The socio-cultural value of food forests in the Netherlands

An exploratory study of perceived values by participants of the National Monitoring Programme on Food Forests (NMVB)

MSc Development and Rural Innovation

Specialisation Technology and Development

Student Suzy Rebisz

Date 8 August 2021

Thesis code CPT 80830

Supervisor Harro Maat

The socio-cultural value of food forests in the Netherlands: An exploratory study of perceived values by participants of the National Monitoring Programme on Food Forests (NMVB)

Master thesis Knowledge, Technology and Innovation Group submitted in partial fulfilment of the degree of Master of Science in Development and Rural Innovation at Wageningen University, the Netherlands

Student name	Suzy Rebisz
Student ID	940415682050
Study	MSc Development and Rural Innovation
Chair group	Knowledge, Technology and Innovation Group
Code Number	CPT- 80830
Date	8 August 2021
Supervisor	Harro Maat
Examiner	Marleen Buizer

Disclaimer:

The views expressed and the outcomes of this report remain responsible to the author and does not represent the views of Wageningen University. The data supporting the findings of this study are available within this thesis and the appendix. Great attention was given to this thesis; however, minor errors may occur which I am solely responsible for.

Recommended citation:

Rebisz, S. (2021). *The socio-cultural value of food forests in the Netherlands: An exploratory study of perceived values by participants of the National Monitoring Programme on Food Forests (NMVB).* (MSc Thesis). Wageningen University, The Netherlands; p.1-73

Contact:

Please contact suzy.rebisz@gmail.com for comments, questions, improvements or access to further datasets and scripts used for the analysis of this study.

Acknowledgements

Abstract

Food forests are an upcoming phenomenon in the Netherlands, yet no study has made a systematic inventory of the societal impacts and perceptions on food forestry. This thesis set out to explore perceived socio-cultural values generated by participants engaged with food forests, as part of the National Monitoring Programme on Food Forests in the Netherlands (NMVB). These values were elicited through the integration of three valuation frameworks: *nature's contribution to people* framework (IPBES, 2016), the *cultural values model* (Stephenson, 2008) and the *IUCN guidelines on cultural and spiritual significance of nature* (Verschuuren et al., 2021). The *people-landscape interaction model* (Tress & Tress, 2001) and a biocultural perspective were also embraced to conceptualise food forestry as a form of socio-ecological interaction. A mixed-method approach was adopted through a survey and 8 follow-up interviews. The survey involved 48 people who voluntarily participated, and they reflected 24 food forests across the Netherlands. All responses were analysed, coded, and clustered using ATLAS.ti and MS Excel. The respondents were aged between 25 and 68, and represented food forest owners, managers, designers, employees, and volunteers. This study identified 7 main socio-cultural value themes: ecology, biocultural harmony & sustainability, knowledge & education, security & livelihoods, health & well-being, identity & community, and experiential perceptions. As visualised by the value wheel below, a heterarchical perception exists for the elicited socio-cultural values of these food forests, which were often non-material and experiential in nature. Results indicated frequent, self-reported, perceptions about food forests supporting both human well-being and ecosystem health. Many values were intrinsic and non-anthropocentric in nature as the ecology and biodiversity aspects of food forests were valued most. These values carried an altruistic and biocentric viewpoint as food forestry was firmly perceived as a sustainable endeavour for future generations with a strong educational component. These socio-cultural values were given within a dominant cognitive framework where humans were seen as part of nature along with notions of stewardship and respect for nature, much alike a biocultural perspective. The interaction between Dutch food forests and humans resulted in a multitude of material and non-material value creation. This thesis provides a basis for future research to monitor the development and impact of socio-cultural values in relation to the practice of food forestry.
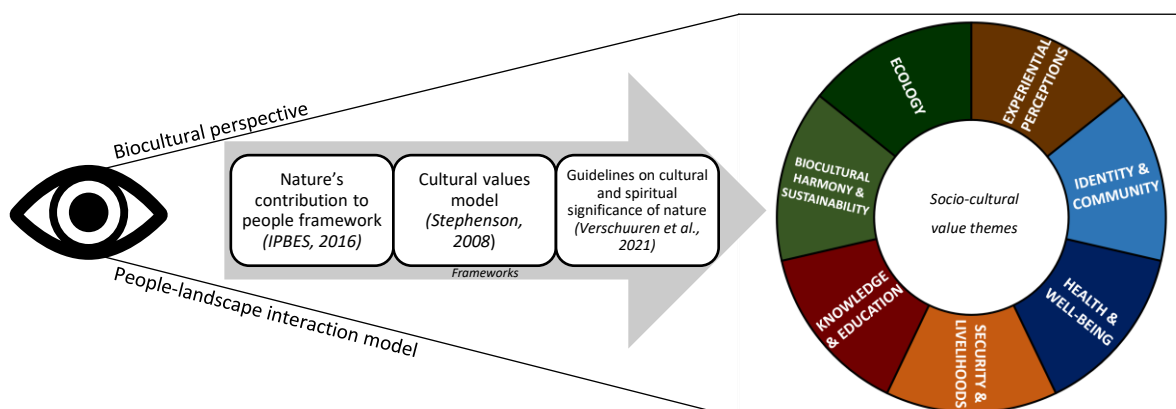
Nederlandse samenvatting

Voedselbossen zijn een opkomend fenomeen in Nederland. Echter zijn de maatschappelijke effecten en percepties van voedselbossen nog niet systematisch in kaart gebracht. Via deze scriptie werden de waargenomen sociaal-culturele waarden van betrokkenen bij voedselbossen onderzocht, als onderdeel van het Nationale Monitoringprogramma Voedselbossen in Nederland (NMVB). Het waarnemen van deze waarden werd geïnterpreteerd door middel van integratie van drie waarderingskaders: *nature's contribution to people* framework (IPBES, 2016), the *cultural values model* (Stephenson, 2008) and *guidelines on cultural and spiritual significance of nature* (Verschuuren et al., 2021). Om voedselbosbouw als een vorm van sociaal-ecologische interactie op te stellen, werden het *people-landscape interaction model* (Tress & Tress, 2001) en een biocultureel perspectief gebruikt. Via een enquête en 8 vervolginterviews werd een gemengde onderzoeksmethode gehanteerd. Aan dit onderzoek deden 48 mensen vrijwillig mee die 24 voedselbossen vertegenwoordigen door heel Nederland. Alle bevindingen werden geanalyseerd, gecodeerd en geclusterd met behulp van ATLAS.ti en MS Excel. Respondenten waren tussen de 25 en 68 jaar, en vertegenwoordigden voedselbos eigenaren, -managers, -ontwerpers, -medewerkers en -vrijwilligers. Als uitkomst werden 7 belangrijke sociaal-culturele waarde thema's herkent: ecologie, bioculturele harmonie & duurzaamheid, kennis & educatie, veiligheid & levensonderhoud, gezondheid & welzijn, identiteit & gemeenschapsgevoel, en beleveniswaarde. Zoals verbeeld door het onderstaande waardewiel, bestaat er een heterarchische perceptie van de sociaal-culturele waarden van deze voedselbossen, die vaak immaterieel en ervaringsgericht van aard waren. Zo gaven de respondenten frequent aan dat het voedselbos waarin zij betrokken zijn zowel hun welzijn als de gezondheid van ecosystemen ondersteunt. Veel waarden waren intrinsiek gemotiveerd en niet-antropocentrisch van aard; de ecologische en biodiversiteitsaspecten van voedselbossen werden het meest gewaardeerd. Deze waarden hadden ook een altruïstisch en bio-centrisch standpunt, aangezien voedselbosbouw veelal werd gezien als een duurzame onderneming voor toekomstige generaties met een sterk educatief component. De meeste uitgedrukte waarden kwamen voort vanuit een bepaald wereldbeeld waarin de mens wordt gezien als onderdeel van de natuur, in samenhang met begrippen gerelateerd aan rentmeesterschap en respect voor de natuur. Dit denkbeeld hangt nauw samen met een bioculturele perspectief. De interactie tussen voedselbossen en mensen resulteerde in een veelzijdigheid aan materiële en immateriële waarden. Deze scriptie biedt een basis voor toekomstig onderzoek om de ontwikkeling en invloed te volgen van sociaal-culturele waarden omtrent voedselbosbouw.
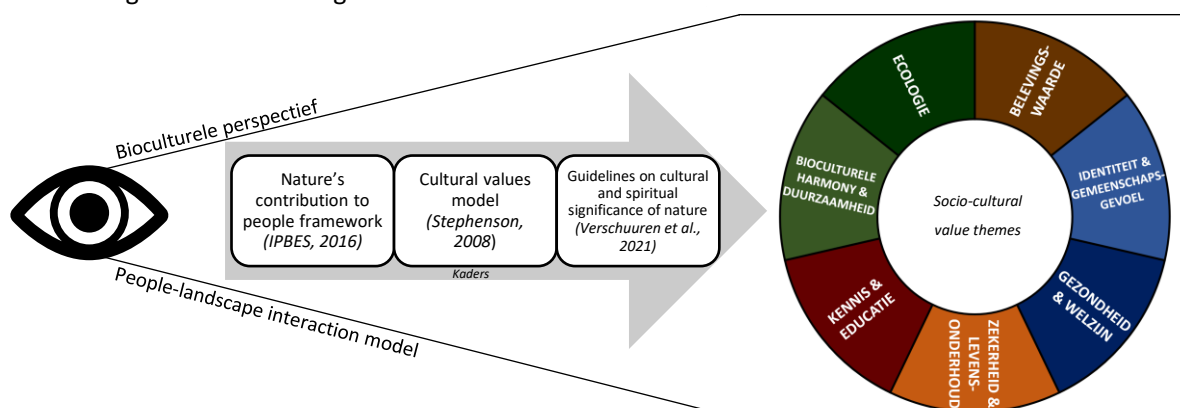
Table of Contents

List of Figures

List of Tables

Abbreviations

C#	Case #
Q#	Survey question #
R#	Response to survey question #
RI#	Response during interview in relation to survey question #
Q#:GI#	Survey question number within Section General Information
Q#: SN#	Survey question number within Section Social Network
IUCN	International Union for Conservation of Nature
-guidelines	Proposed guidelines on cultural and spiritual significance of nature recognised by IUCN
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
FAO	Food and Agriculture Organisation
NCP	Nature's Contribution to People
NMVB	National Monitoring Programme on Food Forests

1   Introduction

Food forests are increasingly being planted and practiced in temperate climates for their multifunctionality in producing food, increasing biodiversity and providing various ecosystem services (Clark & Nicholas, 2013; Groot & Veen, 2017; Park et al., 2018). A food forest is broadly described as an agroecosystem with mainly woody, perennial plants that mimic a forest ecosystem (Crawford, 2010; Jacke, 2008; Kitsteiner, 2013; Limareva, 2014; W. van Eck, 2018 *pers. comm.*, 2nd October). This polyculture is a type of agroforestry system most closely related to traditional practices such as homegardening and forest farming (Nair, 1993). These agroforestry practices originate as far back as 10,000 years ago in the sub-tropics of southeast Asia (Nair, 2014). In the Netherlands, food forestry is considered a novel type of agroforestry system due to its diversified planting composition and level of human-nature interaction.

Like most agroforestry systems, food forests are designed and adapted by humans, reflecting human-environment interactions (Moran, 2005). What is the effect of such human-environment interactions? And how do these effects contribute towards addressing current societal challenges? These are the underlying questions that have shaped my thesis research. To identify these effects, I explored the *social-cultural value* (or values in short); meaning the importance people place on their engagement with a food forest ecosystem and on food forestry as a practice.

To investigate this, frameworks such as the Millennium Ecosystem Assessment (MA, 2005), Nature's Contribution to People (IPBES, 2016; Pascual et al., 2017), the Cultural Values Model (Stephenson, 2008) and the IUCN guidelines on cultural and spiritual significance of nature (Verschuuren et al., 2021) have been used. These frameworks created plural ways to asses and describe the value of nature (Gómez-Baggethun et al., 2010). Assessing the value of ecosystems is often difficult and complex, yet vital in understanding how meaningful human-nature interactions can be for the health and integrity of ecosystems and for the health and well-being of humans (Bieling et al., 2014; Lele et al., 2018; Pascual et al., 2017; Stephenson, 2008).

Some studies have shown that agroforestry systems have "socio-economic advantages and environmental benefits" (Shi et al., 2018, p. 3886; Kay et al., 2019; Lovell et al., 2018; Oosterbaan & Kuiters, 2008). The majority of literature focuses largely on the instrumental and material value of agroforestry systems for humans and societies (Brown et al., 2018; Fagerholm, Oteros-Rozas, et al., 2016; Gaspar et al., 2016; Kremen & Merenlender, 2018; Moreno et al., 2018; van Bree et al., 2021). What is considered of value often carries qualities that are intangible, non-material and cultural in nature (Chan, Satterfield, et al., 2012; Kati & Jari, 2016; Klain et al., 2017). These qualities of value remains largely unrepresented and understudied, and less so in the context of temperate food forests (Arias-Arévalo et al., 2017; Lele et al., 2018). However, in the broader domain on the assessment of

ecosystem services, studies indicate that nature provides a range of inherently intrinsic and instrumental goods and services and where many meaningful relationships can exist between humans and nature (Bieling et al., 2014; Díaz et al., 2018; Douglas, 2017; Fagerholm, Oteros-Rozas, et al., 2016; Kadykalo et al., 2019; MA, 2005).

1.1 Relevance

For millennia, humans have formed an inextricable relationship with the living environment (Latour & Heather, 2015; Moran, 2005). Historians point towards the Neolithic revolution, about 12,000 years ago, when humans began to proactively modify Earth's landscape (Poschlod, 2015). In this period, humans shifted from a hunter-gatherer lifestyle to building settlements and farming practices. Since then, the Earth houses man-made landscapes, semi-natural areas, and pristine ecosystems unaltered by humans. The Netherlands houses largely human-made landscapes where hybrid forms of cultured nature exist (Elands et al., 2019). The upcoming trend of planting food forests is one such example.

The epoch we have now entered is named the *Anthropocene*, reflecting that anthropogenic forces are influencing Earth to a great extent, so much so that humans are not only dependent on the living environment, but that the living environment is increasingly becoming interdependent on humans and human-nature interaction (Douglas, 2017; Latour & Heather, 2015; Lewis & Maslin, 2015; Moran, 2005; O'Neill et al., 2018; Rockström et al., 2009). Human influence on Earth's ecosystems varies from having contributed towards the dispersal of plant species diversity and abundance in the Amazonia since pre-Columbian times (C. Levis et al., 2017; Carolina Levis et al., 2018) towards a loss in biodiversity from land-use changes across the globe (Sodhi et al., 2010).

On a global scale, the result of human activities is placing an alarming pressure on the integrity of Earth's ecosystems, as highlighted by the IPCC (2020), the Convention on Biological Diversity (UNEP, 2020), McKinsey's *Climate risks and response* report (Woetzel et al., 2020) and the Living Planet Report 2020 (WWF, 2020). These institutions call for transformative shifts, such as conserving greater areas of biodiversity hotspots, a shift towards more sustainable diets, and large-scale adoption of sustainable land use practices. Proponents for food forestry suggest that this practice can be part of the solution towards nurturing a biodiverse and habitable Earth (Clark & Nicholas, 2013; Green Deal Voedselbossen, 2020; Park et al., 2018). Understanding what people value can inform change-makers to guide such a transition.

In the Netherlands, more than 100 food forests initiatives exist and more are increasingly being realised in response to climate, biodiversity and societal concerns (Stichting Voedselbosbouw NL, 2016). Since the adoption of the Green Deal *Voedselbossen* in 2017, a demand grew to understand the effects and impacts on the environmental, economic and social aspects of food forests (GD-219,

2017). The National Food Forest Monitoring Programme (NMVB) established itself to monitor six themes: economy, agronomy, soil health, biodiversity, vegetation structure and the social aspects.

Few studies have investigated the social aspects and translating any intangible benefits remains difficult (B. Rooduijn & P. de Graaf, 2020. *pers.comm.,* 29 June). This study aims to contribute to the NMVB by providing an initial inventory of the various social and other added values food forests have at a national scale. The outcome of this study can aid the awareness and communication on the effects of (future) food forest projects and help inform policy makers on the potential impacts of a food forest in urban, peri-urban and rural landscapes.

This study fills a small gap in the large unknowns about food forestry practices and its effects on humans and their accompanying values. This academic endeavour involves the application of frameworks, leading to a production of knowledge and thus, contributing towards our scientific body of knowledge for current and future readers to consult.

1.2   Research questions

The objective is to explore and identify the socio-cultural values direct stakeholders perceive in relation to food forests in the Netherlands. The main research question consists of four sub-research questions and is formulated as:

1) What are the socio-cultural values of food forests by participants of the national monitoring programme on food forests (NMVB) across the Netherlands?
    a) Which value themes come across?
    b) Are any themes considered more valuable than others?
    c) What is the background of the participants?
    d) What types of human-nature relationships exist amongst the participants?

Stakeholders, i.e. participants, include initiative takers, managers, food forest designers, volunteers and people involved in realising the food forest. Values are recorded as individual perceptions and then aggregated per stakeholder group. The main aim is to record the diversity of values humans perceive in this novel social-ecological phenomenon. The concept of *value* is understood as the importance humans place on the food forest with which they have a direct relationship with (Scholte et al., 2015). At an abstract level, food forestry is broadly seen as a social-ecological system (Binder et al., 2013), which is:

A.   an ecological system with all its processes and (sub-)entities
B.   and a social practice with all its motivations, intentions and outcomes.

Exploring 'how' and 'why' stakeholders assign value remains outside the scope of this study due to time and resource constraints. A further explanation of value, value types, stakeholder group and the relevant concepts and frameworks adopted in this study are given in the following Chapter.

2   Theoretical framework

Food forestry can be examined from many different disciplines, such as from ecology, agronomy, economy, landscape design anthropology and sociology. To encapsulate the perspectives taken to assess the socio-cultural values, several frameworks were adopted (Figure 2.1). Three frameworks were consulted to understand socio-cultural values: nature's contribution to people framework (IPBES, 2016), the cultural values model (Stephenson, 2008) and guidelines on cultural and spiritual significance of nature (Verschuuren et al., 2021). The people-landscape interaction model (Tress & Tress, 2001) serves as a boundary framework that conceptualises reality and the practice of perception-making. In this study, understanding reality involves a biocultural perspective to acknowledge the interconnectedness of socio-cultural values in nature valuation (Verschuuren et al., 2021). In brief, I take on the perception that human-nature interactions are inextricable and interrelated, much like a web of life (Capra, 1996; Latour & Heather, 2015; MA, 2005; Steffen et al., 2015). This perspective is further explained in Chapter 2.4 (pg. 15).

Figure 2.1: An overview of the three frameworks guiding this study: the cultural values model (from Stephens, 2008), the IUCN guidelines on cultural and spiritual significance of nature (Verschuuren et. al. (2020) and Nature's Contribution to People (IPBES, 2016), which are framed within the people-landscape interaction model (Tress & Tress, 2001) and a biocultural perspective (Verschuuren et al.,

To explain my theoretical framework, the concept of food forestry is described first, followed by the concept of socio-cultural value. Then, relevant frameworks are discussed to analyse the socio-cultural values as a reflection of socio-ecological interaction. Lastly, I involve two concepts which underpin how I perceive and conceptualise social-ecological interaction.

2.1 Food forestry

The principles and boundaries of food forestry practices in the Netherlands has been described by the Green Deal *Voedselbossen* (GD-219, 2017, p. 4)*,* which defines a food forest as:

- o a human-designed productive ecosystem mimicking a natural forest ecosystem which contains a high diversity of perennials and/or woody plants; of which parts are food sources for humans (i.e. fruits, seeds, leaves, stalks, etc.);
- o the presence of a canopy layer
- o the presence of at least three niches or productive layers (e.g. lower canopy layer, shrub layer herbaceous layer, groundcover layer, underground layer and climbing layer)
- o the presence of a rich forest soil life
- o a robust size; minimally 0.5ha in an ecologically rich environment and minimally 20ha in a degraded landscape.

Despite this definition, it is important to recognise that ecosystems exist which also apply food forest principles but do not fully align with the standard defined by the Green Deal. All food forests taking part in this study comply with this definition as it is a prerequisite of being part of the national monitoring scheme (NMVB). Food forestry is highly adaptive due to the principle that a food forest is designed to be embedded within the context at hand a follow its natural succession into a forest ecosystem. The level of human interaction within a food forest varies as humans engineer a food forest yet once it is planted, the food forest is left intact to follow its natural progression into a forest ecosystem with extensive forms of human interaction. These forms of human interaction are shaped by the ecological setting and human aspirations on the food forest.

2.2 The concept of socio-cultural value

This thesis adopts the term *socio-cultural value* as an umbrella term for investigating the values people perceive about food forestry. This term aligns with the definition by Scholte *et al.* (2015; p. 68), who "define socio-cultural values of ESs as the importance people, as individuals or as a group, assign to ESs [ecosystem services]". The factors that influence the socio-cultural valuation of an ecosystem are many, as shown in Figure 2.2. The determinants outlined in orange are of focus in this study, such as the characteristics of the natural environment, the type of interaction between humans and the ecosystem, and the characteristics of human beings. In this study, eliciting socio-cultural values considers the characteristics of the food forest ecosystem and the perception of humans in relation to the food forest. For example, a food forest ecosystem can be described by its characteristics, which constitute of objects part of a food forest, or to processes happening at the food forest. This ecosystem can also be seen as a phenomenon that constitutes of a practice or concept.

Other influential determinants of socio-cultural values involve the social context and the personal characteristics of those valuing an ecosystem (Scholte et al., 2015). This involves considering characteristics such as age, gender, cultural background, level of education and core values. In addition to this, it is also important to take into account the type of human-nature relationship one has, as this reflects how a person understands and values nature (Muradian & Pascual, 2018; Schouten, 2013). Therefore, this study elicits the kind of relational model people have. I make a distinction into five types of relational models with explanatory viewpoints:
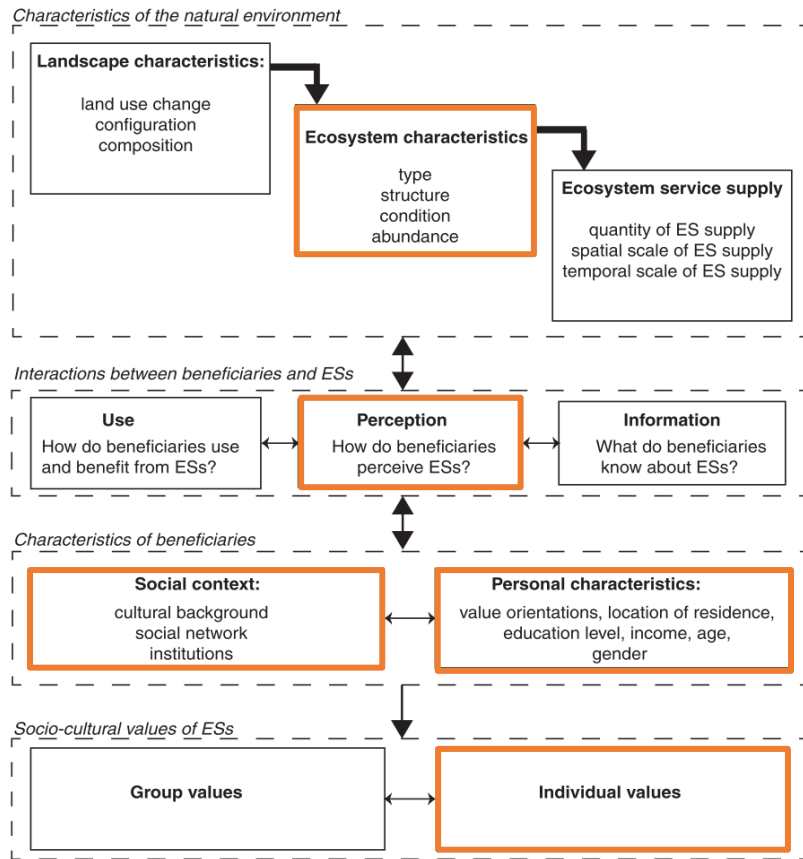
Figure 2.2: The determinants of socio-cultural values, as defined by Scholte et al. (2015). Outlines in orange reflect determinants considered in this study.

- Utilization: the purpose of nature is to serve humans
- Devotion: nature is a sacred and superior deity
- Stewardship: humans are custodians of nature
- Participant: humans are part of nature
- Ritualized exchange: nature is a separate entity and an equal partner to exchange with

These types of human-nature relationships are further described in appendix 8.1. Lastly, socio-cultural values are described at the individual level rather than at group level. Overall, understanding the concept of socio-cultural value is a complex task with many considerations such as the determinants and the outcomes. The outcomes can be clustered into value themes, dimensions, types and other qualities.

Value themes, dimensions, and types

Socio-cultural values can be clustered into a value theme, which often represents a topic about the value, for example about health or ecology. Value dimensions describe the different facets of value. As described by Chan *et al.* (2012), value dimensions can be distinguished into 8 facets on how

value can be expressed at a conceptual level (described in Table 2.1). For example, the 4th dimension distinguishes whether the value is self-oriented or other-oriented.

Table 2.1: Value typology adopted from Chan et al. (2012), as cited in Roodhof (2020)

Dimension	Definition	Relevance	Indicator
1. Preferences vs. principles vs. virtues	Action-oriented vs. consequence-oriented vs. actor-oriented values	Actors may hold conflicting principles, preferences, and virtues	Does the value pertain to actions, consequences, or actor(s)?
2. Market-mediated vs. non-market-mediated	Market-mediated values are often exclusively perceived and valued in monetary terms, whereas non-market-mediated values are not	Commodified objects are valued differently than objects independent of the market	Can the value be traded in markets?
3. Self-oriented vs. other-oriented	Values can pertain to oneself or others	A focus on self-oriented values overlooks values of those who cannot express values (i.e. non- human entities or future generations)	Does the value concern oneself or does it concern others?
4. Individual vs. holistic	Values can pertain to oneself or to a group or community	Collective values do not equate to the aggregation of individual values	Is the value documented individually or through group deliberation?
5. Experiential vs. metaphysical	Objects can be valued for their provision of (expected) experiences, for oneself or for others, or they can be valued simply for their existence (intrinsic value)	While a limited amount of people can value an object experientially, its metaphysical value may resonate with many	Is the object valued for its contribution to experience or for its existence independent of experience?
6. Supporting vs. final	Values can serve to produce other values (instrumental values) or they can be desired ends of themselves (intrinsic values)	Supporting values are substitutable when the substitute value produces the same end value	Is this value in service of another value?
7. Transformative vs. non-transformative	An object or process can be valued for its contribution to change or maintenance of the status	Objects or processes that lead to change may not be considered valuable under current value sets, but may be considered valuable when new value sets establish	Does this object or process challenge values currently held by actor(s)?
8. Anthropocentric vs. biocentric	Values can be held by humans and non-human entities	This dimension addresses underlying worldviews of the human-nature interaction. NB: biocentric values can only be documented as metaphysical values	Are the values to be studied held by humans?

A value type is sometimes also used as a descriptor for the dimension of value. I adopt the term *value type* to describe the perceptual orientation of value within a spectrum from biocentric to anthropocentric, as adopted from IPBES (2016). These value types are categorised into three zones: intrinsic (inherent value about nature), instrumental (value of nature that is regarded as useful to humans), and relational in kind (valuing any form of material or immaterial connection between the

person and their environment) (Díaz et al., 2018). These value types can be seen as a subset example of value dimensions and are further described in Chapter 2.3 (pg. 10).

These themes, types and dimensions are used as a guide to distinguish the many qualities of value during the analytical stage.

Conflated terminology

The language used in the arena of ecosystem services and nature assessments can be confusing. The use of *socio-cultural values* stems from the valuation of ecosystem services; however, I am assessing an ecosystem as a whole and not on particular services or benefits from an ecosystem. Traditionally, *cultural* and *socio-cultural values* were seen as a separate value type that did not describe any instrumental/utilitarian values of ecosystems, but mainly the immaterial well-being of people in relation to the environment (Arias-Arévalo et al., 2018; Dietz et al., 2005; Scholte et al., 2015). I would like to acknowledge that the values explored in this thesis can override these boundary terms and reflect plural forms of value. Eliciting and articulating such value pluralism engages the ecosystem services concept as a heuristic understanding that integrates different visions of human engagement with nature (Arias-Arévalo et al., 2018). Here, I aim to integrate existing ecosystem services frameworks (IPBES, 2016) with other cultural frameworks (Stephenson, 2008; Verschuuren et al., 2021) to elicit values of nature. Table 2.2 provides an overview and explanation to clarify the terms and relevant terminology adopted in this study.

Currently, IPBES (2016) defines socio-cultural values as the shared values of a group, implying that a deliberative process takes part in establishing socio-cultural values. The definition by Scholte *et al.* (2015) deviates from this as they also acknowledge individually held values as socio-cultural values. Thus far, there remains little distinction between values established from the aggregation of individual responses or value formation at group level. Both are considered as valid ways to elicit socio-cultural values. In line with Scholte *et al.* (2015) definition, I acknowledge both group-held and individually held values and make explicit that this study focusses on individually held values that are aggregated to group level.

The words 'values', 'significance' and 'importance' are used interchangeably in this thesis. Also, a conscious decision was to use the term *value* more often than the term *significance* despite Verschuuren *et al.* (2021) placing emphasis that the latter means "the inclusion of knowledge, meaning, and feelings as well as values that make the concept widely applicable" (Verschuuren et al., 2021, p. xiv). Although a difference in nomenclature exists, this thesis acknowledges this description within the operational concept of *value*.

Table 2.2: The definitions of types of values used in this study and adopted from [A]IPBES (2016) and [B]Scholte et al. (2015) and [C] FAO (2019)

Types of values	Explanation
Anthropogenic	Anthropogenic means 'human-generated' and is a term often used to refer to the way in which value is a concept and construct generated by humans. While it can be argued that all principles and preferences are anthropogenic (human-generated), it is important to note that this does not mean they are all anthropocentric (human-centred).[A]
Anthropocentric	Anthropocentric means 'human-centred' so an anthropocentric value is a value that something has for human beings and human purposes. [A]
Non-anthropocentric	A non-anthropocentric value is a value centred on something other than human beings. These values can be non-instrumental (e.g. a value ascribed to the existence of specific species for their own sake) or instrumental to non-human ends (e.g. the instrumental value a habitat has for the existence of a specific species). [A]
Biophysical values	A biophysical value is a measure of the importance of components of nature (living being or non-living element), of the processes that are derived from the interactions among these components, or those of particular properties of those components and processes. [A]
Economic values	Economists group values in terms of their "use" or "non-use". Use values can be both direct and indirect, and relate to the current or future (option) uses. Direct use values may be "consumptive" (e.g. drinking water) or "non- consumptive" (e.g. nature-based recreational activities). Indirect use values capture the ways that people benefit from something without necessarily seeking it out (e.g. flood protection). Non-use values are based on the preference for nature's existence without the valuer using it, and are of three types: existence value, altruistic value, and bequest value. [A]
Instrumental Value	An instrumental value is the value attributed to something as a means to achieve a particular end. This often includes economic and biophysical values. [A]
Non-Instrumental Value	A non-instrumental value is the value attributed to something as an end in itself, regardless of its utility for other ends. [A]
Intrinsic value	This concept can refer to inherent value, i.e. the value something has independent of any human experience or evaluation. Such a value is viewed as an inherent property of the entity (e.g. an organism) and not ascribed or generated by external valuing agents (such as human beings). This is the meaning of intrinsic value that has been adopted in the IPBES Conceptual Framework (Díaz et al., 2015): "Intrinsic value [is] the value inherent to nature, independent of human experience and evaluation and thus beyond the scope of anthropocentric valuation approaches". [A]
Relational value	Values relative to the meaningfulness of relationships, including the relationships between individuals or societies and other animals and aspects of the lifeworld (all of whom may be understood as conscious persons), as well as those among individuals and articulated by formal and informal institutions. Another type of relational values, eudemonistic values are associated with a good life, which include considerations of principles and virtues, and value the actions and habits that are conducive to a meaningful and satisfying life. [A]
Socio-cultural values	The importance people, as individuals or as a group, assign to (bundles of) ecosystem services. [B]
Held value	Held values represent ideals of what is desirable, how things ought to be, and how one should interact with the world. [C]
Assigned value	Assigned values express the relative importance (or worth of an object to an individual or group in a given context. They depend on a number of factors, including people's perception of the object, people's held values and the context (e.g., in socio-economic, environmental and cultural terms). Market prices, for example, constitute an assigned value that is through to change with market conditions. [C]

Scaling value

As described above, values have different dimensions and layers. To allow for the plural and complex characteristics of value, I refrain myself from using a linear approach and listing values that are considered most or more important than another. I aims to sway from a top-down and hierarchical perspective to a horizontal and categorical perspective when making an assessment of socio-cultural values. Hunter & Luck (2015) term this a heterarchical approach to outline the interconnectedness of all aspects. Having said this, I do intend to explore the relative importance's people place to certain value themes. It is not intended to find an absolute benchmark, but an attempt to scale value.

