

More than wine

Cultural ecosystem services in vineyard landscapes

Klara Johanna Winkler

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Submitted May 15, 2014

Supervisor: Kimberly Nicholas, LUCSUS, Lund University

*I imagine hell like this:
Italian punctuality, German humour, and English wine.*

Sir Peter Ustinov

Abstract

Problem area: Ecosystem services, the benefits that people obtain from nature, are essential for human well-being, but are declining globally. Even though research on ecosystem services has increased in the last decade, knowledge on cultural ecosystem services (CES), which are the non-material benefits people gain from ecosystems, is still limited. Wine production shapes special landscapes that provide not only grapes, but also a variety of CES to the people surrounding vineyards.

Methods: Conducting a literature review, I illustrated the knowledge gap on CES connected to wine production. To fill this gap, I assessed wine producers' and residents' perceptions of CES of vineyard landscapes in England, an emerging wine area, and in California, a more traditional wine area. I used Q-Method, which is a qualitative approach using factor analysis to identify social perspectives. To reveal these perceptions, I analyzed Q-sorts by 20 participants from England and 22 from California, who each ranked 44 Q-statements on eleven classes of CES provided by vineyards.

Main findings and implications: I found 28 peer-reviewed publications on the topic, most of which focused on ecological questions and only four of them using the term ecosystem services not only as buzzword, but also as concept for their paper. By analyzing the Q-sorts, I identified four English perspectives on the CES provided by vineyards (termed: *Science*, *Experience*, *Conservation*, and *Wine culture*) and four Californian perspectives (termed: *Terroir*, *Tradition*, *Instrumental*, and *Entertainment*). In California, all perspectives assessed wine production as important for their region, whereas there was no CES that was important to all English perspectives. Wine producers in California had different perspectives than residents; wine producers placed more value on CES more directly connected with wine production, while residents focused more on CES that benefit nature conservation or leisure activities. Furthermore, the *Conservation* and the *Tradition* perspectives highly valued heritage and symbolic services, and feared land use change. Interestingly, representatives of these perspectives are part of the groups that benefit most from the currently dominating landscape, which in England is non-vineyard landscape (*Conservation*) and in California is a vineyard landscape (*Tradition*). These findings emphasize the variety of perceptions on CES as experience- and context-dependent. They imply that CES are an important part of ecosystem services provided by nature and thus, that they should be more considered in policy-making or planning when assessing ecosystem services.

Key words: landscape use, socio-cultural perspective, Q-Method, non-material values, landscape services, cultural landscapes

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Acronyms, abbreviations, and key terms

CA	California/n
CES	cultural ecosystem service, one of the three sections of ecosystem services
CICES	Common International Classification of Ecosystem Services
ES	ecosystem services
IPM	Integrated Pest Management
MEA	Millennium Ecosystem Assessment
PCA	principal component analysis
SEVA	South East Vineyards Association, located in England
SES	social-ecological system
SOP	sense of place
UK	United Kingdom
UKVA	United Kingdom Vineyards Association

Key terms

resident	person who lives in a wine-producing area, but who is not working in or has any other direct connection to the local wine industry
Q-Method	qualitative method using factor analysis to identify social perspectives
Q-participant	participant in the Q-study
Q-sort	ranking of Q-statements conducted by Q-participants
Q-statement	statements that are ranked by Q-participants
Q-study	research study that uses Q-Method as main method
Q1 to Q48	designation for participants in the Q-study; the number identifies the different participants
wine producer	person who lives in a wine-producing area and works in the local wine industry
wine production	describes the whole process of wine production including all steps from planting and growing of vines, harvesting wine grapes, and making wine, to selling the final product

1. Introduction

Almost a decade ago, the Millennium Ecosystem Assessment (2005) (MEA) found that around 60% of global ecosystem services (ES) were declining. These services “are the *contributions* that ecosystems make to human well-being” (Haines-Young & Potschin, 2012, p.9) (original emphasis) and are essential for human life. Research on ES has greatly increased since the publication of the MEA, and the concept has found its way into policy-making and planning, for instance in the European Union Green Infrastructure Strategy (European Commission, 2013). In contrast, specific knowledge of cultural ecosystem services (CES) as well as their assessment is still limited (Daniel et al., 2012). CES are “the non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people” (Haines-Young & Potschin, 2012, p.18).

As most CES are intangible, a quantitative assessment of them is near impossible. However, they are crucial for a successful implementation of policies and plans (Chan, Guerry, et al., 2012a; Satz et al., 2013) such as the Green Infrastructure Strategy (European Commission, 2013). For this reason, the assessment how these services affect people’s physical and mental states is important.

People in rural areas live with and from the landscapes that surround them. In developed countries, humans have shaped landscapes for centuries. They have been and still are driven to change their land use by external factors such as climatic change or economic interests. If land use changes, new types of landscapes emerge, which entails a change of CES and also of people’s perspectives on the landscape.

In this thesis, I am interested in vineyard landscapes as special landscapes induced by the growing, making, and selling of wine (wine production). Wine is a luxury beverage with its own culture including not only its consumption, but also its production as an important contributor to quality.

Vineyard landscapes provide ES to the people surrounding them. I explore these ES with a special focus on CES and how people in different winegrowing areas perceive them. In order to do so, I assess and compare perspectives on CES connected to wine production of people working in the local wine industry (wine producers) and of people living in the area, but not working in the wine industry (residents) in England, as an emerging wine-producing area, and California, as a well-established wine-producing area.

The overarching research question of my master's thesis is:

What ecosystem services do vineyard landscapes provide, and how are cultural ecosystem services in vineyard landscapes perceived locally?

To answer the overarching research question, there are three sub-questions, each intended to address different aspects of the overarching question:

1. Which ES, particularly CES, in vineyard landscapes are quantified or discussed in existing literature?
2. Which CES in vineyard landscapes are important to wine producers and residents in England and California?
3. What are the differences and similarities among English and Californian wine producers' and residents' perspectives on CES in vineyard landscapes?

2. Conceptual frameworks

In this thesis, I use three concepts to frame my inquiry: landscape research, ES, and sense of place (SOP). My research can be classified as landscape research because I examine the human-nature relationship in vineyard landscapes. Landscape research is its own research field, like ecosystem research. Nevertheless, overlaps between landscape and ES research exist as both concepts are concerned with the human-nature relationship. In their core, landscape research focuses on spatial aspects while ecosystem research is more about ecological aspects. Landscapes provide *supporting and intermediate services*, on which ES, including CES, are based. SOP is one of the benefits from CES that landscapes provide. At the same time, SOP can influence the pressure on landscapes, and this way, closes the cycle of the ES cascade, which sees services as produced by natural capital and ecosystem function, which are then consumed and valued by people through social and economic systems (Figure 1).

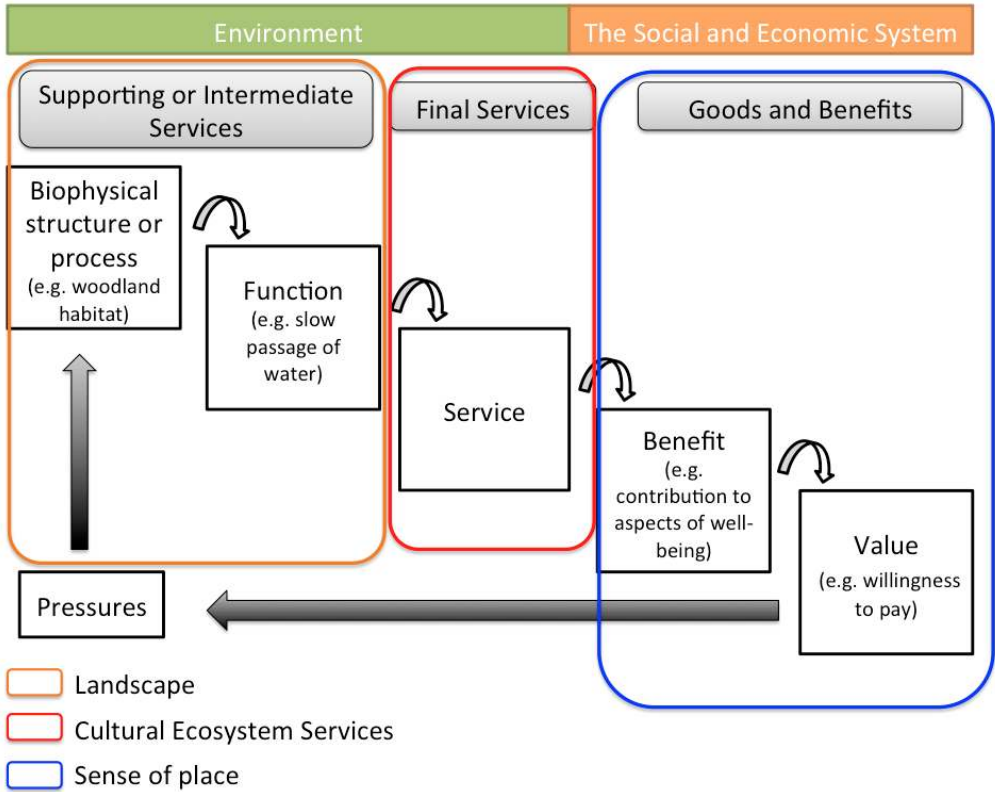


Figure 1: Connection of landscape, CES and SOP (simplified and adapted ES cascade, based on Haines-Young & Potschin, (2012)): The colored boxes indicate the strongest focus of each stage (orange=landscape, red=CES, blue=SOP). Especially landscape research deals with all three parts. However, landscapes primarily provide *supporting and intermediate services* and are the basis for CES. SOP is part of *goods and benefits*, and influences landscapes. CES are the link between landscapes and SOP. For further explanation of the ES cascade please see Figure 2.

2.1. Landscape research

In former times, landscape research viewed nature as the only factor influencing landscapes, but nowadays, it is widely agreed that both humans and nature influence landscapes (Bradley, 2013). The European Landscape Convention (Florence Convention) (2000) defines landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (ELC, 2000). The relationship between humans and landscape is two-way: communities and individuals form landscapes, and landscapes shape communities and individuals (Swanwick, 2009). In developed countries, humans have influenced major parts of their landscapes for many centuries (Bradley, 2013), producing cultural landscapes. Not only cultural practices influence people’s perceptions; but also natural factors, such as weather, light or season, also shape them (The Research Box, 2009). There are various approaches to research different aspects of landscape and thus, landscape research faces practical challenges to combine these approaches (Fagerholm and Käyhkö, 2009).

In 2009, the term ‘landscape services’ found its way into landscape research. Termorshuizen & Opdam (2009) argue for ‘landscapes services’ “because it highlights the importance of spatial pattern”, “more disciplines can recognise themselves in [...]” a landscape concept rather than an ecosystem concept, and is “more relevant and legitimate to local practitioners” (p.1043). Nowadays, the term is often used as synonym to ES (Hermann et al., 2011).

The assessment of landscapes is challenging as objective scientific approaches might miss emotional and cultural subjective perceptions (Bradley, 2013). Mixed-methods approaches help to get more holistic assessment results (Schaich et al., 2010). These methods must assess the entity of a landscape, as people make their preferences on the whole landscape and not on parts of the landscape (The Research Box, 2009).

Landscape assessment must involve both people’s perception of landscapes and their preferences. People’s perceptions are “the way that people attach meaning and value to it” (Swanwick, 2009, p. S63). These perceptions are based on both sensual (sight, smell, feeling, taste and sound) and emotional experiences (The Research Box, 2009), and vary in different time periods and locations (Selman, 2008). In general, landscapes are perceived as beautiful if they are natural or close-to-natural, their scenery is picturesque including landmarks, and/or if there is a kind of harmony between natural and man-made created landscape elements (Navrátil et al., 2013). However, the idea of an ideally composed landscape is highly individualistic and thus different stakeholders might have various perceptions on the elements of a landscape (Bradley, 2013).

The use of landscapes as such, not as a place for providing a service such as growing food, diverge with different socio-economic level: people with an higher socio-economic status use landscapes more (Swanwick, 2009). However, landscape preferences are only slightly influenced by a person's socio-economic status. They depend on the relationship people have with the landscape (e.g., residents vs. visitors) and also on individual attitudes towards environmental values (The Research Box, 2009). For example, a study on cultural services of English landscapes showed that similar landscape features, e.g. trees or water, in different areas, like parks or rural areas, provide the same benefits and services, e.g. recreation or inspiration. The most appraised value of a landscape is to use it for relaxation in the personal free time (The Research Box, 2009).

2.2. Sense of place

SOP is defined as “a holistic concept that focuses on the subjective and often shared experience or attachment to the landscape emotionally or symbolically” (Galliano & Loeffler, 1999, p. 1). An inter- and multidisciplinary set of scholars studies SOP, resulting in widely varying theories and understandings (Ardoin, Schuh, & Gould, 2012; Trentelman, 2009). SOP connects the social and bio-physical sphere (Galliano and Loeffler, 1999) and expands the idea of landscape as the physical environment around people by stressing the aspect of emotions (Swanwick, 2009).

Place meaning and place attachment build the heart of a SOP (Stedman, 2003, 2002; Trentelman, 2009). Place attachment is mainly shaped by social relations people have with the built or natural environment (Lukacs and Ardoin, 2013). SOP can only develop when people turn space into place for themselves through their own experiences and emotions (Stedman, 2003). Nevertheless, the physical appearance of a landscape also plays an important role (Galliano and Loeffler, 1999).

SOP can be seen from two angles: the individual relationship with a place, and the relationship of a community with a place (Ardoin et al., 2012). Values and attitudes are formed on the individual level, whereas a more comprehensive understanding of community relationship can help to make management and political decisions (Galliano and Loeffler, 1999). Policy-makers and planners, who consider SOP in their decisions, maintain characteristics of a place that are pivotal for the local community. Without this consideration, the shift of a place can destroy the meaning places have for people and thus their place attachment (Galliano and Loeffler, 1999). This is why policy-makers and planners should recognize and value “the ways that local landscapes are walked and talked” (Selman, 2008, p. 27).

2.3. Ecosystem services

2.3.1. Ecosystem services

One of the latest and most complete classifications of ES, building on MEA, is the Common International Classification of Ecosystem Services (CICES; Haines-Young & Potschin, 2012) (Table 1), which I mainly used in my thesis. CICES is based on the Ecosystem Service Cascade (Potschin and Haines-Young, 2011) (Figure 2), which points out that supporting ES are intermediate services of the environment such as biomass resulting in final services such as flood protection, which humans can benefit from. Based on this, CICES divides ES in three sections: *provisioning, regulation and maintenance*, and *cultural*. Each section is further divided into division, group, and class (Table 2 shows four levels for CES), although most often the first three levels are shown (Table 1). The CICES definition of ES stays close to the MEA definition: “**final ecosystem services** are the *contributions* that ecosystems make to human well-being” (Haines-Young & Potschin, 2012, p.9) (original emphasis). Additionally, ES are further defined as always having a connection to the underlying ecosystem functions. People obtain benefits as tangible products, and/or less tangible experiences from the ES.

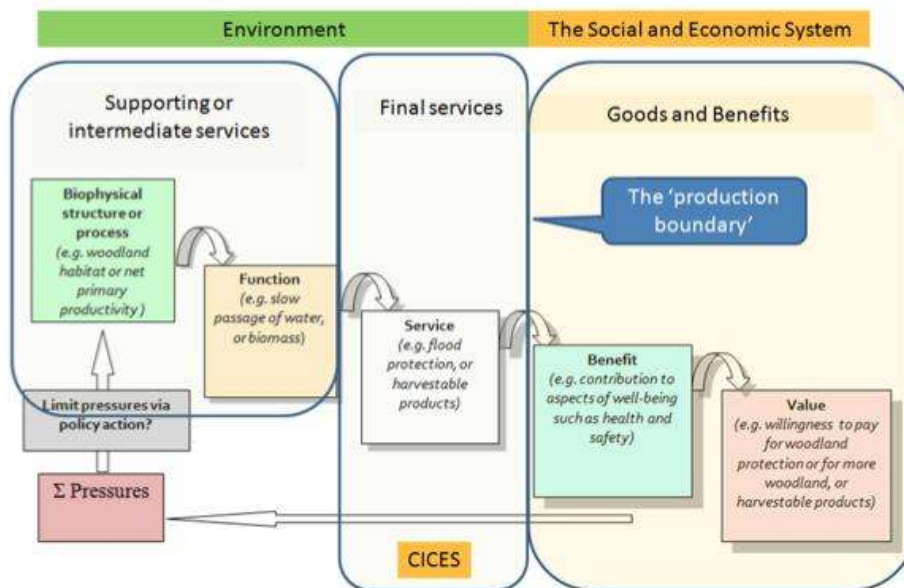


Figure 2: The Ecosystem Service Cascade (Haines-Young and Potschin, 2012): the cascade consists of five stages that describe the process of ES, whereas the *supporting or intermediate services* result in the *final services*, which then give *goods and benefits* to humans. The *supporting or intermediate services* are based on a *biophysical structure or process*, such as *habitat or net primary productivity*. *Functions* can develop based on these structures and processes. Such a *function* could be the *passage of water*. They have no direct use for humans. *Services* rise from *functions*, but different than the *functions* they always contribute in some way to *human well-being*, e.g. *flood protection*. These three steps are part of the *environmental system*. The next step, *benefits*, is part of *the social and economic system*, and contributions to human well-being, like *safety*. Humans appreciate the benefits and attach a *value* to the service. This *value* can be economic, like *willingness to pay*, or socio-cultural, e.g. a virtue. The *values* of people cause *pressures* that influence existing *biophysical structures or processes*.

Table 1: CICES as proposed in the latest modified version to the EEA (Haines-Young and Potschin, 2012): The CICES classifies ES into three sections: *provisioning, regulation and maintenance*, and *cultural*. Each section is subdivided in division and group.

