het Wereldnatuurfonds en de Rabobank? (en hun relatie tot Nederlandse melkveehouderijen of zuivelboerderijen)

In welke opzicht is uw bedrijf bezig met biodiversiteit, en wat is uw mening hierover?

Met welke regelgeving rondom biodiversiteit (of andere relevante aspecten) heeft u te maken met uw boerderij?

Kunt u het biologische karakter uitleggen van uw boerderij? (in welk opzicht is uw bedrijf biologisch etc.)

Wat is uw mening over een instrument zoals de Biodiversiteitsmonitor? (denkt u dat het effectief is, denkt u dat het biodiversiteit bevordert etc.)

Wat is uw mening over het 'agrarisch verdienmodel' van de Biodiversiteitsmonitor?

Op welke manier probeert u bij te dragen aan de natuurlijke omgeving rondom uw boerderij? (uitleggen van uw visie of filosofie)

KPI's:

Wat vindt u van het aantal Kritieke Prestatie Indicatoren?

Actoren:

Wat vindt u van het aantal betrokken actoren bij de biodiversiteitsmonitor?

Inclusiviteit

Hoe inclusief vindt u de ontwikkeling van de biodiversiteitsmonitor?

Hoe ziet u de toekomst van de biodiversiteitsmonitor?

Welke organisaties maken gebruik van de monitor?

In hoeverre zijn melkveehouderijen betrokken bij de monitor?

Wat ziet u als de grootste uitdaging voor de toekomst?

In hoeverre heeft de biodiversiteitsmonitor bijgedragen aan herstel van biodiversiteit rondom melkveehouderijen in Nederland?

In hoeverre denkt u dat er resultaten geboekt zullen worden?

Wat zijn de alternatieven voor de biodiversiteitsmonitor?

11. Literature

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