2.3 Integrating framework to understand the socio-cultural values of food forests

To understand the functioning and importance of biodiversity, ecosystems and nature to humans and non-humans, efforts are made to assess the value of nature through (most notably) the ecosystem services framework, forthcoming from the Millennium Ecosystem Assessment (MA, 2005). Scholars argue that this approach led towards a dichotomization between instrumental vs. intrinsic approaches to nature assessments (Buizer et al., 2016; Chan, Guerry, et al., 2012; Himes & Muraca, 2018; Lele et al., 2018).

To counter this dichotomisation, scholars and practitioners strongly recommend including plural values of nature and multiple valuation methods based on the principle that nature is incommensurable; where non-instrumental values of nature have no basis for measurement or comparison (Arias-Arévalo et al., 2018; Farrell, 2007; Himes & Muraca, 2018; Scholte et al., 2015; Spash, 2007). Building on these critiques, scholars have developed valuation frameworks such as nature's contribution to people (NCP), the cultural values model and the IUCN guidelines on cultural and spiritual significance of nature. These three frameworks claim that their value types and themes are non-prescriptive, non-exhaustive and can be inter-related (Pascual et al., 2017; Stephenson, 2008; Verschuuren et al., 2021). These frameworks are consulted as guidelines when analysing the perceived socio-cultural values of food forests. A description of each framework is given below.

Nature's Contribution to People

The IPBES approach (a.k.a. NCP) is one of the most diverse and inclusive approach in assessing the value of nature (IPBES, 2016). Both the NCP and the ecosystem services framework are very similar to one another, although Kadykalo *et al.* (2019) highlights that a greater set of knowledge systems, worldviews and stakeholders are included which can complement the ecosystem services framework.

According to IPBES (2016), there are many meanings the word 'value' carries, such as the *importance* of something for itself or for others, a *principle*, a *social norm*, a *preference* for a particular state of the world, or a *measurement*. Values are plural, context-dependent, dynamic, vary across scales and often incommensurable (Arias-Arévalo et al., 2018; IPBES, 2016).

As described in Figure 2.3, there can be several foci of value: nature (non-anthropogenic orientation), nature's benefit to people (anthropocentric orientation including biophysical and instrumental values) and values of a good quality of life (anthropocentric orientation including social and relational values) (IPBES, 2019). To help identify and categorize sub-themes, a list showing the focus of value and proxy-indicators of value(s) is also used during the analytical process (Table 2.3). During the analytical process, this study made use of these value types when distinguishing the diversity and plurality of socio-cultural values. To exemplify the recommendations of the IPBES approach, which involves a 6-step approach, three of the six step approach are described in appendix 8.1.

FOCI OF VALUE	TYPES OF VALUE	EXAMPLES
NATURE	Non-anthropocentric (Intrinsic)	Animal welfare/rights
		Gaia, Mother Earth
		Evolutionary and ecological processes
		Genetic diversity, species diversity
NATURE'S CONTRIBUTIONS TO PEOPLE (NCP)	Anthropocentric — Instrumental	Habitat creation and maintenance, pollination and propagule dispersal, regulation of climate
		Food and feed, energy, materials
	Anthropocentric — Relational	Physical and experiential interactions with nature, symbolic meaning, inspiration
GOOD QUALITY OF LIFE		Physical, mental,emotional health
		Way of life
		Cultural identity, sense of place
		Social cohesion

Figure 2.3: The IPBES approach to assessing nature, nature's contribution to people and a good quality of life (Pascual et al., 2017)

Table 2.3: Examples of values related to nature, nature's contribution to people and a good quality of life (adapted from IPBES, 2016)

Category	Type of values		Focus of values	Proxy-indicators of value
NATURE *Intrinsic value*	Non-anthropocentric		Individual organisms	Living beings (biocentrism), sentient beings (animal welfare/rights)...
			Biophysical assemblages	Populations, communities, ecosystems, biomes, the biosphere, Gaia, Pachamama, Mother Earth...
			Biophysical processes	Evolution, ecosystem functions and processes, ecological resilience ...
			Biodiversity	Genetic, functional, taxonomic and phylogenetic diversity, uniqueness, vulnerability...
NATURE'S CONTRIBUTION TO PEOPLE	Anthropocentric	*Biophysical*	Biosphere's ability to enable human endeavour	Energy: Embodied Energy, Human Appropriation of Net Primary Production (HANPP)...
				Materials: Total material consumption, life cycles, carbon footprint, water footprint...
				Land: Land cover flows, ecological footprint...
		Instrumental	Nature's ability to supply benefits (basis of benefits)	Habitats for fisheries, contribution of soil biodiversity to sustenance of long-term yields, biodiversity for future options...
			Nature's gifts, goods and services	Regulating services: Climate regulation, regulation of water flows, pollination, biological control...
				Provisioning services: Food, medicine, timber, water, bioenergy...
				Cultural services: Ecotourism, education, psychological benefits,...
GOOD QUALITY OF LIFE		*Relational*	Security and Livelihoods	Physical security, political stability, food and water security, energy security, livelihood security...
			Sustainability and Resilience	Social-ecological resilience, social, economic and ecological sustainability...
			Diversity and Options	Biocultural diversity, diversity of current and future options ...
			Living Well and in Harmony with Nature and Mother Earth	Stewardship, relationships and interactions between people and nature, conservation activities, contemplation of nature...
			Health and Well-being	Physical, mental, holistic health...
			Education and Knowledge	Inspiration, education, experience, learning space...
			Identity and Autonomy	Sense of place, sense of community, historical values, agency, self-determination...
			Good Social Relations	Community cohesion, social resilience, conviviality...
			Art and Cultural Heritage	Inspiration, artistic creation...
			Spirituality and Religions	Sacred sites, totemic beings, spiritual well-being...
			Governance and Justice	Environmental justice, intra-generational equity, inter-generational equity...

Cultural Values Model

The cultural values model was developed by Stephenson (2008) to holistically define and describe the meaning of a landscape by people. She particularly focussed on the cultural value people may hold in relation to a landscape. In my thesis, I adopted this model to characterize and cluster the perceptions of value towards an ecosystem and practice rather than a landscape. This model distinguishes three components: forms, practices & processes, and relationships (Stephenson, 2008). *Forms* represent the natural and cultural features of an ecosystem.

Practices is the second component and includes natural processes and human practices. Both natural processes and human practices are grouped together to reflect the continuum of dynamic action and deter a nature/culture fission. Through this way, Stephenson aims to acknowledge the inseparability of natural and cultural processes.

The third component is the *relationships* which are generated from human to human interactions, human to landscape interactions and valued relationships with the environment "even where there is little or no direct human involvement (e.g. ecological relationships)" (Stephenson, 2008, p. 134). This approach is closely reflected in the people-landscape interaction model by Tress and Tress (2001) and Figure 2.10, where people imagine, perceive and experience the landscape.

Overall, there is a dynamic interaction between forms, relationships and practices which, together, creates the landscape (Figure 2.4). These three components are seen as the three archetypes of values. These three value archetypes are used to cluster the responses during the analytical stage. Further sub-types of values have been distinguished using the framework from IPBES: Nature's Contribution to People.
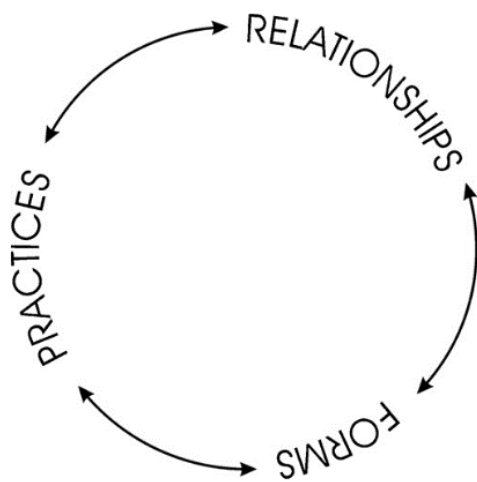
Figure 2.4: The dynamic interaction of forms, practices (including processes), and relationships (Stephenson, 2008)
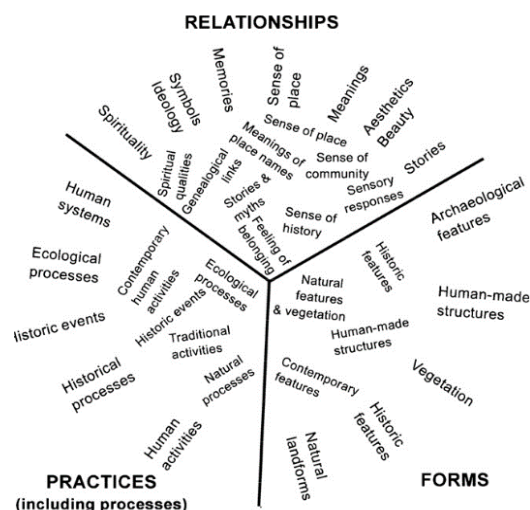
Figure 2.5: Examples of each of the three components: forms, practices & processes, and relationships (Stephenson, 2008)

IUCN guidelines on cultural and spiritual significance of nature

The IUCN guidelines provide an approach for researchers and practitioners to achieve ecologically and socially just ways of governing protected and conserved areas. This involves assessing the cultural and spiritual significance, defined as the values, feelings, ideas, social meanings and associations that nature in general inspires in people (Verschuuren et al., 2021). The IUCN guidelines entail six overarching principles:

1. Respect diversity
2. Build diverse networks
3. Ensure safety and inclusivity

4. Account for change
5. Recognise rights and responsibilities
6. Recognise nature-culture linkages

These principles have led to the development of relevant indicators to monitoring tangible and intangible values. Classifying the encountered values is context-dependent, can change over time and is based on culture and worldview. Hence, a generic classification is described in the report and shown in Table 2.4. This thesis takes inspiration from these guidelines as a possible classification system.

Table 2.4: Suggested possible "classification of values that make up the cultural and spiritual significance of nature in protected and conserved areas." (Verschuuren *et al.*, 2021, pp. 24 & 25)

Values	Tangible and intangible attributes and qualities that convey those values
Aesthetic, perceptual or scenic	**Beauty, silence, tranquillity, harmony:** These qualities are typically directly experienced in relation to nature or natural features, for example, the beauty of a landscape, but also in relation to the experience of nature, the sensorial experience of smelling the sea or hearing the wind rustling through leaves. Other qualities related to nature and natural elements can include intangible cultural heritage such as a 'beautiful song' or a painting about the sea.
Recreational, health and therapeutic	**Mental and physical well-being:** People visit nature because it makes them feel better, to re-create themselves and to feel whole again. Think about ecotourism, the practitioners of outdoor sports, playing games, doing contemplation or meditation, and the visitors of healthy and therapeutic forests (for example Shinrin-yoku, which have spread from Japan to South Korea and now many other countries in the world), thermal waters, wells and sea sides, who come to nature for healing, short, nature's effects on human health and well-being in all its dimensions: preventive, therapeutic, rehabilitative and palliative. A good example of work in protected areas focusing on these values is part of the Healthy Parks Healthy People movement (HPHP Central, 2018).
Artistic, traditional and contemporary	**Performing arts, music and dance:** Inspired by nature, natural features or life and activities in nature or related to the natural cycles of nature-based livelihoods such as agriculture, fisheries, agroforestry and pastoralism. **Literature, poetry and prose:** Expressions that communicate sense of beauty, mystery and harmony found in nature and have influenced the social value of certain natural places or landscapes in favour of their conservation. **Decorative arts:** The expression of nature in items made for everyday or ceremonial use such as clothes, jewellery, materials, pottery, etc. **Visual arts, landscape painting, installation and landscape art, nature photography, movies and television shows, etc.:** The use of nature as a source of inspiration and recreation but also serve to raise awareness and offer reflection on the values of nature while stimulating people to conserve nature.

Information, knowledge and education	**Scientific knowledge** is based on observations of species, geological formations and landscape, and by monitoring the environment. Scientific knowledge is devised under different scientific ontologies and paradigms, but can be assessed with the help of other stakeholders. Think, for example, of citizen science and the perceptions of visitors of protected areas or traditional ecological knowledge based on empirical observations throughout many generations. **Educational value** of particular ecosystems, environmental conditions, the climate, natural features and attributes or specific species and their behaviours. Educational values can be communicated through, for example, on-site interpretation, guided walks, and through schools and conservation organisations.
Historical, ethnological	**Traditional knowledge, customs, law and governance:** Linked to different aspects of culture and society, knowledge systems reflect worldviews, but also contain the basis for good governance and the creation of traditional institutions, laws, norms and for the management of natural resources that have lasted for centuries or millennia. These may include the roles of shaman, spirit masters, trance mediums as well as traditional forms of organisation based on diverse communities: clan, kin and family. **Traditional practices and trades:** These have shaped livelihoods and cultural landscapes and are necessary for their maintenance and for maintaining production and sustainable use of nature: grazing, fishing, beekeeping, agriculture, agroforestry, traditional healing, seed saving, animal husbandry and the extraction of natural materials for constructing, such as dry-walling, roof thatching, boat building, etc. **Festivals, fairs and historical events:** Linked to nature, natural events such as animal migration, the remembrance of natural disasters, rain making ceremonies or historical events linked to nature, landscapes or waterscapes. **astronomy and food cultures:** Linked to nature these food cultures refer to rural modes of production, for example harvest festivals, and with them the recipes of cuisine based on local products and ways of preserving and preparing food.
Linguistic traditions, both written and oral	**Languages or dialects:** Lexical richness provides description in greater detail of particular elements or aspects of nature, for example crops, meadows, forests, and ecosystems of a specific area, as well as changes the conditions of the sea, climate and local populations. **Vocabulary related to nature; place names and their etymologies:** Language as a means of knowing one's environment reveals much knowledge about nature and local places, which may also help recover ancient or vanished knowledge, including former particular relations with natural places. **Traditional folk-tales, legends, proverbs, epics and songs:** Linked to the protected and conserved areas, these often transmit a wisdom derived from the natural world developed over long and evolving human nature relationships.
Religious and spiritual in a natural environment	**Natural elements considered holy, sacred, magical or mythical (sacred natural sites and species):** Caves, mountains, springs, islands, rivers, trees, animals or even whole landscapes and waterscapes can be imbued with spiritual, religious or magic significance from the present or the past. **Built and living religious heritage set in a natural environment:** Monasteries, sanctuaries, temples, hermitages, shrines, chapels, tombs, etc. including their natural surroundings, as well as trails and paths linked to them. **Rituals, ceremonies and pilgrimages:** Set in the natural environment, these activities celebrate a spiritual quality of nature and signify its role in religious and spiritual experience of nature.

2.4 Conceptualising social-ecological interaction

So far, I have described the frameworks on how socio-cultural values can be assessed and analysed. This Chapter serves to clarify the theoretical underpinning of how I can analyse the interactions between people and nature. This is important because how I perceive social-ecological interaction

influences how I interpret my data. To make this explicit, I will describe each concept and its components in a pragmatic way. Despite this delineative approach, I would like to re-emphasize that I perceive human-nature interaction as a dynamic, ever-evolving and context-specific phenomenon.

The people-landscape interaction model

The people-landscape interaction model by Tress & Tress (2001) was embedded as the underlying theoretical framework in this thesis. This model is used to provide a holistic and transdisciplinary approach for conducting human–environment-related research, which these authors refer to as 'people-landscape' interactions. For future reference, I use 'environment' and 'landscape' synonymously. This concept recognizes five united dimensions of landscapes: "the spatial entity, the mental entity, the temporal dimension, the nexus of nature and culture, and the systemic properties of landscapes" (Tress & Tress, 2001, p. 143). These authors emphasize that these dimensions are interactive and in unity, which together *is* the landscape, however for methodological reasons, each dimension is described separately and represented visually (Figure 2.6-Figure 2.10).

Firstly, the landscape is framed to consist of two spatial entities, the *geosphere*; these are the abiotic conditions (e.g. soil type and water) and the *biosphere*; the biotic conditions (e.g. plants and animals – including humans. Secondly, the mental entity is considered as the *noosphere*; the mental space of people involves perception and adaptation of the geo- and biosphere (Figure 2.6). The noosphere also includes human formed artefacts (e.g. roads and buildings) that derive from the bio- and geosphere. The term 'noosphere' was given by Vernadsky (1945) and is derived from Greek, where 'noos' means mind. This term refers to the mental abilities of people to perceive and influence the environment. To highlight the interconnectedness of humans in the environment (in this model), humans are considered as entities part of the biosphere; as relational *and* reflective agents that "creates the landscape[…] by means of their mental abilities" (Tress & Tress, 2001, p. 148).

Figure 2.6: The geo-, bio- and noo-sphere and their dynamic interrelationship over time (Tress and Tress, 2001)
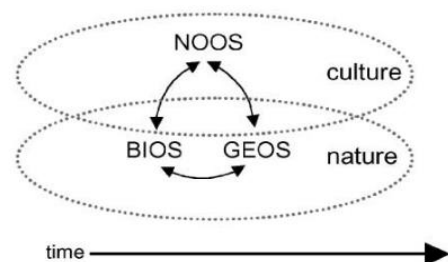
Figure 2.7 : Nature and culture as complementary entities (Tress and Tress, 2001)

Thirdly, 'creation' of a landscape also happens over time. In the case of food forest ecosystems, time relates to the successional stage an ecosystem is evolving through as well as the changing or persisting mental constructs people perceive about the environment. All landscape dimensions are subject to the temporal dynamics of landscapes and these dimensions can change across all scales.

So far, the spatial, mental and temporal dimensions have been briefly described separately, although these dimensions are to be seen as intertwined that do not exist separately from each other. Fourthly (as shown in Figure 2.7), the 'nature' and 'culture' ovals represent these mutual relationships between these dimensions. Natural processes occur due to the interaction between the geo- and biosphere and culture is co-produced in the noosphere – which are influenced by interactions with the geo- and biosphere. Both nature and culture complement each other's existence, where natural processes shape and are shaped by cultural processes (which are enacted by humans and reflected by the noosphere). The landscape comes into existence from these processes as it is the point where nature and culture, the material and mental spheres, come together (Tress & Tress, 2001). Thus, landscape is seen as the nexus of nature and culture; the meeting point between the two as visualised by the vertical oval in Figure 2.8. Food forests can also be seen as the meeting ground for culture and nature.

Lastly, the perception of landscape as a living system is the fifth dimension of landscape. Recognising the landscape as a complex and living system involves recognising the dynamic relationships between the subsystems and its entities over time. The geo-, bio- and noo-sphere are subsystems and "the total human ecosystem" is the suprasystem (*Naveh and Lieberman in Tress and Tress, 2001, p. 149*). The people-landscape interaction model involves material and cognitive processes between all living systems and their environments which can be experienced by humans and observed in the landscape.
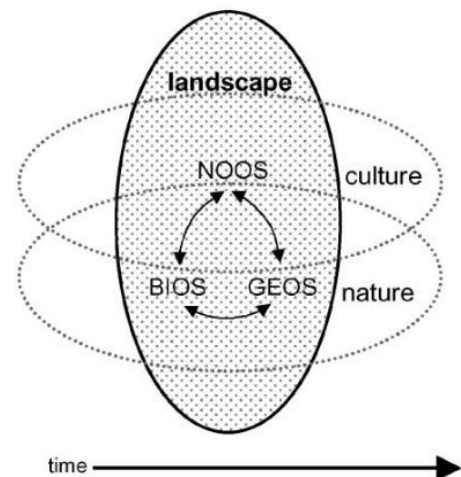
Figure 2.8: The five dimensions of landscape
(Tress and Tress, 2001)
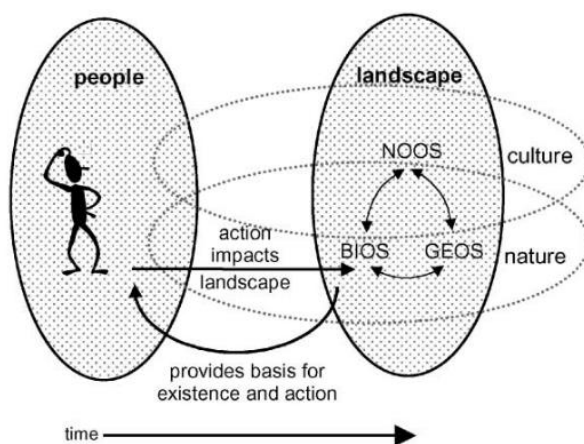
Figure 2.9: The landscape and its material interaction with humans (Tress & Tress, 2001)
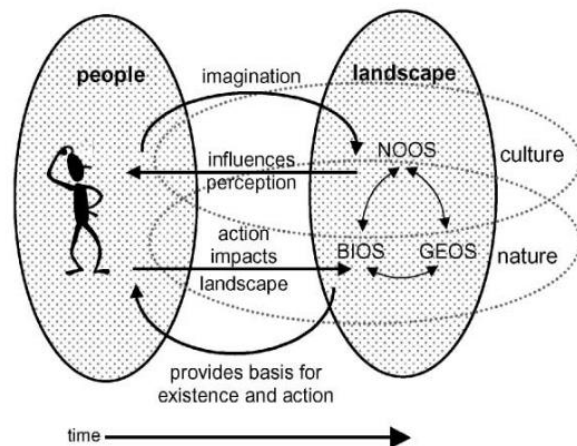
Figure 2.10: The people-landscape interaction model (Tress & Tress, 2001)

17

Landscapes are also seen as "stable structures [...], but can be recreated at any moment by the continual exchange of energy, matter and information and therefore, landscapes are autopoietic systems with dissipative structures" (Tress & Tress, 2001, p. 150). Through reflection, humans can separate themselves from the landscape. Forms of actions and reactions in mutually influencing loops can occur between the people-landscape interaction. For example, people can influence the landscape through action and in return, the subsystem of the landscape provides a basis for existence and (further) action (Figure 2.9). In parallel to this, landscapes also affect people by the way people reflect on their actions and reactions in relation to the landscape (Figure 2.10). Humans are able to "compare their conceptions (expected reality) with actual perception (perceived reality) and draw conclusions" (Tress & Tress, 2001, p. 151). The drawing of such conclusions can continue or change human behaviour and their relationship with the environment. This thesis will focus on the human perception of a landscape, which can provide a basis for more informed actions and decision-making on how to live with our surroundings.

A biocultural perspective

As pointed out, how nature is framed and valued is largely influenced by the theoretical positioning of humans in (or out) of nature (Davidson-Hunt & Berkes, 2009; Latour, 2011; Piccolo, 2017). Due to the increasing interaction and influence of human action on the living environment, conservationists and scholars have promoted a biocultural approach (Agnoletti & Rotherham, 2015; Gavin et al., 2015; Hanspach et al., 2020). This sensitizing concept stems from the term 'biocultural diversity' and is understood as "the sum total of the Earth's biological and cultural diversity in all its expressions" (Verschuuren et al., 2021, p. 9). Introducing a biocultural perspective was a counter to the dichotomised discourse and paradigm where nature is posited against humans. A biocultural lens positions humans *in* nature where a reciprocal-like relationship exists between nature and humans. Such nature with human interaction can lead to a diversity of landscapes and cultures (Elands et al., 2019; Davidson-Hunt & Berkes, 2009; Mehmood et al., 2020; Verschuuren, 2012). I clarify my perspective-taking to be that of a biocultural perspective, as suggested by Verschuuren (2021). To address the potential notion of nature as an 'empty vessel' term, I understood nature as the sum total of the Earth's biological diversity, including humans. In summary, this thesis adopts a biocultural lens in which *value* arises through the interaction between humans and the environment.

3 Methodology

3.1 Study area

This research takes place in the Netherlands where all data collection took place online due to the COVID-19 pandemic. The sampling population are people within the national monitoring programme for food forests. This group consists of 28 food forests across the Netherlands who adhere to the Green Deal food forest definition (GD-219, 2017). Participation in this research was carried out on a voluntary basis.

3.2 Food forest archetypes

To understand the diversity of food forestry systems, this thesis adopts four archetypes of food forests. These four archetypes are based on two variables, as described by van Gent (2019) and illustrated in Figure 3.1:

- o recreational food forests: having stronger social, cultural and educational functions besides provisioning services
- o experimental food forests: a highly personalised form of a food forest, often on private land with complex planting compositions
- o production-oriented food forest: where the main priority is the production of food at scale, often on private land with rational/linear planting schemes
- o communal food forests: are hybrid food forests (and similar to recreational food forests) which balance social goals with productional outcomes.

These archetypes are characterised by two variables: (1) on the orientation of plants, i.e. romantic or rational, and (2) on the land ownership type, i.e. public or private (van Gent, 2019). The 'romantic' placement of plants is where plants are placed in a complex and nature-mimicking way, often in a highly diverse layout. This is shaped by what would typically grow in the surrounding area in combination with what is deemed valuable by the owner/designer, e.g. planting drought-resistant varieties or edible flowers (P. de Graaf, 2020. *pers.comm.,* 08 Oct.).

The 'rational' term refers to a more organised planting schemes, often in lanes with a lower diversity of plant species. Ownership types refers to whether the food forest is publicly accessible of privately owned.

Characterising the food forests in question according to these archetypes provides a level of distinction between the various types of food forests. These archetypes also provide the potential to compare the socio-cultural values per food forest type. In recognition of the diversity in the setup of food forests, the outcomes of this study are based on the aggregation of a variety of site-specific food forests and summarised at national scale.
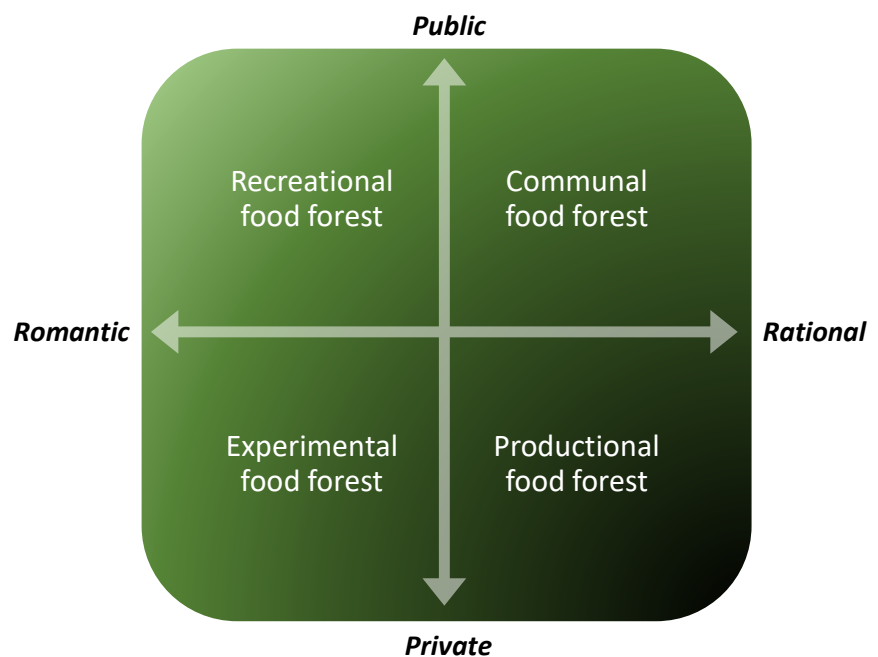
Figure 3.1: The four food forest model archetypes: recreational, communal, productional and experimental (adapted from van Gent, 2019)

3.3   Stakeholders

The people that take part in this study are also described as 'stakeholder', which Freeman defines as: "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p. 46). In this case, the 'achievement of the organization's objectives' is seen as the food forest and the practice thereof. This study engages with *three* of the five categorised stakeholders (adapted from Walker, Bourne, and Shelley, 2008):

- upstream stakeholders: plant suppliers and sub-contractors
- *downstream stakeholders: visitors, volunteers, restaurants, local shops and other end users of the food forest*
- external stakeholders: general community living around the food forest and those influenced by its outcomes
- *invisible stakeholders: food forest designers and groups or individuals involved in realising the food forest*
- *project stakeholder group: initiative takers, managers and sponsors*

Due to time and resource constraints, this study focusses on the downstream stakeholders, invisible stakeholders and the project stakeholder group, thereby leaving out the upstream and external

stakeholders. This study adopts a descriptive stakeholder model (Donaldson and Preston, 1995). The insights elicited from this study are based on the individual scale and aggregated to reflect the socio-cultural values at group level.

3.4   Valuation methods

Academics and researchers have pointed out that different valuation methods result in different answers (Arias-Arévalo et al., 2018; Scholte et al., 2015). They recommend the use of several valuation methods, that are then synthesized together, so as to capture the diversity of values (Jacobs et al., 2018). I considered valuation methods such as: deliberative valuation (i.e. in-depth group discussions) (Kenter et al., 2015), narrative method (i.e. interviews and questionnaires) (Fagerholm et al., 2012), photo-elicitation survey (López-Santiago et al., 2014), photo-series analysis (Tenerelli et al., 2016) and participatory mapping methods (Fagerholm, Oteros-Rozas, et al., 2016).

Due to this emerging field, this study was exploratory and experimental in nature. Considering time and resource constraints, this study focussed on adopting several narrative methods:

- through a survey
- additional follow-up interviews from each stakeholder group

The survey involved the creation of a self-administering questionnaire. The questionnaire was imbedded into an existing app (AkvoFlow) which served to monitor different aspects of the food forest. Within the questionnaire, an alternative version of photo-elicitation was also included where respondents could attach a picture and provide a description. Data was further supplemented with follow-up interviews (appendix 8.3) to identify and clarify worldviews, value types, themes, and sub-themes. A content analysis was performed using ATLAS.ti 9 where I broadly coded key words and sentences to value types and themes (see Appendix 8.4 for the Coding list). I also used Excel to further analyse qualitative and semi-quantitative data (appendix 8.5) according to several characteristics, such as value themes, food forest type, stakeholder group, type of human-nature relationship and socio-economic background (e.g. age, gender, nationality, income, etc.). The research design phase was conducted with fellow student Anna-Minke Roodhof, who co-developed the survey and focussed on the methodological quality of the survey. During the analytical stage, I focussed on the qualitative output of the survey and interviews.

3.5   Data presentation

In line with pluralizing the ways of eliciting values of nature, so too are the methods of presenting the findings. This thesis makes use of written and visual forms of data presentation, such as via quotes, pictures, graphs, and drawings. To allow for my interpretations and data to be traceable, all quotes and pictures are coded with numbers to denote the origin: a response from the survey (R), a response from the interview (RI), in connection to which survey question (R:#) and the anonymised respondent (C#) – see appendix 8.2 for details.