Section	Division	Group
Provisioning	Nutrition	Biomass
		Water
	Materials	Biomass, Fibre
		Water
	Energy	Biomass-based energy sources Mechanical energy
	Regulation & Maintenance	Mediation of waste, toxics and other nuisances
Mediation by ecosystems		
Mediation of flows		Mass flows
		Liquid flows
		Gaseous / air flows
Maintenance of physical, chemical, biological conditions		Lifecycle maintenance, habitat and gene pool protection
		Pest and disease control
		Soil formation and composition
		Water conditions
		Atmospheric composition and climate regulation
Cultural	Physical and intellectual interactions with ecosystems and land-/seascapes	Physical and experiential interactions
		Intellectual and representative interactions
	Spiritual, symbolic and other interactions with ecosystems and land-/seascapes	Spiritual and/or emblematic
		Other cultural outputs

The biodiversity concept, which is also a highly complex concept, is interlinked with the ES concept. However, how exactly they relate to each other is contested: biodiversity has been described as an underlying ecosystem function, as a final ES, but also as a benefit (Mace et al., 2012). As this thesis uses CICES, I understand biodiversity as a CES in the ‘existence’ class and as *regulating and maintenance service* in the ‘lifecycle maintenance, habitat and gene pool protection’ group (Table 1, Table 2). Nevertheless, I recognize that biodiversity contributes on various levels to ecosystems, their functions and services.

2.3.2. Cultural ecosystem services

CES are non-material, occur in natural or semi-natural physical settings, and affect people’s personal state. People benefit from and highly value specific CES, which is the reason CES are their own section and not part of every single ES as some might argue (Haines-Young and Potschin, 2012). CES allow an overlap between the utilitarian values dominating the ES concept and intrinsic values.

Existence services contain elements of intrinsic values as people enjoy nature just for being there without any further services offered (Schröter et al., 2014).

CICES classifies CES in two divisions: *physical and intellectual*, and *spiritual, symbolic and other* interactions with biota, ecosystems and land-/seascapes. The *physical and intellectual* division includes seven classes: *experiential use*, *physical use*, *scientific*, *educational*, *heritage*, *cultural*, *entertainment*, and *aesthetic*. The *spiritual, symbolic and other* division contains four classes: *symbolic*, *sacred and/or religious*, *existence*, and *bequest* (Table 2).

Table 2: CICES classification scheme for CES (Haines-Young & Potschin, 2012): The 4 levels of the CICES classification scheme (section – division – group – class) for CES illustrated with examples helps.

Section	Division	Group	Class	Examples
Cultural	Physical and intellectual interactions with biota, ecosystems, and land-/seascapes [environmental settings]	Physical and experiential interactions	Experiential use of plants, animals and land-/seascapes in different environmental settings	In-situ whale and bird watching, snorkelling, diving etc.
			Physical use of land-/seascapes in different environmental settings	Walking, hiking, climbing, boating, leisure fishing (angling) and leisure hunting
		Intellectual and representative interactions	Scientific	Subject matter for research both on location and via other media
			Educational	Subject matter of education both on location and via other media
			Heritage, cultural	Historic records, cultural heritage e.g. preserved in water bodies and soils
			Entertainment	Ex-situ viewing/experience of natural world through different media
			Aesthetic	Sense of place, artistic representations of nature
	Spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes [environmental settings]	Spiritual and/or emblematic	Symbolic	Emblematic plants and animals e.g. national symbols such as American eagle, British rose, Welsh daffodil
			Sacred and/or religious	Spiritual, ritual identity e.g. 'dream paths' of native Australians, holy places; sacred plants and animals and their parts
		Other cultural outputs	Existence	Enjoyment provided by wild species, wilderness, ecosystems, land-/seascapes
			Bequest	Willingness to preserve plants, animals, ecosystems, land-/seascapes for the experience and use of future generations; moral/ethical perspective or belief

There is no agreed-upon classification, list, or terminology for CES. Comparing CICES (Table 1, Table 2) and the understanding of Chan, Satterfield, & Goldstein (2012b) exemplifies different understandings of CES, as many of the CES in CICES are benefits for Chan et al. (2012b) (Figure 3). This leads to a mix of terms between and within research on CES especially concerning the distinction between services, benefits and values (Chan et al., 2012b; Haines-Young & Potschin, 2012; Milcu, Hanspach, Abson, & Fischer, 2013). For the sake of clarity, I use the CICES definition and classification of CES throughout this thesis. Nevertheless, I am aware that some CES, e.g. *heritage*, *aesthetic*, or *spiritual*, could be also described as benefits (Chan et al., 2012b).

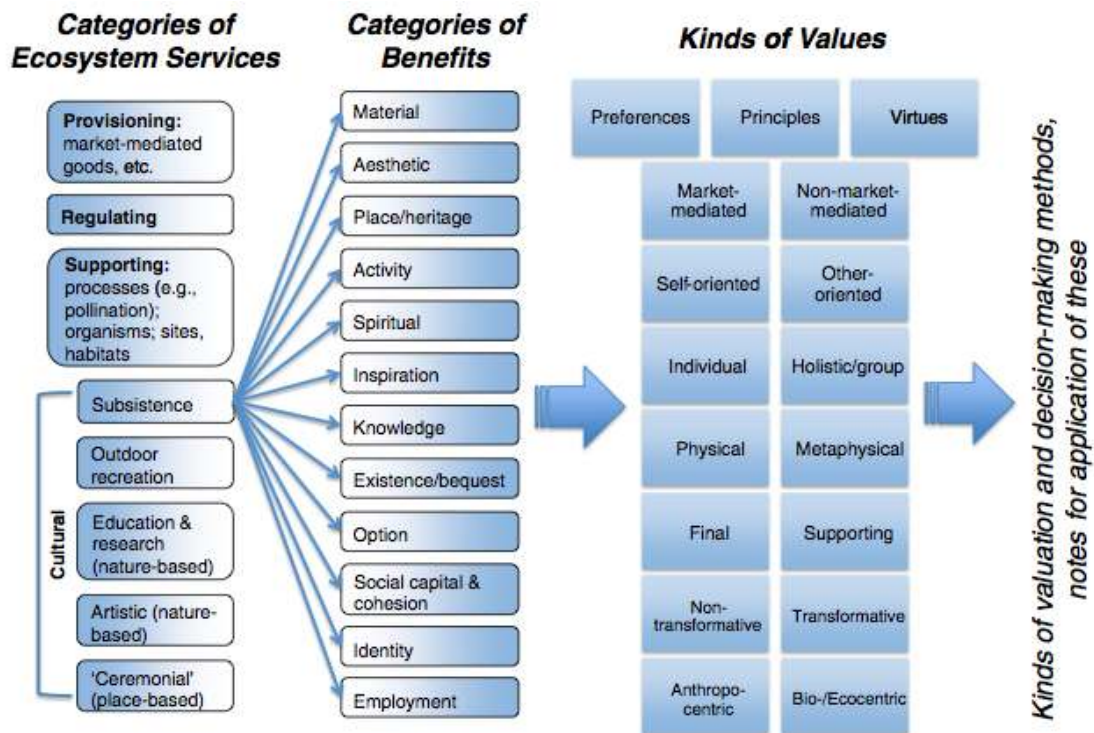


Figure 3: Typologies of ES and values (Chan et al., 2012b): shows how ES, benefits and values are connected for Chan et al. (2012) Most of the categories, which are in this thesis termed CES, would fall in their definition into the categories of benefits, e.g. *aesthetic*, *heritage*, or *spiritual*.

Research on ES has been rapidly growing in recent years (Figure 4 a), while CES are often just mentioned and not further studied (Milcu et al., 2013). A Scopus search for the term 'cultural ecosystem services' for the time period 1997–2013, gave the first hit for 2007 and a maximum of 14 publications in 2012 (Figure 4 b). This causes an imbalance of knowledge and understanding, where we know more about non-CES than CES (Rey Benayas et al., 2009; Schaich et al., 2010). One reason is that ES research is dominated by ecology, and ecological and environmental economics (Daniel et al., 2012; Orenstein, 2013) with a focus on monetary and biophysical aspects of ES (Oteros-Rozas et al., 2013). Social science can contribute to the advancement of CES research with its more qualitative methods and expertise to assess socio-cultural perspectives (Milcu et al., 2013; Orenstein, 2013). Milcu et al. (2013) conducted a literature review including 107 publications published after 2005 dealing with CES. Although less than 5% of the reviewed publications were entirely focused on CES, and in papers about various ES, CES normally had the smallest focus, More than half of the publications acknowledged that CES contributed to human well-being.

Various publications stress the importance of CES for people – especially in industrialized countries (Agbenyega et al., 2009; Malinga et al., 2013; Martín-López et al., 2012; Plieninger et al., 2013; Raymond et al., 2009). CES play a crucial role to increase people's awareness and motivation for the protection of nature and of other ES that develop with CES (Daniel et al., 2012; Milcu et al., 2013;

Orenstein, 2013). As ES are increasingly considered in decision-making, it is not only important that CES are also incorporated in the decision-making process (Satz et al., 2013) but also beneficial to consider all aspects of ES (Chan et al., 2012a).

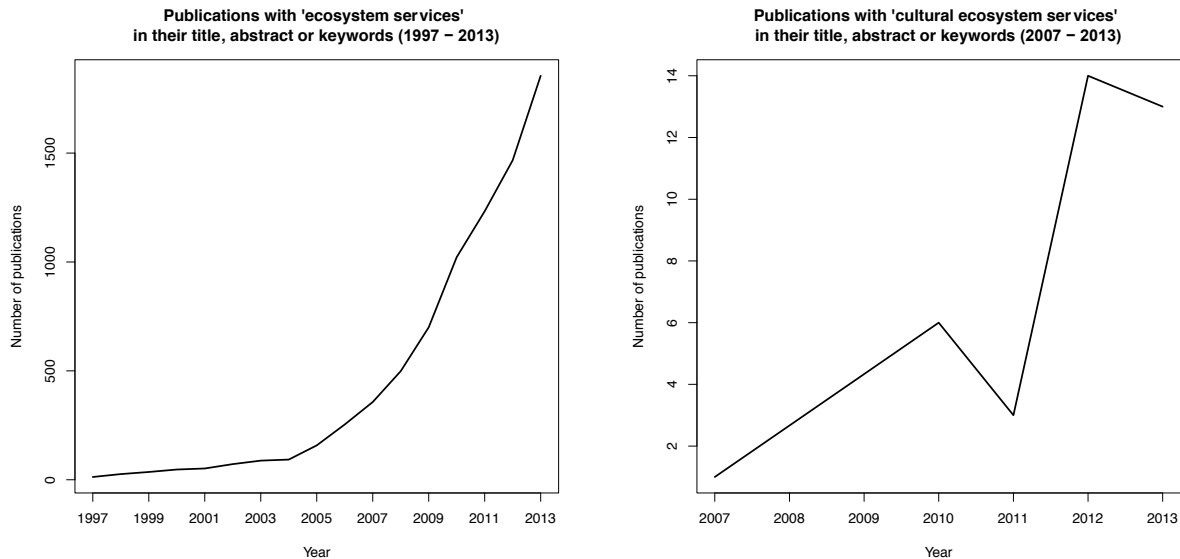


Figure 4: Number of peer-reviewed publication with (a) 'ecosystem services' and (b) 'cultural ecosystem services' in their title, keywords or abstract (1997 - 2013): Search was conducted with Scopus. Be aware of the different scales! **(a)** Between 1997 and 2005 the number is slowly increasing. After the publication of the MEA in 2005, the number of publications exponentially increases. In 2010, the number exceeds 1,000 publications. In 2013, 1,855 publications with the term 'ecosystem services' were published. **(b)** There were no hits for publications containing 'cultural ecosystem services' before 2007. Since 2007, the number has been slowly increasing with a maximum of 14 publications in 2012. In 2013, 13 peer-reviewed publications were published.

2.3.3. Valuation and assessment

Current assessment of ES

The assessment of ES is nearly always equated with economic valuation in monetary terms (Farber et al., 2002). The idea of using market instruments, including payment for ES, to govern ES has increased especially for the last decade (Gómez-Baggethun et al., 2010). This trend culminated in *The Economics of Ecosystems and Biodiversity study (TEEB; 2010)*, which triggered the interest of politicians and managers for ES (Potschin and Haines-Young, 2011). However, the total value of ES is a combination of ecological, socio-cultural and economic values (Figure 5; de Groot et al., 2002). Since all valuation methods are culturally constructed and not value-free (Oteros-Rozas et al., 2013), only the use of multiple methods (not only economic, but also biophysical and socio-cultural valuation) can assess the whole value of ES (Gómez-Baggethun and Ruiz-Pérez, 2011; Martín-López et al., 2012; Schröter et al., 2014).

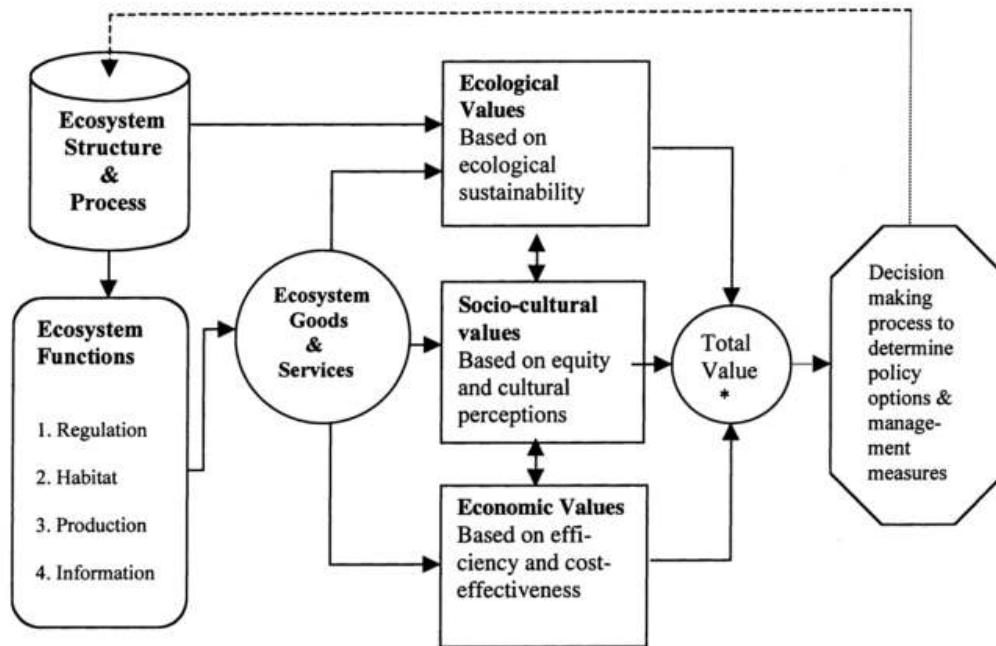


Figure 5: Framework for integrated assessment and valuation of ecosystem functions, goods, and services (de Groot et al., 2002): The total value of ecosystem structures, processes, goods and services is composed of ecological, socio-cultural and economic values. Ecosystem goods and services contribute to all three kinds of values, whereas ecosystem structures and processes contribute only to ecological values. In this thesis, I will contribute to the assessment of socio-cultural values.

Assessment of CES

CES are hard to value with economic instruments, because most CES are intangible and non-tradable on markets (Daniel et al., 2012; Millennium Ecosystem Assessment, 2005). As result, economic valuations of ecosystems usually ignore CES (Chan et al., 2012a). Until now, there is no agreed-upon approach how to assess and value CES, or how to consider CES in decision- and policy-making (Milcu et al., 2013). As consequence, CES are often monetarily undervalued, if valued at all, compared to people's ranking choices (Malinga et al., 2013; Orenstein, 2013; Schaich et al., 2010).

For the valuation of CES not only economic values play a role, but also socio-cultural values, such as beauty or awe. These services are the entrance point of existence values, which contain elements of intrinsic values (Schröter et al., 2014). A standardized method to capture this variety is challenging (Satz et al., 2013).

Notwithstanding the difficulties to value CES, assessing and identifying CES and people's priorities concerning them is crucial to legitimize decision- and policy-making (Chan et al., 2012a). A proper assessment of CES helps to complement economic valuation of ES and allows a more social-cultural approach in decision-making (Milcu et al., 2013). Such an assessment helps to reveal values of CES, which are hidden in economic valuations (Martín-López et al., 2012). This is especially important as

currently CES fall victim to decision-makers' preference for economic or ecological values (Milcu et al., 2013). If CES were used in decision-making, decisions would be better because they would be based on a broader view including socio-cultural values, and not only on an often short-sighted economic perspective.

As monetary valuation can only capture a small portion of the total value of CES, researchers increasingly use non-monetary, socio-cultural valuation methods to assess the total value of CES (Abson and Termansen, 2011; Kerr and Swaffield, 2007; Nelson et al., 2009; Oteros-Rozas et al., 2013). Especially in cultural landscapes, socio-cultural valuation gives a more complete understanding of people's perspectives on existing ES, as the landscape is highly influenced by humans (Martín-López et al., 2012). Chan et al. (2012a) argue for using qualitative methods for such valuations. By combining quantitative survey material with qualitative data collected in focus group and in-depth interviews, Norton, Inwood, Crowe, & Baker (2012) have shown the potential of measuring CES with a mix of quantitative and qualitative methods.

However, if CES are assessed, most publications use economic instruments (Milcu et al., 2013), with the effect that certain CES e.g. *recreation* and *scenic beauty* are better researched than other CES like *cultural identity*, *heritage value*, or *spiritual values* (Chan et al., 2012a). Satz et al. (2013) posit that the variety of CES must not be neglected by focusing on easily (economically) assessable CES such as recreation. An overemphasis of these services could unconsciously marginalize other equally important CES (Milcu et al., 2013).

In this thesis, I investigate the full range of CES, using the eleven classes for CES under CICES (Table 2) in a ranking exercise (Q-sort) to allow a comprehensive analysis of non-monetary, socio-cultural valuations.

3. Case description

This master thesis is partly contributing to the Wine Exemplar in the EU research project OPERAs¹, in which the case of the emerging English wine production and its connection to ES is being developed. As comparative case for my study, I have chosen California, a well-established wine-producing area. I have wanted to test the effects of landscape familiarity (prevalence and length of time of the presence of a landscape) on local perspectives on the CES provided by vineyard landscapes.