In particular, the development of a visual presentation form summarizing my findings is based on the synthesis of the three frameworks used to analyse socio-cultural values: the NCP framework,
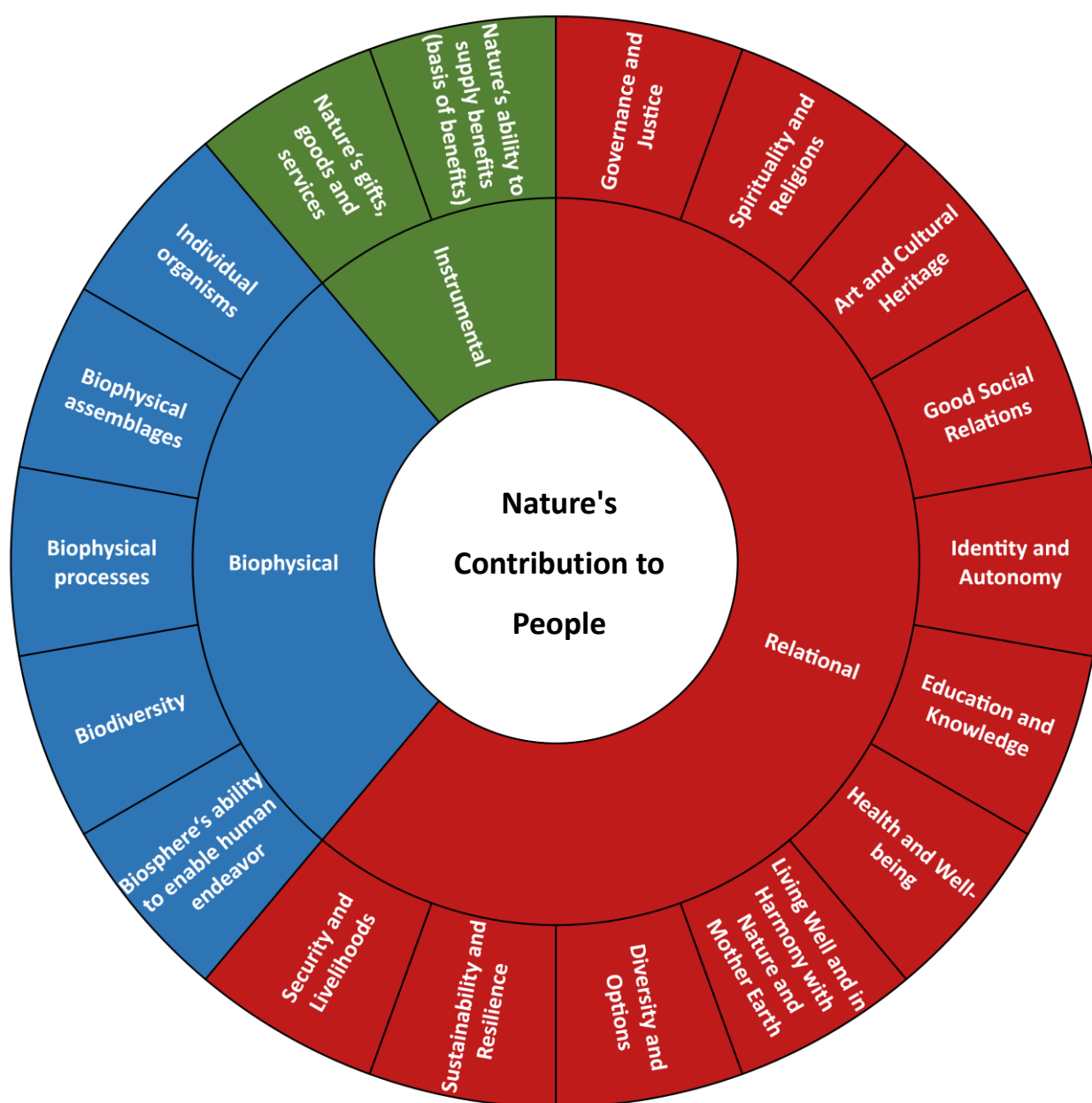
Figure 3.2: A sunburst diagram of the NCP framework with its value types (inner circle) and focus of values (outer circle)

the cultural values model, and the IUCN guidelines. During the analytical stage, the NCP and IUCN frameworks (Table 2.2 & Table 2.4) were transformed into sunburst diagrams with the intention to convey a non-linear perspective on socio-cultural values (Figure 3.3 & Figure 3.2). This method of presentation carried on in presenting my findings and are further elaborated on in Chapter 4 & 5 (pg. 26 - 72).
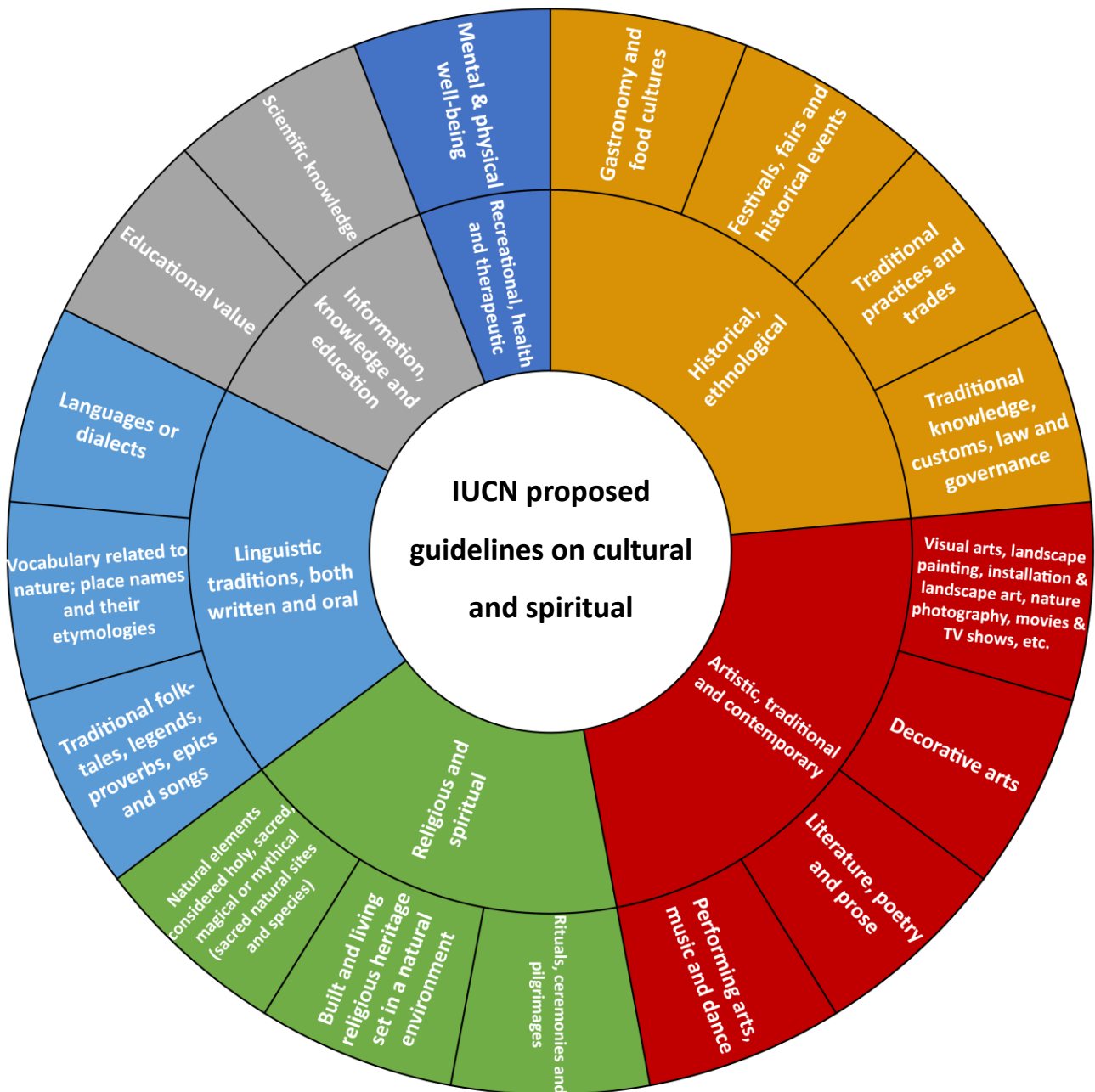
Figure 3.3: A sunburst diagram of the IUCN framework on spiritual and cultural significance with its values (inner circle) and attributes and qualities (outer circle)

3.6 Ethical considerations
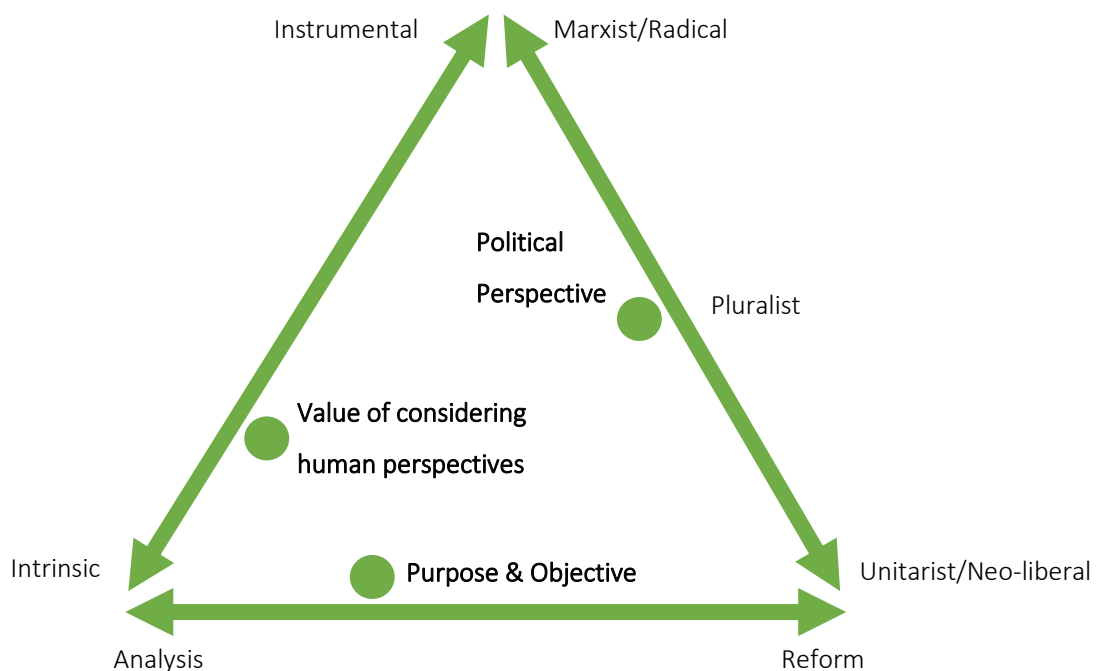
Figure 3.4: My ontological perspective in conceptualizing this research
(adapted from Stoney & Winstanley in Walker et al., 2008)

The way of understanding *value* as knowledge is an interpretive task. This interpretivist research approach is shaped by my own background; one that is multicultural, privileged, and feminine. My dual academic upbringing also plays a role where positivism and interpretivism exist side by side, collide and/or hybridize. I acknowledge that complete impartiality within research is impossible, particularly in the social sciences and this study. The main unit of analysis are individuals and stakeholder groups directly related to food forests, which give way to confirmation bias; the first level of bias. Acknowledging this bias is important and hence, made explicit in this study. To respect privacy concerns, answers are published anonymously.

The second level of bias comes from the way the stakeholders themselves interpret their interactions and shape their meanings in relation to food forestry. To deal with this, stakeholders were given the space to reflect on their responses by self-administering the questionnaire and some were probed with interview questions.

Thirdly, I myself interpret their responses in a way that makes sense to me. This is guided by the use of the frameworks as interpretive tools. This is another interpretation level with the potential for personal bias. In being explicit about my biases and ontological perspective on food forest valuations, a triangle is used to visualize my beliefs and position, indicated by the green dots inside the triangle (Walker et al., 2008).

As shown in Figure 3.4, I take on a pluralist perspective with the belief that there are different stakeholders with a variety of claims to consider. This aligns with an interpretivist research approach. In addition, the purpose of considering stakeholders is to identify, understand and analyse their

relationship with the food forest. There is an underlying notion to consider the expressions of the stakeholders with the purpose to influence (and to some extent reform) policies, yet this is not the main intention of this study. What is more important lies in identifying the value of food forests in relation to the stakeholders, which is seen as instrumental but also more intrinsic in itself.

Reducing such forms of bias to zero is unrealistic as the aim of this research is to identify the meaningful representations of those engaged with food forestry. These meaningful representations often carry a relational quality and are therefore subjective. This subjective basis can, on one hand, be seen as a flaw in research due to the difficulty in testing the 'validity' of such perceptions. On the other hand, acknowledging these subjectivities also carries an intrinsic value exactly because human beings are capable of forming relationships to people, plants and processes in a plethora of ways. This study strives to derive and document these subjectivities in the context of temperate food forestry. This is done by starting with the participants most close to this practice in the Netherlands with the intention to provide a systematic recognition of the various values ascribed to food forests.

To account for these biases, reflecting on our own way of understanding is key throughout the research project. Reflection occurs through deliberation with the respondents themselves, between my research colleagues and with my supervisor in a reflexive manner. In acknowledging these biases, it also remains important to be explicit about any interpretations and subjectivities. Hence, all data responses are also included for the reader to cross-check and to form their own conclusions.

4 Main findings

My findings are based on the participation of 48 survey respondents and 8 follow-up interviews (appendix 8.3). These respondents represent 24 food forests across the Netherlands (for a list, see appendix 8.6). The three frameworks acted as analytical tools to identify and cluster the responses. The results have been categorised into seven value themes with several attributes (as displayed in Figure 4.1):

- ecology: on biophysical entities such as trees and insects to ecosystem functioning such as carbon sequestration and water storage capacities
- biocultural harmony & sustainability: on human-nature relationships, environmental responsibility, resilience and sustainability for future generations
- knowledge & education: on generating inspiration, hope, awareness, education and scientific knowledge that is observed and experienced
- security & livelihood: on food security and financial security
- health & well-being: on recreation, enjoyment, sense of life satisfaction, inspiration and physical & mental well-being
- identity & community: on sense of place, sense of community, sense of agency and empowerment
- experiential perceptions: on the experiential value of being, connecting, feeling at peace and marvelling at the beauty and diversity of ecosystems.

Below, the socio-cultural values are categorised and visualized in the form of a value wheel to symbolize the interconnected nature of the identified themes. To structure my findings, four topics are presented to answer each sub-research question. First, a description is given on the identified value themes (SRQ1). Secondly, a prioritization of themes (SRQ2) is portrayed. Thirdly, the determinants of socio-cultural values are described, i.e., the background of the respondents (SRQ3). Fourthly and lastly, the types of human-nature relationships (SRQ4) are depicted.
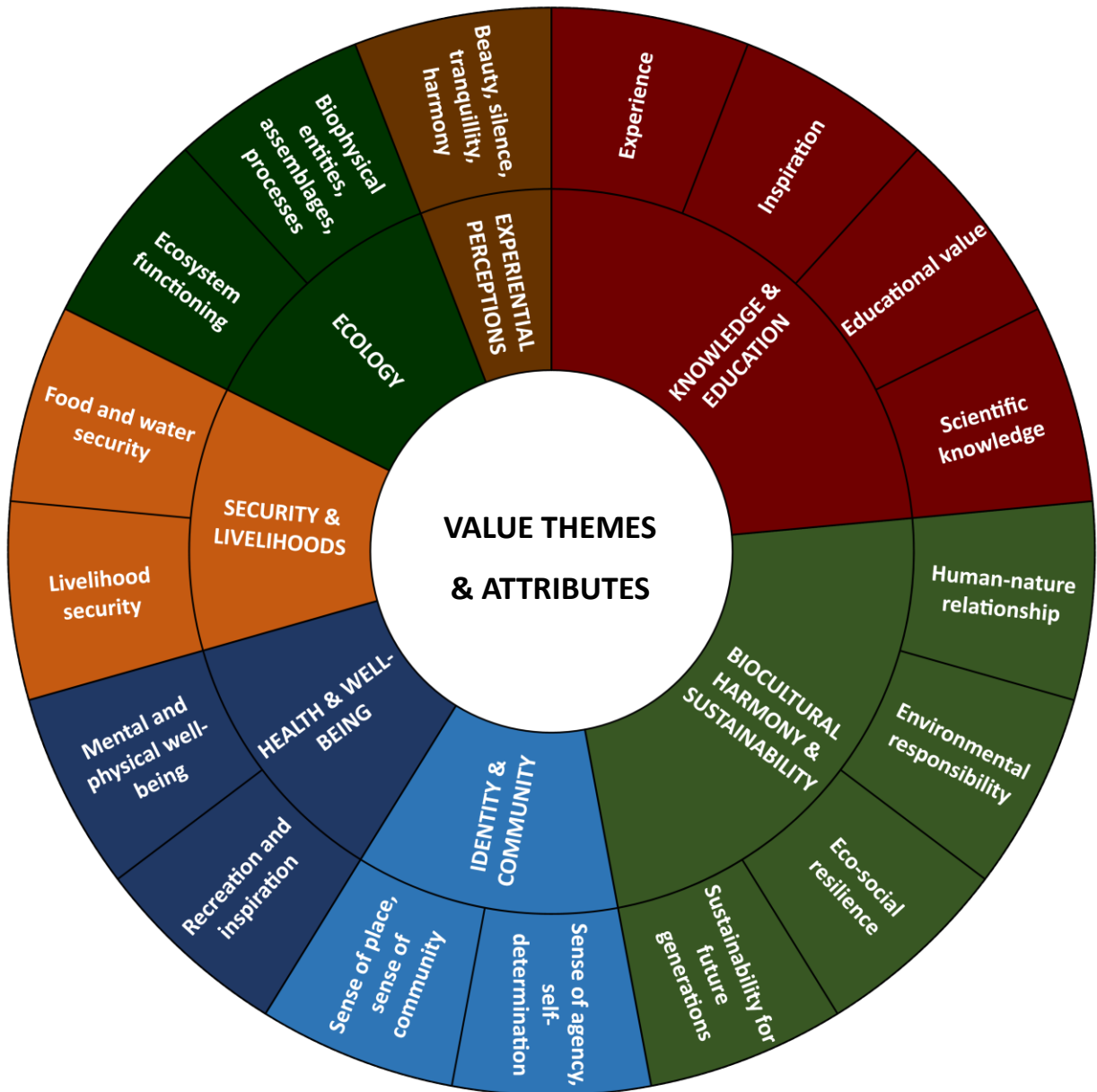
Figure 4.1: A value wheel showing the socio-cultural value themes (inner circle) and attributes (outer circle) based on the results of this study

4.1   Value themes

Based on the responses, a value wheel visually presents the main value themes and attributes. As shown in Figure 4.2, these themes (starting from ecology and ending with experiential perceptions) are listed in a relative order from biocentric to anthropocentric notions; e.g. ecology themed statements are often about plants and wildlife, whereas identity & autonomy statements are more anthropocentric minded. Biocentric, anthropocentric and gradations in between came across in many statements.

Figure 4.2: A value wheel showing the value themes encompassing the results of this study.

Figure 4.3: The level of other-oriented values (dark green) to self-oriented values (light green) reflected through the gradation of colour throughout the value wheel.

To also incorporate statements ranging from the individual to the collective, themes are also listed in relative order from other-oriented to self-oriented and from holistic/group level to individual level, e.g. ecology themed statements are often about biodiversity (non-anthropogenic, i.e. other-oriented and usually holistic/group oriented) whereas experiential perceptions are personal observations and feelings at the individual level. These dimensions (e.g. biocentric, other-oriented and holistic/group level) are described by Chan, Satterfield and Goldstein (2012) to demonstrate the diverse dimensions of values and their interconnectedness. This entanglement of values across such dimensions and themes is a recurring motif in the results obtained from this study. Categorising these responses was a complex task because most responses involved several themes and dimensions. Such layering of values is visualised by the colouring of the value wheel when describing a particular quote/response. In this Chapter, each value theme is presented via relevant quotes, pictures, and the use of a value wheel.

Ecology

From the responses gathered by the survey and interviews, most statements are related to the realm of ecology. This is logical as social-ecological interaction take place in the living environment. The majority of responses to Q9, for example, were about parts of the food forest, such as *"the many mushrooms"* (C43:R9), *"the autumn colours, few fruits, many animals (birds)"* (C2:R9) and *"how much grass has grown in comparison to last year and how slow the shrubs grow at our place"* (C22:R9). There were also responses in relation to the ecosystem functioning and its processes, such as *"the recovery after a terrible drought"* (C44:R9)" and *"that it is growing nicely at its own pace"* (C10:R9). The combination of ecological entities is also often paired with social activities and subjective thoughts, such as *"children find self-harvesting and cooking fantastic"* (C15:R9) and *"overwhelming growth of brambles, implications of nitrogen, satisfaction in my work"* (C6: R9). These personal thoughts and observations convey to me, many values embedded in ecological entities and processes that facilitate relational values. For example, the last quote suggests that despite some observed implications at the food forest, one also feels satisfied with their engagement. This sense of satisfaction may be partly nurtured through the interaction of the ecosystem and the person, leading to such feelings. The feeling of satisfaction is frequently reported by respondents and is discussed further in part 'Health & Well-Being'.

Another example of intertwining values is the picture and quote from respondent C7, which shows that wonder, inspiration, and knowledge about the productivity of food forest entities are all significant to the eye of the beholder. The main entities in this quote are about parts of a food forest, such as wild garlic and their neighbouring trees and plants, which convey meaningful representations in connection to one's experiential perceptions, health & well-being, and sense of knowledge & education. As I have just described, the perception by C7 is grounded in ecology, a value theme and biocentric worldview, with intertwining relational values. Alternatively, I can also argue that the perception by C7 emanates from their mind and is therefore a wholly experiential perception. This goes to show that there are analytical differences in interpreting such responses. Having chosen to adopt a biocultural lens, I interpret these responses in such a way that value is formed through the interaction between nature and humans where making derivations is not the goal. All in all, I see that meaningfulness, based on the food forest engagement, often takes shape through an ecological frame.

In summary, ecologically oriented statements are often the main topic of all the responses, sometimes by referencing the composition and structure of the food forest, the development of a food forest, and its ecosystem functioning: such as about food production and carbon storage capacity. These attributes are built from the synthesis of both the intrinsic and instrumental value types, as defined by IPBES (2016), but seen from a relational perspective, a biocultural perspective.
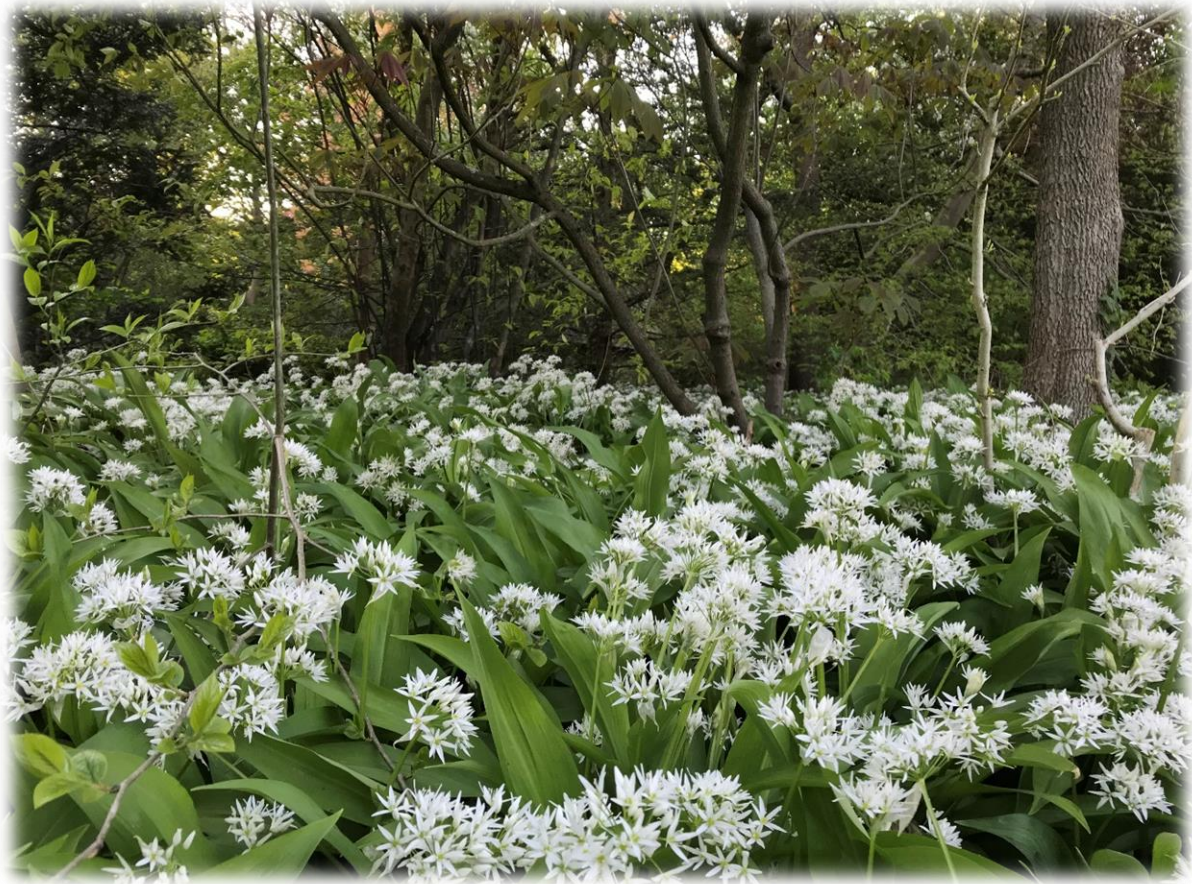
"Seeing the wild garlic in bloom for the first time this year completely took my breath away. The bright pearly white looks so magical under the shadow of trees and plants. And it is one of the first signs of spring and the beginning of the productive calendar of the food forest."

(Picture and quote from C7:R34, food forest De Overtuin)
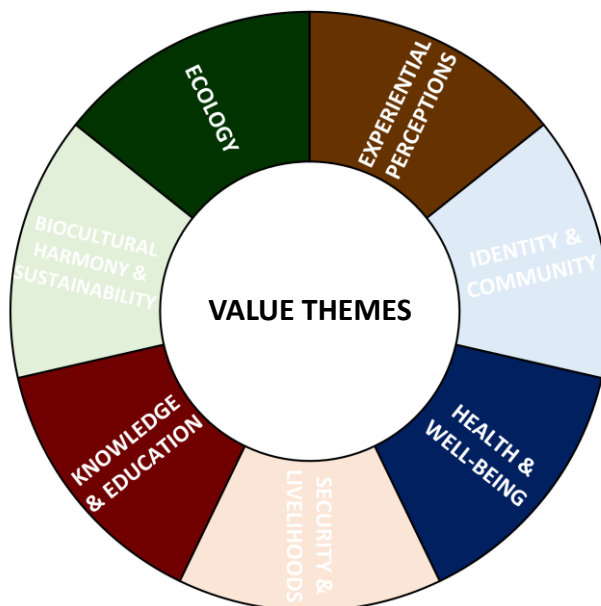
Figure 4.4: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to ecology.

Biocultural Harmony & Sustainability

Many responses imply a form of stewardship with nature as well as for sustainable forms of development. For example, the following quote motivates this for food forest Houtrak:

"It [Houtrak] promotes a conscious shift whereby humans are being challenged to
have a new, empathic and respectful way of sharing the harvest with each other.
It serves as a fountain of inspiration to be able to identify plants again and
thereby developing a certain independence in dealing with food. Likewise, the
food forest is one of the most promising ways to bring ecological agriculture,
nature conservation, wildlife protection, and CO2 storage together."
(C8:R41, food forest Houtrak)

Stewardship is described by West *et al.* (2018, p. 30) as *"action in pursuit of sustainability"* using *"wise and responsible use of natural resources"*. The previous quote is one of many that project a strong association and perception that food forests, such as Houtrak, are sustainable projects because of their multi-functionality to produce food, support biodiversity and sequester carbon. The respondent projects several mental aspirations that are of value to themselves and for society at large. Talk of a *"conscious shift"* is also mentioned several times within the survey responses and from follow-up interviews. Houtrak, like many food forests, facilitate a transformative value dimension, as mentioned earlier. This is also seen in the following quote: *"[A] place to reinvent how we interact with each other and all other inhabitants of the food forest"* (C15:R36). Conveying a transformative dimension about food forests are commonly intertwined with value themes such as knowledge, education, research and experiential experiences. The picture from C15 also evokes this through the portrayal of engaged humans within a food forest (Figure 4.5). As most statements are related to a specific food forest, these statements also show that sense of place inherently shapes a basis for biocultural manifestations. This suggests that engagement with food forests have the ability to strengthen a human's sense of place, stewardship and their forthcoming perceptions, experiences, and values.
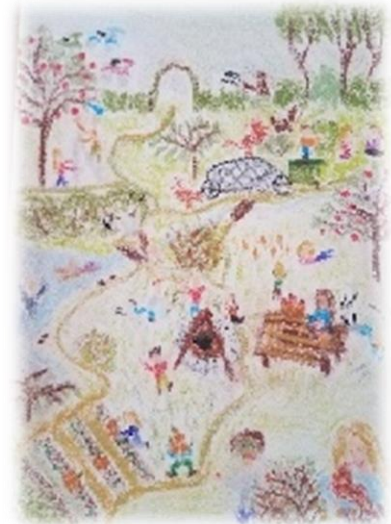
Figure 4.5: A print about food forest Droevendaal (C15:R33)

Stewardship and care for future generations is also a very strong reason for respondents to engage with food forestry. During an interview, a respondent said: *"I now find it very important that we treat our nature much more sustainably, so that future generations also have a nice earth."*

(C40:RI46). This quote suggests that (through interaction) this person's perception has shifted altruistically with greater care for nature and future generations.

In summary, responses that are related to biocultural harmony and sustainability are often intertwined with other dimensions. Take for example the picture and quote below (Figure 4.6), which emits inspiration and hope coupled with collective agency and enjoyment. This quote illustrates that notions of biocultural harmony and sustainability are situated in ecology, i.e. the food forest, which enables the community to enjoyably engage with.

"Dit voedselbos […] verzoent landbouw en natuur … biedt hoop op spoedig herstel van biodiversiteit/natuur, verbetering van de waterhuishouding en mitigatie van klimaatverandering […] is een concreet duurzaamheidproject waaraan mensen met veel plezier kunnen samenwerken."

"This food forest […] reconciles agriculture and nature…offers hope for a speedy recovery for biodiversity/nature, improves water management and mitigation of climate change […] is a concrete sustainability project where many people can enjoyably work together."

(Picture and quote from C21:R36, food forest Eemvallei Zuid)
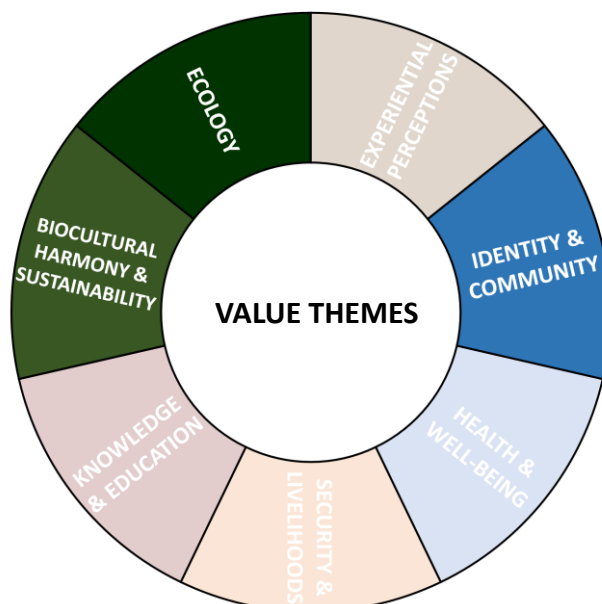
Figure 4.6: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to biocultural harmony and sustainability.

Knowledge & Education

21 out of the 24 participating food forests engage with research and/or educational aspects. The theme of knowledge and education is often expressed in forms of learning and understanding: knowledge about plants, ecosystem processes, cooperation, inspiration, aspiration, and conscious shifts in understanding. For example, during an interview, one explained: *"You learn from a food forest in so many ways, you learn about your own health, in relation to being outdoors – being in touch with nature. You learn about the different plant layers, about permaculture. I learn from it to apply in my own garden."* (C40:RI36).

Many respondents are eager to learn about food forests to someday setup their own food forest. Reasons given for this range from the climate and biodiversity crisis, localising sustainable farming practices, producing healthy and seasonal food for oneself and the community to doing something meaningful that is outdoors, enjoyable and with like-minded people. These reasons reflect strong principles, preferences and virtue-based values that facilitate engagement with a food forest.

Conducting research into instrumental values were also of relevance, such as the productivity, affordability, nutritional value, ecosystem services and nature-inclusive farming, etc., hence the setup of the National Monitoring program on food forests. Food forest Schijndel (Hardekamp & Boschweg) is a prominent pilot project to investigate the aforementioned aspects on a 20h scale. One respondent reflects this functionality by mentioning food forest Schijndel (Boschweg) as a *"functional example (nature in conjunction with food production)"* (C27:R42). Many food forests like Schijndel, Eemvallei-Zuid and Ketelbroek carry a prominent instrumental value in showcasing a system where nature and agriculture can co-reside.

Besides research, raising awareness and fostering alternative ways of thinking is also of value at some food forests. During an interview with a respondent from food forest Thuishaven, it was clarified that the main aspiration is to raise awareness and consciousness for a *"beautiful society, a beautiful world. More balance between people and between people, nature and animals."* (C13: RI38). This transformative value is promoted through learning and experiential knowledge. This is also reflected in the quote below (Figure 4.7) indicating that learning with children enables a change in perspective.

Several food forests specifically focus on educational activities for children, locals, visitors, etc, such as food forest Vlaardingen, De Overtuin, Schijndel Harderkamp (in part) and Droevendaal. The latter explicitly aims to increase ecoliteracy levels amongst children and adults (e.g. picture and quote from C17, p.36). Ecoliteracy was coined by Capra (1996) with the idea that "An ecoliterate person is prepared to be an effective member of sustainable society, with well-rounded abilities of head, heart, hands, and spirit, comprising an organic understanding of the world and participatory action within and with the environment."(McBride et al., 2013, p. 14). From this and the following statement, I

observe that understanding nature and the relationship one has with nature is often embodied, situated and experienced at food forests (West *et al.*, 2018). These inherently transformative experiences leading to such an understanding is implicit in many of the mentioned quotes and is described more in detail in the Section 'Experiential Perceptions' (pg. 45).

Through a *learning-by-doing* approach, people embody the values and ideas that emerge during their interaction with a food forest. For example, the following quote from a manager at food forest Droevendaal explains: *"[…] if you are in the mood to investigate, then there is so much to investigate; this often overwhelms me; the complexity of nature, the many great relations that exist between organisms; everyday there is something to learn and to respect. Lately we discovered a wasps' nest in the ground. At first you think: that should go, but afterwards we respected it and we follow what the impact is on the whole food forest and this keeps on developing a bigger ecoliteracy level!"* (C18:R41). This quote shows embodied qualities that develop one's ecoliteracy skills, such as curiosity, relational thinking and engagement. My findings show that developing knowledge and education are relevant value themes within food foresters which encompass transformative and experiential value dimensions.

"Wij werken veel met kinderen, en zij zijn een inspiratiebron voor ons om voedselbossen te begrijpen los van de dominante volwassenperspectieven."

"We work a lot with children, and they are a source of inspiration for us in understanding food forests separately from dominant adult perspectives"

(Picture and quote from C17:R34, food forest Droevendaal)

Figure 4.7: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to knowledge and education.

Security & Livelihoods

This theme came across less frequent than many other aspects. Nonetheless, establishing food security through more (bio)diverse forms of agriculture was of value for many respondents. For example, one wrote *"together, all food forests contribute towards the discussion about sustainable agriculture"* (C33:R42) and another respondent wrote *"Agroforestry [including food forests] is an essential tool for enhancing our agricultural systems"* (C7:R25). As mentioned in the previous theme, the role of learning through research, education and cognitive transformations, are seen as underlying dimensions in developing food secure societies.

There also exists a keen aspiration amongst respondents to be able to support one's diet through a food forest. This points towards an aspiration to incorporate food forests into the livelihoods of those engaged and often, also for the wider community. This encapsulates a strong preference value for a certain outcome, together with self-oriented and other-oriented notions of value. Time and experience will show the outcome as over 50% of the participating food forests are under the age of 2.

In addition, there exists a strong sense of agency and altruism to contribute to the local environment and society at large amongst many respondents, particularly amongst volunteers. For example, this volunteer writes: *"for me, learning how a FF [food forest] can look like/functions etc, I want one of my own one day for everyone, being able to learn about food, agriculture and nature for everyone, being able to spend time in nature"* (C14:R36). Another respondent said: *"Food forests are a concrete way for me to engage in systems thinking and to contribute structurally towards a healthier and more sustainable living environment"* (C2:R36). These quotes reflect how personal ambitions intertwine with a caring and altruistic mindset.

In general, there were few references to instrumental values with self-oriented dimensions such as economic security or finance from the responses. 48% of respondents did consider the economic aspect of food forests as 'least important' (Ch.4.2). This result suggests that the economic side of food forests are less important than other aspects, however, 38% of the respondents were volunteers with no direct financial ties to the food forest. Finding economic security through food forestry is implied by some respondents, although this is difficult to establish and expect from relatively young food forests. One respondent noted that a disadvantage of food forestry is *"starting up with costs [and] without income […]"* (C47:R55) but adds that this is something that all food forest initiatives go through.

Despite this aspect being a less popular theme from the responses gathered, finding economic feasibility is an important topic in practice the food forestry (NMVB participants, 2020. *pers.comm.,* 12 Nov.). Developing business models are in pursuit at food forests such as Schijndel and there are diverse ways that food forests are currently being financed. Some food forests, such as Mijn Stadstuin

and Haarzuilens, have adopted a community supported agriculture approach whereby people pay a subscription fee for a share of the harvesting. Others are financed through, and in combination with, grants, personal investments, municipal funding and cooperation with restaurants and food producers such as beer breweries and restaurants. Through my observations, it seems that the economic aspects of a food forest are mainly instrumental in the sense of realising a goal that is biocentric, anthropogenic and preference based. A sustainability income provided by food forest projects remains to be further scoped out as food forests have yet to age over time.

The few food forests that are older of age (3 out of 24 food forests are >5 years) are often (for a large portion) self-financed to pursue one's own ideal. These ideals can be seen by the quote below (Figure 4.8) where the respondent places importance on dwelling amidst their own food forest and to harvest from one (C19:R36). Dwelling refers to *"a world of mutually constituted aspects (humans and nonhumans) that coexist as a holistic achievement […] dwelling paints people as active participants in the making of the biosphere, while also recognizing that people's tangible experience of the biosphere will shape their understanding of it"* (Cooke et al., 2016, p. 833). In this study, dwelling is seen as a significant phenomenon which intertwines with values such as identity, knowledge & education and biocultural harmony & sustainability. Overall, these anecdotes reflect the frequent aspirations amongst respondents to incorporate food forestry practices into their livelihoods. This is often to pursue their own ideals, interwoven to ensure localised food security, and with a sense of agency and altruism to support nature and society.

"Een eigen voedselbos was al 25 jaar een droom: een plek om mijn ideeën over een gezonde manier van samenleven tussen mens en natuur in de praktijk te brengen, en daarmee anderen te kunnen inspireren. En ook heel belangrijk om hier zelf te kunnen zijn en van oogsten."

"My own food forest was already a dream for 25 years: a place to put my ideas about a healthy coexistence between people and nature into practice, and thus to be able to inspire others. And also very important is to be able to be here and harvest."

(Picture and quote from C19:R36, food forest Voedselrijk)

Figure 4.8: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to security & livelihoods.

Health & Well-Being

Health and well-being are major value themes. These socio-cultural values are often expressed as a relational value type. For example, 83% of respondents have indicated that their affiliated food forest is important to them on a personal level (Figure 4.25, p.56) and all respondents said it contributes towards their own sense of well-being. In particular, the contribution towards satisfaction in life and meaningful engagement is widespread amongst the respondents. For example, one respondent said: *"This food forest [Eemvalei-Zuid] offers me meaningful work for which I dedicate myself with my heart and soul"* (C21:R39). This statement reflects a socio-cultural value that is metaphysical and experiential in nature.

Relaxation and enjoyment are also frequent value themes with experiential dimensions. For example, in relation to food forest De Overtuin, one said: *"it strengthens my attention and senses, it allows me to be in the moment, feeling the connection with nature is enriching, I relax, and the oxygen is invigorating."* (C3:R39). Such a response reflects values portraying the ways of well-being. These values are often nonmaterial and in relation to a sense of connection with nature.

A sense of connection with nature is often grounded in place and (inter)action. For example, one respondent writes: *"It gives me satisfaction that I can locally and close to home do/mean (something) to restore nature."* (C23:R36). Another respondent describes: *"the feeling of satisfaction by being useful and contributing something, through for example planting trees and working outdoors with yours hands in the earth."* (C28:R38). These quotes showcase that agency can be nurturing towards one's health and sense of well-being. These self-reported benefits are not only situated at a personal level, but also in relation to others, as shown by the following quote: *"Planting in the winter with a large group of people gives satisfaction"* (C26:R38). To summarize, one respondent states: *"A green environment is good for you. Working outdoors is good for you. Working together with people from all walks of life is good for you. That is what the food forest contributes to me."* (C32:R38).

A sense of satisfaction often goes hand in hand with enjoyment. For example, the quote below conveys enjoyment from the sight, the walk and the ability to harvest from food forest Roggebotstaete (Figure 4.9). The picture vividly illustrates the enjoyment and beauty of this food forest, providing visual support to the accompanying statement. Besides enjoyment, food forests are also seen as a healthy haven for some, especially during the lockdowns imposed from the COVID-19 pandemic. For example, one respondent said: *"The food forest at the Overtuin was a lifesaver during the covid lockdown. It was incredible to have access to this space when it was closed to the public and to be able to get outside and breath and feel like I was outside of the city."* (C2:R57). This shows how important and valuable access to green spaces are for physical and mental health and well-being during uncertain and overwhelming times.

These responses are in line with other studies showing that places, practices and experiences with the natural environment is tightly linked to human well-being (Abraham et al., 2010; Bieling et al., 2014; Hausmann et al., 2016; MA, 2005; Miller et al., 2020). Bieling *et al.* suggest that strong perceptions and attachments to an area that is formed through interaction with the living environment/nature can be considered a cultural landscape and positions that "almost all areas in Europe can be considered cultural landscapes" (Bieling et al., 2014, p. 20). This study indicates that food forests are seen as ecological systems with many socio-cultural ties. All in all, the aforementioned value themes carry instrumental, experiential, inherent and transformative value dimensions.

"Mooi weer, je kunt zien dat je er lekker kunt wandelen en er kunt oogsten."

"Nice weather, you can see that you can enjoyably walk and harvest."

(Picture and quote from C37:R34, food forest Roggebotstaete)

Figure 4.9: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to health & well-being.

Identity & Community

As mentioned with previous themes, the role of identity and community spirit are often intertwined with value sentiments related to human-nature relationships (quote C40:RI46, p.31), learning about food forestry (quote C13: RI38, p.34), and self-reported perceptions about health and well-being (quote C23:R36 & C32:R38, p.40). Through physical and mental engagement with a food forest, respondents value their interaction with a food forest and to the place itself. I believe this generates a sense of belonging to the food forest and its community, thereby contributing to a sense of identity.

There are many ways that place-making contribute towards a sense of belonging (Bendt et al., 2013; Hausmann et al., 2016; Marsden, 2013; Mehmood et al., 2020). For example, the following statement provides a general sentiment about food forest Groengenoten: *"It brings people together to learn from each other and to learn from nature, creating something together (social cohesion) and positively working with each other and the surrounding."* (C30:R41). Here, a sense of belonging emerges and merges through group interaction. One respondent explicitly values this, saying they appreciate: *"The collaboration with other people. An organic form of cooperation develops as if 'by itself'. The one is good in one aspect, the other in something else. A group takes shape. That's nice to see."* (C23:R56).

A sense of identity is also generated through agency and sense of empowerment, as one respondent shows: *"[This is an] enormous learning experience that enriches my life. I can show others how we / I try to improve the world here."* (C37:R38). The experiential value produced through the practice of food forestry seems to facilitate a sense of agency and empowerment, this then can translate into self-determinism. Some responses show determination in practicing alternative ways of producing food which (aim to) contribute to society: *"We inspire people to live healthier lives with more respect for nature. We show that it is possible and how beautiful it is."* (C35:R41). These statements hold value dimensions such as preferences, principles, transformative capacities, and a perspective of care (i.e., other-oriented dimension). Food forest D'Ekkers is an example of this, as the quote and picture below (Figure 4.14) convey the aim for care and hope where locals can connect with nature through this communal food forest.

From this study, we see that the idea of identity is partly shaped by the physical environment (i.e. place). Secondly, a sense of identity and community is also shaped in a metaphysical space (connection with nature and each other), which overlaps with the literature (Hausmann et al., 2016; Mehmood et al., 2020).

"een mooi stuk natuur in ons dorp erbij. Toegang voor iedereen zodat mensen

hopelijk meer betrokken raken bij de natuur."

"a beautiful piece of nature in our village. Access for everyone so that hopefully,

people become more involved with nature."
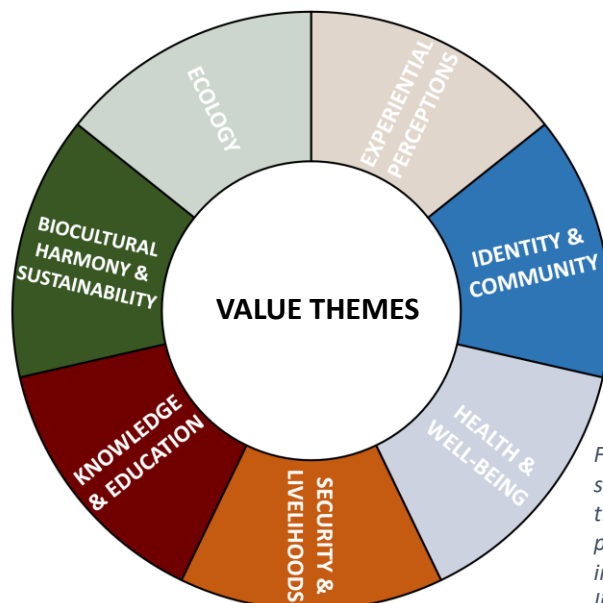
(Picture from C39 and quote from C42:R36, voedselbos D'Ekkers)
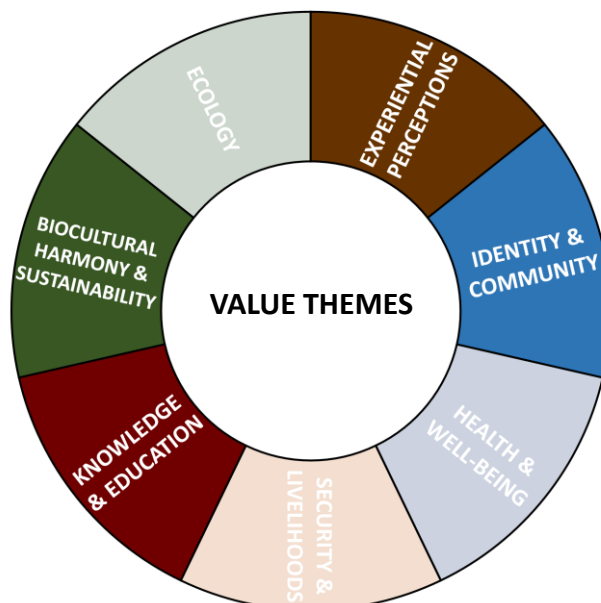
Figure 4.10: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to identity & community.

Experiential Perceptions

So far, we have seen many value themes, types and dimension from respondents that engage with food forests. In one way or another, they are related to a major theme, and this last one is a complementary theme that is considered as interwoven with all themes yet deserving further description. There are statements from respondents that bring across an intangible message across that is alike to their emotions and feelings. For example, one respondent described food forest Thuishaven as: *"Every morning when I look out of the kitchen window, I thoroughly enjoy this piece of land. What a pleasure!"* (C13:R36). Here, metaphysical experiences such as joy and enjoyment come across, which is also a contributing factor to one's sense of well-being, as described earlier.

One described what makes food forest Droevendaal important to them personally as: *"intimate connection with a place – at peace – enjoying rewilding"* (C15:R36). In an attempt to describe this quote using words (rather than speech or images), the message that comes across is one that is a personal perception, inherently of value and experiential. Such meaningful experiences facilitate perceived linkages between food forests and well-being. Noting down these experiential perceptions only exposes the tip of an iceberg, as such perceptions allow for a taste of the emotions and experiences to foster knowledge in the course of environmental awareness and education (Bieling et al., 2014).

Many responses conveyed a hopeful message across where food forests are perceived as a beneficial agroecosystem for people and planet. In relation to food forest Ketelbroek, one described: *"It is a nice place to stay and also gives hope for the future for the world."* (C28:R36). Aspiration is often conveyed with emotion. The quote below brings across aspiration, admiration, joy and a sense of well-being in relation to food forest Groengenoten:

> *"It gives me space to explore, experiment, and learn to appreciate the dynamics*
> *that you usually have no control over. Also, seeing a plant or even an entire place*
> *grow helps to give hope that we not only destroy but also can create beautiful*
> *things that benefit nature. So self-medication." (C30:R38, food forest*
> *Groengenoten)*

Overall, experiential perceptions reflect a snapshot of the impact generated from people engaged with the living environment. My findings suggest that this form of interaction contributes to a sense of well-being and quality of life, as the quote and picture convey below. The given statement is considered a relational value type with experiential value dimensions that are supportive, inherently of value and transformative in nature; and reflects someone that is dwelling joyfully at a food forest.

"Leren, prikkelen, avontuur, samen bezig zijn in de natuur, dingen zien groeien en ontwikkelen, leven!"

"Learning, excitement, adventure, working together in nature, seeing things grow and develop, living!"
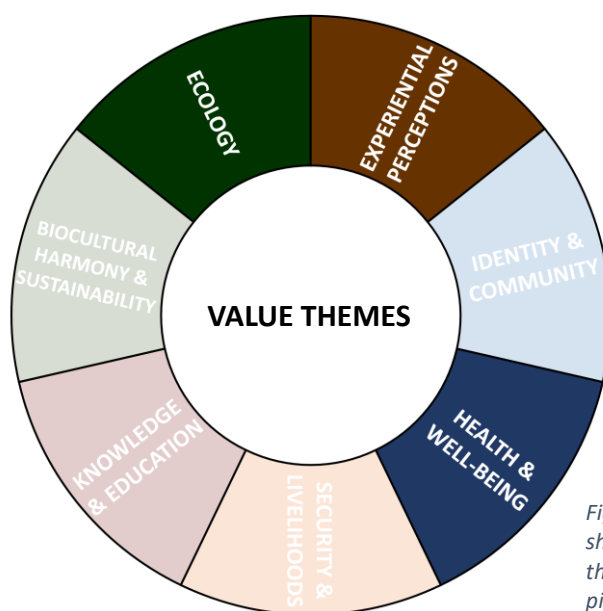
(Picture and quote from C30:R36, food forest Groengenoten)
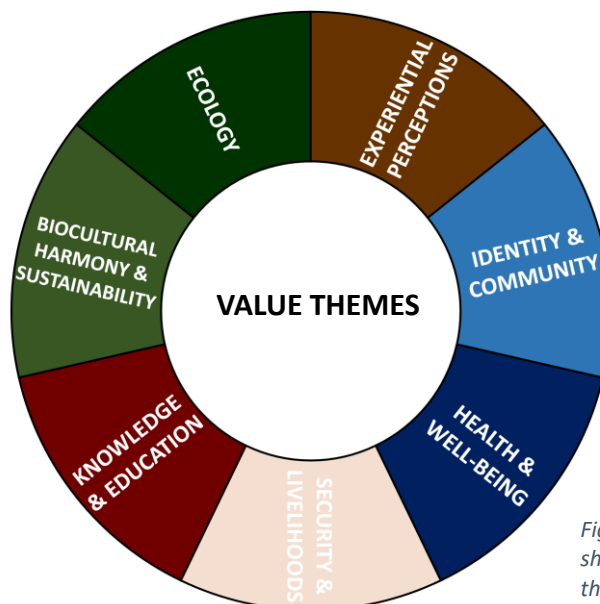
Figure 4.11: A value wheel showing the relevant themes the above statement and picture can be classified with in addition to experiential perceptions.

4.2   Scaling value

So far, a variety of socio-cultural values exist which people perceive about their engagement with food forests as a practice and concept. These values are described as being inherently important, without a clear distinction between the themed values.

In many cases, order is a prerequisite when making further distinctions. In this case, providing some form of relative scaling gives further insight into the socio-cultural values found in this study. These insights are brough across in various ways to effectively and playfully translate the variety of socio-cultural values (Arias-Arévalo et al., 2017); through a word cloud, graphs, quotes and visuals.

First of all, when asked to name up to five words in connection to the term 'food forestry', the most prominent associations people made are *"biodiversity"*, followed by *"nature"* and *"food"*, as shown by size in Figure 4.12. These popular words represent strong connections that are held amongst the respondents. Amongst the top three are many other words that were mentioned, such as *"connection"*, *"polyculture"*, *"people"* and *"future"*. *Should these connotations be considered any less significant?* Through my study, I suggest not per se, but this remains a discussion that is most effective *with* and amongst the respondents. However, this is beyond the scope of this study as finding shared values requires a group conversation amongst the respondents (Kenter et al., 2015; Scholte et al., 2015).
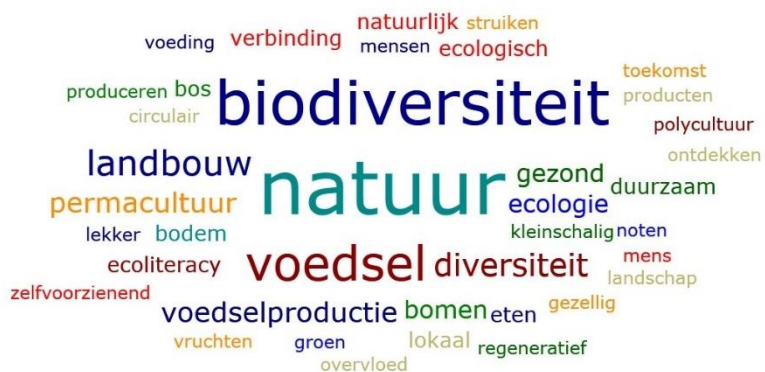
Figure 4.12: A wordle showing the most prominent words associated with the term 'food forest' (NL: voedselbos) in Dutch (Q1).

'Most important' aspects

To further dive into the depth of valuation, in the survey (Q42), respondents were asked to choose one aspect they personally found most important about the affiliated food forest. This question was a semi-closed question with 10 choice options (in order of appearance): social aspects, food production, economic aspects, ecological aspects, educational aspects, research aspects, well-being aspects (including spiritual aspects), intrinsic worth of the food forest and sustainable for future generations. The 10th option was 'other', whereby respondents could provide an alternative answer. The results are shown in Figure 4.13.

Many respondents carry across a biocentric worldview as the *ecological aspect* of a food forest is considered as 'most important' by 42% of the respondents. Bequest, instrumental and transformative value dimensions come across through the second and third most important aspects: *sustainable for future generations* with 19%, followed by the *educational* aspect with 15% (Figure

4.13). These answers elicit a crude prioritisation on the aspects valued most about a food forest, implying that ecology, is considered more important than any other aspect. This priority is also expressed through the wordle image; where *"nature"* and *"biodiversity"* are the two most frequently used words. This form of prioritization is given by all stakeholders (apart from a respondent who self-identified as "other") and prevalent across ages, ranging from 26 to 68 years of age (Figure 4.13B & Figure 4.14). These respondents are also affiliated to all four 'types of food forests' (van Gent, 2019), reflecting that ecology is a common priority for all existing food forests initiatives. Interestingly, *food production* was not chosen by any respondent as the most important aspect. However, this aspect is seen as 'also important' by 65% (Figure 4.17). This could be because of the common rhetoric that if the ecological system is intact, then so will be the harvest of that system. This rhetoric is also implied by the quote and picture below:

> *"[…] it shows a forest structure consisting of domestic trees where food forest species are integrated into. Thereby biodiversity, forest climate and production support each other."* (C47:R34)

In addition to the earlier mentioned aspects, responses show that the *intrinsic worth*, *research*, *well-being*, *social* aspects and *other* aspects were also considered as the most important aspect about a food forest. The *other* aspect, given by 1 respondent, was a combination of several aspects, namely: *"social aspects, sustainable for future generations, reconnecting people to natural spaces and inspiring people"* (C14:R42). This suggests that there is not one aspect that is considered most important.

A more elusive aspect considered by respondents is the *intrinsic worth* of food forests. Although this is considered the fourth most important aspect with 40% indicating that it is 'also important' (Figure 4.15A), we saw a mixed understanding of this term through our interviews. Some described the term as *"deeper values"* (C11: RI42), *"core value"* (C13:RI46), spiritual, holistic, encompassing and/or transcending all other aspects. One respondent described the core value in a food forest as the ability to understand nature: *"[…] we need to listen to nature, we need to read the forest and then act. […] What does nature teach us and then I arrive at the intrinsic values."* (C47:RI41). It was often implied that a food forest has qualities that are inherently valuable in itself, with an emphasis placed on the ability to function as an inspirational example for further engagement and development of food forests. This indicates how inherent and metaphysical values go hand in hand with transformative and experiential value dimensions.

Figure 4.14: A boxplot showing the age range of respondents who considered the ecological aspect as the
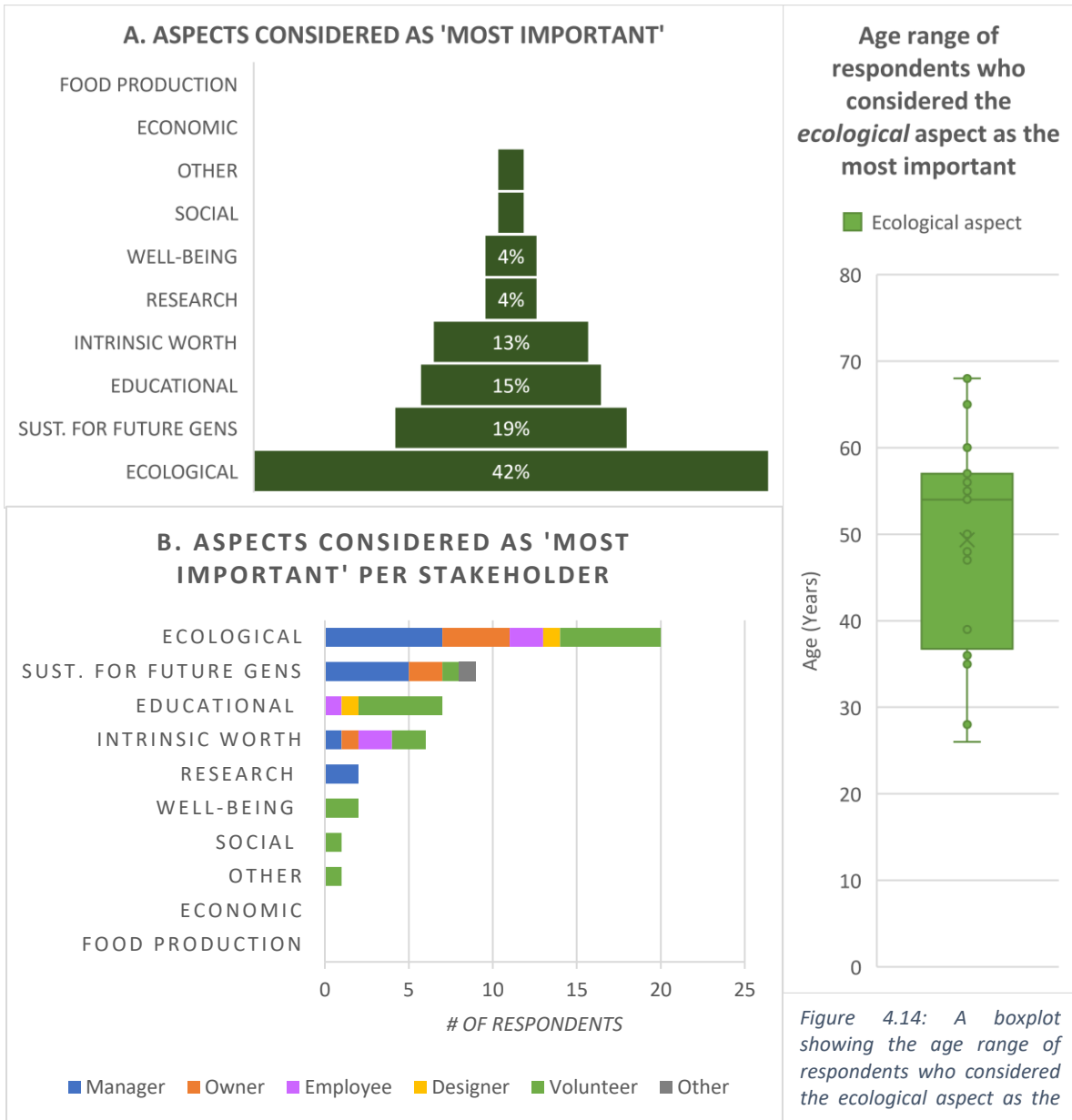
Figure 4.13: Two graphs showing the aspects considered as 'most important' by all respondents in percentages (A) and the breakdown of responses per stakeholder (B)

'Also important' aspects

Diving deeper into these deliberate distinctions, a follow-up question allowed respondents to choose several other aspects they considered as 'also important' (Figure 4.15, Q43). Figure B shows that almost all aspects were chosen by almost all stakeholder groups. In addition to *food production*, the aspect of *sustainable for future generations* was considered equally often with 65%, followed by *educational aspects* with 58%. My findings show how these aspects are indeed seen as valuable and significant.
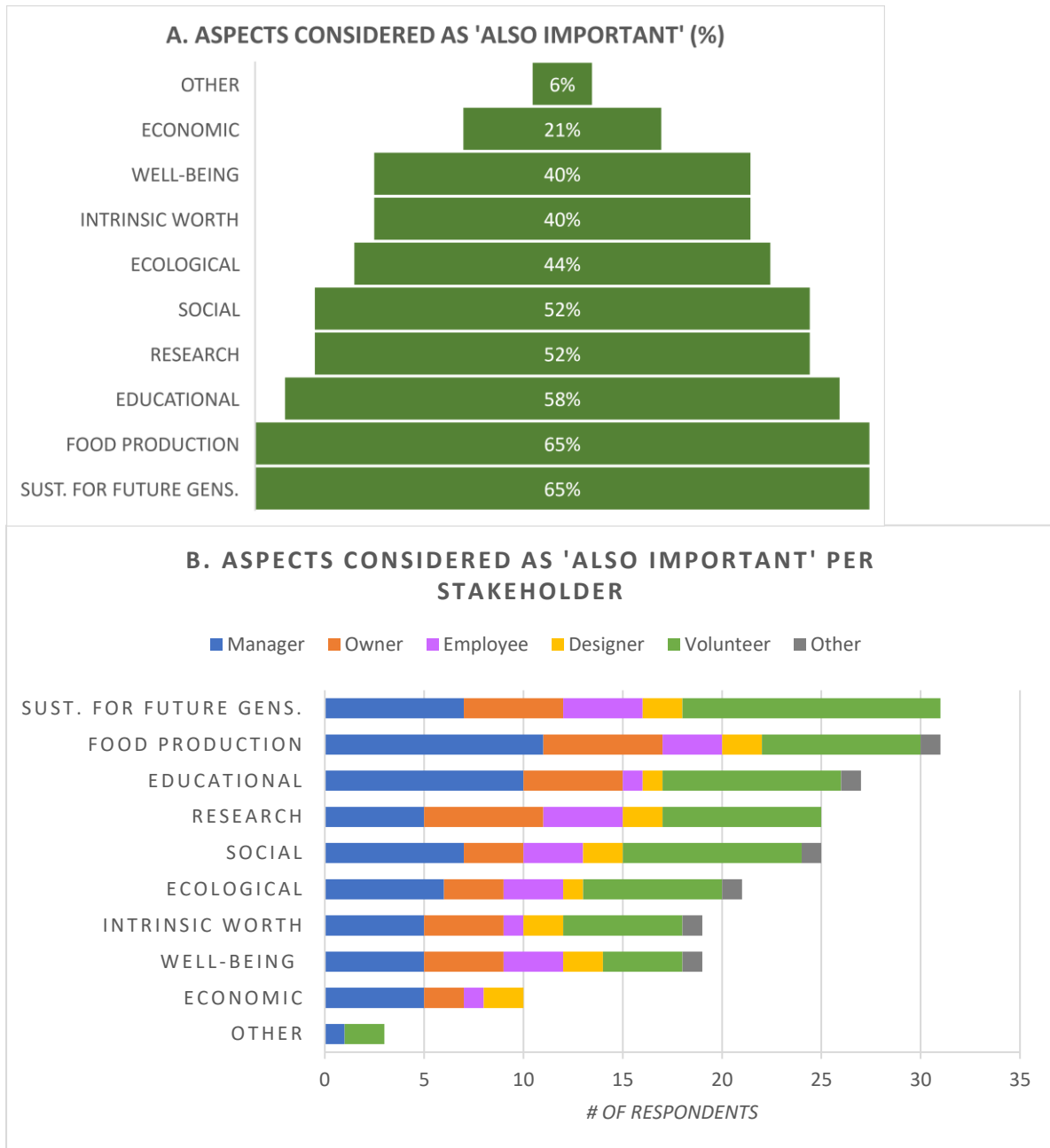
Figure 4.15: Two graphs showing the aspects considered as 'also important' by all respondents in percentages (A) and the breakdown of responses per stakeholder (B) [Q43-51]

Overall, all given aspects are signalled as significant. Several respondents indicate that other aspects are also important, such as water storage capacity (incl. groundwater recharge) of the food forest and agitprop (C34&C41:R43-51). 21% of the respondents indicate the *economic* aspect to be also important, which is less often than all other aspects. As mentioned in Section 'Security & Livelihoods' (pg. 37), economic security was mentioned, but less often than other themes.