3.1. England

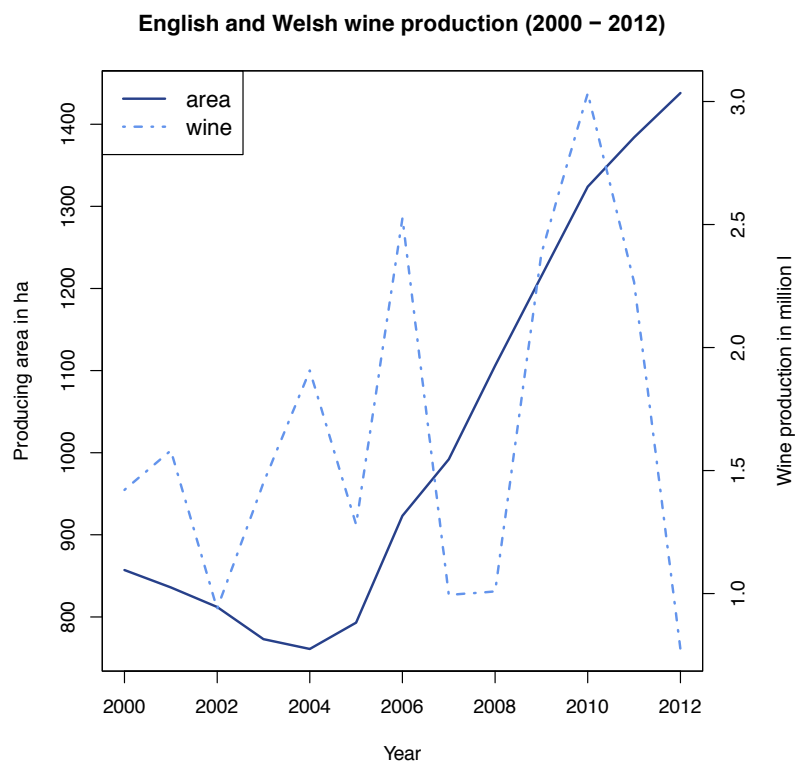


Figure 6: Wine production (dashed line) and producing area (solid line) in England and Wales (2000 – 2012) (data from Wine Standards Board (2013): Producing area is increasing, while wine production experiences strong deviations.

England is probably one of the least-known wine-growing areas in the world, although Romans brought wine to Britain about 2,000 years ago and wine production has increased over the last decades (BBC, 2013). Climate change predictions for England, with drier summers and overall higher temperatures under a medium emissions scenario, are favorable for increasing future wine production (Jenkins et al., 2009). In 2012, the United Kingdom was importing the most wine in the

¹ OPERAs stands for “Operational Potential of Ecosystem Research Applications” and aims to develop “ecosystem science for policy and practice to enhance sustainable use of ecosystems” (OPERAs, 2013).

whole world by value (Rocchi and Gabbai, 2013) and thus, is globally one of the most important markets for wine (Ritchie et al., 2010). The per capita consumption is near the average for European countries (Smith and Mitry, 2007).

Since 2004, the producing area has nearly doubled, but harvested yield has heavily fluctuated (Figure 6)². Despite doubling of area, the 2012 yield was less than half of the 2004 yield (Wine Standards Board, 2013). Extremely different annual weather patterns are the main cause of these enormous variations.

The industry is engaged in its own development, especially concerning economic profitability and establishing a common vision, rather than in its relationship with the natural and social environment (UKVA, 2012a). Projections for 2015 estimate a production of more than five million bottles of sparkling wine with a retail sales value of almost £ 100 million, and sparkling wine as the dominant sector (English Wine Producers, 2013).

3.1. California

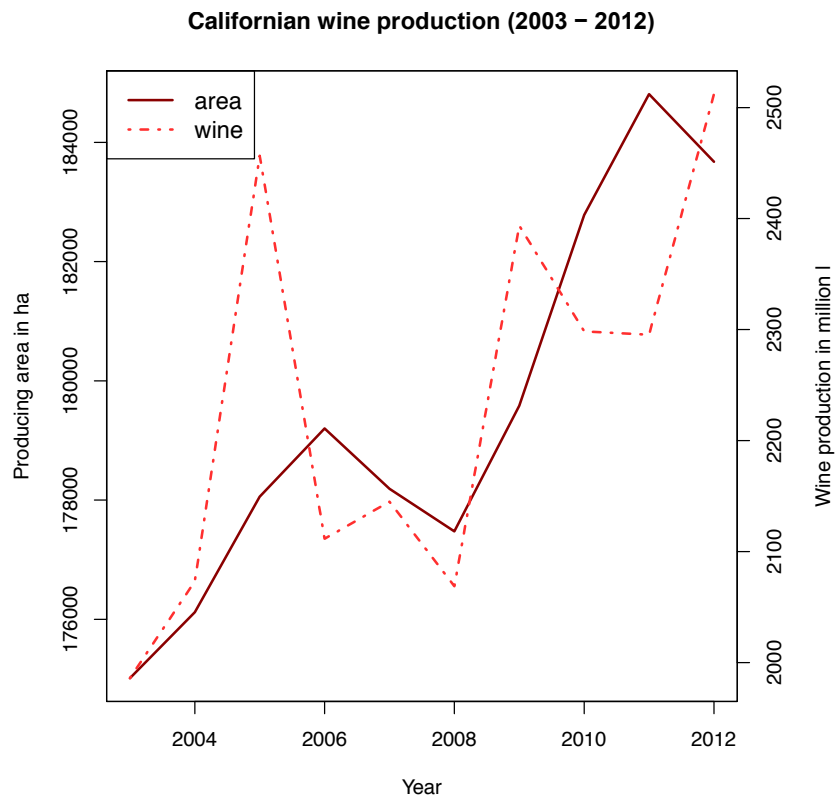


Figure 7: Wine production (dashed line) and producing area (solid line) in California (2003 - 2012) (data from CDFA (2013) and Wine Institute (2013)): there is an overall increase in wine production and in producing area in California.

² throughout this thesis, blue represents England and red represents California.

California belongs to the New World Mediterranean, which is characterized by dry and warm summers, and wet and mostly mild winters (Robinson, 2001). The wine-producing tradition is long, with the first recorded date of grape cultivation in the 1770's (Viers et al., 2013). Both producing area and wine production have increased over the last decade (Figure 7). California is the biggest English-speaking wine-producing area in the world and produces 90% of the total US wine (Wine Institute, 2012). The Californian wine industry not only produces wine, but also markets the natural asset of winegrowing areas for tourism and local entertainment.

3.2. Comparison of the two cases

The selected cases differ greatly in size of wine production and producing areas, and kind of produced wines (Table 3). The Californian wine industry has over 10 times more vineyards, a 170 times larger producing area, an over 12 times bigger average vineyard size, over 30 times more wineries, and a greater production variety compared to England, which focuses on sparkling wine production.

Table 3: Comparison of English and Californian wine industry (English Wine Producers, 2013; UKVA, 2012b; Wine Institute, 2014a, 2014b, 2012): The table shows key characteristics of the two compared wine industries. The English wine industry is marginal compared to all aspects of comparison. The strong emphasis on sparkling wine is striking for the English industry, while the Californian is more diverse.

	England	California
number of vineyards/ winegrower	432 (2012)	4,600 (2012)
producing area (in 1,000 ha)	1.3 (2013)	221.0 (2012)
average vineyard size (in ha)	3.3	39.9
number of wineries	124 (2012)	3,800 (2012)
main wine types/ style	60% sparkling wine (2012)	20% Chardonnay, 13% Cabernet Sauvignon, 9% Merlot (2013)

The change rate of annual wine production is crucial for the industry as variations in the amount of produced wine result in varying amounts of wine to sell and fluctuating income. Only with a stable income can wine producers plan ahead and commit themselves to wine production completely. Hence, production variations are a major concern for the industry to be able to build a sustainable strategy. The change rates can serve as indicators for the degree of professionalization and economic sustainability of the wine industry of a country.

Comparing the change rates of the English and Californian annual wine production, the enormous change rates in England are striking (Figure 8). California also has fluctuations in its production (between +18.5% and -14.0%), but the English fluctuations are about 7.4 times greater than the Californian ones.

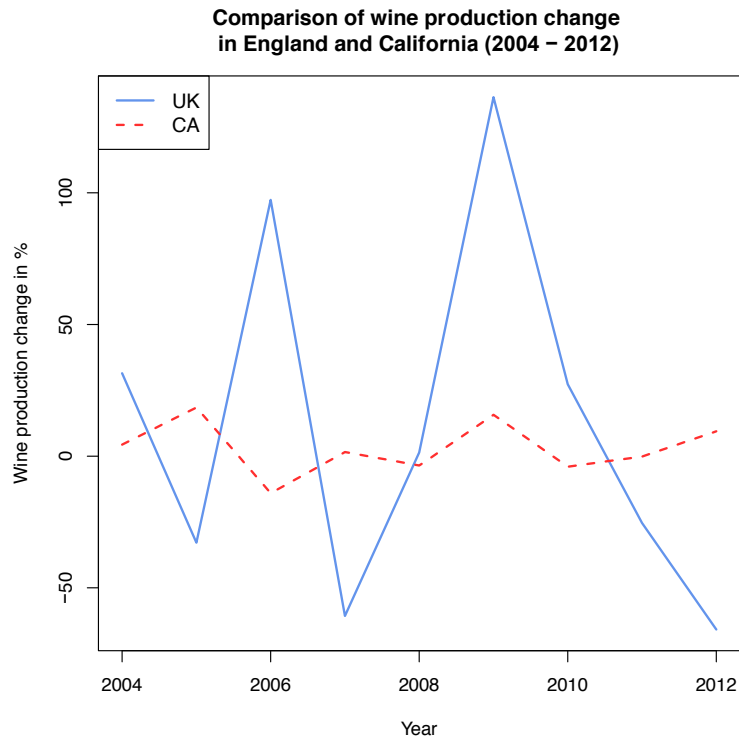


Figure 8: Comparison of wine production rates (2004 – 2012) (data from Wine Institute (2013) and Wine Standards Board (2013)): The percentage change rate is based on wine production compared to the previous year. Californian wine production fluctuates over the years, with most years having a positive wine production change rate (> 0%). In contrast the production change rate for England: both extreme positive and extreme negative change rates (> 50%; > -50%) occurred in the time period. These variations in production make it hard for the wine producers to plan long-term in England.

4. Method

4.1. Epistemology

My research followed a critical realist approach, which acknowledges an existing reality and social discourses (Bryman, 2004). Critical realists are interested not only in observable structures that give rise to the discourses, but also in the underlying mechanisms. The aim is not to find universal laws, but to identify contextual causalities, deduce tendencies and explain these mechanisms (Alvesson and Sköldbberg, 2009). Not only material objects are real, but also discourses if they have a causal effect. The perspectives I identified in my thesis are discourses that affect behaviors and are consequently realities, which are not less real because they are socially constructed. My thesis, conducting a “comparative analysis of different cases” and “emphasizing the social as relational and emergent” (Alvesson and Sköldbberg, 2009, p. 43) from the individual level, utilized a methodology suiting critical realism.