'Least important' aspects

Figure 4.16 shows that almost half (48%) of the respondents indicate that the *economic aspect* is considered (on a personal level) as the least important aspect compared to all other aspects. This result suggests that the economic side of food forests are less important than other aspects, however, 38% of the respondents were volunteers with no direct financial ties to the food forest. Finding economic security through food forestry is implied by some respondents, although this is difficult to establish and expect from relatively young food forests.

Other aspects were also considered as least important. During an interview, one respondent explained why he considers *well-being* and *social aspects* as less important. The respondent made a separation between goals and effect. The main goal and functioning of the food forest in question is to produce food and support biodiversity, with additional 'side-effects' that support well-being and social cohesion (C47:RI50). This illustrates how one can make distinctions between values that are
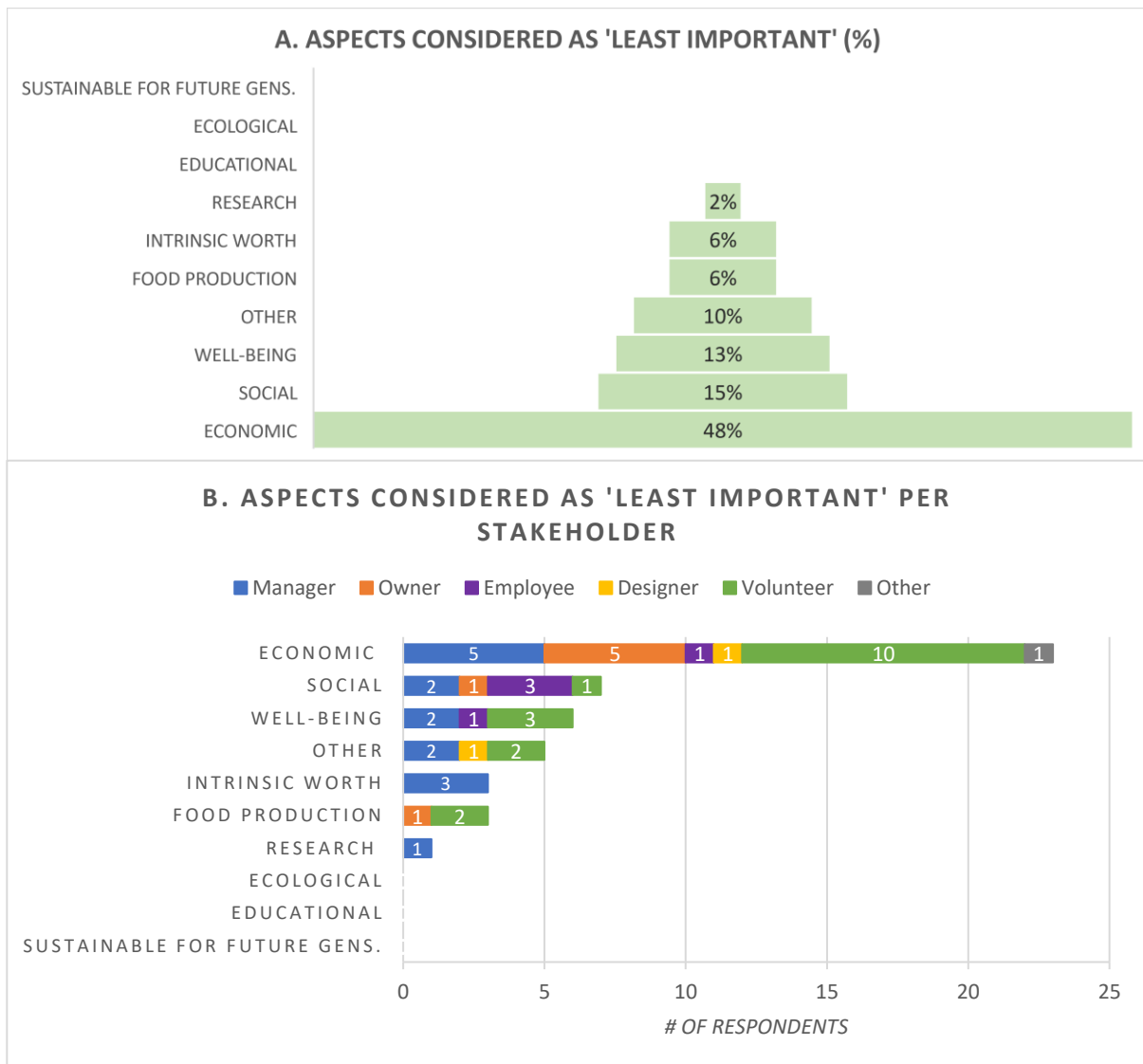
Figure 4.16: Two graphs showing the aspects considered as 'least important' by all respondents in percentages (A) and the breakdown of responses per stakeholder (B) [Q52]

desired ends in themselves (a final value dimension) and supplementary value forms (an instrumental value dimension).

In addition to this, several respondents circumvented question 43 by responding with *other*, with one indicating that *"they are all important"* (C18:R52) and another saying *"You cannot say that. Developing a food forest is like the decathlon at the Olympics. You have to score well on all aspects."* (C22:R52). This statement suggests a multitudinous mindset where a range of aspects are considered valuable. These statements evoke a pluralised understanding of multidimensional ecosystems. To complete the picture, seven out of the ten optional aspects were considered 'least important' by respondents, the exceptions being: the *educational,* the *ecological* and *sustainable for future generations aspect*.

Types of appreciation

In general, there is a positive appreciation by respondents that engage with food forests, with over half reporting that their sense of appreciation has positively changed over time (56% in Figure 4.17). A reason one respondent gave for their sense of appreciation is described as *"The beauty and multidimensionality of food forest systems" (C3:R56)*. As we have seen in the previous Sections, there are indeed many perceptions of beauty and multidimensionality surrounding food forestry practices in the Netherlands.

Nevertheless, positive bias is not omnipresent amongst the respondents, as almost two-fifths (42%) do see disadvantages about their food forest (Figure 4.18). Some respondents showed a critical ability in assessing whether their attached preference values are realisable over time and space. One respondent mentioned that their food forest requires *"more work than expected" (C37:R54),* adding
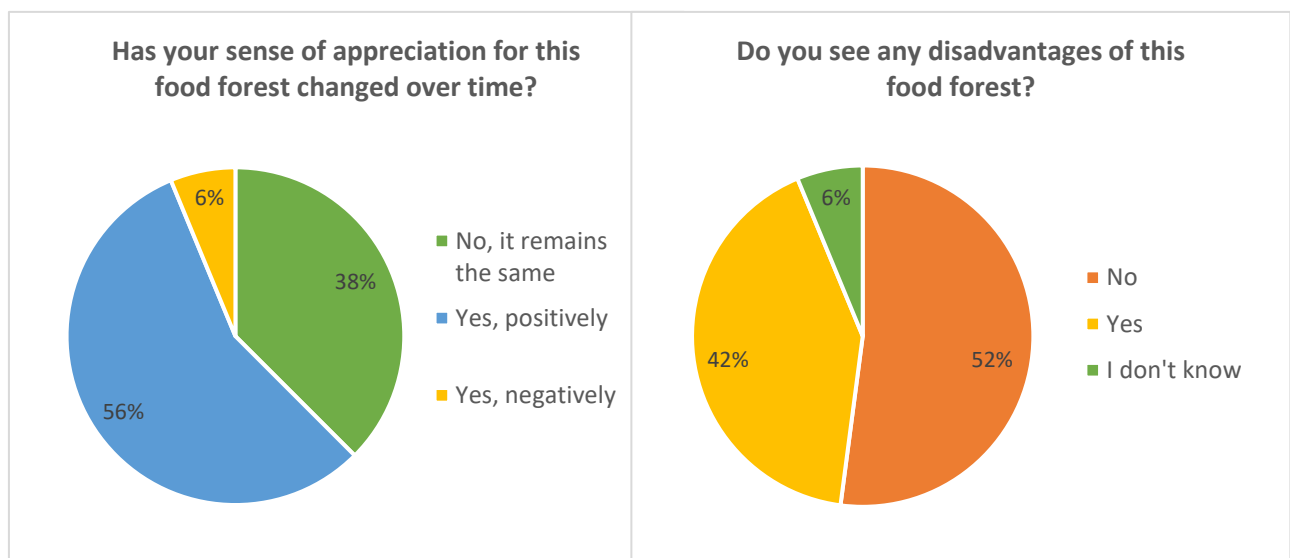
Figure 4.17: A pie chart showing the percentage of respondents who consider whether their sense of appreciation has changed over time and if so, in what way: positively, negatively of neither (Q55).

Figure 4.18: A pie chart showing the percentage of respondents that perceive any disadvantages of the particular food forest in question (Q53)

"I thought it was the answer to everything, but it's not that simple" (C37:R56). One respondent said there is *"not enough production"* about a 5 year-old food forest (C38:R54). Another respondent also described a personal struggle from their connection with a food forest: *"I am connecting greatly to this place, which also causes me stress and sadness when circumstances occur of which I can do nothing about (e.g., drought) with many falling casualty. But this is, at the same time, also one of the to be learned lessons, to accept and respect these dynamics. This is sometimes very difficult, but eventually naturally an advantage." (C30:R54).* This goes to show that social-ecological interactions generate meanings, experiences, and perceptions across the spectrum. By spectrum, I mean the spectrum of advantages to disadvantages, from experiential to metaphysical, from personal/individual to societal/others, etc. This statement reflects preference values such as food forest aspirations going hand in hand with transformative value dimensions that encompass instrumental, intrinsic and relational values. To summarize these critical reflections, I quote the following: *"We have to be careful not to look at a food forest as the silver bullet that can solve many different issues. We are still learning about what a food forest means, what it can achieve and how to experiment within it." (C7:R54).*

4.3   Background of respondents

To contextualise my findings, a description on the characteristics of the respondents is given. Most respondents (63%) are men, 35% are women and 2% refrained from answering this question (Figure 4.20). The main nationality of respondents is of Dutch origin (88%) with other nationalities being Belgian, German and British (Figure 4.19). Most respondents are highly educated, where 98% have a post-secondary educational degree, of which roughly two thirds are more theoretically trained and one third being more practically trained (Figure 4.21). From the 48 responses, 38% represented volunteers, 31% as managers, 15% as owners of a food forest, 10% as employees, 4% as designers of a food forest and 2% stated otherwise (Figure 4.22).

Those who responded to our survey ranged from the ages of 25 to 68 (Figure 4.23 & Table 4.1). Noticeable is that owners have a higher average age (53) than most other stakeholder groups. The age range of owners is smaller and higher, between 42 and 68, than the other stakeholder groups, indicating that currently, a select age group within the survey respondents have the means to own and sustain a food forest. The diversity in age is greatest between the volunteer and manager groups, who are also the largest constituents within the survey respondents.
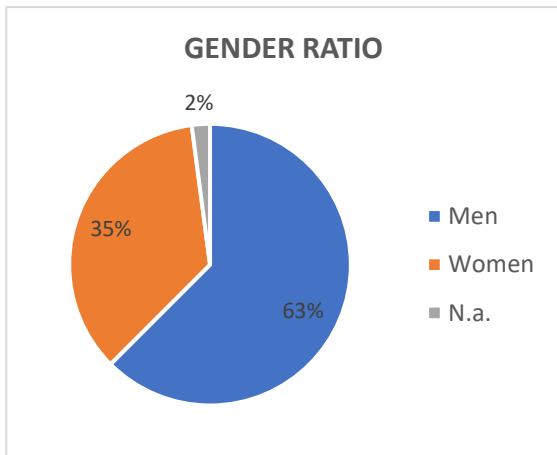
Figure 4.19: Gender ratio of survey respondents (Q1:GI).
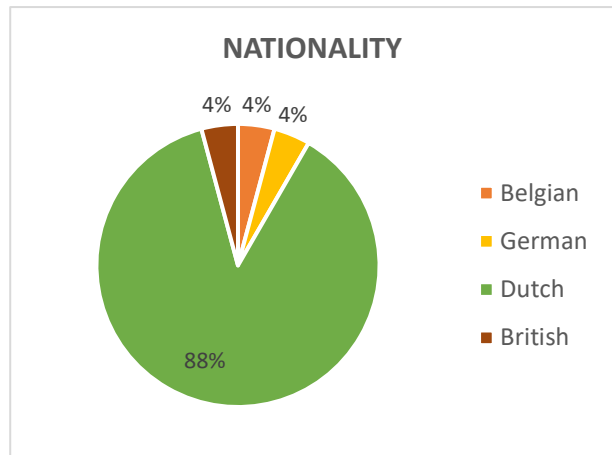
Figure 4.20: Nationality of survey respondents (Q3:GI).
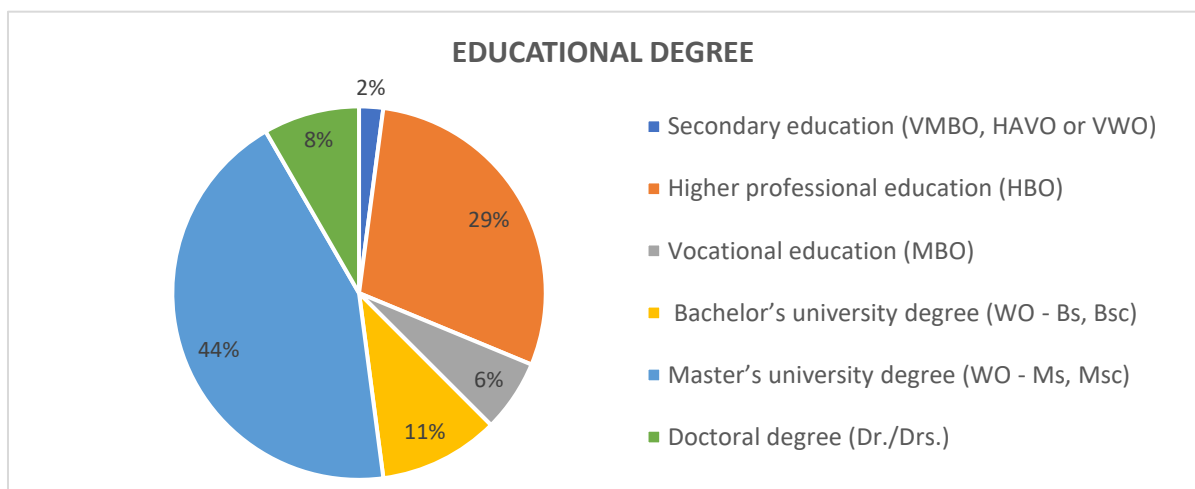
Figure 4.21: A pie chart showing the educational degrees of respondents (Q4:GI).
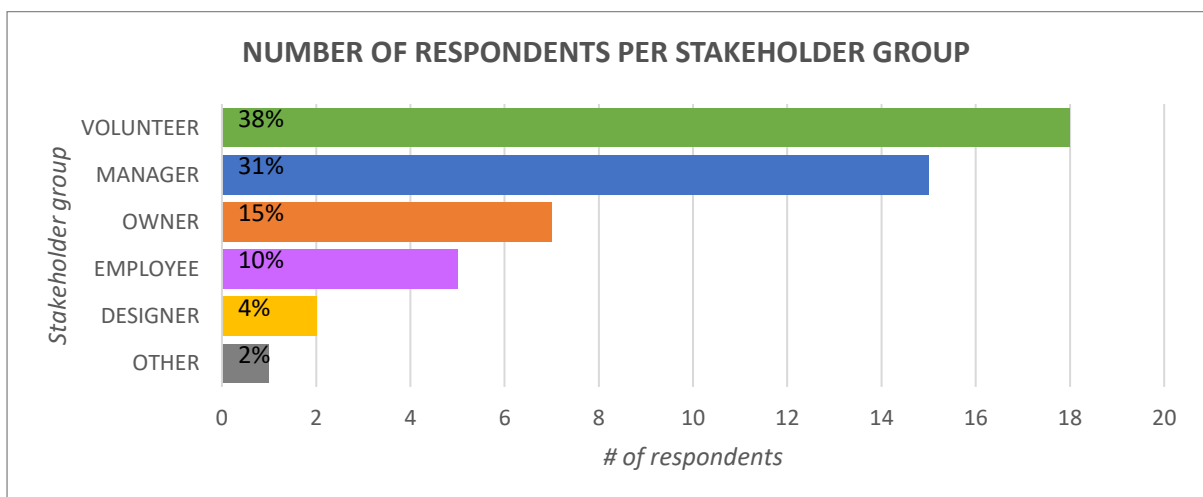
Figure 4.22 Number of respondents per stakeholder group (Q14).

	Average Age	Minimum Age	Maximum Age	Median Age	Stakeholder Count
Volunteer	46	27	68	45	18
Manager	45	26	68	44	15
Owner	53	42	68	54	7
Employee	39	26	60	28	5
Designer	37	25	48	37	2
Other	62	62	62	62	1
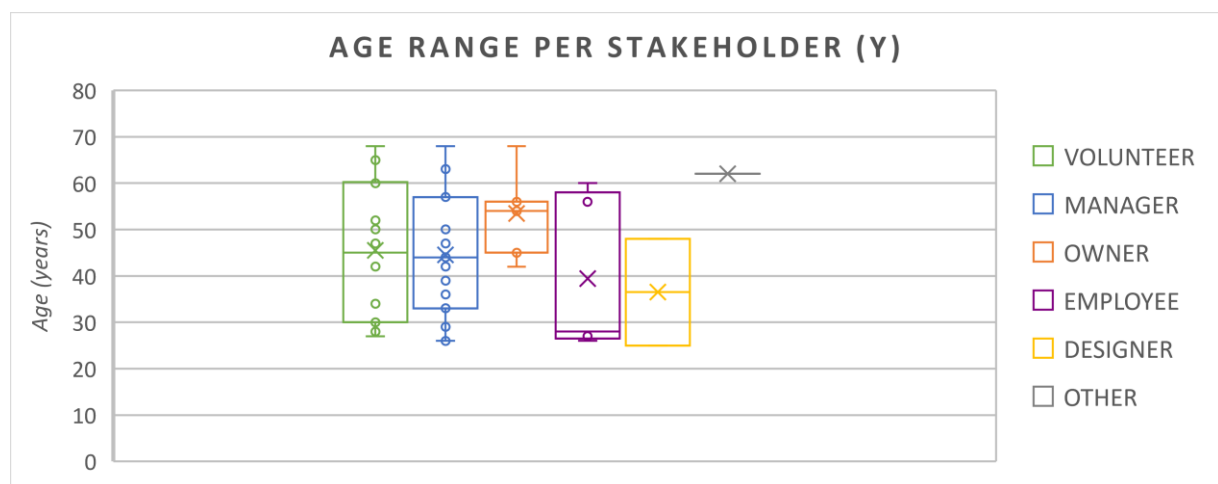
Figure 4.23: A boxplot showing the age range per stakeholder (Q1:GI).

Background of food forests

As mentioned earlier, there are several food forest archetypes (van Gent, 2019) which may influence the perceptions of respondents in terms of what is deemed valuable. Hence, a general typology of food forests is distinguished. The majority of respondents (60%) engage with food forests with mixed goals, those oriented towards both production and cultural goals. Although ecological goals are not explicitly mentioned here, it is implied in all types because the ecological value is considered a core goal within food forestry principles (GD-219, 2017). Roughly one-fifth of food forests represented in this survey are mainly oriented towards cultural goals (21%), followed by production-oriented ones with 13%. Lastly, 6% are fully oriented towards production and none were fully oriented towards
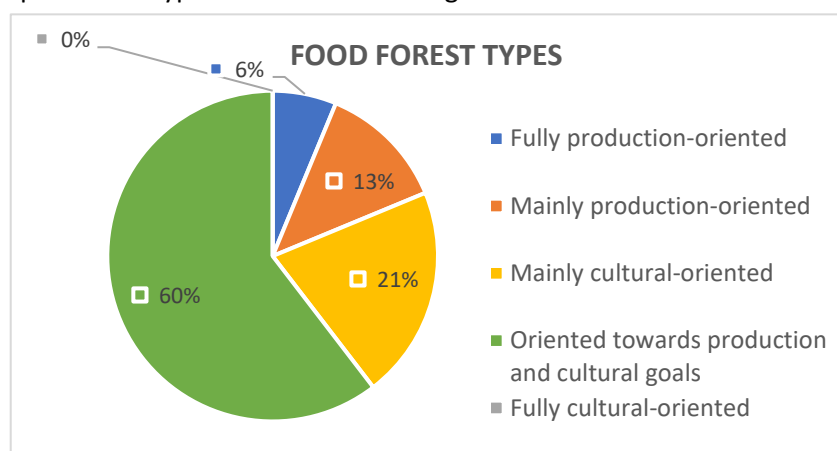
Figure 4.24: A pie chart showcasing the types of food forest: fully production-oriented (dark blue), mainly production-oriented (orange), mainly cultural-oriented (grey), oriented towards production and cultural goals (yellow) and fully cultural-oriented (light blue) [Q17]

55

culture. Interestingly, sometimes there was a discrepancy between the assigned type within a particular food forest. For example, food forest Droevendaal was indicated as mainly production oriented and a mix of both production and cultural oriented. This shows that creating a distinction for the types of food forests is not clear cut and that connecting case studies to theories remains a fuzzy task. These presentations suggests that food forests often have several goals and dimensions.
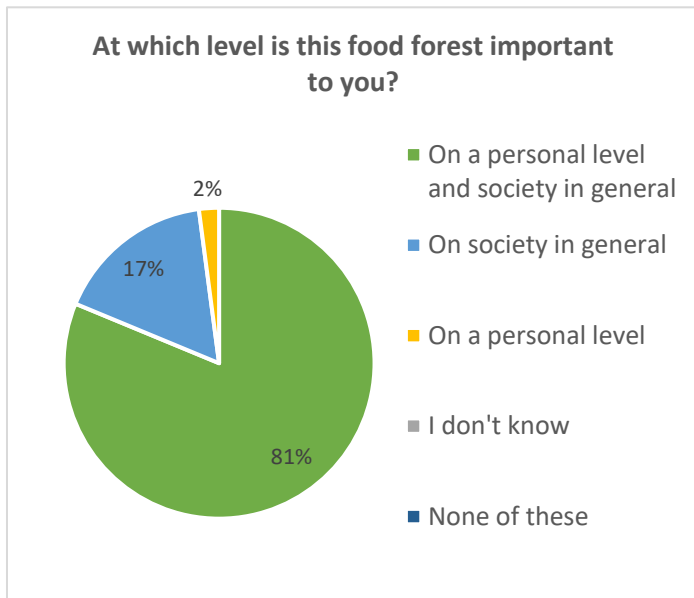
Figure 4.25: A pie chart illustrating the percentage of respondents who feel that the food forest/forestry is important to them on a personal level and/or for society in general (Q35).

98% of respondents indicate that the food forest they engage with is considered important at a societal level and 83% stated their food forest to be of personal importance (Figure 4.25). Through follow-up interviews, we established that this question was often interpretated beyond the particular food forest they were engaged with, but more broadly as a concept and movement. It therefore places it into perspective that respondents consider food forestry important for society at large (98%) more often than on a personal level (83%). This reflects other-oriented values being stronger than self-oriented values.

When asked to rate the level of influence their food forest has on society at large (Figure 4.27), almost half found the contribution to be "much" (49%), a third found it "not much" (31%) and almost
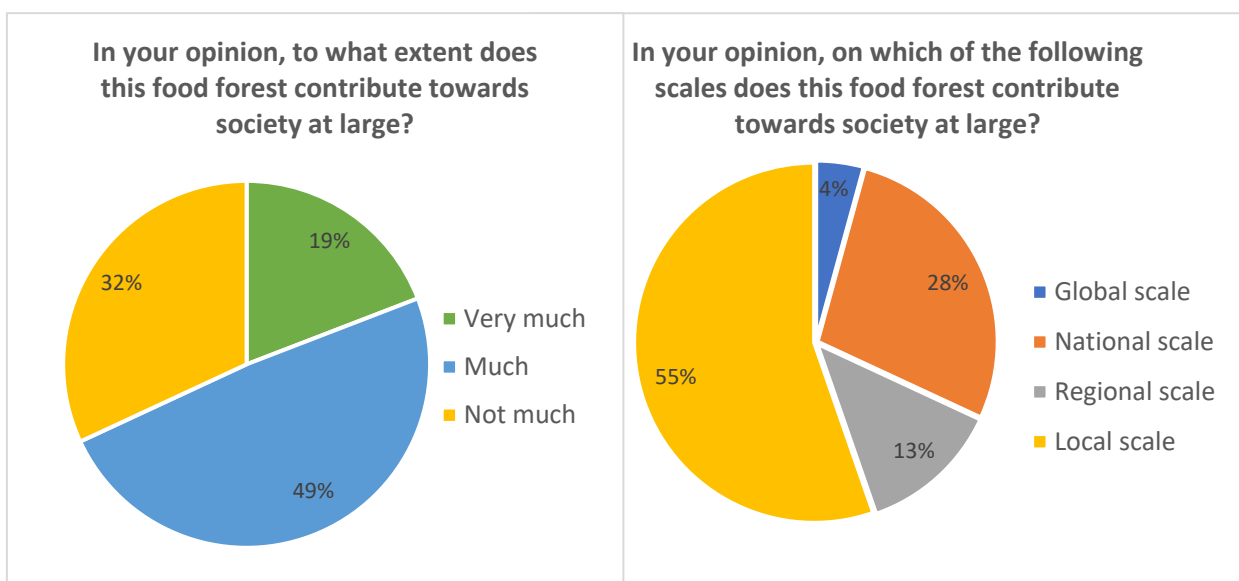
Figure 4.26: A pie chart illustrating the percentage of respondents considering the level of impact of a particular food forest towards society at large (Q40).

Figure 4.27: A pie chart illustrating the percentage of respondents considering at which levels the particular food forest contributes to society at large (Q39).

a fifth responded with "very much" (19%). When asked further, more than half of the respondents (55%) indicate that the food forest in question contributes mainly on a local scale (Figure 4.26). The second largest scale of impact is at national scale (28%), followed by regional scale (13%) and global scale (4%).

The following quote synthesizes the reasoning behind the various levels of impact a food forest is seen to have, for example about food forest 'Voedselrijk' (C19, RQ42):

"What happens here, is investigated and being developed, inspires many to also start at their own locations". The respondent associates a transformative capacity of the food forest to initiate other food forest initiates. *"This improves the soil, biodiversity, water management, climate resilience and food security of the region and of the Netherlands."* Here, a biocentric view comes across where intrinsic (the mentioning of 'soil' and 'biodiversity') and instrumental values (i.e. 'food security') come across. *"It also contributes to society within the region because of the visitors and volunteers. People get to know each other, get inspired, gain hope and tools for a healthy future and have a healthy, enjoyable time whilst being here."* The respondent conveys a statement about others, an other-oriented value dimension with value themes such as sense of community, collective engagement and inspiration. As shown, there are various value types (intrinsic, instrumental and relational), dimensions and themes present. To conclude this summary on the background of respondents and food forests, all have indicated that the food forest in question, and food forestry as a concept, positively contributes to their own well-being (Q37). Besides the background of the respondents, the type of human-nature relationship is also a determinant of socio-cultural values.

4.4 Human-nature relationships

The way humans relate to nature is a determinant of how nature is valued. As we have seen, there are many kinds of meaningful expressions from the interaction between people and food forests. Therefore, we crudely identified the types of cognitive frameworks respondents have in relation to nature. Understanding these cognitive frameworks (i.e. relational model) is said to shape the values associated with nature and considering these frameworks is valuable in understanding the core mentality that drives individual and social behaviour (Muradian & Pascual, 2018). In our survey, we asked respondents to give their viewpoint on nature through a series of statements (Table 4.2). Each statement represents one type of relational model which is based on a typology described by Muradian & Pascual (2018) and Schouten (2013).

Table 4.2: A table showing which statements relate to which relational model type and its attribute.

Statement	Relational Model	Attribute
"The purpose of nature is to serve humans."	Utilization	Utilitarian
"Humans are responsible to maintain nature for nature."	Stewardship	Responsibility
"Nature is an equal partner alongside humans to maintain nature itself."	Ritualised Exchange	Equality
"Humans are part of nature."	Participant	Inclusion
"Nature is sacred and should be respected by humans."	Devotion	Spiritual & Reverence

Figure 4.28: A radar graph showing variations within the type of relational models between humans and nature, i.e. human-nature relationship (adapted from Muradian & Pascual, 2018)
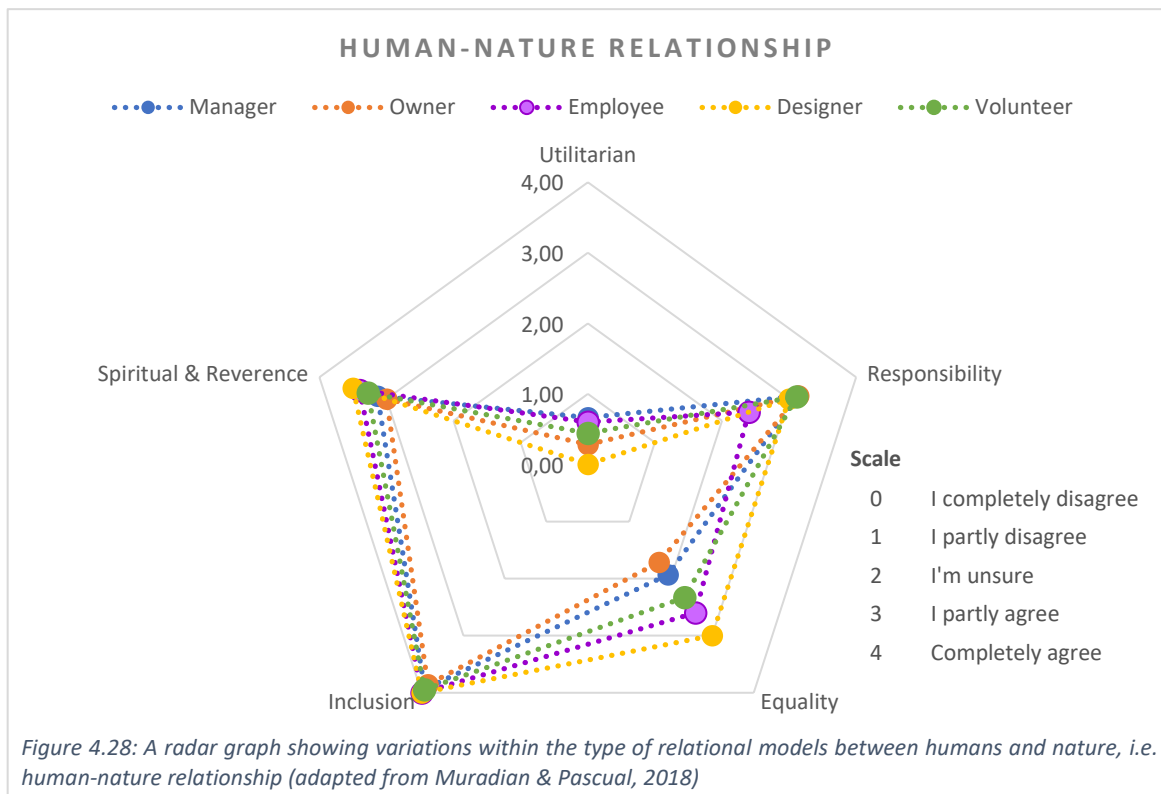
To group the responses, I classified per stakeholder type and illustrated the results through a radar graph (Figure 4.28). This graph shows five axes, each being one type of relational model from 0 (where respondents completely disagree with the statement) to 4 (respondents completely agree with the statement). Based on their level of (dis-)agreement, we can see which types of relational model(s) reflect their human-nature relationship.

Within the categorisation of respondents into stakeholder types, all respondents feel *"part of nature"*, indicated through the high 'inclusion' level. There is also a strong tendency to act as stewards and take care of nature, as indicated by the 'responsibility' dimension. A high level of respect and (to some extent) a kind of devotion towards nature is also present amongst the respondents, as highlighted by the 'spiritual & reverence' dimension. Many respondents seem to absorb a biocultural perspective where humans are part of nature, as described in Chapter 'Biocultural Harmony & Sustainability' (pg. 31). However, there were some respondents that indicated otherwise by showing disagreement with humans being responsible for taking care of nature.

Most respondents did not adopt a utilitarian perspective in relation to nature. The majority of stakeholders disagree that *"the purpose of nature is to serve humans"*, labelled as the 'utilitarian' dimension. This worldview was merely present as many respondents showcased a biocentric and collective mindset.

Where most contrast about the view on human-nature relationship exists is about the notion of partnership between nature and humans, labelled as 'equality'. Food forest designers show a greater level of agreement with this statement, whereas owners and managers have a neutral opinion on this. This variation may be explained because it can collide with the notion of 'humans being part of nature'. Another explanation for these differences could be that designers have a greater tendency to view nature as a separate entity to co-shape with and that owners and managers may have a greater sense of responsibility to maintain nature, thereby implicitly rejecting the statement that: *"Nature is an equal partner alongside humans to maintain nature itself"*. Another reason for these differences can be attributed to the difficulty in interpreting this statement, as found during follow-up interviews.

In summary, most respondents hold a relation with nature where humans are part of nature, with characteristics such as stewardship and respect playing a role. Such a perspective aligns with the socio-cultural values found in this study.

A fluid relational perspective

From a follow-up interview, I was able to understand that perspectives about nature can be time dependent. In the transcript below, respondent C11 reflects on their equal standing to nature, which sways from being an equal partner in current time towards a lesser equal to nature at a future point in time. Such a mentality can reflect a person's ability to interact and influence the living environment with a range of intensity. The extent of intensity aligns with their understanding on the state of 'nature' and their role as humans in relation with nature, as proposed by Tress & Tress (2001).

Interview passage

Survey statement: "Nature is an equal partner alongside humans to maintain nature itself."

Survey answer: "I partly agree"

Interview:

X1: "How did you give meaning to this statement?"

C11: "[…] We both need to do this, nature and humans. Maybe afterwards, nature is a far greater partner, but we also have a great deal of influence. […] I keep thinking from this situation, [that] now nature is being influenced and we really need to do something. But on the other hand, eventually, nature needs to be able to maintain itself and we need to have less influence on this. Then, we are no longer equal partners because nature is itself."

X1: "Yes, so this is maybe more of a temporal thing?"

C11: "Yes, for now, for this situation."

This signifies that a relationship between humans and nature can be fluid. This also reflects that the answers given in this survey by the respondents are merely a snapshot in time. These outcomes relate well to the idea of reciprocity in the people-landscape interaction model by Tress & Tress (2001); whereby our perceptions and understandings of nature can influence our relation and interaction with it. Our understanding and relationship with nature can therefore be described as a continuous feedback loop that is based on perception and interaction.

5   A discussion and reflection

As the results show, a wealth of value themes exists with multiple layers involving value types and dimensions. In this Chapter, I provide a discussion and reflection on the assessment of socio-cultural values by focussing on the methods, results, theoretical frameworks used and recommendations for future research.

Socio-cultural value themes and attributes

My findings indicate that socio-cultural values such as ecology, sustainability, education, food security, sense of well-being, sense of place, social cohesion and experiential perceptions are present for the participants interacting with their food forest(s). These values display characteristics that are plural in nature: ranging from anthropocentric and (more so) bio-centric, collective and individual-oriented, care for current and future generations and largely non-material in kind. Due to the novelty of this research in terms of context and methods, a wider range was taken to cross-compare my findings. Through further cross-comparison of my results with other studies, I see other similarities in the outcome. To briefly summarize, engaging with food forests contributes towards:

- Increasing (perceived) biodiversity levels through the creation of enjoyably diverse ecosystems (Björklund et al., 2019; Breidenbach et al., 2017; J. Schepers, 2021. *pers.comm.* 07 May; West, 2006)
- Nurturing social cohesion and interpersonal experiences (Stoltz & Schaffer, 2018; Veen, 2015; Verbeek, 2019)
- Growing local and sustainable food sources adaptive to the effects of climate change (Björklund et al., 2019; Verbeek, 2019)
- Supporting (self-perceived) mental and physical well-being (Stoltz & Schaffer, 2018)
- Reinforces pro-environmental behaviour (Stoltz & Schaffer, 2018)
- Embracing a relational perspective where humans are part nature (Askerlund & Almers, 2016; J. West, 2006)

Similar studies in other contexts such as on forests, wetlands, and agroforests indicate a range of non-material values perceived by stakeholders (Fagerholm, Torralba, et al., 2016; Oteros-Rozas et

al., 2014; Reyes-Arroyo et al., 2021; Shams et al., 2015). For example, in a socio-cultural analysis of the ecosystem services provided by mangroves in La Encrucijada Biosphere Reserve (Mexico), values were overgeneralized in their study as identified values such as sense of belonging, identity, spirituality, beauty, tranquillity, and happiness were classified into two themes: 'tourism/recreation/research' and 'spirituality/symbolism' (Reyes-Arroyo et al., 2021). Despite similar findings, an overgeneralised presentation of findings can overlook and undermine the range and extent of socio-cultural values in relation to an ecosystem.

In addition to this, a different approach was taken by the authors to identify and cluster the values through an ecosystem accounting system: the common international classification of ecosystem services (CICES), developed by Haines-Young & Potschin (2018). This difference in approach has influenced the way data is interpretated and presented. The reason for this difference in approach could be attributed to the reason that the aim of Reyes-Arroyo *et al.*, is to develop better conservation and coastal management strategies where priorities are made clear. The purpose of my thesis is less directed, as I aimed at the exploration and identification of socio-cultural values. Hence, the goal of assessing socio-cultural values shapes the method and outcomes of findings.

Stoltz & Schaffer (2018) suggest that edible forest gardens "potentially could reinforce several affordances of salutogenic importance, both in terms of, e.g., social cohesion but also in regard to restoration from psycho-physiological stress and attention fatigue."(Stoltz & Schaffer, 2018, p. 1). My findings seem to align with some of these affordances as respondents valued notions of social cohesion (e.g. quote C30:R41 in Chapter 4.1: 'Identity & Community', pg. 43) and sense of well-being (Chapter 4.1: 'Health & Well-Being', pg. 40).

Another parallel can also be drawn between my findings on sense of place and the strong educational value of food forests with that of a study on ecosystem services provided by home gardens in Spain (Calvet-Mir et al., 2012). This study concluded that home gardens can contribute towards the development of sense of place which "can generate opportunities for comprehensive knowledge-building of practices that improve ecosystem services management" (Calvet-Mir et al., 2012, p. 159). I would argue that knowledge-building practices is case for food forestry in the Netherlands. The existence of the National Monitoring programme on food forests and the Green Deal *voedselbossen* platform are prime examples.

Identifying socio-cultural values is a complex task and worth undertaking, especially when ecosystems are at risk of (further) degradation. It is, however, unknown to what extent and how long socio-cultural values play a role in human behaviour. The outcomes of this study only provide a snapshot in time of socio-cultural values perceived by the participants. Several other studies have also broadly explored and described the potential of food forests and other multifunctional green spaces

to tackle today's societal challenges (Abbas et al., 2017; Clark & Nicholas, 2013; Kabisch et al., 2016; Kremen & Merenlender, 2018; Park et al., 2018). These studies worth building upon.

The value wheel: a visualisation tool

During the analysis, I found it difficult to categorise the perceptions and values accordingly because there were often layers of value themes, types and dimensions. I was sometimes conflicted how to interpret a statement; should I focus on the words itself (written knowledge) or also take along the message that I believed to be conveyed (sensed knowledge). Deciding which layers to interpret was a struggle and dealing with these interpretive dilemma's led me to embrace the layering of perceptions and thus, to the development of the value wheel. The use of the value wheel allowed me to visually show the associated values I interpreted from the statements and pictures in an eye-blink. Additionally, I can also signal any interpreted layers within a statement.

As presented in this study, I visualised my findings through a tailored value wheel. This is to showcase the transgression and interconnectedness of socio-cultural values and thus, presented in a circular and heterarchical fashion. I have yet to come across a study presenting socio-cultural values in the same way, but similar forms exist in literature by using scatterplots, biplots and symbol tables (Hunter & Luck, 2015; López-Santiago et al., 2014; Oteros-Rozas et al., 2014). One study visualised the "heterarchical interrelationships between 14 identified qualities of urban greenspace" through a web of connections (Hunter & Luck, 2015, p. 1156).

Most ecosystem service valuation studies present their findings in a tabular method with some form of hierarchy (Calvet-Mir et al., 2012; Gaspar et al., 2016; Kijazi & Kant, 2010; López-Santiago et al., 2014). To incorporate the plurality of values, I transformed the linear setup of two frameworks, the NCP framework in Table 2.3 (pg. 12) and the IUCN guidelines in Table 2.4 (pg. 14), into sunburst diagrams: Figure 3.2 (pg. 22) and Figure 3.3 (pg. 23). Many of these themes were adopted into the resulting value wheel, such as 'knowledge and education', 'security and livelihoods' and, 'health and well-being'. Several other identified themes can be considered a hybrid value theme from several frameworks. A brief description of these hybrid value themes is given below.

Ecology

The ecological value theme is based on the *intrinsic value* type from the NCP framework as well as the *forms* type from the cultural values model. The attributes of this value theme also incorporate instrumental values from the NCP framework, such as ecosystem functioning. My reasoning behind combining these two intrinsic and instrumental value types within one theme via the inclusion of several forms of value attributes is because I consider the functions and processes being generated by biophysical entities (such as trees and humans) as part of the entity. In other words, I consider the subject and its actions as one.

Biocultural harmony & sustainability

Many statements implied a tight relation with nature where humans were considered part of nature. Because of this worldview, I adopted the term 'biocultural harmony & sustainability'. This value theme was adapted from the merging of three foci values from the NCP framework: 'living well and in harmony with Nature and Mother Earth', 'diversity and options' and 'sustainability and resilience' (Figure 3.2). The term 'biocultural harmony' describes a worldview where biological and cultural interaction are synergistic, harmonious, and diverse in outcome and process. This is often expressed as a preference value, a worldview that is aspired to. Making a judgement as to whether this is put in practice is near-impossible because it depends on how people perceive and judge this, which can be highly subjective. I connect these notions with sustainability because of the inherent care about ecosystems, nature and humans that is expressed. As shown in Chapter 4.1, the care in building a sustainable future for current and future generations is a strong theme for many respondents.

Identity and community

The theme 'identity and community' can be seen as a combination of two relational themes from the NCP framework: 'identity and autonomy' with 'good social relations'. I decided to merge these two because I regard notions of identity as a subset of community; seeing that for example sense of place, agency and life's fulfilment is a relational phenomenon and are often in relation to (and often with) fellow (human) beings. Hence, in this study, I assert that one should not separate the individual from a collective.

Experiential perceptions

Lastly, the value theme 'experiential perceptions' is alike the aesthetics, perceptions and scenic value type described in the IUCN framework. Verschuuren describes this value type as "qualities […] typically directly experienced in relation to nature or natural features, for example, the beauty of a landscape, but also in relation to the experience of nature" (Verschuuren et al., 2021, p. 24). Although such human experiences can be derived from nature, natural features, the landscape or from the interaction with them, I have decided to outline this as a value theme because of several prominent statements about sensorial experiences and emotional expressions. For example, the quote "Every morning when I look out of the kitchen window, I thoroughly enjoy this piece of land. What a pleasure!" (C13:R36) emits to me a strong sense of enjoyment. Trying to 'interpret' and characterise the underlying value led me to value the emotional expression in the form of experiential perceptions. This is my reasoning behind the value theme made from the perceptions from those engaged with food forests.

As I have just described, these value themes come across from an exploratory study about people engaged with food forests in the Netherlands. This value wheel and its attributes provide a

portrait of the values perceived at that moment in time and should therefore not be taken at face value, nor should these identified themes and attributes be strictly adhered to in any subsequent study. The difference in presenting my findings in a wheel can be seen as a synthesis of previous ecosystem valuation models and to some extent, novel. However, as mentioned earlier, the way of presenting the results is shaped by the underlying goal of the research, which can differ per case. Articulating values remains a reflexive task.

Valuation frameworks

All three frameworks recognise the complexity in assessing values of ecosystems. Using these frameworks as analytical tools in an effective manner requires tailoring the framework to the context (IPBES, 2016; Verschuuren et al., 2021). In the following Sections I will elaborate on the frameworks used in this study and discuss other potentially relevant concepts when assessing socio-cultural values in relation to nature.

Nature's Contributions to People

As shown in this study, relational values such as inspiration, feeling connected to nature and sense of well-being are non-instrumental in kind. It is argued that to recognise such non-instrumental values, a pluralistic approach to value articulation is needed.

Plural value articulations are necessary because solely expressing nature in monetary terms is a shortcoming, especially for non-material values as found in my study. It is understandable to account for the monetary of nature with the intention to sustainably manage ecosystem services. However, conforming solely to the notion of monetary valuation implies that ecosystem functions and cultural values have an exchange value, undermining the essentialness and irreplaceability of ecosystems once key functions, services and socio-cultural connections are lost (Cardinale et al., 2012; Gómez-Baggethun et al., 2010; Plieninger et al., 2013).

Himes & Muraca (2018) conceptually visualise instrumental values as substitutable, whereas relational and intrinsic values are not (Figure 5.1). I would argue that certain key ecosystem functions that are categorised as instrumental, such as pollination, is not viably substitutable once lost. The process of valuation is a relational act in itself (Himes & Muraca, 2018). All forms of ecosystem services and values should therefore be considered of intrinsic and fundamental value.

In my effort to adopt a pluralistic valuation assessment, I found myself swinging from a one-dimensional value lens (where I classified between intrinsic, instrumental or relational), to a relational value lens (where I interpretated all statements as relational) with a plural value lens (a combination of both). Adopting a plural value lens challenged me to analyse the responses in a consistent way because of the dilemma in *how* to process and synthesize the responses. IPBES suggests "mixed methodologies and multi-criteria analysis" (IPBES, 2016, p. 87) for the synthesis of values and I see the

value wheel as one such method. The role of deliberation, feedback and collective valuation processes is also highlighted by IPBES to acknowledge different values, identify trade-offs and discuss (potential) conflicts surrounding the use of natural resources. This was unfortunately not incorporated into the study due to a restraint on time and organisation capacity amidst a pandemic.
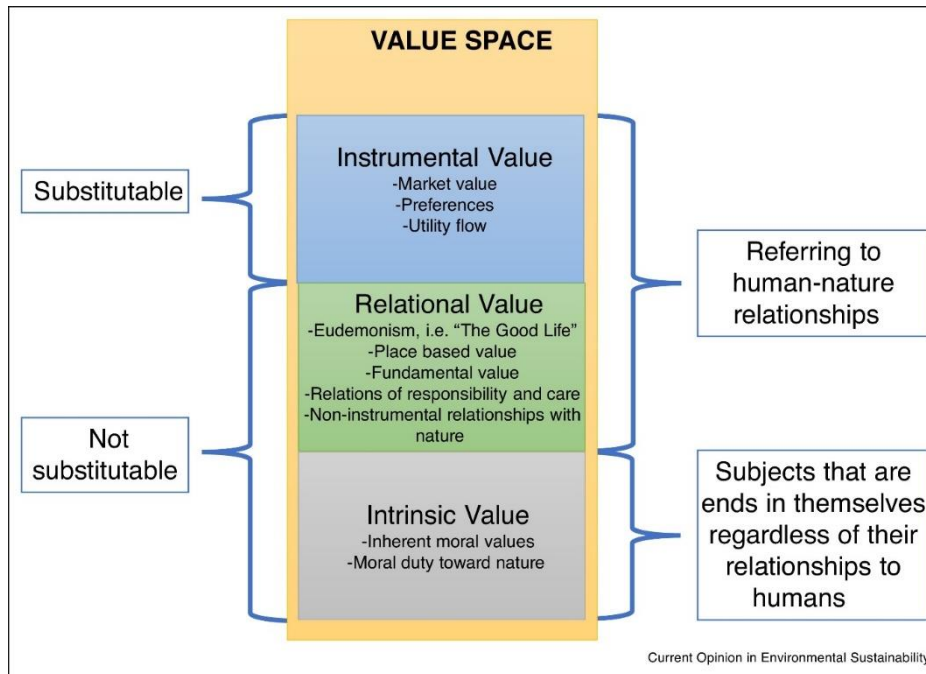
Figure 5.1: The levels of distinction within a value space, e.g. values that are substitutable and non-substitutable within the IPBES framework, according to Himes and Muraca (2018)

Operationalising these NCP framework remained a challenge despite the elaborate guidelines about the framework (IPBES, 2016). Rather than fully adopting the framework at face-value, I adapted the framework by overriding the value types (intrinsic, instrumental and relational) to the 'focus of values', i.e. value themes in this report (Table 2.3; pg. 12). The value wheel shows value themes as a combination of elements from the cultural values model and the IUCN guidelines.

Cultural values model

Although this model seemed the easiest way to apply during the analytical stage, it became clear to me that categorising responses per category would be time-intensive and ineffective in seeing the multiplicity of value statements. This model did bring across the connectivity between values, whether through forms, practices and/or relationships, which I also found in my findings. For example, the picture and quote about the blossoming wild garlic (in Section Ecology, pg. 30) illustrate that natural forms can facilitate relational feelings such as beauty and inspiration. Values stated via forms and relationships often came across hand-in-hand. During the analysis I decided against dissecting the responses per value type and adopted a pluralistic approach acknowledging the multiplicity of values via the value wheel.

Additionally, I came to realise that a lot of the values described by respondents fell into the relationship category. Due to the immense diversity of values within this category, I referred to the

NCP and the IUCN frameworks. For example, the NCP distinguishes 11 sub-categories within the relational value type, 8 of which were incorporated into the value wheel. This exemplifies how each model complemented each other and led towards an integrative application of valuation frameworks.

IUCN guidelines on cultural and spiritual significance of nature

This framework was adopted during the analytical stage because of the availability at the start of 2021. I found the guidelines useful because of the elaborate and practical descriptions about the attributes/qualities per value (theme) [Table 2.4]. Many of the described value attributes were incorporated into the value wheel, such as 'Beauty, silence, tranquillity, harmony' for the 'Aesthetic, perceptual or scenic' value type. These attributes were adapted into the experiential perception value type within the value wheel. Although these guidelines were not used as much as the NCP framework, I felt the guidelines were complementary to the NCP framework because it helped me to operationalize and fine-tune the value wheel.

Moreover, the reports by the main writer of the IUCN guidelines (Verschuuren, 2012; Verschuuren et al., 2021) prompted my awareness of the biocultural approach in analysing socio-cultural values in relation to nature. The biocultural approach is a rather fuzzy yet sensitizing concept on the interconnectedness between humans and nature in all its ways (Elands et al., 2019; Hanspach et al., 2020).

Human-nature relationship

All respondents strongly indicated a participant relationship type with nature; one where humans are part of nature. Notions of devotion (in the form of respect) and stewardship were also strong characteristics for the type of human-nature relationships present amongst the respondents (Chapter 4.3). Together with the dominant value themes such as ecology and biocultural harmony & sustainability, I interpret the presence of a dominant worldview that is biocentric and altruistic in nature amongst the respondents. This kind of worldview reflects a group that is part of a cultural shift, one that Matthijs Schouten describes as a growing shift from an anthropocentric to an eco-centric worldview that is taking place across the world, particularly in western societies (*Schouten in* Maarhuis, 2021; Schouten, 2013).

An interesting overlap with my findings is with one study on the experiences children described when learning in a forest garden (Askerlund & Almers, 2016). Despite using a different valuation system and terms, this study concluded that values such as aesthetic, naturalistic and humanistic were present amongst the children. Children enjoyed their experiences and activities in the forest garden (aesthetic and naturalistic), which overlaps with the self-perceived effect of engaging with or being in a food forest on one's own well-being (e.g. quote C28:R38 in Chapter 4.1: 'Health & Well-Being', pg. 40). Children also showed much (willingness to) care for plants and insects,

which also theoretically overlaps with notions of stewardship in my study, described in Chapter 4.1: 'Biocultural harmony & sustainability' (pg. 31). Askerlund & Almers (2016) suggest that these experiences can foster the development of relationships with organisms and the environment. My thesis cannot verify this, but my findings carry an inherent embeddedness of relational thinking towards ecological entities and the ecosystem, just as these children display. The resulting expressions on the value of food forests in relation to sustainability and future generations may increase pro-environmental behaviour, as suggested by Stoltz & Schaffer (2018). Future studies could monitor such behaviour over time. It can be recognised that the respondents in this study embrace a pro-environmental ethic.

A biocultural perspective

From this study, I suggest that a biocultural perspective is embodied by respondents that have indicated a worldview where humans are part of nature. Whether I conclude this because I myself also adopt this perspective is a possible determinant, however, sharply analysing my results also point towards this perspective. I observe that food forestry (and agroforestry) practices are inherently a biocultural act because humans aspire for a thriving ecosystem that follows its natural succession whilst also influencing this process by introducing as many edible and other valued plant species as possible. This interplay produces a diversity of ecosystems and cultural experiences.

The practice of food forestry can sometimes be likened to a conservation practice with a biocultural approach (Gavin et al., 2015). Gavin states that "we define these biocultural approaches to conservation as 'conservation actions made in the service of sustaining the biophysical and sociocultural components of dynamic, interacting and interdependent social–ecological systems'" (Gavin et al., 2015). I see resemblances where biocultural approaches are embodied here in the Netherlands through the practice of food forestry.

Lastly, Pace Ricci & Merten (2020) proposed a new term, called synergistic ecological change, to describe nature conservation strategies that nurture ecological stewardship whilst also supporting broader notions of well-being. This study was set in Mexico and Brazil analysing agroforest-frontiers. In comparison to this study, my findings identify that synergistic agency, ecological stewardship and well-being are concurrent themes within the practice of food forestry.

Alongside other scholars (Arias-Arévalo et al., 2018; Gavin et al., 2018; Rawluk et al., 2019), Pace Ricci & Merten also endorse the adoption of biocultural approaches because they "capture the inextricable relations between biological aspects and social aspects in SES [social-ecological systems], offering an alternative understanding of the reciprocal influences between people and nature" (Pace Ricci & Merten, 2020, p. 31). To counter the linear narrative between humans and nature, I advise the adoption of a plural narrative which can acknowledge the mutually beneficial relationships between

humans and ecosystems alongside the destructive forms. Further exploring the link between a biocultural lens and types of human-nature relationships remained outside the scope of this study.

Validity

Roodhof (2020) concluded that the survey was adequately effective at documenting the socio-cultural values of food forests and that the combination of the survey and the follow-up interviews provided both breadth and depth of information. The findings are deemed valid only for the respondents and the food forests that took part in this study. This is because of the limited sample size (n=48) and population type (people closely engaged with food forests within the national monitoring programme). An unequal representation also exists of the various types and ages of food forests and various interpretations around the definition of a food forest. It is however, exactly for this reason that studies are being undertaken because many of these food forests are pioneering practices. Hence, understanding their significant perceptions at an early stage can be indicative of what people in the future may think and feel if and when others engage with food forests. This study also provided a reference point for future comparative studies.

Interpreting visual, written and sensed information

The information gathered from the follow-up interviews often complemented the survey responses as they provided more context and were richer in kind, yet time-consuming to analyse. In addition to this, the use of visual information enriched my understanding of people's connection with the living environment. This is reflected through the inclusion of pictures taken and shared by respondent in Chapter 4.1. In particular, Figure 4.4 & Figure 4.9 add an intangible richness to the message being conveyed. Through narrative and visual reporting, researchers can fine-tune the portrayal of socio-cultural values. Based on this study, I argue that knowledge (in terms of value) is also conveyed through experience and interaction. For example, the following passage of an interview with respondent C11 suggests that through conversations, enthusiasm, and pictures, volunteers can carry across potentially valuable connections across to others.

"[…] that I sort of can be an example, without imposing this on others of course. And that [a] food forest is an example in itself, but a food forest cannot 'talk' by itself, so we as volunteers will have to be that example, by talking about it, by being enthusiastic, through pictures and in this way, pulling people towards the food forest. And so, enthusing other people to also get yourself started." (C11:RI36, food forest Mijn Stadstuin)

Such display of intrinsic and relational values are often intangible, experienced and situated, where I sense that emotion is an underlying driver for (inter-)action. An internal WUR report about the many visions on transformative change via research also highlights this: *"The focus is almost*

always on knowledge and facts and data, which can be helpful, but in the end, most people do not act based on dry data, they act on emotion." (Chambers et al., 2020, p. 11). With this in mind, via this study I hope to have acknowledged such emotions and perceptions as a legitimate form of knowledge that is significant in understanding human behaviour and developing sustainable relationships with all living and non-living forms.

Transparency of interpretations

My findings are based on a large set of qualitative and semi-quantitative data pool. I adopted a general coding scheme to cluster and analyse the responses, however, this was not consistently iterative in nature. I therefore advise to follow-up with an iterative approach when coding qualitative data using 1st and 2nd order analysis (Gioia et al., 2013) through the use of ATLAS.ti.

To remain transparent about by interpretations, access to the transcripts and survey responses are made accessible to my supervisor and examiner and can be made available to anyone who wishes to verify my work. To allow for my interpretations and data to be traceable, all quotes and pictures are coded with numbers to denote the origin: a response from the survey (R), a response from the interview (RI), in connection to which survey question (R:#) and the anonymised respondent (C#) – see appendix 8.2 for details. Ideally, a follow-up round is organised whereby respondents provide a second round of input based on my interpretations made. In addition to this, a third person should go through my data and cross-check whether my interpretations are the same as theirs. Both steps were unfortunately not possible within the available time.

Throughout this thesis, I have aspired to harness my curiosity about food forestry with an academic mindset. I cannot hide behind a utopic demand for objectiveness, hence, I would like to acknowledge that my interpretations are subjective to my own background and ways of understanding, as described in Section 3.6: 'Ethical considerations' (pg. 24). As a trained academic, I can reflect on my subjectivity, acknowledge any that I have and so, prevent major forms of biases that may cloud my judgement. I am aware of my interest in food forestry, and I consider this academic study an exercise where I side-step any major forms of bias and adopt a critical and appreciative perspective in a transparent way.

Recommendations

To contribute towards more reliable and valid studies, I provide a series of recommendations per topic.

Survey

a) Adopt a more extensive set of statements to elicit the types of human-nature relationship (Muradian & Pascual, 2018).

b) Increase the sample size with a near ideal representation of stakeholder types, food forest types and ages.

c) Adding a question to determine how economically dependent a respondent is on the food forest.

d) Follow the recommendations by Roodhof (2020) to improve the questionnaire and to adapt the questionnaire (if needed) in a reflexive manner.

Methodology & approach

a) Use the NCP framework (IPBES, 2016) and the proposed guidelines on assessing cultural and spiritual significance of nature (Verschuuren et al., 2021) as a foundation whilst remaining reflexive and adaptive towards gathering information at hand.

b) Depending on the goal, adopt a mixed-methods approach to account for diverse ways of valuation, such as narrative method (i.e. interviews and questionnaires) (Fagerholm et al., 2012), photo-elicitation survey (López-Santiago et al., 2014), deliberative methods (Kenter et al., 2015) and participatory mapping methods on e.g. food forest elements or at system-level (Fagerholm, Oteros-Rozas, et al., 2016).

c) To contextualize future research, identify and incorporate the determinants of socio-cultural values of ecosystem services (Scholte et al., 2015), such as landscape characteristics, the uses of a food forest and group-generated values.

d) Consider adopting a biocultural lens when studying values embedded in socio-ecological systems.

e) Adopt of a plural narrative which can acknowledge the mutually beneficial relationships between humans and ecosystems alongside the destructive forms. Rawluk et al. (2019) presented a conceptual framework that is ontologically plural and epistemologically flexible, allowing values and valuation methods to be mapped across different levels of abstractness and context dependency. This boundary object can facilitate interdisciplinary engagement, suggests relevant ways of understanding values and translate results into the policy arena.

Future research

There are many possibilities to explore due to the novelty of food forestry practices in the Netherlands, below are several recommendations.