4.2. Literature review

To answer the first research question, I performed a literature review on ES and wine production. I conducted my search with Scopus, a database for peer-reviewed literature (Scopus, 2014), which allows easily download results unlike Web of Science, and to concentrate on peer-reviewed literature unlike googlescholar. For the search, I used a research string (Figure 9) and edited it by using various search terms concerning ES in wine production (Annex 1). Search terms with more than 2,000 hits were excluded from the further proceeding as the terms were too broad.

```
(TITLE-ABS-KEY(viticulture* OR vineyard* OR wine OR "grape* grow*" OR "wine* grow*") AND TITLE-ABS-KEY(search term)) AND DOCTYPE(ar OR re) AND ( LIMIT-TO(LANGUAGE,"English" ) ) AND( EXCLUDE(PUBYEAR,2014) ) AND ( LIMIT-TO(SUBJAREA,"AGRI" ) OR LIMIT-TO(SUBJAREA,"ENVI" ) OR LIMIT-TO(SUBJAREA,"EART" ) OR LIMIT-TO(SUBJAREA,"SOCI" ) OR LIMIT-TO(SUBJAREA,"ECON" ) OR LIMIT-TO(SUBJAREA,"ECON" ) ) AND ( LIMIT-TO(SRCTYPE,"j" ) )
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Figure 9: Research string for literature search in Scopus to find literature on ES in vineyard landscapes: the search was limited to articles or reviews written in English and published in journals. To get replicable results, publications of 2014 were excluded. The words in the blue box were search terms for words title, abstract, or keywords that were used for every search to find articles about vineyard landscapes. *Search term* in brackets of the red box, was replaced with one of the search terms (Annex 1) for words in title, abstract, or keywords, e.g. “tourism”. The green box limits the document type to article and reviews. The purple box limited the search to publications written in English. The turquoise box excluded publication of 2014 to get reproducible results. The orange box limited the subject areas (disciplines) of which publications were allowed. The yellow box limited the results to publication in journals.

I downloaded the search results as csv-files. To reduce the number of coincidental hits, and to increase the quality and condense results, I compiled lists of publications appearing twice or more often when checking all search terms of one ES class using the software R (R Core Team, 2013). The rationale behind this was that if the same publication was found twice or more often using different

search terms for the same ES class, the probability that this publication would be mainly about the considered ES was higher. To make the results more comparable, I divided the number of all duplicates for each of the ES sections by the total amount of all search terms in the considered section.

In addition, I used the same research string and the search term “ecosystem services” for an extra search. I analyzed the results of this search more in detail than the ones of the previous search as the number of hits was manageable.

4.3. Q-Method

To answer the second and third research sub-questions, I used Q-Method to reveal people’s perspectives on CES in vineyard landscapes. Q-Method is a qualitative approach using factor analysis to identify social perspectives. Unlike in a normal factor analysis, Q-Method correlates subjects across a sample of variables and has been used since the 1930’s (Brown, 1980). Q-Method is suitable to illuminate wicked problems (Nijnik et al., 2013), hence, researchers have used Q-Method for a variety of environmental studies (Annex 2). An assumption of Q-Method is that there are only a certain number of distinct perspectives on each topic (Barry and Proops, 1999; van Exel and de Graaf, 2005). A reason to use Q-Method is that the participants (Q-participants) can give their personal subjective view on a topic since they sort a number of given statements (Q-statement) in a forced normal distribution (Q-sort). Simultaneously, Q-participants’ Q-sorts, which represent their views, can be compared thanks to the fact that the Q-statements are the same (Danielson, 2009).

A Q-study consists out of four steps (Figure 10). First, the researcher needs to identify a topic and the group of people, whose perspectives on the topic s/he is interested in. Second, Q-statements must be retrieved from either interviews or existing literature, which represent the possible range of views on a topic. Third, Q-participants that represent the broadest possible view on the topic are asked to conduct Q-sorts. Fourth, a factor analysis helps to reveal a distinct number of social perspectives on the researched topic. The factors found help to understand different perspectives on a certain topic (van Exel and de Graaf, 2005)³.

³ A more detailed explanation of the ideas of Q-Method and its basic principles is given in Annex 3.

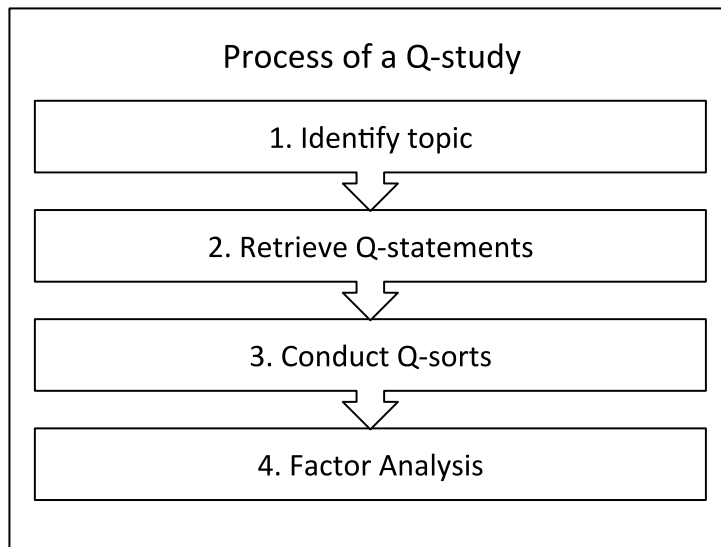


Figure 10: Process of a Q-study: A Q-study has four parts: (1) the researcher identifies a relevant topic, (2) Q-statements are retrieved from the existing discourse, (3) Q-participants conduct Q-sorts, and (4) factor analysis helps to identify common perspectives.

4.3.1. Identify topic

My research question defined local perspectives on CES of vineyard landscapes as the research topic of my Q-study.

4.3.2. Retrieve Q-statements

The selection of the Q-statements is a “methodological value judgment” (Webler et al., 2009, p.11) and “remains more an art than a science” (Brown, 1980, p. 186). I derived a large number of Q-statements from homepages of wine producers in England (members of the South East Vineyards Association), California (located in Sonoma Valley), and from other Q-Method studies on environmental perception. I used strategic sampling to classify these Q-statements into the eleven CES classes (Table 2) of the CICES framework. To have concise and varying Q-statements, I adapted some of the Q-statements and made up some of my own. For the final Q-study, four Q-statements remained in each class resulting in a total of 44 Q-statements (Annex 7).

4.3.3. Conduct Q-sorts

To conduct the Q-sorts, I used the free online software www.qsoftware.com. I created a Q-study, including questions on demographic facts, the Q-sort itself, and in the end, a short evaluation, which asked Q-participants to give free text comments on Q-Method and the topic. I used quotations from these comments to illustrate the described perspectives in section 6.2., attributed to the Q-participant who stated them. Besides year of birth, gender, place of residence, and length of residence, I asked participants about their connections to wine production. For the Q-sort itself, I

used a scale with nine categories (+4 to -4), as used in many Q-studies (Annex 2). I labeled the extremes ‘most like how I think’ and ‘least like how I think’ as suggested by Webler et al. (2009). There were no further labels as Q-sorts are self-referential because Q-statements are ranked relative to each other according to the participants’ perspectives (Swedeen, 2006; Woolley and Mccginnis, 2000). In addition, I pre-determined the number of possible Q-statements in each category to get quasi-normal distribution of Q-statements (Figure 11). Q-participants could change the position of the Q-statements as often as they wanted until they saved it (van Exel and de Graaf, 2005).

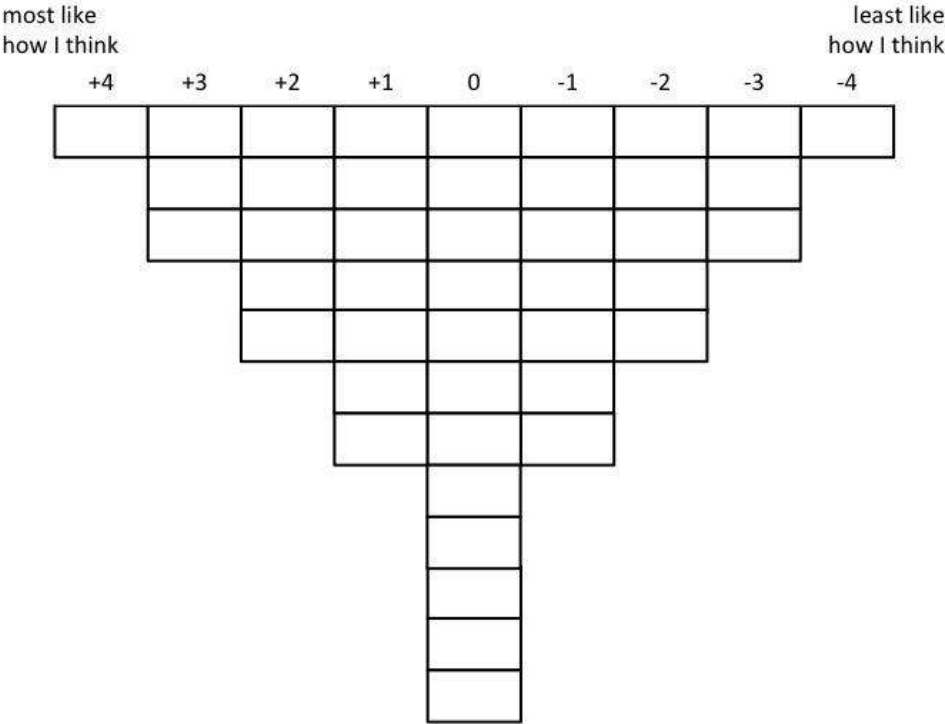


Figure 11: Graphical outline of the utilized Q-Sort raster: There were nine categories from +4 (‘most like how I think’) to -4 (‘least like how I think’), into which the 44 Q-statements were sorted by each participant in a forced normal distribution. The largest number of Q-statements (n=12) was placed in the middle category 0. The two extreme categories +4 and -4 could have each only one statement and were the only categories with labels.

Q-participants should reflect the complete spectrum of people concerned with wine production and local land use (Nijnik et al., 2013; Webler et al., 2009). For this reason, I invited wine producers and residents representing the following groups to participate: local administration, elected councils (e.g., parish council), tourism industry, nature conservation, heritage and local societies, housing industry, and agricultural industry. Possible participants were either contacted personally via e-mail or through existing e-mail lists (Table 4).

Table 4: Overview of all groups of Q-participants invited to participate in the study, and how they were contacted.

Location	Who was contacted	How
England	Members of South-East England Vineyard Association (SEVA)	SEVA e-mail list
	local stakeholders from South-East England identified by online research of local parishes homepages	personal e-mails by Klara J. Winkler
California	members of Sonoma Valley Vintners and Growers Alliance	weekly newsletter
	local stakeholders from Sonoma County identified by online research	<ul style="list-style-type: none"> • letter to the editor in local newspaper (Annex 4) • personal contacts of supervisor Kimberly Nicholas • post on University of California Cooperative Extension Sonoma Facebook site

4.3.1. Factor Analysis

The objective of Q-Method is to reveal key perspectives on a certain topic. This is achieved through factor analysis, which correlates Q-participants' Q-statement rankings to produce factors, which represent the perspectives. Some view a factor analysis as an objective method (Brown, 1980), whereas others find especially the identification of the numbers of factors a subjective interference of the researcher (Backhaus et al., 2003). In Q-Method, either Centroid analysis, or Principal Component Analysis (PCA) is used to calculate the factors. I opted for PCA as it is more common in factor analysis (Webler et al., 2009) and helps to condense variables (Q-sorts) into a certain amount of components (factors) by calculating the correlations of the variables and ascribing them to these components according to their correlations (Backhaus et al., 2003). For the PCA, I used the package "psych" and "GPArotation" in R (R Core Team, 2013).

The analysis part of a Q-study has four steps (Figure 12): decision on the number of factors, PCA, allocation of Q-sorts to identified factors, and identification of Q-statement rankings of each factor.

Number of factors

A common method to identify the number of factors is to extract the amount of factors that have an eigenvalue > 1 (Kaisers criterion), as eigenvalues⁴ are a measure of the explained variance of each factor (Backhaus et al., 2003; Brown, 1980). An additional best-practice criterion is to have at least

⁴ sum of squared factor loadings of all variables of one factor

three Q-sorts in each factor (Webler et al., 2009). For each case, I applied first the Kaisers criterion using `eigen()`, and then reduced the number of factors until each factor had at least three Q-sorts.

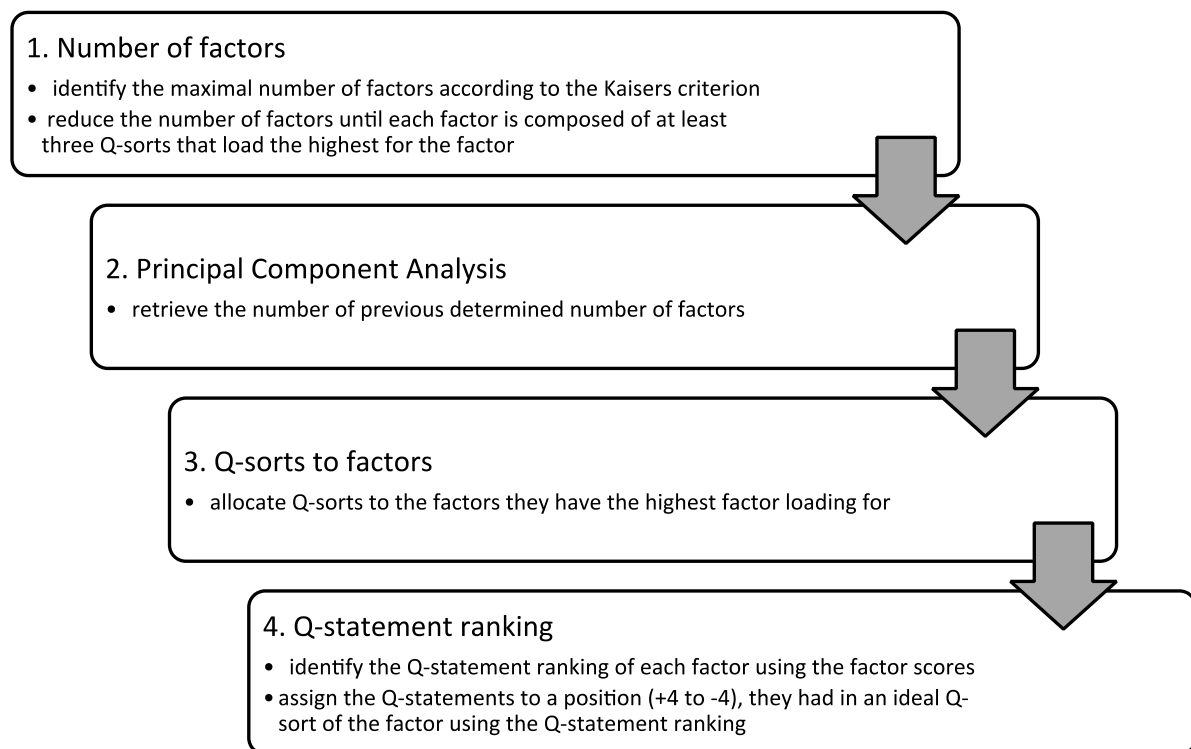


Figure 12: Flow chart of Q-study analysis steps: The flow chart shows the four analysis steps conducted in the Q-study: First the number of factors is calculated with the Kaisers criterion, then the PCA calculates the factors. Afterwards the Q-sorts are allocated to the factor they best fit. Last, the Q-statements ranking in each factor and their placement in a normal distribution is identified.

Principal component analysis

I conducted a PCA to generate the factors, factor loadings of the Q-sorts, and factor scores using `principal()` in R. The function does a varimax rotation of the factors by default, which helps to get “a mathematically precise solution” (Brown, 1980, p. 224).

Assignment of Q-sorts to factors

I assigned each Q-sort to a factor by using its factor loadings, which are the correlation between the computed factor and the Q-sorts, and show the degree of similarity between the two. The factor loadings can attain values between +1.0, and -1.0 with +1.0 indicating that factor and Q-sort completely concur and with -1.0 opposing each other. Researchers use different minimum levels of factor loadings⁵ to assign a Q-sort to a factor and to express significance. I allocated the Q-sorts to the factor they loaded highest to, no matter how high the factor loading was.

⁵ often between +0.3 and +0.5 (Addams and Proops, 2000b; Backhaus et al., 2003)

Extraction of Q-statement ranking of factors

For each factor, I extracted its Q-statement ranking using the factor scores, which indicate the ranking of the Q-statements within the factor. According to the ranking, I assigned each Q-statement in the category (+4 to -4, as Figure 11) the Q-statement would have been, if an ideal representative of the factor had done a Q-sort.

5. Results: ecosystem services in vineyard landscapes

Research Sub-Question 1:
Which ES, particularly CES, in vineyard landscapes are quantified or discussed in existing literature?

Using the research approach described in 4.2., I found a total of 27,219 publications with most publication on *regulating and maintenance* services (Table 5). However, due to the fact that different amounts of ES classes with varying numbers of search terms were in each section, I calculated a ratio of the number of articles and the number of search terms. This more comparable number shows a bias towards publications on *provisioning* services, followed by the publications on *regulating and maintenance* (Annex 6). The ratio for CES is three times smaller than the one of *regulating and maintenance* services and four times smaller than the one of *provisioning* services. Many publications dealt with specific ES, like pest control, and do not use the term *ecosystem services*.

Table 5: Search results for literature research: the ratio of publication on CES in ratio with the search terms and classes used are lower than those of the regulating & maintenance services. The highest results are those for provisioning ES.

Section	# of CES classes	Unique articles	Double articles	Ratio unique articles/ # of search terms	Ratio double articles/ # of search terms
<i>provisioning</i>	3	4,219	1,261	1,406	420
<i>regulating & maintenance</i>	13	16,248	3,857	1,250	297
<i>cultural</i>	11	7,252	1,075	558	98

I found that there is limited literature specifically on ES and wine production. Using Scopus, my literature research using the search term “ecosystem services” resulted in 30 hits (Annex 5). Of these articles, one was not accessible and one was not written in English, which reduced the number of reviewed articles to 28. The analysis of the abstracts of the 28 papers showed that only four had some focus on ES and wine production. The rest focused on other topics, using the concept of ES varyingly (Danne et al., 2010; Fiedler et al., 2008; Jedlicka et al., 2011; Kross et al., 2012). In addition, four further publications concerning the topic, cited in at least one of the 28 reviewed articles, were also considered for the review.

The majority of publications dealt with the ecological valuation of ES in vineyards, sometimes mixed with economic effects (Orre-Gordon et al., 2013; Tompkins, 2010; Tompkins et al., 2012). The focus was on the relationship between biodiversity and vineyards. All of the four articles with a focus on ES were on *regulating and maintenance* services. Only Kross et al. (2012) was additionally concerned with *provisioning* services and only Fiedler et al. (2008) tackled CES. Three of the four additional publications had an ecological perspective and discussed possibilities and effects of changes in management methods in vineyards on ES (Orre-Gordon et al., 2013; Tompkins, 2010; Tompkins et al., 2012). The fourth showed that consumers had a positive attitude towards sustainable wine production and were willing to pay more for sustainably produced wine (Forbes, Cohen, Cullen, Wratten, & Fountain 2009).

In the reviewed literature, CES in vineyards were little studied. Tompkins (2010) conducted one of the most holistic studies on ES and vineyards. Nevertheless, he excluded *aesthetic and cultural* services from his assessment without justifying it. The only service that he investigated and that can be classified as a CES was 'biodiversity conservation'. According to CICES, biodiversity can be an *existence* service. Tompkins (2010) did not use any classification framework and avoided like this the on-going scientific discussion how to classify biodiversity (chapter 2.3.1.).

The following chapter deals only with ES classes tackled in the 32 reviewed articles. This does not mean that ES not discussed here have no relevance for vineyards or wine production in general (Annex 6) as the number of found publications in the literature review demonstrates.

5.1. Biodiversity in vineyard landscapes

Lot of literature is on biodiversity in vineyard landscapes. Vineyard management can positively influence local biodiversity when e.g. focusing on native animals or plants (Fiedler et al., 2008; Jedlicka et al., 2011; Tompkins, 2010). Especially organic vineyard management has the potential to improve local biodiversity while optimizing wine production (Gaigher and Samways, 2010). Remnant habitats in vineyards are important as they are more natural than the rest of the vineyards and thus allow native species to spread (Gaigher and Samways, 2010; Gillespie and Wratten, 2012; Hogg and Daane, 2011). A high biodiversity in vineyards has positive effects on the resilience of the whole ecosystem, on pest and disease control but also on the production of commercial goods (Kross et al., 2012; Tompkins, 2010).

On the other hand, vineyards are always man-made monocultures that reduce the area of natural habitat and thus reduce the natural abundance of biodiversity. This situation can increase the

vulnerability of vineyards to pests (Viers et al., 2013). Season-long pesticide application can decrease the number of parasitoids with consequences not only for pest control, but also for pollination and the soil nutrient cycle (Nash et al., 2010).

5.2. Regulating and maintenance services

Vineyard management, which focuses not only on one ES, but on the multifunctionality of an ecosystem, helps to enhance a multitude of ES and simultaneously the overall sustainability of winegrowing (Orre-Gordon et al., 2013). Fiedler et al. (2008) conclude that an appropriate habitat management can foster CES e.g. conservation and maintenance of biodiversity and ecotourism, as well as other services like suppression of weeds, the maintenance of the soil composition and condition, and pest control.

The way a vineyard is managed influences the soil composition and condition. The use of native cover crops in vineyards can e.g. help to sustain an adequate soil moisture and bacteria level (Fiedler et al., 2008). Different mulching materials effect the soil habitat and the microclimate (Addison et al., 2013). The presence of both cover crops and vine can cause nitrogen stress, which has a negative influence on the growth of the plants (Celette and Gary, 2013).