Explore shared values

This requires a deliberative valuation method, i.e. in-depth group discussions. Ideally, group discussions are held with 4-6 people to elicit shared values, which can greatly differ from individual responses (Kenter et al., 2015). Group discussions can make shared values (such as transcendental, societal, communal and other-regarding) more explicit due to an open deliberative process. Processes such as learning and reflection allow for values to be co-constructed, which challenges the assumption that values are pre-formed.

Compare indigenous and western values on nature

It can be beneficial to draw insights from various studies that have assessed the significance of nature in conservation areas and indigenous communities that depend on their direct living environment (Bernbaum & Verschuuren, 2019; Verschuuren, 2012; Verschuuren et al., 2021). Such studies can also provide a basis to compare indigenous knowledge and nature perspectives with western perspectives on nature (Nalini, 2017). I also think these studies can provide prospective on the ways people relate to their environment, how to recognise, elicit and monitor such meaningful interactions and the impact of such socio-cultural values on the quality of life.

Monitor the change of values over time, e.g. across seasons

Through a discussion (B. Rooduijn & P. de Graaf, 2021. *pers.comm.,* 25 March), it was pointed out that people particularly make connections with nature during springtime, something I also came across in my study. This could be further explored in order to make substantial claims about the effect of seasons on human perceptions, such as by Oteros-Rozas et al. (2014). A potential method to explore the effect of seasons on perceptions is using a photo-series analysis (Tenerelli et al., 2016) or comparing valuations across different times/seasons. The NMVB is in pursuit of monitoring the effects food forests in many respects and will provide a basis for comparison as food forests age over time. The functions and goals of food forests are also likely to develop over time and future research can identify the accompanying socio-cultural valuations that are experienced throughout. It is best to tailor research needs in a dynamic way.

Suggested reading

Studying values in urban areas, mainly in the global North, is a relatively new, albeit growing, trend. Insights from studies by Elands et al. (2015); Kabisch et al. (2016); Park & Higgs (2018) provide a basis for potential indicators and attributes to consider when studying values in a food forest setting. To build on existing food forestry studies in the Dutch context, it is recommended to read Baas (2018); Bakker (2016); Boldyreva (2019); Breidenbach et al. (2017); Doomen et al. (2019); Green Deal Voedselbossen (2020); de Groot & Veen (2017); Limareva (2014); Rebisz (2019); van Bree et al., (2021); van Eijk, (2019); van Gent (2019); and Verbeek (2019).

6   Conclusion

The interaction between humans and food forests that have taken part in this study resulted in a rainbow of socio-cultural values. This study explores how 48 food forest owners, managers, designers, employees and volunteers value their engagement with a food forest, in context and as a practice. These findings are deemed valid only for the respondents and the food forests that took part in this study. An elaborate report is given to answer the following research questions:

1) *What are the socio-cultural values of food forests by participants of the national monitoring programme on food forests (NMVB) across the Netherlands?*
   a) *Which value themes come across?*
   b) *Are any themes considered more valuable than others?*
   c) *What is the background of the participants?*
   d) *What types of human-nature relationships exist amongst the participants?*

To summarize, this study identifies 7 main socio-cultural value themes: ecology, biocultural harmony & sustainability, knowledge & education, security & livelihoods, health & well-being, identity & community, and experiential perceptions. As visualised by the value wheel, a heterarchical perception exists for the elicited socio-cultural values of these food forests. Most values are intrinsic and non-anthropocentric in nature as the ecology and biodiversity aspects of food forests have been valued more than other aspects. Values are also carried by an altruistic and biocentric viewpoint as food forestry is strongly perceived as a sustainable endeavour for future generations. Together with the educational value of food forests, these themes are valued more so than the economic, social and well-being aspects of food forests. Despite this relativity, there have been frequent (self-reported) perceptions about food forests supporting both human well-being and ecosystem health. The economics of a food forest seems of less value; however, it is an aspect of which is still under development due to the premature ages of food forests.

The elicited values range from being intrinsic and relational types to also instrumental types, with relational values being the most frequent type. Socio-cultural values are often non-material, individually held values and experiential in nature. Notions of value are also often expressed in the form of a preference for a biodiverse ecosystem encompassing metaphysical, transformative, supportive, and inherent value dimensions.

The background of the participants is a diverse collection of people aged between 25 and 68, with two thirds being male and one third being female. 98% have a post-secondary educational degree, of which roughly two thirds are more theoretically trained and one third being more practically trained. The majority of respondents (60%) engage with food forests that have mixed goals,

those oriented towards both production and cultural goals. This is followed by food forests mainly oriented towards cultural goals (21%), followed by production-oriented ones with 13%. 98% of respondents indicate that the food forest they engage with is considered important at a societal level and 83% stated their food forest to be of personal importance. All respondents perceived a positive influence on their sense of well-being from their engagement with a food forest.

These socio-cultural values are given within a dominant cognitive framework where humans are seen as part of nature, much alike a biocultural perspective. The 'participant relational model' is most common type of human-nature relationship elicited for almost all respondents, often in combination with notions of stewardship and respect for nature. Few respondents show a utilitarian perspective on their human-nature relationship. The socio-cultural values found in this study are seen as a complementary form in the effort to pluralize our understanding and identification of values in relation to nature. These socio-cultural values are currently not mediated by the market and the question remains open on whether this should or could be valued via monetary means. In sum, the interaction between food forests and humans results in a multitude of material and non-material value creation. Overall, I hope to have illustrated that understanding socio-cultural values reflect the qualities of a story about how humans can relate to one another and the living environment.

7 References

Abbas, F., Hammad, H. M., Fahad, S., Cerdà, A., Rizwan, M., Farhad, W., Ehsan, S., & Bakhat, H. F. (2017). Agroforestry: a sustainable environmental practice for carbon sequestration under the climate change scenarios—a review. *Environmental Science and Pollution Research*, *24*(12), 11177–11191. https://doi.org/10.1007/s11356-017-8687-0

Abraham, A., Sommerhalder, K., & Abel, T. (2010). Landscape and well-being: A scoping study on the health-promoting impact of outdoor environments. In *International Journal of Public Health* (Vol. 55, Issue 1, pp. 59–69). Birkhauser Verlag AG. https://doi.org/10.1007/s00038-009-0069-z

Agnoletti, M., & Rotherham, I. D. (2015). Landscape and biocultural diversity. *Biodiversity and Conservation*, *24*(13), 3155–3165. https://doi.org/10.1007/s10531-015-1003-8

Arias-Arévalo, P., Gómez-Baggethun, E., Martín-López, B., & Pérez-Rincón, M. (2018). Widening the Evaluative Space for Ecosystem Services: A Taxonomy of Plural Values and Valuation Methods. *Environmental Values*, *27*(1), 29–53. https://doi.org/10.3197/096327118X15144698637513

Arias-Arévalo, P., Martín-López, B., & Gómez-Baggethun, E. (2017). Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. *Ecology and Society*, *22*(4), art43. https://doi.org/10.5751/ES-09812-220443

Askerlund, P., & Almers, E. (2016). Forest gardens – new opportunities for urban children to understand and develop relationships with other organisms. *Urban Forestry & Urban Greening*, *20*, 187–197. https://doi.org/10.1016/j.ufug.2016.08.007

Baas, W. R. (2018). *Bodemactiviteit en landgebruik* [B.Sc. Thesis, Van Hall Larenstein University of Applied Sciences]. https://www.greeni.nl/webopac/MetaDataEditDownload.csp?file=2:144573:1

Bakker, M. (2016). *Sustainability Assessment of Complex Agroecosystems: a case study at Ketelbroek Food Forest* [M.Sc. Thesis, Wageningen University]. http://edepot.wur.nl/418372

Bendt, P., Barthel, S., & Colding, J. (2013). Civic greening and environmental learning in public-access community gardens in Berlin. *Landscape and Urban Planning*, *109*(1), 18–30. https://doi.org/10.1016/j.landurbplan.2012.10.003

Bernbaum, E., & Verschuuren, B. (2019). *Proceedings of the 2018 US / ICOMOS Symposium*. *August*.

Bieling, C., Plieninger, T., Pirker, H., & Vogl, C. R. (2014). Linkages between landscapes and human well-being: An empirical exploration with short interviews. *Ecological Economics*, *105*, 19–30. https://doi.org/10.1016/j.ecolecon.2014.05.013

Binder, C. R., Hinkel, J., Bots, P. W. G., Pahl, C., Binder, C. R., Hinkel, J., Bots, P. W. G., & Pahl-Wostl, C. (2013). Comparison of Frameworks for Analyzing Social-ecological Systems. *Ecology and Society*, *18*(4), 26. https://doi.org/10.5751/ES-05551-180426

Björklund, J., Eksvärd, K., & Schaffer, C. (2019). Exploring the potential of edible forest gardens: experiences from a participatory action research project in Sweden. *Agroforestry Systems*, *93*(3), 1107–1118. https://doi.org/10.1007/s10457-018-0208-8

Boldyreva, M. (2019). *Exploring the Social Aspects of Food Forests in the Netherlands*.

Breidenbach, J., Dijkgraaf, E. J. J., Rooduijn, B., Nijpels-Cieremans, R., & Strijkstra, A. M. M. (2017). Voedselbossen van belang voor biodiversiteit. *De Levende Natuur*, *118*(3), 90–93. https://greendealvoedselbossen.nl/wp-content/uploads/2019/03/DLN-Breidenbach-e.a.-Voedselbossen-van-belang-voor-biodiversiteit-2017.pdf

Brown, S. E., Miller, D. C., Ordonez, P. J., & Baylis, K. (2018). Evidence for the impacts of agroforestry on agricultural productivity, ecosystem services, and human well-being in high-income countries: A systematic map protocol. *Environmental Evidence*, *7*(1), 24. https://doi.org/10.1186/s13750-018-0136-0

Buizer, M., Elands, B., & Vierikko, K. (2016). Governing cities reflexively—The biocultural diversity concept as an alternative to ecosystem services. *Environmental Science and Policy*, *62*, 7–13. https://doi.org/10.1016/j.envsci.2016.03.003

Calvet-Mir, L., Gómez-Baggethun, E., & Reyes-García, V. (2012). Beyond food production: Ecosystem services provided by home gardens. A case study in Vall Fosca, Catalan Pyrenees, Northeastern Spain. *Ecological Economics*, *74*, 153–160. https://doi.org/10.1016/j.ecolecon.2011.12.011

Capra, F. (1996). The web of life : a new scientific understanding of living systems. In *Anchor Books*. Anchor Books/Doubleday. http://catdir.loc.gov/catdir/description/random0413/96012576.html

Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., Narwani, A., Mace, G. M., Tilman, D., Wardle, D. A., Kinzig, A. P., Daily, G. C., Loreau, M., Grace, J. B., Larigauderie, A., Srivastava, D. S., & Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, *486*(7401), 59–67. https://doi.org/10.1038/nature11148

Chambers, J. M., Nell, J. L., & Hille, R. L. (2020). *71 Visions on our role in social-environmental transformative change* (Issue December). www.wur.eu/transformative-change

Chan, K. M. A., Guerry, A. D., Balvanera, P., Klain, S., Satterfield, T., Basurto, X., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B. S., Hannahs, N., Levine, J., Norton, B., Ruckelshaus, M., Russell, R., Tam, J., & Woodside, U. (2012). Where are Cultural and Social in Ecosystem Services? A Framework for Constructive Engagement. *BioScience*, *62*(8), 744–756. https://doi.org/10.1525/bio.2012.62.8.7

Chan, K. M. A., Satterfield, T., & Goldstein, J. (2012). Rethinking ecosystem services to better address and navigate cultural values. *Ecological Economics*, *74*, 8–18. https://doi.org/10.1016/j.ecolecon.2011.11.011

Clark, K. H., & Nicholas, K. A. (2013). Introducing urban food forestry: A multifunctional approach to increase food security and provide ecosystem services. *Landscape Ecology*. https://doi.org/10.1007/s10980-013-9903-z

Cooke, B., West, S., & Boonstra, W. J. (2016). Dwelling in the biosphere: exploring an embodied human–environment connection in resilience thinking. In *Sustainability Science* (Vol. 11, Issue 5, pp. 831–843). Springer-Verlag Tokyo. https://doi.org/10.1007/s11625-016-0367-3

Crawford, M. (2010). *Creating a forest garden*. Green Books.

Davidson-Hunt, I. J., & Berkes, F. (2009). Nature and society through the lens of resilience: toward a human-in-ecosystem perspective. In *Navigating Social-Ecological Systems*. https://doi.org/10.1017/cbo9780511541957.006

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., Hill, R., Chan, K. M. A., Baste, I. A., Brauman, K. A., Polasky, S., Church, A., Lonsdale, M., Larigauderie, A., Leadley, P. W., van Oudenhoven, A. P. E., van der Plaat, F., Schröter, M., Lavorel, S., … Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, *359*(6373), 270–272. https://doi.org/10.1126/science.aap8826

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. In *Annual Review of Environment and Resources* (Vol. 30, pp. 335–372). Annual Reviews. https://doi.org/10.1146/annurev.energy.30.050504.144444

Doomen, R., van Leeuwen, B., & Puhe, L. (2019). *Food Forest business models*. HAS University of Applied Sciences.

Douglas, I. (2017). Ecosystems and human well-being. In *Encyclopedia of the Anthropocene*. https://doi.org/10.1016/B978-0-12-809665-9.09206-5

Elands, B.H.M., Vierikko, K., Andersson, E., Fischer, L. K., Gonçalves, P., Haase, D., Kowarik, I., Luz, A. C., Niemelä, J., Santos-Reis, M., & Wiersum, K. F. (2019). Biocultural diversity: A novel concept to assess human-nature interrelations, nature conservation and stewardship in cities. *Urban Forestry & Urban Greening*, *40*, 29–34. https://doi.org/10.1016/j.ufug.2018.04.006

Elands, Birgit H.M., Wiersum, K. F., Buijs, A. E., & Vierikko, K. (2015). Policy interpretations and manifestation of biocultural diversity in urbanized Europe: conservation of lived biodiversity. *Biodiversity and Conservation*, *24*(13), 3347–3366. https://doi.org/10.1007/s10531-015-0985-6

Fagerholm, N., Käyhkö, N., Ndumbaro, F., & Khamis, M. (2012). Community stakeholders' knowledge in landscape assessments – Mapping indicators for landscape services. *Ecological Indicators*, *18*, 421–433. https://doi.org/10.1016/j.ecolind.2011.12.004

Fagerholm, N., Oteros-Rozas, E., Raymond, C. M., Torralba, M., Moreno, G., & Plieninger, T. (2016). Assessing linkages between ecosystem services, land-use and well-being in an agroforestry landscape using public participation GIS. *Applied Geography*, *74*, 30–46.

https://doi.org/10.1016/j.apgeog.2016.06.007

Fagerholm, N., Torralba, M., Burgess, P. J., & Plieninger, T. (2016). A systematic map of ecosystem services assessments around European agroforestry. In *Ecological Indicators* (Vol. 62). https://doi.org/10.1016/j.ecolind.2015.11.016

FAO. (2019). Held and assigned values. In *Valuing Forest Ecosystem Services* (pp. 172–172). UN. https://doi.org/10.18356/b2d4a902-en

Farrell, K. (2007). Living with living systems: The co-evolution of values and valuation. *International Journal of Sustainable Development and World Ecology*, *14*(1), 14–26. https://doi.org/10.1080/13504500709469704

Freeman, E. R. 1984. (1984). Freeman, E.R. 1984. *Strategic Management: A Stakeholder Approach*.

Gaspar, P., Escribano, M., & Mesias, F. J. (2016). A qualitative approach to study social perceptions and public policies in dehesa agroforestry systems. *Land Use Policy*, *58*, 427–436. https://doi.org/10.1016/j.landusepol.2016.06.040

Gavin, M. C., McCarter, J., Mead, A., Berkes, F., Stepp, J. R., Peterson, D., & Tang, R. (2015). Defining biocultural approaches to conservation. *Trends in Ecology and Evolution*, *30*(3), 140–145. https://doi.org/10.1016/j.tree.2014.12.005

Gavin, McCarter, J., Berkes, F., Mead, A., Sterling, E., Tang, R., & Turner, N. (2018). Effective Biodiversity Conservation Requires Dynamic, Pluralistic, Partnership-Based Approaches. *Sustainability*, *10*(6), 1846. https://doi.org/10.3390/su10061846

GD-219. (2017). *Green Deal Voedselbossen*. https://www.greendeals.nl/sites/default/files/downloads/GD219-dealtekst-Voedselbossen.pdf

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, *16*(1), 15–31. https://doi.org/10.1177/1094428112452151

Gómez-Baggethun, E., de Groot, R., Lomas, P. L., & Montes, C. (2010). The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. *Ecological Economics*, *69*(6), 1209–1218. https://doi.org/10.1016/j.ecolecon.2009.11.007

Green Deal Voedselbossen. (2020). *Factsheet Voedselbossen* (Issue September). https://greendealvoedselbossen.nl/factsheet-voedselbossen/

Groot, E. De, & Veen, E. (2017). *Food Forests : An upcoming phenomenon in the Netherlands*. *33*.

Haines-Young, R., & Potschin, M. (2018). *Towards a Common International Classification of Ecosystem Services (CICES) for Integrated Environmental and Economic Accounting*. https://cices.eu/resources/

Hanspach, J., Jamila Haider, L., Oteros-Rozas, E., Stahl Olafsson, A., Gulsrud, N. M., Raymond, C. M.,

Torralba, M., Martín-López, B., Bieling, C., García-Martín, M., Albert, C., Beery, T. H., Fagerholm, N., Díaz-Reviriego, I., Drews-Shambroom, A., & Plieninger, T. (2020). Biocultural approaches to sustainability: A systematic review of the scientific literature. *People and Nature*, *2*(3), 643–659. https://doi.org/10.1002/pan3.10120

Hausmann, A., Slotow, R., Burns, J. K., & Di Minin, E. (2016). The ecosystem service of sense of place: Benefits for human well-being and biodiversity conservation. *Environmental Conservation*, *43*(2), 117–127. https://doi.org/10.1017/S0376892915000314

Himes, A., & Muraca, B. (2018). Relational values: the key to pluralistic valuation of ecosystem services. In *Current Opinion in Environmental Sustainability* (Vol. 35, pp. 1–7). Elsevier B.V. https://doi.org/10.1016/j.cosust.2018.09.005

Hunter, A. J., & Luck, G. W. (2015). Defining and measuring the social-ecological quality of urban greenspace: a semi-systematic review. *Urban Ecosystems*, *18*(4), 1139–1163. https://doi.org/10.1007/s11252-015-0456-6

IPBES. (2016). Preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services. In *Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services - Fourth session*. https://doi.org/IPBES/4/INF/13

IPCC. (2020). *About the IPCC*. https://www.ipcc.ch/about/

Jacke, D. (2008). *Edible Forest Gardens About Forest Gardening*. http://www.edibleforestgardens.com/about_gardening

Jacobs, S., Martín-lópez, B., Barton, D. N., Dunford, R., Harrison, P. A., Kelemen, E., Saarikoski, H., Termansen, M., García-llorente, M., Gómez-baggethun, E., Kopperoinen, L., Luque, S., Palomo, I., Priess, J. A., Rusch, G. M., Tenerelli, P., Turkelboom, F., Demeyer, R., Hauck, J., … Smith, R. (2018). The means determine the end – Pursuing integrated valuation in practice. *Ecosystem Services*, *29*, 515–528. https://doi.org/10.1016/j.ecoser.2017.07.011

Kabisch, N., Strohbach, M., Haase, D., & Kronenberg, J. (2016). Urban green space availability in European cities. *Ecological Indicators*, *70*, 586–596. https://doi.org/10.1016/j.ecolind.2016.02.029

Kadykalo, A. N., López-Rodriguez, M. D., Ainscough, J., Droste, N., Ryu, H., Ávila-Flores, G., Le Clec'h, S., Muñoz, M. C., Nilsson, L., Rana, S., Sarkar, P., Sevecke, K. J., & Harmáčková, Z. V. (2019). Disentangling 'ecosystem services' and 'nature's contributions to people.' In *Ecosystems and People* (Vol. 15, Issue 1, pp. 269–287). Taylor and Francis Ltd. https://doi.org/10.1080/26395916.2019.1669713

Kati, V., & Jari, N. (2016). Bottom-up thinking-Identifying socio-cultural values of ecosystem services in local blue-green infrastructure planning in Helsinki, Finland. *Land Use Policy*, *50*, 537–547.

https://doi.org/10.1016/j.landusepol.2015.09.031

Kay, S., Graves, A., Palma, J. H. N., Moreno, G., Roces-Díaz, J. V., Aviron, S., Chouvardas, D., Crous-Duran, J., Ferreiro-Domínguez, N., García de Jalón, S., Măcicăşan, V., Mosquera-Losada, M. R., Pantera, A., Santiago-Freijanes, J. J., Szerencsits, E., Torralba, M., Burgess, P. J., & Herzog, F. (2019). Agroforestry is paying off – Economic evaluation of ecosystem services in European landscapes with and without agroforestry systems. In *Ecosystem Services* (Vol. 36). https://doi.org/10.1016/j.ecoser.2019.100896

Kenter, J. O., O'Brien, L., Hockley, N., Ravenscroft, N., Fazey, I., Irvine, K. N., Reed, M. S., Christie, M., Brady, E., Bryce, R., Church, A., Cooper, N., Davies, A., Evely, A., Everard, M., Fish, R., Fisher, J. A., Jobstvogt, N., Molloy, C., … Williams, S. (2015). What are shared and social values of ecosystems? *Ecological Economics*, *111*, 86–99. https://doi.org/10.1016/j.ecolecon.2015.01.006

Kijazi, M. H., & Kant, S. (2010). Forest stakeholders' value preferences in Mount Kilimanjaro, Tanzania. *Forest Policy and Economics*, *12*(5), 357–369. https://doi.org/10.1016/j.forpol.2010.02.007

Kitsteiner, J. (2013). *Nine Layers of the Edible Forest Garden (Food Forest) | Temperate Climate Permaculture*. http://tcpermaculture.com/site/2013/05/27/nine-layers-of-the-edible-forest-garden/

Klain, S. C., Olmsted, P., Chan, K. M. A., & Satterfield, T. (2017). Relational values resonate broadly and differently than intrinsic or instrumental values, or the New Ecological Paradigm. *PLoS ONE*. https://doi.org/10.1371/journal.pone.0183962

Kremen, C., & Merenlender, A. M. (2018). Landscapes that work for biodiversity and people. *Science*, *362*(6412). https://doi.org/10.1126/science.aau6020

Latour, B. (2011). From multiculturalism to multinaturalism: What rules of method for the new socio-scientific experiments? *Nature and Culture*. https://doi.org/10.3167/nc.2011.060101

Latour, B., & Heather, D. (2015). Diplomacy in the Face of Gaia : Bruno Latour in conversation with Heather Davis. *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies*.

Lele, S., Brondizio, E. S., Byrne, J., Mace, G., & Martinez-Alier, J. (2018). Framing the Environment. In *Rethinking Environmentalism*. http://search.ebscohost.com.ezproxy.library.wur.nl/login.aspx?direct=true&db=nlebk&AN=2094629&site=ehost-live&ebv=EB&ppid=pp_5

Levis, C., Costa, F. R. C., Bongers, F., Peña-Claros, M., Clement, C. R., Junqueira, A. B., Neves, E. G., Tamanaha, E. K., Figueiredo, F. O. G., Salomão, R. P., Castilho, C. V., Magnusson, W. E., Phillips, O. L., Guevara, J. E., Sabatier, D., Molino, J. F., Cárdenas López, D., Mendoza, A. M., Pitman, N.

C. A., … Ter Steege, H. (2017). Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science*, *355*(6328), 925–931. https://doi.org/10.1126/science.aal0157

Levis, Carolina, Flores, B. M., Moreira, P. A., Luize, B. G., Alves, R. P., Franco-Moraes, J., Lins, J., Konings, E., Peña-Claros, M., Bongers, F., Costa, F. R. C., & Clement, C. R. (2018). How people domesticated Amazonian forests. *Frontiers in Ecology and Evolution*, *5*(JAN), 171. https://doi.org/10.3389/fevo.2017.00171

Lewis, S. L., & Maslin, M. A. (2015). Defining the Anthropocene. In *Nature*. https://doi.org/10.1038/nature14258

Limareva, A. (2014). *Ecological Principles in Natural Temperate Forest Ecosystems Relevant for Productive Food Forests* [Van Hall l Larenstein University of Applied Sciences]. http://www.anastasialimareva.com/wp-content/uploads/2016/01/Food-forests-in-temperate-climate_Anastasia-Limareva-1.pdf

López-Santiago, C. A., Oteros-Rozas, E., Martín-López, B., Plieninger, T., Martín, E. G., & González, J. A. (2014). Using visual stimuli to explore the social perceptions of ecosystem services in cultural landscapes: The case of transhumance in Mediterranean Spain. *Ecology and Society*, *19*(2). https://doi.org/10.5751/ES-06401-190227

Lovell, S. T., Dupraz, C., Gold, M., Jose, S., Revord, R., Stanek, E., & Wolz, K. J. (2018). Temperate agroforestry research: considering multifunctional woody polycultures and the design of long-term field trials. In *Agroforestry Systems* (Vol. 92, Issue 5). https://doi.org/10.1007/s10457-017-0087-4

MA. (2005). *Ecosystems and Human well-being: Health Synthesis*.

Maarhuis, N. (2021, June 18). *Matthijs Schouten: "Wie denken we als mensheid wel dat we zijn?"* MaatschapWij. https://maatschapwij.nu/videoportret/matthijs-schouten-natuurfilosoof/

Marsden, T. (2013). Sustainable place-making for sustainability science: The contested case of agri-food and urban-rural relations. *Sustainability Science*, *8*(2), 213–226. https://doi.org/10.1007/s11625-012-0186-0

McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? *Ecosphere*, *4*(5), art67. https://doi.org/10.1890/ES13-00075.1

Mehmood, A., Marsden, T., Taherzadeh, A., Axinte, L. F., & Rebelo, C. (2020). Transformative roles of people and places: learning, experiencing, and regenerative action through social innovation. *Sustainability Science*, *15*(2), 455–466. https://doi.org/10.1007/s11625-019-00740-6

Miller, D. C., Ordoñez, P. J., Brown, S. E., Forrest, S., Nava, N. J., Hughes, K., & Baylis, K. (2020). The impacts of agroforestry on agricultural productivity, ecosystem services, and human well-being

in low-and middle-income countries: An evidence and gap map. *Campbell Systematic Reviews*, *16*(1). https://doi.org/10.1002/cl2.1066

Moran, E. (2005). Human-environment interactions in forest ecosystems: An introduction. In *Seeing the forest and the trees: Human environment interactions in forest ecosystems*.

Moreno, G., Aviron, S., Berg, S., Crous-Duran, J., Franca, A., de Jalón, S. G., Hartel, T., Mirck, J., Pantera, A., Palma, J. H. N., Paulo, J. A., Re, G. A., Sanna, F., Thenail, C., Varga, A., Viaud, V., & Burgess, P. J. (2018). Agroforestry systems of high nature and cultural value in Europe: provision of commercial goods and other ecosystem services. *Agroforestry Systems*, *92*(4), 877–891. https://doi.org/10.1007/s10457-017-0126-1

Muradian, R., & Pascual, U. (2018). A typology of elementary forms of human-nature relations: a contribution to the valuation debate. In *Current Opinion in Environmental Sustainability* (Vol. 35, pp. 8–14). Elsevier B.V. https://doi.org/10.1016/j.cosust.2018.10.014

Nair, P. (1993). *An Introduction to Agroforestry Kluwer Academic Publishers*. Kluwer Academic Publishers. http://www.worldagroforestry.org/Units/Library/Books/PDFs/32_An_introduction_to_agroforestry.pdf?n=161

Nair, P. (2014). Agroforestry: Practices and Systems. In *Encyclopedia of Agriculture and Food Systems* (pp. 270–282). Elsevier. https://doi.org/10.1016/B978-0-444-52512-3.00021-8

Nalini, N. S. (2017). *Images of nature: exploring the Saamaka Maroon meanings of nature in the upper Suriname river area* (Issue February). Wageningen University.

O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability*, *1*(2), 88–95. https://doi.org/10.1038/s41893-018-0021-4

Oosterbaan, A., & Kuiters, A. T. (2008). Agroforestry in the Netherlands. In *Agroforestry in Europe* (pp. 331–341). Springer Netherlands. https://doi.org/10.1007/978-1-4020-8272-6_16

Oteros-Rozas, E., Martín-López, B., González, J. A., Plieninger, T., López, C. A., & Montes, C. (2014). Socio-cultural valuation of ecosystem services in a transhumance social-ecological network. *Regional Environmental Change*, *14*(4), 1269–1289. https://doi.org/10.1007/s10113-013-0571-y

Pace Ricci, J., & Merten, K. (2020). *Reviewing and Verifying People ' s Contribution to Nature* (Issue February). Wageningen University.

Park, H., & Higgs, E. (2018). A criteria and indicators monitoring framework for food forestry embedded in the principles of ecological restoration. *Environmental Monitoring and Assessment*, *190*(3), 113. https://doi.org/10.1007/s10661-018-6494-9

Park, H., Turner, N., & Higgs, E. (2018). Exploring the potential of food forestry to assist in ecological

restoration in North America and beyond. *Restoration Ecology*, *26*(2), 284–293. https://doi.org/10.1111/rec.12576

Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R. T., Başak Dessane, E., Islar, M., Kelemen, E., Maris, V., Quaas, M., Subramanian, S. M., Wittmer, H., Adlan, A., Ahn, S., Al-Hafedh, Y. S., Amankwah, E., Asah, S. T., … Yagi, N. (2017). Valuing nature's contributions to people: the IPBES approach. *Current Opinion in Environmental Sustainability*, *26–27*, 7–16. https://doi.org/10.1016/j.cosust.2016.12.006

Piccolo, J. J. (2017). Intrinsic values in nature : Objective good or simply half of an unhelpful dichotomy ? *Journal for Nature Conservation*, *37*, 8–11. https://doi.org/10.1016/j.jnc.2017.02.007

Plieninger, T., Dijks, S., Oteros-Rozas, E., & Bieling, C. (2013). Assessing, mapping, and quantifying cultural ecosystem services at community level. *Land Use Policy*, *33*, 118–129. https://doi.org/10.1016/j.landusepol.2012.12.013

Poschlod, P. (2015). The Origin and Development of the Central European Man-made Landscape, Habitat and Species Diversity as Affected by Climate and its Changes – a Review. *Interdisciplinaria Archaeologica - Natural Sciences in Archaeology*, *VI*(2/2015), 197–221. https://doi.org/10.24916/iansa.2015.2.5

Rawluk, A., Ford, R., Anderson, N., & Williams, K. (2019). Exploring multiple dimensions of values and valuing: a conceptual framework for mapping and translating values for social-ecological research and practice. *Sustainability Science*, *14*(5), 1187–1200. https://doi.org/10.1007/s11625-018-0639-1

Rebisz, S. (2019). *Exploring food forestry as a sustainable land management practice: starting at the soil - A comparative case study assessing soil health at Food Forest Ketelbroek, nature reserve "De Bruuk" and a conventional arable farm in Groesbeek, the Netherlands* [M.Sc. Thesis, Wageningen University]. https://edepot.wur.nl/511035

Reyes-Arroyo, N., Camacho-Valdez, V., Saenz-Arroyo, A., & Infante-Mata, D. (2021). Socio-cultural analysis of ecosystem services provided by mangroves in La Encrucijada Biosphere Reserve, southeastern Mexico. *Local Environment*, *26*(1), 86–109. https://doi.org/10.1080/13549839.2020.1867836

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., … Foley, J. (2009). Planetary boundaries: Exploring the safe operating space for humanity. *Ecology and Society*. https://doi.org/10.5751/ES-03180-140232

Roodhof, A. (2020). *Finding Quality in Quantitative Methods: Documenting Socio-Cultural Values of*

Food Forests using a Questionnaire. Wageningen University.