Naturally, vineyards store less carbon than woody wildlands. However, the management of vineyards can influence the amount of stored carbon. A mixed land cover with vines and native natural land covers augments carbon stocks in the soil (Williams et al., 2011).

As vineyards are monocultures an important topic is pest and disease control. Vineyard management using knowledge of conservation biology and integrated pest management (IPM) can contribute to a reduced need of chemical herbicides and pesticides. IPM aims to reduce the usage of synthetic chemical inputs using existing knowledge on the grapes and possible pests, while enhancing the ES including the crop production of the vineyards (Addison et al., 2013). This method works by promoting conditions for natural pest control: e.g., mulching supports beneficial organisms like arthropods (Addison et al., 2013) and increases the biological degradation of vine debris to decrease harmful fungus (Jacometti et al., 2007), or adapting the habitat to the needs of certain animals and plants can strengthen the natural food chain and the native biodiversity (Addison et al., 2013; Fiedler et al., 2008; Jedlicka et al., 2011; Orre-Gordon et al., 2013; Tompkins, 2010). However, native plants like cover crops can also increase pest problems (Danne et al., 2010).

Many wine-producing areas are in biomes with dry periods, and thus liquid flows are of major concern for wine producers there (Celette and Gary, 2013). Especially in spring, water stress can be caused when not only vines but also cover crops are planted in the vineyards. To avoid this competition, vines can re-distribute their roots into deeper soil layers. In contrast, cover crops can be beneficial for the refilling of soil water in winter.

External pollinators play only a minor role for vines, which are wine-pollinated. Nevertheless pollinators are exposed to a high risk of getting in direct contact with pesticides in vineyards (Barmaz et al., 2010) as pollinators often use cover crops as forage (Viers et al., 2013).

5.3. Cultural ecosystem services

Most publications briefly mention CES in vineyards, and do not further research them, although they are a visible material representation of a cultural landscape that often function as trademarks for whole regions (Daniel et al., 2012). This master's thesis tries to fill this research gap in the following chapters.

Various recreational activities are based on wine production. The way a wine region is managed is also a selling point for tourism in the region (Orre-Gordon et al., 2013). The usage of native plants for pest and weed control can trigger recreational opportunities for visitors as they are beautiful (Tompkins, 2010). Some wine producers encourage visitors to actively discover the nature by offering educational trails (Fiedler et al., 2008).

Since wine is a luxury beverage, special consumption cultures have developed. Consumers are increasingly interested in sustainably grown wines (Tompkins, 2010). The fact that a wine is coming from a vineyard that has adopted sustainable winegrowing methods enhancing various ES can influence the consumer's decision (Orre-Gordon et al., 2013). Consumers are willing to pay higher prices for a wine grown in a 'green' way and think that it tastes equal or better than conventionally grown wine (Forbes et al., 2009).

Vineyards are monocultures, often widely planted and thus shaping the whole landscape. The introduction of native plants can contribute to the aesthetic of the winegrowing areas (Orre-Gordon et al., 2013). Vineyards can have such a high symbolic significance for an area that it seems profitable to change the land use in a major part of this area. However, this can result in the loss of other traditional land uses and in the change of the look of the landscape as a whole (Simoncini, 2011).

6. Perceptions of cultural ecosystem services in vineyard landscapes

In this chapter, I present the results of local perceptions of CES in vineyard landscapes, starting with section 6.1., where I show the demographic results of the English and Californian Q-sorts, including age and gender distribution of Q-participants, as well as the duration of residence and time working in the wine industry. In 6.2., I present the four perspectives I found for each case by describing their ideal Q-statement ranking and Q-participants highly loading for the perspective. In 6.3., I identify differences and similarities within the cases and between them.

6.1. Demographic results of the Q-study

In total, 42 Q-sorts were completed including 20 in England and 22 in California. The age group between 53 and 44 years was the biggest (n=11) (Figure 13). This group was also the most represented in the English case. In the Californian case, the biggest group was the one of the under 33 years old (n=8). There was a gender balance between the Q-participants (Figure 14) with a slight dominance of men in the English answers and an exact equilibrium in the CA answers. Overall, more wine producers than residents took part in the Q-study (Figure 15).

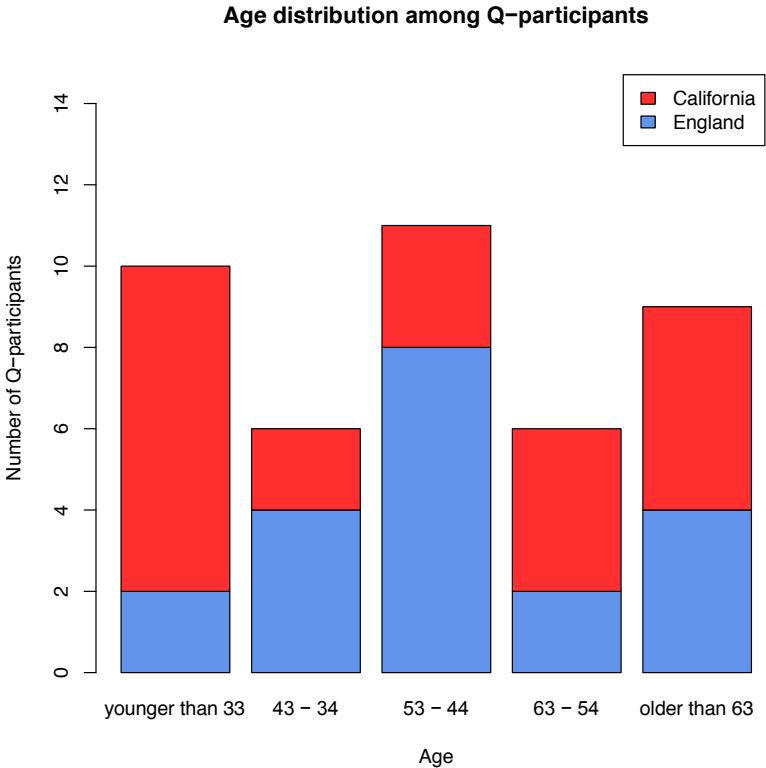


Figure 13: Age distribution of Q-participants: The age group between 53 and 44 years had the most Q-participants. The most English Q-participants fell in this group. There were many Californian Q-participants younger than 33 years old.

Gender distribution of Q-participants

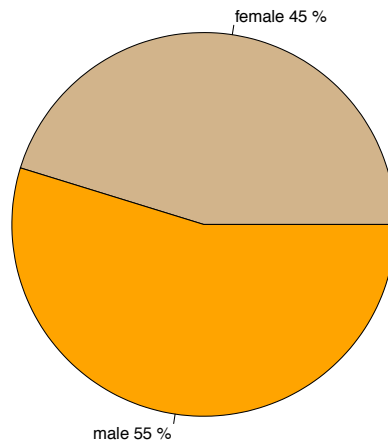


Figure 14: Gender distribution of Q-participants: The gender distribution was pretty much equalized among the 44 Q-participants with 45% of women and 55% of men.

Q-participants' profession

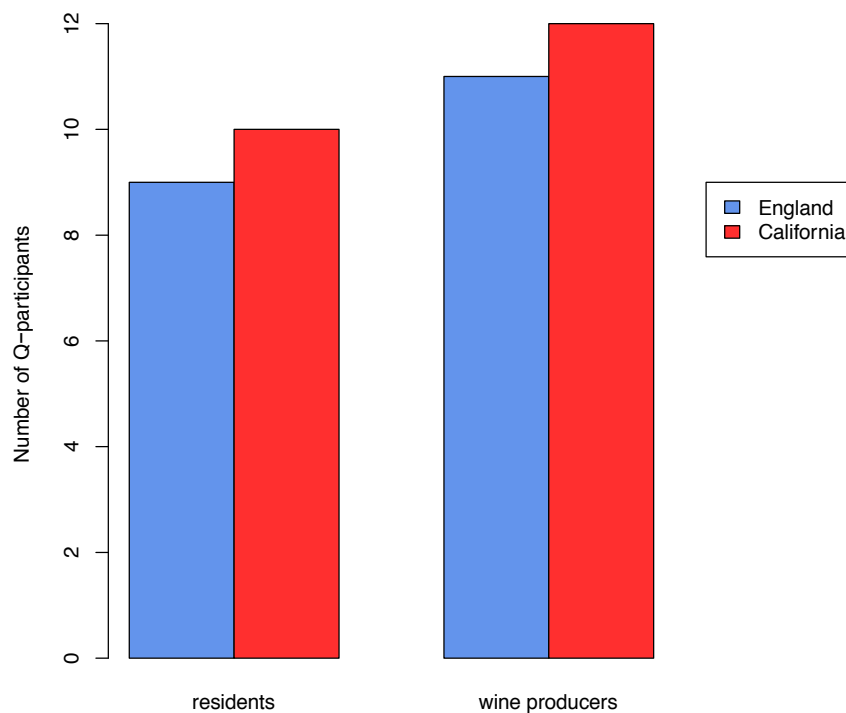


Figure 15: Distribution between Q-participants working and not-working in the wine industry: In the English and the Californian case, there were slightly more wine producers than residents.

On average, English Q-participants had lived longer in their region (28.8 years) than Californians (19.6 years) (Figure 16). English residents had lived on average for 40 years in their region. Californian residents had lived for less than half of this time (17.3 years) in their region. With regards

to wine producers, Californians had lived a bit longer (21.6 years) in their region than English (19.5 years).

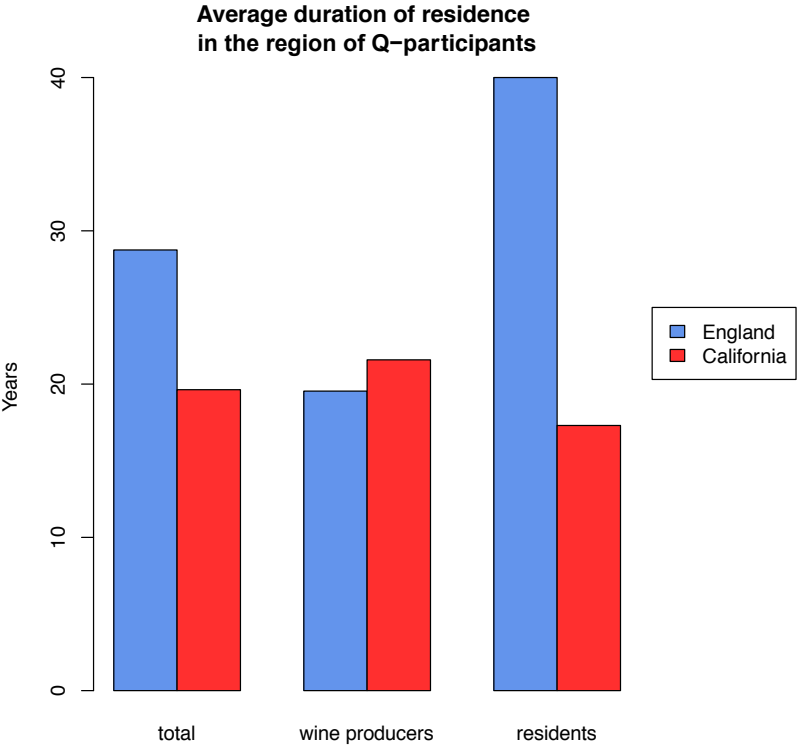


Figure 16: Comparison of duration of residence: This figure allows the comparison of the time span Q-participants had lived in their current region. The left group shows the average for each case study for all Q-participants (n=20 in England, n=22 in California). The middle one shows the average time span for wine producers. The right group displays the duration of residents.

There were differences between the two cases when comparing the duration of residence and the time span wine producers had worked in the wine industry (Figure 17). The time English and Californian wine producers have worked in the wine industry was for both shorter than their duration of residence in their region. However, the difference between the duration of residence and the time working in the wine industry was not as big in the English case as it was in the Californian case. Californian wine producers had lived on average for more than twice as long in their region (21.6 years) than worked in the industry (10.3 years). In England, wine producers had worked in the wine industry about three fourth of the time (14.9 years) they had lived in the area (19.5 years).

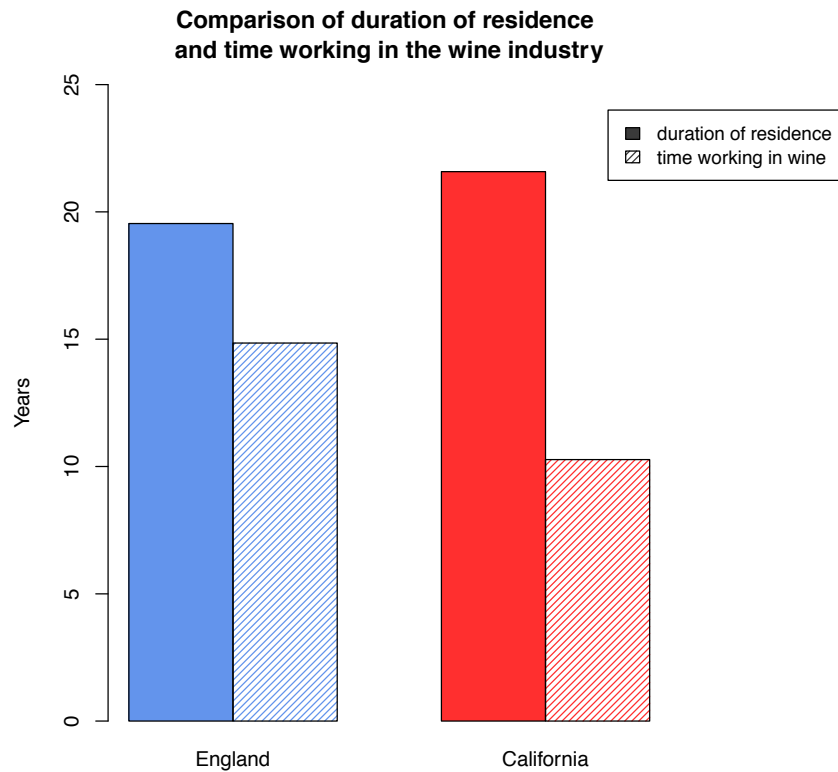


Figure 17: Comparison of duration of residence and time working in the wine industry: In England and California, wine producers had lived longer in the area than working in the wine industry, whereas the time difference is bigger in California than in England. These bars represent just data for wine producers and do not include residents.

6.2. Results of Q-study

6.2.1. England

I identified four distinct perspectives on CES in vineyard landscapes held by English wine producers and residents. These four were selected from the PCA because they each contained at least three Q-sorts, therefore were more robust than the six perspectives that would have been suggested by solely following the Kaiser criterion. Based on my analysis of their contents, I have called these four perspectives:

1. Science
2. Experience
3. Conservation
4. Wine culture

In the next step, I allocated the English Q-sorts to the four identified perspectives (Table 6) and assigned the Q-statements to the categories an ideal representative of the perspectives would have ranked them (Table 7).

Table 6: Assignment of Q-sorts to English perspectives: The Q-loadings are the correlation between the four perspectives and the Q-sorts conducted by the English Q-participants, and show the degree of similarity between the two. The highest loading for each perspective is the first shown. Eight Q-sorts loaded highest for *Science*, four for *Experience*, four for *Conservation*, and four for *Wine Culture*. All but one participant (Q47) were above 0.5 for their Q-loading, indicating they fell rather strongly into the selected perspective.

Perspective	Q-sort	Q-loading
<i>Science</i>	Q11	0.838
	Q4	0.784
	Q14	0.750
	Q5	0.614
	Q1	0.612
	Q3	0.584
	Q13	0.557
	Q18	0.548
<i>Experience</i>	Q2	0.849
	Q8	0.722
	Q6	0.689
	Q10	0.594
<i>Conservation</i>	Q26	0.814
	Q41	0.742
	Q12	0.734
	Q22	0.573
<i>Wine Culture</i>	Q7	0.747
	Q28	0.646
	Q9	0.593
	Q47	0.429

England perspective 1: Science

Science was characterized by the emphasis on science as a tool for wine production and the denial of (personal) emotional connections with vineyards. Two statements on science (C1/4, Figure 18) were ranked among the highest four. This perspective represented a wine experts’ perspective as it stressed terroir⁶ (X3, Y2) and wine producers’ duty to conserve natural resources (B2). It was indifferent to services of the classes *entertainment*, *physical* and *experiential*. Emotional connections with vineyards such as *spiritual* or *aesthetic* services were neglected as the eight least agreed statements were either on *spiritual* (S1/2/3/4), *aesthetic* (A1/2), *symbolic* (Y3), and *heritage* services (H4) (Table 7). The two Q-statements about land use change (Y4, H2) scored -1 and 0.

⁶ “the possession by a wine of a sense of place; that is the wine expresses flavour characteristics influenced by the properties of the vineyard or region from which it hails” (Goode, 2005, p. 25)

Table 7: Q-statement ranking of the four English perspectives: Q-statements are sorted in alphabetical order of the CES classes, with codes for cross-reference to statements in the text. The numbers represent the category each Q-statement would have been ranked in, from +4 to -4 as Figure 11, if an ideal representative of the perspective had done a Q-sort. The categories were determined by the computed factor scores (Annex 9), which indicate the ranking of the Q-statements within each perspective. Q-statements ranked positive have a green background, Q-statements ranked negative have a red background, with a more intense color the higher/lower the Q-statement was ranked. Thus, an ideal representative of *Conservation* would have ranked statement E1 the highest and B1 the lowest.

Code	CES class	Q-statement	Science	Experi-ence	Conser-vation	Wine Culture
A1	aesthetic	The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes.	-3	1	-2	0
A2	aesthetic	The inspiring views in vineyards are unique.	-2	2	2	1
A3	aesthetic	Vineyards inspire art.	-1	1	-1	3
A4	aesthetic	Vineyards show the structure of the underlying landscape in a beautiful way.	-1	1	0	1
B1	bequest	I owe a lot to the environment in vineyards.	2	-1	-4	-2
B2	bequest	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.	3	0	3	3
B3	bequest	Wine producers are the stewards of a tradition created by previous generations with the task to preserve the vineyards into the future.	0	0	1	0
B4	bequest	Vineyards have a value in themselves.	0	2	2	0
D1	educational	Learning to produce wine means learning that there is so much more than textbooks can ever say.	2	0	0	-2
D2	educational	A vineyard teaches you that nature is important for humans.	1	0	-2	-2
D3	educational	During a visit to a vineyard, people can learn a lot about wine production as well as about wine.	2	2	1	0
D4	educational	Wine production can increase consumer interest in where food comes from and how it is grown.	1	2	1	0
S1	entertainment	Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities.	0	4	3	-2
N2	entertainment	On the whole, tourists attracted by vineyards benefit my region.	1	1	2	1
N3	entertainment	Whether people want to just turn up and enjoy the beautiful countryside, or come en masse for a fully-tutored tour, tasting (and buying) wine with a dedicated and knowledgeable tour guide, they are welcome to visit vineyards.	0	2	1	0
N4	entertainment	Vineyards attract valuable entertainment activities like festivals and balloon rides.	-1	0	-1	4
E1	existence	Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production.	0	-2	4	2
E2	existence	Vineyards detract from the natural beauty of the countryside.	0	-4	0	-1
E3	existence	Vineyards provide a big benefit to society that is not provided elsewhere.	-1	1	1	-1
E4	existence	I enjoy the natural beauty of vineyards.	0	3	-1	1

X1	experiential	Vineyards contribute to a special food culture that can be experienced in local shops and restaurants.	1	1	0	3
X2	experiential	A vineyard is a valuable place to experience nature.	1	3	-3	-1
X3	experiential	You can taste and enjoy in wine the changing nuances of season, place and vineyard parcel.	2	0	0	0
X4	experiential	Wine tastings are valuable to experience a vineyard.	1	3	1	1
H1	heritage	For wine producers in my region, wine production is not only an occupation, but also a way of life and a cultural tradition that should be preserved.	0	-3	0	0
H2	heritage	The change away from traditional land use in my region ultimately weakens local traditions and identity.	0	-2	3	-3
H3	heritage	Most people living in my region simply are not interested in vineyards.	1	0	1	-3
H4	heritage	My region has decades of experience dedicated to perfecting the art of crafting fine wines.	-4	-3	-1	2
P1	physical	Vineyards are a great setting for cycling.	-2	-1	0	2
P2	physical	Harvesting grapes at vintage is enjoyable work.	2	-2	-2	0
P3	physical	Wine growing areas offer the opportunity to explore the surrounding countryside through walking or hiking on nearby trails.	-1	0	0	0
P4	physical	Horseback riding near vineyards is a fun activity.	-1	-2	-1	2
C1	scientific	Science, not emotional reactions, must serve as the foundation for wine production.	4	-1	-2	-1
C2	scientific	Expert knowledge of producing excellent wines is created by following traditional wine producing methods.	0	0	0	-1
C3	scientific	Experience in wine production teaches much more than being in school.	0	0	0	-1
C4	scientific	More holistic scientific analysis is required to fully understand the challenges facing wine production and point to appropriate solutions.	3	-1	-3	2
S1	spiritual	When you are out in the vineyards, you realize where humankind really and truly comes from and what life is really and truly about.	-3	1	-1	-3
S2	spiritual	Vineyard areas help to fulfill spiritual needs.	-3	-1	-2	-2
S3	spiritual	Being in the vineyards connects me to a larger spirit.	-2	0	-3	-1
S4	spiritual	Weddings in vineyards celebrate the special nature of vineyards.	-2	0	0	0
Y1	symbolic	I prefer the view of a natural landscape to vineyards.	0	-3	2	1
Y2	symbolic	Wine should be a bit like a fingerprint taken from the land – a unique expression of what the grapevine can achieve.	3	-2	-1	1
Y3	symbolic	My region has a unique wine producing tradition.	-2	-1	0	0
Y4	symbolic	Changing the traditional land use in my region would mean that we destroy a part of ourselves.	-1	-1	2	-4

Top-ranked Q-statements:

- Science, not emotional reactions, must serve as the foundation for vineyard management. (C1)
- Wine should be a bit like a fingerprint taken from the land – a unique expression of what the grapevine can achieve. (Y2)
- Wine producers have a duty to conserve soil, water resources and the living nature for the next generation. (B2)
- More holistic scientific analysis is required to fully understand the challenges facing wine making and point to appropriate solutions. (C4)

Last-ranked Q-statements:

- When you are out in the vineyards, you realize where humankind really and truly comes from and what life is really and truly about. (S1)
- Vineyard areas help to fulfill spiritual needs. (S2)
- The vineyards in my region contribute to make it one of the nation’s exceptional natural landscapes (A1)
- My region has decades of experience dedicated to perfecting the art of crafting fine wines. (H4)

Figure 18: Top and last ranked Q-statements of the English perspective *Science*: The four top-ranked Q-statements were on science (C1, C4), terroir (Y2), and wine producers’ duty to conserve natural resources (B2) (statement codes from Table 7). The four statements ranked “least like how I think” were on *spiritual* services (S1/2), the *symbolic* meaning of vineyards (A1), and the tradition of wine production (H4).

Men who had worked in the wine industry and lived in the region for a long time dominated this perspective. On average, they had lived for over 23 years in the region. Seven of eight Q-sorts were done by men and seven representatives had worked in the wine industry for an average of 18.7 years. Q-participant Q11 loaded highest for this perspective. His/her evaluation comment summarized the perspective well: “... most wine producers in our region have few concerns about traditions and environment” (Q11).

England perspective 2: Experience

Experience emphasized a combination of concerns on wine production and on environmental consciousness (Figure 19). The highest ranked Q-statement stressed that wine producers “have a greater responsibility to produce wine than to provide an arena for recreational activities” (N1). Nevertheless, all positively ranked Q-statements dealt with experiences and activities in vineyards that linked with wine production and wine itself and could be grouped as recreational activities specific to wine production. However, physical use of the vineyards was not seen important. The perspective was indifferent on spiritual services of vineyards. Neither *scientific*, nor *educational* services were highly scored. Representatives of the perspective did not fear land use change (H2, Y4). They enjoyed vineyards as landscapes, ranking E4 as third highest, and Y1 and H4 as the two last Q-

statements. All Q-statements on heritage and symbolic benefits of vineyards were negatively scored (Table 7).

<p>Top-ranked Q-statements:</p> <ul style="list-style-type: none">– Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities. (N1)– Wine tastings are valuable to experience a vineyard. (X4)– I enjoy the natural beauty of vineyards. (E4)– A vineyard is a valuable place to experience nature. (X2) <p>Last-ranked Q-statements:</p> <ul style="list-style-type: none">– My region has decades of experience dedicated to perfecting the art of crafting fine wines. (H4)– For wine producers in my region, wine production is not only an occupation, but also a way of life and a cultural tradition that should be preserved. (H1)– I prefer the view of a natural landscape to vineyards. (Y1)– Vineyards detract from the natural beauty of the countryside. (E2)

Figure 19: Top and last ranked Q-statements of the English perspective *Experience*: The four top-ranked Q-statements were on wine production (N1), wine tasting (X4) and vineyards as part of nature (E4, X2) (statement codes from Table 7). The four last-ranked Q-statements were on tradition (H1/4), and preferences of landscape kind (E2, Y1).

In *Experience*, most Q-participants were working in the wine industry. Gender was equalized between men and women. A special characteristic of the perspective was its diversity in age distribution, time period of working in the wine industry and of living in the area. The time spent working in the wine industry was rather short, with an average of 5.8 years. However, the average duration of residence in the region was more than threefold that, at 18.3 years. Q-participants' evaluation reflections supported the findings. They characterized the English wine-producing area as "a new region so little tourism infrastructure and no wine heritage but it will come" (Q10). Overall, the attitude towards vineyards was positive (Q6) and the produced wine was described as "wonderful" (Q2).

England perspective 3: Conservation

Conservation focused on nature conservation and concerns about land use change (Figure 20). The top ranked Q-statement (E1) prioritized nature protection over wine production. The Q-statement on nature conservation (B2) was rated in the top four Q-statements, which strengthened this aspect. In addition, Q-statements on land use change (H2, Y4) were highly ranked, which stressed that the perspective was concerned about land use change causing identity and heritage loss. *Symbolic* and *heritage* services provided by wine production were not valued. Representatives of the perspective preferred "natural landscape to vineyards" (Y1) and did not think that "a vineyard is a valuable place

to experience nature” (X2). Persons in the perspective gained no personal enjoyment from vineyards or spiritual benefits. All Q-statements on spirituality scored negatively. The perspective assigned no importance to the class *scientific*.

Top-ranked Q-statements:

- Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production. (E1)
- Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities. (N1)
- The change away from traditional land use in my region ultimately weakens local traditions and identity. (H2)
- Wine producers have a duty to conserve soil, water resources and the living nature for the next generations. (B2)

Last-ranked Q-statements:

- Being in the vineyards connects me to a larger spirit. (S3)
- A vineyard is a valuable place to experience nature. (X2)
- More holistic scientific analysis is required to fully understand the challenges facing wine making and point to appropriate solutions. (C4)
- I owe a lot to the environment in vineyards. (B1)

Figure 20: Top and last ranked Q-statements of the English perspective *Conservation*: The four top-ranked Q-statements were one conservation of natural resources (B2, E1), wine production (N1), and land use change (H2) (statement codes from Table 7). The four last-ranked Q-statements were about spirituality (S3), *experiential use* (X2), *science* (C4), and *bequest* (B1).

Most Q-participants in *Conservation* did not work in the wine industry. They had lived on average for 36.8 years in the region. The Q-participants in this perspective felt that it was “difficult to prioritise” (Q12) and that they were “forced to be more positive than I wanted to be” (Q26) due to the given number of Q-statements per category. The negative attitude towards wine production in England did not mean that Q-participants in the perspective had a generally negative attitude towards wine production. Q-participant Q26 stated, “I could enthuse about Savigny-les-Beaune⁷ and its vineyards”. However, Q-participants were not enthusiastic about wine production in their own region.

England perspective 4: Wine Culture

Wine Culture highly rated Q-statements on entertainment and environmental aspects (Figure 21). Entertainment activities (N4), inspiration for art (A3), special food (X1), and physical activities (P1/4) contributed to a positive attitude towards vineyards. Nature conservation (B2) and protection (E1) were another major priority of the perspective. The importance of the aesthetics of vineyards was

⁷ French AOC wine production area. AOC stands for appellation d’origine contrôlée, translated term of controlled origin, and is a French certification granted to products coming from certain French regions.

the connection between these two major issues. There were as well two issues the perspective was not concerned about: effects of land use change (H2, Y4) and spirituality (S1). All Q-statements on spirituality were ranked as unimportant.

Top-ranked Q-statements:

- Vineyards attract valuable entertainment activities like festivals and balloon rides. (N4)
- Wine producers have a duty to conserve soil, water resources and the living nature for the next generation. (B2)
- Vineyards inspire art. (A2)
- Vineyards contribute to a special food culture that can be experienced in local shops and restaurants. (X1)

Last-ranked Q-statements:

- When you are out in the vineyards, you realize where humankind really and truly comes from and what life is really and truly about. (S1)
- The change away from traditional land use in my region ultimately weakens local traditions and identity. (H2)
- Most people living in my region simply are not interested in vineyards. (H3)
- Changing the traditional land use in my region would mean that we destroy a part of ourselves. (Y4)

Figure 21: Top and last ranked Q-statements of the English perspective *Wine Culture*: The four top-ranked Q-statements were on experience and activities connected with vineyards (A3, N4, X1) and conservation of natural resources (B2) (statement codes from Table 7). The four last-ranked Q-statements were on spiritual value (S1), land use change (H2, Y4) and people’s interested in vineyards (H3).

Q-participants in *Wine Culture* were residents that had lived in the area on average for 42.5 years. There was a slight majority of women in the perspective. Their comments reflected their positive attitude towards vineyards and wine production in the area: “The sight of our vineyard still makes me happy” (Q9). The issue of nature conservation also came up in the comments. One Q-participant stated that the Q-sort made him/her reflect on “the tension between a highly managed productive landscape, and one that supports biodiversity” (Q7).

6.2.2. California

I identified four distinct perspectives on CES in vineyard landscapes held by Californian wine producers and residents. These four were selected from the PCA because they each contained at least three Q-sorts, therefore were more robust than the six perspectives that would have been suggested by solely following the Kaiser criterion. Based on my analysis of their contents, I have called these four perspectives:

1. Terroir
2. Tradition

3. Instrumental
4. Entertainment

Next, I allocated the Californian Q-Sorts to the four identified perspectives (Table 8), and assigned the Q-statements to the categories an ideal representative of the perspectives would have ranked them in (Table 9).

Table 8: Assignment of Q-sorts to Californian perspectives: The Q-loadings are the correlation between the four perspectives and the Q-sorts conducted by the Californian Q-participants, and show the degree of similarity between the two. The highest loading for each perspective is the first shown. Four Q-sorts loaded highest for *Terroir*, five for *Tradition*, ten for *Instrumental*, and three for *Entertainment*. The first three perspectives had one participant (Q35, Q33, Q25) with rather low (<0.5) factor loadings.

Perspective	Q-sort	Factor loading
<i>Terroir</i>	Q39	0.771
	Q32	0.705
	Q42	0.684
	Q35	0.448
<i>Tradition</i>	Q44	0.851
	Q37	0.764
	Q38	0.669
	Q30	0.532
	Q33	0.270
<i>Instrumental</i>	Q27	0.798
	Q43	0.729
	Q24	0.708
	Q34	0.707
	Q40	0.642
	Q45	0.628
	Q36	0.625
	Q46	0.591
	Q31	0.539
	Q25	0.364
<i>Entertainment</i>	Q19	0.779
	Q29	0.720
	Q48	0.656

Table 9 Q-statement ranking of the four Californian perspectives: Q-statements are sorted in alphabetical order of the CES classes, with codes for cross-reference to statements in the text. The numbers represent the category each Q-statement would have been ranked in, from +4 to -4 as Figure 11, if an ideal representative of the perspective had done a Q-sort. The categories were determined by the computed factor scores (Annex 10), which indicate the ranking of the Q-statements within each perspective. Q-statements ranked positive have a green background, Q-statements ranked negative have a red background, with a more intense color the higher/lower the Q-statement was ranked. Thus, an ideal representative of *Terroir* would have ranked stated Y2 the highest and N4 the lowest.

Code	CES class	Q-statement	<i>Terroir</i>	<i>Tradition</i>	<i>Instru- mental</i>	<i>Enterta- inment</i>
A1	aesthetic	The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes.	-3	2	0	3
A2	aesthetic	The inspiring views in vineyards are unique.	-1	0	0	1
A3	aesthetic	Vineyards inspire art.	1	-2	0	0
A4	aesthetic	Vineyards show the structure of the underlying landscape in a beautiful way.	0	1	-1	1
B1	bequest	I owe a lot to the environment in vineyards.	1	2	-2	0
B2	bequest	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.	3	2	3	1
B3	bequest	Wine producers are the stewards of a tradition created by previous generations with the task to preserve the vineyards into the future.	1	3	0	0
B4	bequest	Vineyards have a value in themselves.	0	0	0	-1
D1	educational	Learning to produce wine means learning that there is so much more than textbooks can ever say.	2	0	-1	2
D2	educational	A vineyard teaches you that nature is important for humans.	0	1	-2	0
D3	educational	During a visit to a vineyard, people can learn a lot about wine production as well as about wine.	0	0	2	2
D4	educational	Wine production can increase consumer interest in where food comes from and how it is grown.	1	1	0	2
N1	entertainment	Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities.	3	-2	1	-2
N2	entertainment	On the whole, tourists attracted by vineyards benefit my region.	0	-1	3	3
N3	entertainment	Whether people want to just turn up and enjoy the beautiful countryside, or come en masse for a fully-tutored tour, tasting (and buying) wine with a dedicated and knowledgeable tour guide, they are welcome to visit vineyards.	-1	0	1	0
N4	entertainment	Vineyards attract valuable entertainment activities like festivals and balloon rides.	-4	-3	2	4
E1	existence	Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production.	2	-2	4	-3
E2	existence	Vineyards detract from the natural beauty of the countryside.	0	-4	0	-3
E3	existence	Vineyards provide a big benefit to society that is not provided elsewhere.	-2	1	-3	1
E4	existence	I enjoy the natural beauty of vineyards.	1	1	-1	1

X1	experiential	Vineyards contribute to a special food culture that can be experienced in local shops and restaurants.	2	0	1	3
X2	experiential	A vineyard is a valuable place to experience nature.	0	0	-2	1
X3	experiential	You can taste and enjoy in wine the changing nuances of season, place and vineyard parcel.	3	-1	-1	0
X4	experiential	Wine tastings are valuable to experience a vineyard.	1	0	0	2
H1	heritage	For wine producers in my region, wine production is not only an occupation, but also a way of life and a cultural tradition that should be preserved.	1	3	1	0
H2	heritage	The change away from traditional land use in my region ultimately weakens local traditions and identity.	-2	3	1	-3
H3	heritage	Most people living in my region simply are not interested in vineyards.	0	-3	-3	-1
H4	heritage	My region has decades of experience dedicated to perfecting the art of crafting fine wines.	-1	2	2	1
P1	physical	Vineyards are a great setting for cycling.	-2	-3	2	0
P2	physical	Harvesting grapes at vintage is enjoyable work.	0	-1	-2	-1
P3	physical	Wine growing areas offer the opportunity to explore the surrounding countryside through walking or hiking on nearby trails.	-1	-1	1	-1
P4	physical	Horseback riding near vineyards is a fun activity.	-2	-2	-1	2
C1	scientific	Science, not emotional reactions, must serve as the foundation for wine production.	-3	2	0	-2
C2	scientific	Expert knowledge of producing excellent wines is created by following traditional wine producing methods.	-1	1	-1	-2
C3	scientific	Experience in wine production teaches much more than being in school.	2	0	-1	-1
C4	scientific	More holistic scientific analysis is required to fully understand the challenges facing wine production and point to appropriate solutions.	-2	0	1	-1
S1	spiritual	When you are out in the vineyards, you realize where humankind really and truly comes from and what life is really and truly about.	0	0	-2	0
S2	spiritual	Vineyard areas help to fulfill spiritual needs.	0	-1	-3	-2
S3	spiritual	Being in the vineyards connects me to a larger spirit.	2	-1	-4	-1
S4	spiritual	Weddings in vineyards celebrate the special nature of vineyards.	-3	-1	0	0
Y1	symbolic	I prefer the view of a natural landscape to vineyards.	0	-2	2	-2
Y2	symbolic	Wine should be a bit like a fingerprint taken from the land – a unique expression of what the grapevine can achieve.	4	1	0	0
Y3	symbolic	My region has a unique wine producing tradition.	-1	0	3	0
Y4	symbolic	Changing the traditional land use in my region would mean that we destroy a part of ourselves.	-1	4	0	-4

Californian perspective 1: Terroir

Terroir focused on wine production (Figure 22). It highly agreed with Q-statements on wine producers' duties to conserve natural resources (B2) and to concentrate on wine production (N1). Q-statements on terroir (X3, Y2) also mattered. The perspective emphasized the importance of experience to produce wine (D1, C3) and denied the importance of scientific knowledge for wine production (C1/4), which indicated that the perspective represented the perspective of wine producers. "Being in the vineyards connects me to a larger spirit" (S3) was ranked +2, which was the only statement that showed a positive emotional connection to wine production. Other Q-statements on *spiritual* services were indifferently (S1/2) or negatively (S4) valued (Table 9). The perspective negatively ranked Q-statements on services provided to a wider range of people, such as *aesthetics* (A1) or (physical) activities for entertainment (N4, P1/4). Representatives of *Terroir* did not fear a change in land use and its effects on society (H2, Y4).

Top-ranked Q-statements:

- Wine should be a bit like a fingerprint taken from the land – a unique expression of what the grapevine can achieve. (Y2)
- Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities. (N1)
- Wine producers have a duty to conserve soil, water resources and the living nature for the next generation. (B2)
- You can taste and enjoy in wine the changing nuances of season, place and vineyard parcel. (X3).

Last-ranked Q-statements:

- The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes. (A1)
- Weddings in vineyards celebrate the special nature of vineyards. (S4)
- Science, not emotional reactions, must serve as the foundation for wine production. (C1)
- Vineyards attract valuable entertainment activities like festivals and balloon rides. (N4)

Figure 22: Top and last ranked Q-statements of the Californian perspective *Terroir*: The four top-ranked Q-statements were all statements of experts on wine production concerned either with duties of wine producers (B2, N1) and with terroir (X3, Y2) (statement codes from Table 9). The four last-ranked Q-statements were on *aesthetics* (A1), activities connected to vineyards (N4, S4) and *science* (C1).

Q-participants in *Terroir* were wine producers. There was a wide range of how long people had lived in the region (between 3 and 53 years), but the range how long they had worked in the wine industry was not as big (between 3 and 15 years). A comment of the Q-sort loading highest on the perspective summed up the perspective: "I have fundamental doubts about the utility of tourism to wine production, but [...] wine tourism is beneficial to a lot of people -- just not those of us who grow grapes" (Q39).

Californian perspective 2: Tradition

The special feature of *Tradition* was that the four highest Q-statements were all concerned with issues of tradition and heritage (Figure 23) (B3, H1/2, Y4). These Q-statements stressed both a danger of losing traditions and identity with land use change (H2, Y4) and the role of wine producers as stewards of a special cultural tradition (B3, H1). The whole region had supposedly an interest in wine production (H3). Three of four Q-statements on *bequest* were ranked either +3 or +2. Even though *bequest* and *heritage* were important, nature conservation as such was not relevant (E1). Representatives of the perspective enjoyed the beauty of vineyards (A1/4) and saw them as part of nature (E3/4, Y1). Concerning experience and activities connected with vineyards and wine, *Tradition* was indifferent to *experiential use services* (X1/2/4) of vineyards, and negative about *entertainment* (N1/2/4) and *physical use services* (P1/2/3/4).

<p>Top-ranked Q-statements:</p> <ul style="list-style-type: none">– Changing the traditional land use means that we destroy ourselves. (Y4)– For wine producers in my region, wine production is not only an occupation, but also a way of life and a cultural tradition that should be preserved. (H1)– The change away from traditional land use in my region ultimately weakens local traditions and identity. (H2)– Wine producers are the stewards of a tradition created by previous generations with the task to preserve the vineyards into the future. (B3) <p>Last-ranked Q-statements:</p> <ul style="list-style-type: none">– Most people living in my region simply are not interested in vineyards. (H3)– Vineyards attract valuable entertainment activities like festivals and balloon rides. (N4)– Vineyards are a great setting for cycling. (P1)– Vineyards detract from the natural beauty of the countryside. (E2)