Scholte, S. S. K., van Teeffelen, A. J. A., & Verburg, P. H. (2015). Integrating socio-cultural

perspectives into ecosystem service valuation: A review of concepts and methods. *Ecological*

Economics, *114*, 67–78. https://doi.org/10.1016/j.ecolecon.2015.03.007

Schouten, M. (2013). Van wie is de natuur nou eigenlijk? *SIGMA*, *6*, 6–10.

https://www.trefpuntgroeneindhoven.nl/wp-content/uploads/2019/12/Van-wie-is-de-natuur-

nou-eigenlijk-.pdf

Shams, R., Parkins, J. R., & Swallow, B. M. (2015). Socio-cultural dimensions of a Jackfruit- Burmese

grape dominated agroforestry system in Bangladesh. *International Journal of Development and*

Sustainability, *44*(66), 721–743. https://www.researchgate.net/publication/292970090

Shi, L., Feng, W., Xu, J., & Kuzyakov, Y. (2018). Agroforestry systems: Meta-analysis of soil carbon

stocks, sequestration processes, and future potentials. *Land Degradation & Development*,

29(11), 3886–3897. https://doi.org/10.1002/ldr.3136

Sodhi, N. S., Koh, L. P., Clements, R., Wanger, T. C., Hill, J. K., Hamer, K. C., Clough, Y., Tscharntke, T.,

Posa, M. R. C., & Lee, T. M. (2010). Conserving Southeast Asian forest biodiversity in human-

modified landscapes. *Biological Conservation*, *143*(10), 2375–2384.

https://doi.org/10.1016/j.biocon.2009.12.029

Spash, C. L. (2007). Deliberative monetary valuation (DMV): Issues in combining economic and

political processes to value environmental change. *Ecological Economics*, *63*(4), 690–699.

https://doi.org/10.1016/j.ecolecon.2007.02.014

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R.,

Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M.,

Persson, L. M., Ramanathan, V., Reyers, B., & Sorlin, S. (2015). Planetary boundaries: Guiding

human development on a changing planet. *Science*, *347*(6223), 1259855–1259855.

https://doi.org/10.1126/science.1259855

Stephenson, J. (2008). The Cultural Values Model: An integrated approach to values in landscapes.

Landscape and Urban Planning, *84*(2), 127–139.

https://doi.org/10.1016/j.landurbplan.2007.07.003

Stichting Voedselbosbouw NL. (2016). *Voedselbossen in NL*.

https://www.voedselbosbouw.org/voedselbossen-in-nederland

Stoltz, J., & Schaffer, C. (2018). Salutogenic affordances and sustainability: Multiple benefits with

edible forest gardens in urban green spaces. *Frontiers in Psychology*, *9*(DEC), 2344.

https://doi.org/10.3389/fpsyg.2018.02344

Tenerelli, P., Demšar, U., & Luque, S. (2016). Crowdsourcing indicators for cultural ecosystem

services: A geographically weighted approach for mountain landscapes. *Ecological Indicators*,

64, 237–248. https://doi.org/10.1016/j.ecolind.2015.12.042

Tress, B., & Tress, G. (2001). Capitalising on multiplicity: a transdisciplinary systems approach to landscape research. *Landscape and Urban Planning*, *57*(3–4), 143–157. https://doi.org/10.1016/S0169-2046(01)00200-6

UNEP. (2020). *The Convention on Biological Diversity*. https://www.cbd.int/convention/

van Bree, H., Schenk, C., & de Vroome, M. (2021). *Voedselbos Ecosysteemdiensten*. HAS.

van Eijk, J. (2019). *Voedselbosbouw in het Deltalandschap*. Wageningen University.

van Gent, T. (2019). *Food Forest Business Models in the Netherlands : Challenges and Opportunities for Scaling*. Utrecht University.

Veen, E. J. (2015). Community gardens in urban areas: a critical reflection on the extent to which they strengthen social cohesion and provide alternative food. In *Community gardens in urban areas: a critical reflection on the extent to which they strengthen social cohesion and provide alternative food*. http://search.ebscohost.com/login.aspx?direct=true&db=lah&AN=20153289130&site=ehost-live

Verbeek, H. (2019). *Communal forest gardens in urban environments in the Netherlands An analysis of the benefits and success factor*. Van Hall Larenstein - University of Applied Sciences.

Vernadsky, V. (1945). The biosphere and the noosphere. *American Scientific*.

Verschuuren, B. (2012). Integrating biocultural values in nature conservation: Perceptions of culturally significant sites and species in adaptive management. In *Sacred Species and Sites: Advances in Biocultural Conservation*. https://doi.org/10.1017/CBO9781139030717.023

Verschuuren, B., Mallarach, J., Bernbaum, E., Spoon, J., Brown, S., Borde, R., Brown, J., Calamia, M., Mitchell, N., Infield, M., & Lee, E. (2021). *Cultural and spiritual significance of nature. Guidance for protected and conserved area governance and management. Best Practice Protected Area Guidelines Series No. 32* (Best Pract, Issue 32). Impremta Aubert. https://doi.org/https://doi.org/10.2305/IUCN.CH.2021.PAG.32.en

Walker, D. H. T., Bourne, L. M., & Shelley, A. (2008). Influence, stakeholder mapping and visualization. *Construction Management and Economics*, *26*(6), 645–658. https://doi.org/10.1080/01446190701882390

West, J. (2006). *Homing in: Wisdom, Knowledge And Practice in Temperate Forest Gardening*. University of Plymouth.

West, S., Haider, L. J., Masterson, V., Enqvist, J. P., Svedin, U., & Tengö, M. (2018). Stewardship, care and relational values. *Current Opinion in Environmental Sustainability*, *35*, 30–38. https://doi.org/10.1016/j.cosust.2018.10.008

Woetzel, J., Pinner, D., Samandari, H., Engel, H., Krishnan, M., Boland, B., & Powis, C. (2020). *Climate risk and response* (Issue January).

WWF. (2020). *LIVING PLANET REPORT 2020 - BENDING THE CURVE OF BIODIVERSITY LOSS* (R. E. A. Almond, M. Grooten, & T. Petersen (eds.)).

8   Appendix

8.1   Adopting the IPBES approach

The IPBES approach fosters a 6-step approach in valuing a social-ecological system. Steps 1 and 2 are carried out and described below. Step 3 is described in Chapter 3. Steps 4 to 6 are omitted because they fall outside the scope of this study.

1. **Identifying the purpose**

   The purpose of this study is to raise awareness and inform society by documenting and recognizing the diversity of values attributed to the interaction between humans a food forestry.

2. **Defining the scope**

There are a plethora of worldviews around which this study aims to consider, as illustrated in Figure 8.1A. Through previous studies, a set of characteristics and their respective typologies exist about the diversity of worldviews people can have (although not exhaustive). Firstly, the concept of worldview can be characterised from an ontological aspect and an epistemological aspect.

   2.1. <u>Various ontologies</u>

   Ontology is a philosophical term referring to the essence of reality by questioning: what is reality? When assessing the valuation of nature, biodiversity or an ecosystem, it is important to acknowledge the different ontological understandings people can have. Different ontologies exist due to the different ways people can understand *reality* (Figure 8.1B). The following typologies (IPBES, 2016) are ways that human beings can view reality:

   - Reductionism: phenomena is reduceable to a basic level of organisation;
   - Spiritualism: the world is constituted of physical matter with a spiritual dimension or metaphysical entity;
   - Idealism: reality is a mental construct;
   - Materialism: the world is only constituted from physical matter and everything is Reducible to material entities, process and interactions;
   - Holism: some high-level systems present emergent properties that cannot be reduced to lower level interactions (e.g. ecosystems)

   These typologies serve as cognitive frameworks and are by no means exhaustive nor concrete categories. When conducting research, these ontological differences can be important to recognize and be made explicit during the data collection and data analysis phases.

   Secondly, how a human being understands the nature of reality is also characterized by their human-nature relationship (Kadykalo et al., 2019; Scholte et al., 2015), as illustrated by Figure 8.1C and Table 8.1. Amidst the diversity of human-nature relationships described by

philosophers and scholars (Arias-Arévalo et al., 2018; Díaz et al., 2018; Lele et al., 2018; Muradian & Pascual, 2018), this study draws on the typologies describes by Muradian & Pascual (2018) and Schouten (2013). They described several types of relational models:

- Detachment: nature is inexistent

- Domination: nature is inferior to human beings

- Devotion: nature is a sacred and superior deity

- Stewardship: humans are custodians of nature

- Participant: humans are part of nature

- Wardship: nature is its own entity with intrinsic rights

- Ritualized exchange: nature is an equal partner

- Utilization: nature is a resource and a separate entity with no intrinsic rights

When analysing the perceived values, assessing them based on these types of relational models can provide a conceptual tool to further compare, differentiate and cluster the various responses.

Thirdly, the view on the form of human interaction influences the way value can be assessed (Figure 8.1D). IPBES (2016) made a distinction between:

- Individualism: where individual beings are the basic units of communities and communities are defined as the aggregation of individuals;

- Communitarianism: communities are more than the aggregation of communities with collective entities and with their own properties and dynamics, ex. what is good for a group may significantly differ from the sum of what is good for its members (IPBES, 2016).

This study took on an individualistic approach to assess nature's value due to the physical restrictions imposed by the outbreak of COVID-19. For this reason, collecting information took place through electronic means which may skew the results towards humans that are expressive through literate means.

2.2. Various epistemologies

IPBES (2016) acknowledges that different 'ways of knowing' (i.e. epistemological systems) are possible due to the presence of various worldviews. Although this study also remains aware of this diversity, the context of this study remains within a dominant Western scientific tradition of justifying true beliefs through a social constructivist lens. Social constructivism is a (Western) philosophy whereby "knowledge, including scientific knowledge, are contingent social productions that depend on varied social factors and paradigms as well as on historical and personal conditions that are (more or less partly) independent of any external objective world" (*Berger and Luckmann, 1966, in* IPBES, 2016).
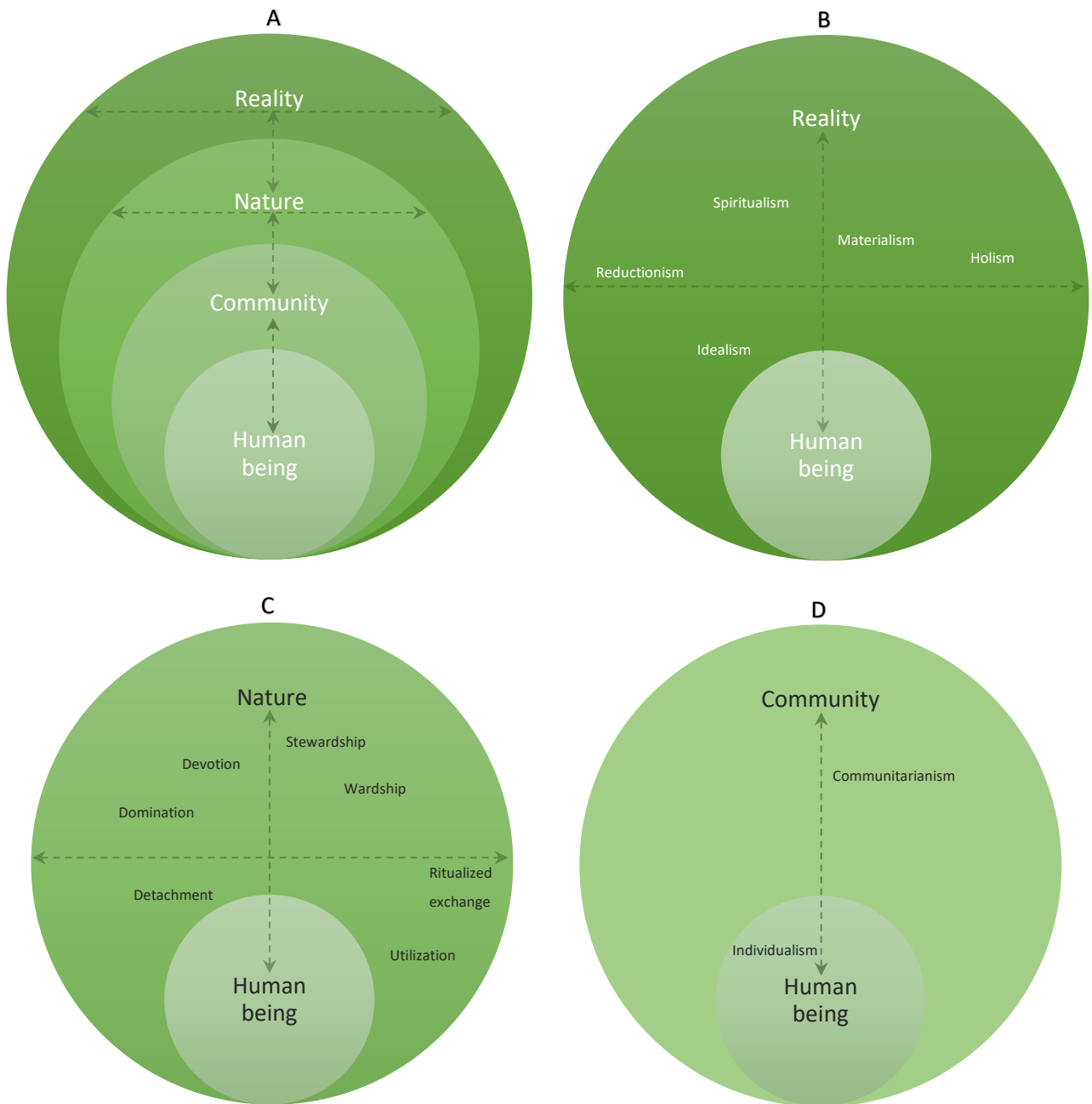
Figure 8.1: A conceptual visualisation on how the concept of worldview can be characterized by and from the four aspects: human being, community, nature and reality [A]; how a human being understands the world can be sub-categorized between the way reality is viewed by a human being [B], the type of human-nature relationship [C] and by the type of human to human community relationship [D] (adapted from IPBES, 2016). This thesis explores aspect C more so than the others.

Table 8.1: An elementary typology of human-nature relational models, as defined by Muradian & Pascual (2018)

Relational model	Ontology (nature of the subject)			Goal orientation	Emotional drivers	Practices	Main mode of interaction
	Clear society-nature distinction	Nature entity with agency	How nature is positioned vis-à-vis humans				
Detachment	Yes	No	Nature as inexistent (invisible)	Preference for urban-and technological spaces. Nature perceived as not important	Indifference	Absence of codified practices	Isolationism
Domination	Yes	No	Hierarchical relation: Nature as subordinated (inferior)	Preference for human control over nature. Nature perceived as a threat	Fear	Rules and norms based on human entitlement (for appropriation/ annihilation of nature) and superiority	Destruction (hostility)
Devotion	No	Yes	Hierarchical relation: Nature as deity (superior)	Preference for situations that are believed to be favorable for the deities. Nature perceived as sacred	Seek of transcendence Obligation	Sacredness yielding religious practices (rituals including taboos)	Worship
Stewardship	No	No	Humans as part of Nature	Preference for human restraint in order to respect nature. Nature perceived as a comprehensive system that encompasses humans.	Sense of belonging, Identity Care	Rules and norms about nature-centered management and self-imposed behavioral limits	Livelihoods integration into nature
Wardship	Yes	No	Nature as a separate entity with intrinsic rights	Preference for pristine spaces or conditions. Nature perceived as a separate entity to be protected.	Aesthetic experience Care Peacefulness	Rules and norms where delimitation of pristine spaces or conditions, and biocentrism (intrinsic rights of nature) prevail	Preservation of wilderness Benevolent patronage
Ritualized exchange	No	Yes	Nature as equal	Preference for equality. Nature perceived as an interactive agent	Obligation	Rules and norms based on the sense of partnership	Partnership Seek of balance
Utilization	Yes	No	Nature as a separate entity with no intrinsic rights	Preference for maximizing benefit-cost ratios. Nature as a source of goods and services and disservices.	Needs satisfaction Hedonic pleasure	Rules based on rational calculation and market orientation	Utilization (exploitative or preservationist) Profit-maximization

8.2   Questionnaire & codes

# in group	Variable name	Question
R0		Ik geef toestemming aan het NMVB om mijn antwoorden anoniem bruikbaar te maken voor wetenschappelijke doeleinden.
R1	Per_assoc	Noem twee tot vijf woorden of begrippen die u associeert met de term 'voedselbos'.
R2	Att_dominion	Geef aan hoe eens of oneens u het bent met de volgende stelling: "De mens staat boven de natuur."
R3	Att_stewardship	Geef aan hoe eens of oneens u het bent met de volgende stelling: "De mens is verantwoordelijk om goed voor de natuur in zijn omgeving te zorgen."
R4	Att_partnership	Geef aan hoe eens of oneens u het bent met de volgende stelling: "De mens moet een balans vinden met de natuur waarin de natuur en de mens evenveel bestaansrecht hebben."
R5	Att_participant	Geef aan hoe eens of oneens u het bent met de volgende stelling: "De mens is onderdeel van de natuur."
R6	Att_worship	Geef aan hoe eens of oneens u het bent met de volgende stelling: "De natuur is heilig en mensen moeten de natuur respecteren."
R7	Dem_voedselbos	Met welk voedselbos bent u het meest betrokken? Indien u een bezoeker bent, geef dan aan welk voedselbos u het laatst heeft bezocht.
R8	Conf_laatstebez	Wanneer bent u voor het laatst in dit voedselbos geweest?
R9	Per_opvallend	Wat viel u het meeste op tijdens uw laatste bezoek aan dit voedselbos? Licht uw antwoord alstublieft toe of vul in 'niets' als u niets is opgevallen.
R10	Conf_bekendvb	Hoe goed kent u dit voedselbos naar eigen inschatting?
R11	Conf_bekendls	Hoe goed bent u bekend met het landschap in de omgeving?
R12	Conf_afstandvb	Hoe ver woont u van het voedselbos?
R13	Dem_aanrvb	Hoe bent u in aanraking gekomen met het voedselbos?
R14	Dem_relatie	Wat is uw relatie tot dit voedselbos? Indien er meerdere functies van toepassing zijn, selecteer dan de functie waar u zich het meest mee identificeert.
R15	Reg_locatie	Waar bevindt dit voedselbos zich?
R16	Reg_toegang	In hoeverre is het voedselbos toegankelijk voor bezoekers?
R17	Reg_aanplant1	Hoe zou u het aanplantingsschema van dit voedselbos omschrijven?
R18	Conf_taken1	Met welke voedselbos-gerelateerde taken houdt u zich voornamelijk bezig? Selecteer minimaal één en maximaal drie van de volgende opties.
R19	Conf_actiefont	Speelt u nog een actieve rol in uw aangegeven voedselbos?
R20	Conf_taken2	Met welke voedselbos-gerelateerde taken houdt u zich voornamelijk bezig? Selecteer minimaal één en maximaal drie van de volgende opties.
R21	Att_reden3	Wat zijn de voornaamste redenen dat u werkt bij dit voedselbos? Selecteer minimaal één en maximaal drie van de volgende opties.
R22	Att_reden3_overig	Als er nog andere redenen zijn die u belangrijk vindt om te benoemen, kunt u dat hier doen:
R23	Conf_actiefvr	Hoe lang bent u al actief als vrijwilliger voor het voedselbos? Geef dit in aantal maanden of jaren aan.
R24	Att_reden4	Wat zijn de voornaamste redenen dat u heeft gekozen om als vrijwilliger bij te dragen aan dit voedselbos? Selecteer minimaal één en maximaal drie van de volgende opties.

R25	Att_reden4_overig	Als er nog andere redenen zijn die u belangrijk vindt om te benoemen, kunt u dat hier doen:
R26	Att_reden5	Wat zijn de voornaamste redenen dat u heeft gekozen om pluk-abonnee te worden? Selecteer minimaal één en maximaal drie van de volgende opties.
R27	Att_reden5_overig	Als er nog andere redenen zijn die u belangrijk vindt om te benoemen, kunt u dat hier doen:
R28	Att_reden6	Wat zijn de voornaamste redenen om een samenwerkingsverband aan te gaan met dit voedselbos? Selecteer minimaal één en maximaal drie van de volgende opties.
R29	Att_reden6_overig	Als er nog andere redenen zijn die u belangrijk vindt om te benoemen, kunt u dat hier doen:
R30	Att_belang	In het algemeen, hoe belangrijk is de samenwerking met het voedselbos voor u?
R31	Att_reden7	Wat zijn de voornaamste redenen voor uw bezoek aan dit voedselbos? Selecteer minimaal één en maximaal drie van de volgende opties.
R32	Att_reden7_overig	Als er nog andere redenen zijn die u belangrijk vindt om te benoemen, kunt u dat hier doen:
R33	Per_foto	Indien mogelijk, upload een foto van het voedselbos.
R34	Per_fotouitleg	Indien u een foto heeft geupload, kunt u kort toelichten waarom u deze foto heeft genomen?
R35	Per_schaalbelang	Op welke schaal is dit voedselbos volgens u belangrijk?
R36	Per_persbelang	Beschrijf kort de aspecten die het voedselbos voor u persoonlijk belangrijk maken of vul in: 'weet ik niet'.
R37	Wel_persvb	In welke zin draagt dit voedselbos bij aan uw eigen welzijn?
R38	Wel_belanguitleg	U kunt hier kort beschrijven hoe het voedselbos bijdraagt aan uw welzijn of vul in 'heb ik al gedaan'.
R39	Per_belangniveau	Op welk niveau draagt dit voedselbos bij aan de samenleving volgens u? Selecteer één of meer van de volgende opties.
R40	Per_matebelang	In welke mate draagt dit voedselbos volgens u bij aan de samenleving als geheel?
R41	Per_belangaspecten_uitleg	Hoe draagt dit voedselbos bij aan de samenleving volgens u?
R42	Att_meestbelangaspect	Welk aspect van dit voedselbos vindt u persoonlijk het belangrijkst? Selecteer er één.
R43	Att_ookbelangaspect_1	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R44	Att_ookbelangaspect_2	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R45	Att_ookbelangaspect_3	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R46	Att_ookbelangaspect_4	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R47	Att_ookbelangaspect_5	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R48	Att_ookbelangaspect_6	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R49	Att_ookbelangaspect_7	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R50	Att_ookbelangaspect_8	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R51	Att_ookbelangaspect_9	Welke aspecten van dit voedselbos vindt u ook belangrijk? U kunt meerdere opties selecteren.
R52	Att_minbelangaspect_1	Welk aspect van dit voedselbos vindt u persoonlijk het minst belangrijk?

R53	Att_nadelen	Ziet u enige nadelen aan dit voedselbos?
R54	Att_nadelenuitleg	U kunt hier de nadelen die u ziet verder toelichten of vul in: 'liever niet'.
R55	Att_waardering	Is uw waardering voor dit voedselbos veranderd sinds u voor het eerst in aanraking bent gekomen met voedselbossen?
R56	Att_waarduitleg	U kunt hier verder toelichten wat u precies meer of minder bent gaan waarderen sinds u eerst in aanraking bent gekomen met een voedselbos of vul in: 'liever niet'.
R57	Att_overigopm	Als u nog andere opmerkingen heeft over dit voedselbos, kunt u die hier met ons delen. Zo niet, kunt u doorgaan naar het volgende tabblad.
S1	Conf_freq	Op welke basis heeft u het voedselbos in de afgelopen 6 maanden bezocht?
S2	Soc_COVID_invloed	Heeft de COVID-19 pandemie invloed gehad op hoe vaak u dit voedselbos bezoekt?
S3	Soc_COVID	Voor de COVID-19 pandemie, hoe vaak bezocht u dit voedselbos gemiddeld per maand?
S4	Soc_contactno	Hoeveel sociale contacten (vrienden en kennissen) heeft u opgedaan via uw betrokkenheid met het voedselbos?
S5	Soc_contactint	Hoe veel keer heeft u deze sociale contacten in de afgelopen vier weken gezien?
S6	Soc_boodsch	Hoeveel sociale contacten die u heeft opgedaan via het voedselbos zouden een keer boodschappen voor u doen als u zelf niet in staat zou zijn om boodschappen te doen?
S7	Soc_steun	Hoeveel sociale contacten die u heeft opgedaan via het voedselbos zouden u financiële steun (bijv. een lening van €1000) bieden als u daar behoefte aan zou hebben?
S8	Soc_carriere	Hoeveel sociale contacten die u heeft opgedaan via het voedselbos zouden u kunnen helpen met het opbouwen van uw carrière, bijvoorbeeld middels het geven van advies of via toegang tot relevante contacten?
S9	Soc_subsidie	Hoeveel sociale contacten die u heeft opgedaan via het voedselbos zouden u kunnen helpen met het verkrijgen van een subsidie?
S10	Soc_gemvb	De gemeenschap rondom het voedselbos betekent veel voor mij.
A1	dem_leeftijd	In welk jaar bent u geboren?
A2	dem_geslacht	Wat is uw geslacht?
A3	dem_nationaliteit	Wat is uw nationaliteit?
A4	dem_opleiding	Wat is uw hoogst genoten opleiding?
A5	dem_baan	Heeft u een baan?
A6	dem_sector	In welke sector(en) werkt u? U kunt meerdere opties selecteren.
A7	dem_inkomen	Hoe zou u uw inkomen beschrijven?
A8	dem_huishouden	Hoe groot is uw huishouden?
A9	dem_vervolg	Wil u ons verder helpen door aan een vervolg interview mee te doen?
A10	dem_naam	Laat hier uw naam achter:
A11	dem_contact	Laat hier uw telefoonnummer en/of e-mailadres achter:

Link to questionnaire with answer options (in Dutch): SURVEY_FORM-151200048.xls

8.3   Transcripts

Access transcripts via this link.

8.4   Coding list

Code name	Code Group 1
Conf_actiefvr_maanden	Codes from Survey import
Att_minbelangaspect_1--OTHER--	Codes from Survey import
Att_nadelenuitleg	Codes from Survey import
Att_overigopm	Codes from Survey import
Att_Reden_Vrijwilliger	Codes from Survey import
Att_redenMede_overig	Codes from Survey import
Att_redenVrijw_overig	Codes from Survey import
Att_waarduitleg	Codes from Survey import
Dem_aanrvb--OTHER--	Codes from Survey import
dem_Age	Codes from Survey import
Dem_relatie--OTHER--	Codes from Survey import
Per_assoc	Codes from Survey import
Per_belangaspecten_uitleg	Codes from Survey import
Per_foto	Codes from Survey import
Per_fotouitleg	Codes from Survey import
Per_opvallend	Codes from Survey import
Per_persbelang	Codes from Survey import
Reg_toegang--OTHER--	Codes from Survey import
Wel_belanguitleg	Codes from Survey import

Access coding report with all quotations via this link.

Access ATLAS.ti data bundle via this link.

Code	Code Group 2	Code Group 3	Code Group 4	Code Group 5	Code Group 6	Code Group 7	Code Group 8	Code Group 9
Accessability						Preferences		
Agency_collective	Experiential value dimension				Other-oriented value dimension		Relational value type	Transformative value dimension
Agency_personal	Experiential value dimension						Relational value type	Transformative value dimension
Agriculture_farming_difference						Preferences		
Altruism				Metaphysical value dimension	Other-oriented value dimension			
Awareness	Experiential value dimension				Other-oriented value dimension	Preferences		Transformative value dimension
Biocentric			Intrinsic value type	Metaphysical value dimension	Other-oriented value dimension			
Change_Systemic					Other-oriented value dimension	Preferences		Transformative value dimension
Children	Experiential value dimension						Relational value type	Transformative value dimension
Children_Youth	Experiential value dimension						Relational value type	Transformative value dimension
Connect	Experiential value dimension			Metaphysical value dimension	Other-oriented value dimension	Preferences	Relational value type	Transformative value dimension
Connect_Nature	Experiential value dimension			Metaphysical value dimension	Other-oriented value dimension	Preferences	Relational value type	Transformative value dimension
Connect_Social	Experiential value dimension			Metaphysical value dimension	Other-oriented value dimension	Preferences	Relational value type	Transformative value dimension
Creativity	Experiential value dimension			Metaphysical value dimension				
Diversity		Instrumental value type	Intrinsic value type					
Drought	Experiential value dimension							
Ecoliteracy				Metaphysical value dimension				Transformative value dimension
Economy		Instrumental value type						
Education						Preferences		Transformative value dimension
Experiential	Experiential value dimension						Relational value type	Transformative value dimension
FF_Development			Intrinsic value type					Transformative value dimension
FF_Structure			Intrinsic value type					

Food		Instrumental value type						
Food_abundance		Instrumental value type	Intrinsic value type					
Food_diversity		Instrumental value type	Intrinsic value type					Transformative value dimension
Food_eating	Experiential value dimension	Instrumental value type					Relational value type	
Food_harvesting	Experiential value dimension	Instrumental value type					Relational value type	
Food_know							Relational value type	
Food_production		Instrumental value type						
Food_products		Instrumental value type	Intrinsic value type					
Future				Metaphysical value dimension				
GL	Experiential value dimension			Metaphysical value dimension			Relational value type	
GL_enjoy	Experiential value dimension			Metaphysical value dimension			Relational value type	
GL_Explore	Experiential value dimension			Metaphysical value dimension			Relational value type	
Health	Experiential value dimension					Preferences	Relational value type	
Health_Active	Experiential value dimension					Preferences	Relational value type	
Health_food	Experiential value dimension					Preferences	Relational value type	
Health_outdoors	Experiential value dimension					Preferences	Relational value type	
Human_Nature_Relation				Metaphysical value dimension	Other-oriented value dimension			Transformative value dimension
Income		Instrumental value type						
Inspiration	Experiential value dimension			Metaphysical value dimension		Preferences	Relational value type	Transformative value dimension
Intrinsic value			Intrinsic value type	Metaphysical value dimension				
Learning	Experiential value dimension			Metaphysical value dimension		Preferences	Relational value type	Transformative value dimension
Living_environment								
Local								

Local_species			Intrinsic value type				
Long_term						Relational value type	
Pollution	Experiential value dimension						
Research						Relational value type	
Restoration			Intrinsic value type				Transformative value dimension
Rewilding			Intrinsic value type				Transformative value dimension
Social_action	Experiential value dimension			Other-oriented value dimension		Relational value type	Transformative value dimension
Social_drive				Other-oriented value dimension		Relational value type	Transformative value dimension
Social_fun	Experiential value dimension			Other-oriented value dimension		Relational value type	Transformative value dimension
Social_play	Experiential value dimension			Other-oriented value dimension		Relational value type	Transformative value dimension
Sustainable_development							Transformative value dimension
Well_Life-satisfaction	Experiential value dimension		Metaphysical value dimension			Relational value type	Transformative value dimension
Well-being	Experiential value dimension		Metaphysical value dimension			Relational value type	Transformative value dimension
Wildlife			Intrinsic value type				
Worldview			Metaphysical value dimension				

8.5   Excel analysis

Access spreadsheet via this link.

8.6   List of participating food forests

Display Name	Starting year
De Overtuin	2018
Houtrak	2017
Mijn Stadstuin	2016
Thuishaven	2018
Droevendaal	2019
Voedselrijk	2020
Eemvallei-Zuid	2018
Den Food Bosch	2017
Schijndel Hardekamp	2019
Schijndel Boschweg	2019
Ketelbroek	2009
Groengenoten	2019
Sualmana	1999
Vlaardingen	2015
Benthuizen	2018
De Stomp	2019
Roggebotstaete	2016
D'ekkers	2020
Breedenbroek	2019
De Pullenhap	2020
Heische Hoeve	2020
Het Loonse Bos	2019
Woensdrecht	2020
Haarzuilens	2016