Figure 23: Top and last ranked Q-statements of the Californian perspective *Tradition*: The four top-ranked Q-statements were about the tradition in wine production of the region (B3, H1/2, Y4) (statement codes from Table 9). The four last-ranked Q-statements were on people’s attitude towards vineyards (H3), activities connected to vineyards (N4, P1), and *aesthetics* (E2).

Wine producers dominated this perspective. On average, they had lived in the region for 16.6 years and had worked in the wine industry for 11.4 years, with a rather small range between 8 and 15 years. Multiple Q-participants stated that the sorting helped them to be “more aware of the priorities” (Q37), but that they also struggled as “Many of the statements fell [sic] like they ‘should’ be important to me but if I am honest, they really aren’t” (Q33). Only one Q-participant gave a comment concerning the perspective’s emphasis on tradition of wine production: “... it is very important to the identity of the place” (Q39).

Californian perspective 3: Instrumental

Instrumental highly ranked Q-statements on environmental aspects (B2, E1), existing tradition (Y3), and the importance of wine tourism (N2) (Figure 24). The highest ranked Q-statement was on nature protection (E1). The perspective negatively assessed Q-statements that described vineyards as part of nature (D2, E4, X2) and preferred “the view of a natural landscape to vineyards” (Y1). Nevertheless, the importance of wine production for tourism, and as well as a tradition in the region were acknowledged (N2/4, H2/4, Y3). Concerning the kind of tourism, the perspective highly ranked (physical) activities and events such as cycling (P1), festivals and balloon rides (N4), and vineyard tours (D3). In contrast, more specific wine experiences as wine tastings (X4) or terroir (Y2) were not considered important. Wine production was an important part of the heritage and traditions in the region (H4, Y3) and residents felt that they were part of these traditions (H3). *Aesthetics* and *scientific* services were of no concern. Representatives of *Instrumental* did not consider vineyards as special or unique landscapes (D1/2, E3), nor did they experience any personal (spiritual) connection with vineyards (S1/2/3). Overall, the perspective was concerned about nature conservation, admitted the importance of wine production for the region, but was not emotionally attached to it.

Top-ranked Q-statements:

- Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production. (E1)
- My region has a unique wine producing tradition. (Y3)
- Wine producers have a duty to conserve soil, water resources and the living nature for the next generation. (B2)
- On the whole, tourists attracted by vineyards benefit my region. (N2)

Last-ranked Q-statements:

- Vineyard areas help to fulfill spiritual needs. (S2)
- Most people living in my region simply are not interested in vineyards. (H3)
- Vineyards provide a big benefit to society that is not provided elsewhere. (E3)
- Being in the vineyards connects me to a larger spirit. (S3)

Figure 24: Top and last ranked Q-statements of the Californian perspective *Instrumental*: The four top-ranked Q-statements were on environmental aspects (B2, E1), existing tradition (Y3) and the importance of wine tourism (N2) (statement codes from Table 9). The four last-ranked Q-statements were on *spiritual* services provided by vineyards (S2/3), people’s attitude towards vineyards (H3) and the uniqueness of vineyards (E3).

Q-participants of *Instrumental* were mainly residents. The average duration of residence in the region was 18.3 years. The gender distribution was balanced. The comments of the Q-participants helped to support and enrich the description of *Instrumental*. Q-participants “generally ‘like’ vineyards [...], the associated benefits for our county” (Q40), thought wine production “is very

central to our economy” (Q45) and were “proud of where [they] live” (Q46). However, they also identified drawbacks, like the fact that “everything is related to wine production” (Q24) caused “conflict between economic growth, resource conservation and natural preservation” (Q43). The Q-participant defining *Instrumental* well summarized the attitude: “... there are both positive and negative aspects of wine production in my region” (Q27).

Californian perspective 4: Entertainment

<p>Top-ranked Q-statements:</p> <ul style="list-style-type: none">– Vineyards attract valuable entertainment activities like festivals and balloon rides. (N4)– On the whole, tourists attracted by vineyards benefit my region. (N2)– Vineyards contribute to a special food culture that can be experienced in local shops and restaurants. (X1)– The vineyards in my region contribute to make it one of the nation’s exceptional natural landscapes. (A1) <p>Last-ranked Q-statements:</p> <ul style="list-style-type: none">– Vineyards detract from the natural beauty of the countryside. (E2)– The change away from traditional land use in my region ultimately weakens local traditions and identity. (H2)– Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production. (E1)– Changing the traditional land use in my region would mean that we destroy a part of ourselves. (Y4)
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Figure 25: Top and last ranked Q-statements of the Californian perspective Entertainment: All four top-ranked Q-statements were on activities and experiences connected to vineyards (statement codes from Table 9). The four last-ranked Q-statements were on *aesthetics* (E2), the effect of land use change on tradition (H2, Y4), and conservation of natural resource (E1).

Main concerns of *Entertainment* were entertainment activities surrounding wine production (Figure 25). The top ranked Q-statements, except one, dealt with how people could enjoy vineyards and wine production in different ways, including *educational* and *aesthetic* services. The one Q-statement not in this category stated that “there is so much more than textbooks can ever say” (D1) about wine production. Vineyards were seen as valuable as natural landscapes (E2, Y1). Science did not matter for wine production (C1/2/3/4). The conservation of natural resources was not of major concern for persons in the perspective (E1). The two Q-statements on the effects of land use change (H2, Y4) were ranked -3 and -4 respectively.

Q-participants had lived for, on average, 24.0 years in the region. Only three Q-sorts highly loaded for this perspective, which made it difficult to give further information on typical demographics. The

three Q-participants had given few comments, mainly on their experience during the Q-sort itself and not on their personal perspectives.

6.3. Analysis of Q-study results

Research Sub-Question 2:

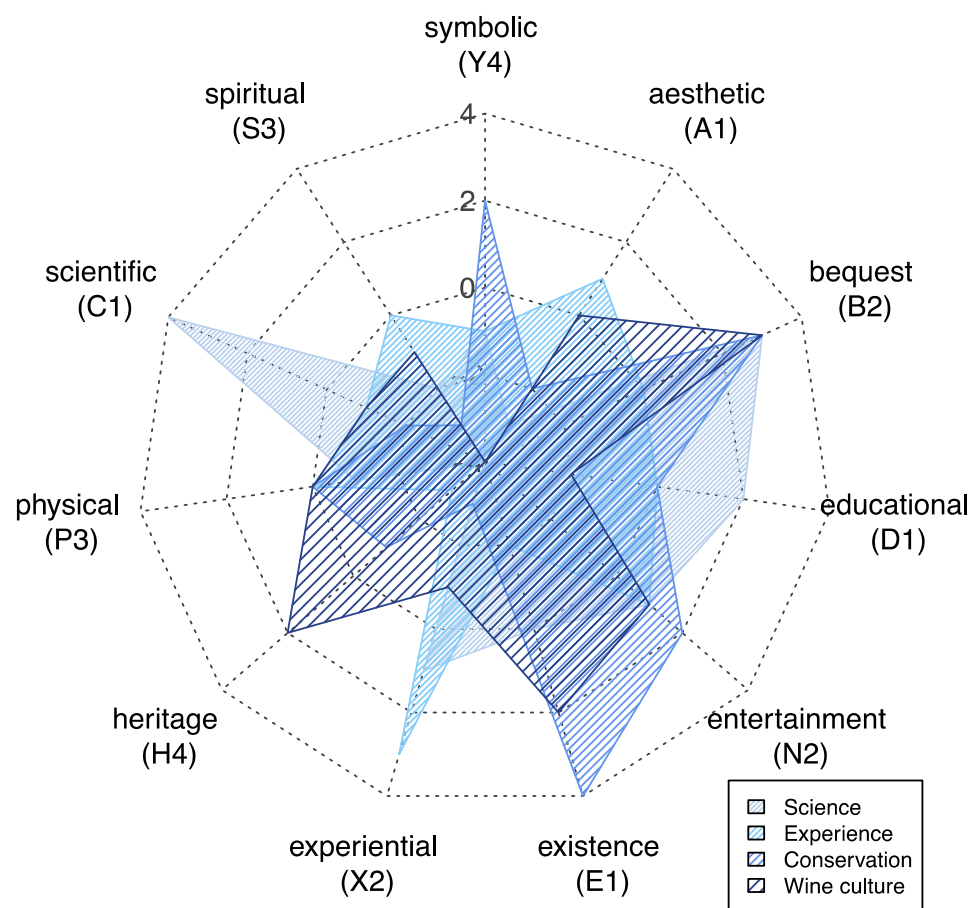
Which CES in vineyard landscapes are important to wine producers and residents in England and California?

I compared the four perspectives of each case using one Q-statement from each of the 11 CES classes. The selected Q-statement was chosen because it had the largest differences in ranking position between perspectives when comparing the results from Tables 7 and 9. For example for *aesthetic*, I selected A1 as *Wine Culture* ranked it +3 and *Terroir* ranked it -1, the overall difference was 6 and thus it was the largest differences for *aesthetic* compared with the other Q-statements which had smaller differences.

6.3.1. Comparison of English perspectives

The four English perspectives could be split up in two wine producers' perspectives (*Science*, *Experience*) and two residents' ones (*Conservation*, *Wine Culture*) (Figure 26). *Science* was different from all other perspectives with regard to its emphasis on the importance of science for wine production. *Experience* was a more balanced perspective as it admitted benefits of wine tourism (N2), but prioritized wine production. *Conservation* and *Wine Culture* differed in their attitude towards wine production. *Conservation* feared land use change (H2), cared about nature conservation (E1), and doubted that there were benefits of vineyards. Against this, *Wine Culture* appreciated "entertainment activities" (N4) in vineyards and did not fear land use change.

English perspectives



A1	The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes.
B2	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.
D1	Learning to produce wine means learning that there is so much more than textbooks can ever say.
N2	On the whole, tourists attracted by vineyards benefit my region.
E1	Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production.
X2	A vineyard is a valuable place to experience nature.
H4	My region has decades of experience dedicated to perfecting the art of crafting fine wines.
P3	Wine growing areas offer the opportunity to explore the surrounding countryside through walking or hiking on nearby trails.
C1	Science, not emotional reactions, must serve as the foundation for wine production.
S3	Being in the vineyard connects me to a larger spirit.
Y4	Changing the traditional land use in my region would mean that we destroy a part of ourselves.

Figure 26: Spider graph showing Q-statement rankings of the four English perspectives for one representative statement from each of the 11 CES classes: The different lines symbolize the four different perspectives (Science, Experience, Conservation, and Wine Culture). The scale is from -4 in the center ("least like how I think") to +4 at the edge ("most like how I think"). The closer the lines are to the center of the web, the more disagreement of the perspective to the Q-statement. The eleven axes represent the eleven CES classes. The code in brackets indicates which Q-statement I selected as most representative for the CES class based on ranking positions of the perspectives. In the spider graph, each differently colored form illustrates the Q-statement rankings of one perspective (taken from Table 7).

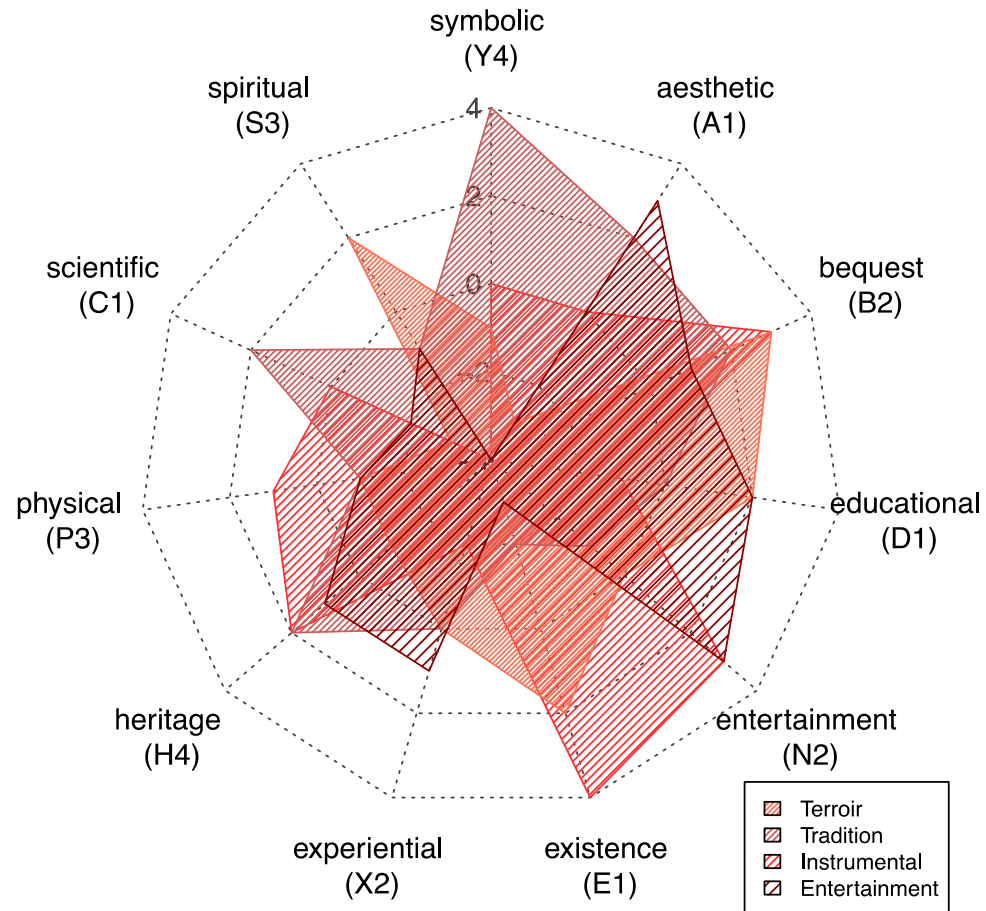
All English perspectives ranked five Q-statements (B3, N2, C2/3, P3) similarly with just a difference of one ranking position (Table 7). The only Q-statement of these all perspectives positively scored was on the benefits of wine tourism (N2). The other four were indifferently rated near zero. Two of the five Q-statements (C2/3) were on expert knowledge in vineyards. Against this, a fourth of all Q-statements (B1, N1/4, E1, X2, H2/4, C1/4, Y1/2/4) varied in their ranking positions by more than five positions between the four perspectives. Two of these divisive Q-statements were about science (C1/4) and another two were about *heritage*: the effects of land use change on traditions (H2), and the tradition of wine production in England (H4). There was also a great difference in the focus of wine producers (N1) and the perceived *entertainment* in vineyards (N4). The English perspectives differently valued three Q-statements of the *symbolic* services: the preferences of natural landscapes over vineyards (Y1), the importance of terroir (Y2), and the effects of land use change on the personal identity (Y4). The importance of land use, its change and effect on identity, traditions and heritage were strongly contested among the English perspectives.

Science and *Wine Culture* had surprising characteristics. No other perspective focused as much on the classes *scientific* and *educational* as *Science*. Most of the other perspectives even placed the Q-statements of these classes in a negative category. *Science* especially stressed the importance of scientific knowledge for wine production whereas it denied more emotional relations with vineyards. *Wine Culture* was surprising because it highly valued Q-statements on *heritage*, *symbolic* services and *entertainment*. By only looking the ranking of the perspective, one could assume it is a perspective from a long-standing wine-producing area.

6.3.2. Comparison of Californian perspectives

I identified four perspectives for the Californian case (Figure 27). *Terroir* and *Tradition* represent wine producers' perspectives. *Instrumental* was a perspective coined from residents. Due to the small number of Q-sorts in *Entertainment* (n=3, Table 8), there was no clear assignment of this perspective. The importance of vineyards for the local economy and identity, and nature conservation mattered for *Instrumental*. *Terroir* and *Tradition* were critical about wine tourism. *Terroir* emphasized the responsibilities of wine producers and the importance of nature conservation. Against this, *Tradition* feared land use change. *Physical* and *experiential services* of vineyards for people outside the wine industry mattered most for *Entertainment*.

Californian perspectives



A1	The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes.
B2	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.
D1	Learning to produce wine means learning that there is so much more than textbooks can ever say.
N2	On the whole, tourists attracted by vineyards benefit my region.
E1	Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production.
X2	A vineyard is a valuable place to experience nature.
H4	My region has decades of experience dedicated to perfecting the art of crafting fine wines.
P3	Wine growing areas offer the opportunity to explore the surrounding countryside through walking or hiking on nearby trails.
C1	Science, not emotional reactions, must serve as the foundation for wine production.
S3	Being in the vineyard connects me to a larger spirit.
Y4	Changing the traditional land use in my region would mean that we destroy a part of ourselves.

Figure 27: Spider graph showing Q-statement rankings of the four Californian perspectives for one representative statement from each of the 11 CES classes: The different lines symbolize the four different perspectives (*Terroir, Tradition, Importance, and Entertainment*). The scale is from -4 in the center ("least like how I think") to +4 at the edge ("most like how I think"). The closer the lines are to the center of the web, the more disagreement of the perspective to the Q-statement. The eleven axes represent the eleven CES classes. The code in brackets indicates which Q-statement I selected as most representative for the CES class based on ranking positions of the perspectives. In the spider graph, each differently colored form illustrates the Q-statement rankings of one perspective (taken from Table 9).

The Californian perspectives shared similar rankings for only one Q-statement, about the intrinsic value of vineyards (B4), while they ranked nine Q-statements (A1, N1/4, E1, H2, P1, C1, S3, Y4) very differently (Table 9). It was striking that the two wine producers' perspectives very differently rated these nine Q-statements, except N4 on the value of wine-related activities and P1 about vineyards for biking, which they assessed similarly. Two statements on entertainment activities attracted by vineyards (N4) and the destruction of the personal identity due to land use change (Y4) were ranked as both the highest and lowest by different perspectives, with Entertainment/Tradition perspectives ranking them +4, and *Terroir/ Entertainment* ranking them -4. A ranking between +4 and -3 for E1, which was about natural resource conservation, was the third greatest rating difference, with the *Instrumental* perspective positively and *Entertainment* negatively ranking it. The four perspectives very differently ranked the two Q-statements on the effects of land use change (H2, Y4), with *Tradition* most positively and *Entertainment* most negatively ranking them.

A special feature of the Californian perspectives was that they all recognize the economic and/or traditional importance of wine production for their region, albeit not all four stressed the same aspects. *Entertainment* emphasized the importance of *entertainment* services and *Instrumental* added *symbolic* and *traditional* services as important contributors. Wine producers (*Terroir, Tradition*) were not enthusiastic about *entertainment* in or *physical use* of vineyards although many activities for visitors exist in Californian wine-producing regions. They might perceive the emphasis on wine tourism as too much and too far away from wine production, and would rather like the region to refocus on it. In contrast, vineyards were at times too dominant for residents.

6.3.3. Comparison of the perspectives between case studies

Research Sub-Question 3:

What are the differences and similarities among English and Californian wine producers' and residents' perspectives on CES in vineyard landscapes?

When adding up the rankings of the four Q-statements of each class in each perspective, all eight perspectives positively valued the CES class *bequest* (Table 10). The highest overall positively ranked Q-statement dealt with the duty of wine producers to conserve natural resources (B2) (Table 11). The other Q-statements positively ranked by all perspectives were concerned with benefits to consumers (Table 11). All perspectives negatively rated overall the class *spiritual and* negatively ranked S2 on vineyards contribution to fulfill spiritual needs, which was the lowest overall negatively rated Q-

statement. All English perspectives negatively ranked *symbolic* services, which CA perspectives mainly positively assed (Table 10).

Table 10: Overall rating of CES class by each perspective: For this table the ranking positions of the four Q-statements in each CES class were summed up. For example, the score of -7 for *aesthetic* for the perspectives *Science* was found by the sum of the ranking positions of all *aesthetic* Q-statements (-3+(-3)+(-1)+(-1)) (Table 7). Comparison between CES classes was possible as each perspective ranked the same Q-statements in each CES class. The value of the ranking position of the Q-statements were multiplied by -1 if the statement did not support the value of the CES class (e.g. N1, E2, H3) (Annex 7, column *Multiplier factor*). The maximal value could have been 13 (one rating of +4 and three ratings of +3) and the minimal value -13. Positive values have a green background. Negative values have an orange background. Values of 6 or greater, or -6 or lower are bold. If the sum were 0, to assign a slightly positive or negative attitude, I looked into the rankings for all Q-statements and identified if there was a more positive or negative attitude towards the concerning CES class, shown with light green or light orange backgrounds respectively.

		UK				CA			
	CES	<i>Science</i>	<i>Exper ience</i>	<i>Conser vation</i>	<i>Wine culture</i>	<i>Terroir</i>	<i>Tradition</i>	<i>Instru mental</i>	<i>Enterta inment</i>
A	aesthetic	-7	5	-1	4	-3	1	-1	5
B	bequest	5	1	2	1	5	7	1	0
D	education	6	4	0	-4	3	2	-1	6
N	entertainment	0	-1	5	7	-8	-2	5	9
E	existence	-1	6	4	3	1	4	0	-4
X	experiential	5	7	-2	3	6	-1	-2	6
H	heritage	-5	-8	1	2	-2	11	7	-1
P	physical	-2	-5	-3	4	-5	-7	1	0
C	scientific	7	-2	-5	3	-6	1	3	0
S	spiritual	-10	0	-6	-6	-1	-3	-9	-3
Y	symbolic	0	-1	-1	-4	2	7	1	-2

To compare perspectives between regions, I correlated⁸ the Q-statement rankings of all perspectives (Table 12). This shows that perspective within a region are not, or only very marginal correlated. Higher correlations are between the two regions, with three correlations with $r > |0.5|$: *Instrumental – Conservation*, *Instrumental – Wine Culture*, and *Wine Culture – Entertainment*.

Instrumental positively correlated with *Conservation* ($r = 0.54$) and with *Wine Culture* ($r = 0.54$), but *Conservation* and *Wine Culture* did not correlate ($r = 0.04$) (Table 12). Residents dominated in these perspectives. Overall, they adopted a positive attitude towards the CES classes *bequest*, *entertainment*, and *heritage*, and a negative one towards *spiritual* (Table 10). They highly ranked

⁸ Pearson correlation: most common measure of correlation in statistics. The correlation is given as r and can attain values between -1 and +1, with $r = -1$ indicating a perfectly negative correlation, $r = +1$ a perfectly positive correlation and $r = 0$ no correlation.

allotting responsibility for a sustainable handling of natural resources to wine producers (B2). Nature conservation was important (E1). The perspectives preferred nature to vineyards (E4, Y4), and had no personal (spiritual) connection to vineyards (B1, S1/2/3). Nevertheless, they admitted that there were benefits of wine tourism for their regions (N2).

Table 11: Positively or negatively ranked Q-statements by all perspectives: the top green rows are the Q-statements that all perspectives ranked positively. The bottom orange rows are the Q-statements that all perspectives ranked negatively. The right column gives the mean calculated with the ranking position of the Q-statement in each perspective, found by averaging the ranking across all 8 perspectives from both England and California (Tables 7 and 9).

code	Q-statement	mean
B2	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.	2.3
X1	Vineyards contribute to a special food culture that can be experienced in local shops and restaurants.	1.4
X4	Wine tastings are valuable to experience a vineyard.	1.1
D4	Wine production can increase consumer interest in where food comes from and how it is grown.	1.1
D3	During a visit to a vineyard, people can learn a lot about wine production as well as about wine.	1.1
B3	Wine producers are the stewards of a tradition created by previous generations with the task to preserve the vineyards into the future.	0.6
S4	Weddings in vineyards celebrate the special nature of vineyards.	-0.8
E2	Vineyards detract from the natural beauty of the countryside.	-1.5
S2	Vineyard areas help to fulfill spiritual needs.	-1.8

Table 12: Pearson correlation between the perspectives: The ranking positions of the Q-statements in each perspective were used for the correlation. The red numbers are correlations $> |0.5|$.

	Science	Experience	Conservation	Wine Culture	Terroir	Tradition	Instrumental	Entertainment
Science	1.0000							
Experience	0.0286	1.0000						
Conservation	0.0000	0.1143	1.0000					
Wine Culture	0.0214	-0.0214	0.0357	1.0000				
Terroir	0.3643	0.1286	0.1786	-0.0214	1.0000			
Tradition	0.1143	0.0214	-0.0214	-0.2643	0.0143	1.0000		
Instrumental	0.0571	-0.1500	0.5357	0.5429	-0.0643	-0.0357	1.0000	
Entertainment	-0.0143	0.4071	-0.1785	0.5071	-0.0714	-0.0071	0.0929	1.0000

The Californian *Entertainment* perspective positively correlated with *Wine Culture* ($r= 0.51$) (Table 12). The two perspectives highly loaded on Q-statements in the classes *bequest*, *entertainment*, and *experiential*, while negatively on *spiritual*. They especially highly valued *entertainment* connected to vineyards, which coincided with a positive attitude towards *experiential use* and *physical use* (Table 10). They disagreed that recreational activities connected to wine have

the same right to exist as wine production (N1). The exclusivity of wines was irrelevant as they were indifferent on Q-statements about terroir (X3, Y2) and the uniqueness of the area as wine-producing area (Y3). They did not fear land use change (H2, Y4). Nature conservation (E1) was important for *Wine Culture*, while *Entertainment* negatively ranked the Q-statement.

The *Conservation* and *Tradition* perspective worried both about the effects of land use change to society (H2, Y4). Except for this common trait, they did not have much in common and correlated slightly negatively ($r = -0.02$) (Table 12). Comparing the two perspectives, *Conservation* stressed more Q-statements connected to nature and its conservation (E1, Y1). *Tradition* emphasized more the importance of wine production for the area (B3, H1/4). Both perspectives had a gender balance. Q-participants in England had lived more than twice as long in the region than Californian Q-participants (36.8 vs. 16.6 years). Interestingly, English Q-participants were residents, whereas Californian Q-participants were wine producers. This suggested that a change of land use frightened Q-participants that preferred the currently dominating landscape.

All Californian perspectives, but especially *Tradition* and *Importance*, highly valued the *symbolic* and *heritage* services of wine production. Against this, the English perspectives did not understand wine production as a symbol or part of their heritage (Table 10). The only exception was *Wine Culture*, which ascribed some heritage value to wine production.

In each region, I could identify two perspectives mainly dominated by wine producers (Table 13). The wine producers' perspectives within each case study were quite distinct. The two cases had one wine producers' perspective (*Science, Terroir*) whose representatives perceived wine and its production as something special and unique and, therefore, presented themselves as wine experts. I could identify such a wine experts' perspective as well in preliminary results for New Zealand wine producers (Annex 8). A common feature of these perspectives was that they put emphasis on the idea of terroir, the duty of wine producers to conserve natural resources, and the process of learning to produce wine based on experience and not only knowledge. Major differences of their perceptions concerned the importance of science and spiritual traits of vineyards. Being a wine expert did not necessarily mean having an emotional personal relationship with vineyards. In addition, representatives of these perspectives did not consider of importance activities connected to wine for people from outside wine production, which reinforced the impression of a slightly elitist perspective on wine production. The fact that they were not afraid of land use change completes the impression.

Table 13: Comparison of the eight perspectives: Overview over the eight perspectives. Blue perspectives were drawn from the English case, and red from California.

Perspective	Group	# of Q-sorts	key features
<i>Science</i>	wine producer	8	wine expert, focus on science, no personal/ emotional/ spiritual connection to vineyards
<i>Experience</i>	wine producer	4	wine production, environmental consciousness
<i>Conservation</i>	resident	4	concerns about land use change, nature conservation
<i>Wine Culture</i>	resident	4	focus entertainment and environmental aspects
<i>Terroir</i>	wine producer	4	wine expert, exclusivity of wine, nature conservation
<i>Tradition</i>	wine producer	5	concerned about tradition, heritage, land use change
<i>Instrumental</i>	resident	10	importance of wine production for region, no personal/ emotional/ spiritual connection
<i>Entertainment</i>	NA	3	focus on entertainment and tourism connected to wine production

7. Discussion

In the discussion, I put my findings in context with existing academic literature. First, I discuss my results on the case study level. Second, I zoom out and discuss patterns that occurred across the two case studies, such as the differentiation of users and beneficiaries, the emphasis of expertise among wine producers, the fear of land use change, and the importance of SOP. I conclude by discussing limitations of this thesis and further research recommendations.

7.1. Discussion of case results

7.1.1. England

Wine production has a tough position in the competition for land in England. Residents appreciate natural landscapes more than vineyards. On the housing market, the current environmental assets in South-East England increase prices up to 35% compared to average English housing prices (Gibbons et al., 2014). In particular, East and South facing properties, which English wine production would benefit from for their vineyards, are decisively higher valued than other properties. English wine production joins in and contributes to a competition for land without strong advocates outside the wine industry.

On the other hand, climate change will likely increase opportunities for wine production, while decreasing other forms of agriculture in South-East England. With a low emission scenario, the area of cereal production is projected to decrease by 25 % and the farm gross margin (£/ha) will decrease around 50 £/ha by 2060 compared to 2004 (Fezzi et al., 2014). English wine production could use this situation and transform suitable land, which is now used for cereal production, into vineyards. The high benefits of wine could compensate the expected decrease of farm gross margin.

7.1.2. California

The identified Californian wine producers' perspectives differ from the perspectives Brodt, Klonsky, & Tourte (2006) identified in their study on management styles of Californian almond and winegrape growers. They described three perspectives: *Environmental Stewards*, *Production Maximizers*, and *Networking Entrepreneurs*. The *Terroir* perspective I identified is a mix of *Environmental Stewards* and *Production Maximizers* as nature conservation, also for future generations, is important, and wine producers' priority is wine production. *Tradition* has some traits of *Production Maximizers* because wine production is the main priority, but the emphasis of tradition is not reflected in the study of Brodt et al. (2006).

There are several possible explanations for these differences relating to the study participants and the values examined. The other study focused on almond and winegrape growers, whereas this study was concerned with wine producers including winegrape growers, wine makers, and winery owners. The different occupations could have different foci on wine production. What speaks against this is that in both perspectives I identified, wine growers as well as wine makers were represented. Another explanation could be the different core themes of the two studies: Brodt et al. (2006) studied management styles and had no Q-statements on heritage, while I was interested in the perceived CES and had no Q-statements on information and knowledge flow.

7.2. Discussion of cross-case patterns

Overall, my results suggest that people most strongly appreciate CES in vineyard landscapes in the *entertainment* and *bequest* classes. The services from the *heritage* and *symbolic* classes are intermediately valued, and *scientific* services are only very sporadically valued. This valuation ranking is consistent with previous work, which found *tourism and recreation* as highly valued CES and *scientific value* scarcely valued (Casado-Arzuaga et al., 2013). The degree of tangibility of ES plays a crucial role how people perceive these services: generally, the more tangible CES are, the more people sense and valued them. In addition, CES are never stand-alone because they always come with other ES. The more intangible a CES is, the more likely that people only appreciate the other *provisioning*, or *regulating and maintenance* ES and that they are not aware of the CES (Hauck et al., 2013). An exception from this is the fact that all eight perspectives positively valued *bequest*. Wine producers supposedly have a special responsibility towards nature and future generations.

7.2.1. Difference between wine producers and residents

In the Q-study, wine producers and residents from both regions studies had distinct perspectives on vineyards. This means that wine producers and residents perceive the CES in vineyards landscapes differently in their region, no matter how long-standing wine production is in the area.

Wine producers are *users* of vineyards as they work in and make a living from them. The residents are *beneficiaries* as they work in and make a living from other industries. In both cases, I could attribute all but one of the perspectives I identified to either wine producers or residents. This suggests that users and beneficiaries hold different perspectives on CES no matter how well-established the industry is. This corresponds with findings of Martín-López et al. (2012) in seven different Spanish landscapes that users have different perspectives on landscapes than beneficiaries.

In addition to this, previous studies showed that beneficiaries favor CES compared to users who had a stronger focus on *provisioning*, and *regulating and maintenance* ES (Martín-López et al., 2012). In each case study, at least one of the wine producers' perspectives mainly focused on wine production (B2, N1, X3, and Y2) and attached less value to more intangible cultural values, particularly *aesthetic* and *physical use*. Compared to this, residents cherished more intangible CES such as *aesthetic* or *entertainment*, which are less dependent on provisioning or regulating and maintenance ES. However, as my study focused only on CES and had no Q-statements on the other ES sections, further study would be required to show that CES were more highly valued than other sections of services by wine producers and residents in vineyard landscapes

7.2.2. Wine producers

The two wine producers' perspectives focusing on wine production (*Science, Terroir*) presented themselves as wine experts. For marketing reasons, it would be smart of these perspectives to open up for the public because the characteristics emphasized in these perspectives (terroir, uniqueness) build symbolic capital that can be transformed into economic capital on the market (Beckert et al., 2014). I identified no major similarities concerning the second perspective of each country (*Experience, Tradition*).

While there were CES classes or specific Q-statements within both the English and Californian case that all wine producers' perspectives rated differently to the residents' perspectives, this was not the case considering all ratings between cases together. This finding suggests that perceptions are experience- and context-specific. Therefore, the results of a study that revealed the relevance of certain ES for Australian wine production (Sandhu et al., 2012) are not transferable, only comparable. In the Australian case, the CES *recreation and ecotourism, ethical values, historical values, and science and education values* were highly relevant for Australian wine production. *Aesthetic information* and *cultural and artistic values* were neither relevant nor impacted (Sandhu et al., 2012). The Australian perspective could be classified as a wine experts' perspective because it has similarities with *Science* and *Terroir* although a major difference is its positive attitude towards *entertainment*.

In general, Q-statements in the *entertainment* class were mostly positively assessed by the eight factors, except by, the Californian wine producers. This could mean that wine producers positively perceive *entertainment* services, as long as the goal for agricultural activities remains wine production for its own sake, not as a means for entertainment.

7.2.3. Wine as symbol and heritage

Most Q-participants in California acknowledged to some degree the cultural heritage and/or symbolic significance of wine production for their region, but valued other CES more highly. This result is in accordance with similar findings for other ecosystems, including beaches, cliffs, scrublands, and forests, that most of the time other CES than *heritage* and/or *symbolic* are highly valued (Casado-Arzuaga et al., 2013). However, these traits of wine production can be beneficial if used as symbolic capital because on the market, wine with these symbolic positions can gain higher prices (Beckert et al., 2014).

7.2.4. The fear of change

In both the Californian and the English case, I identified one perspective that stressed the importance of the traditional landscape, and focused on the negative effects of a possible land use change. These perspectives stood out among the others, because only they had this focus. It is interesting that representatives of the currently dominating landscape loaded highest for these perspectives: in California, where wine production is widespread, wine producers loaded highest on *Tradition*, and in England, where wine production is still scarce, residents loaded highest on *Conservation*. However, these perspectives only represent one group within residents or wine producers in each case, implying that only a part of the group was concerned. Neither the concerned Q-participants' age nor the time span they had lived in the region differentiated them from the representatives of the other perspective. On average, the Q-participants of the other perspective of the same group of people had lived for an even longer time period in the region. This implies that the longer people live in an area the less they fear change, perhaps because they doubt the landscape will change, or because they have already lived through substantial changes.

7.2.5. Sense of place

My findings corroborated the ideas of García-Llorente et al. (2012), who suggested that the more people felt an attachment to their region, the more they supported landscape conservation and reject land use change. Place attachment does not necessarily correlate with the duration of residence. Nevertheless, according to SOP research, some emotional relationship based on experiences is necessary to develop place attachment. Since I assessed people's perspective on vineyard landscapes around them and not on the whole landscape around them, I was not able to make a point on people's place attachment.

7.3. Limitations

7.3.1. Q-Method

Q-Method is still a rather rare qualitative research method. Only a few publications, e.g. Brown (1980), Webler, Danielson, & Tuler (2009) or Addams & Proops (2000), help to answer practical methodological questions like the number of Q-participants or the selection of Q-statements. Thus such decisions stay rather subjective.

Because it aims to identify rather than estimate the prevalence of perspectives, Q-Method does not depict the distribution in society of the social perspectives it reveals (Danielson, 2009; Kerr and Swaffield, 2007; Steelman and Maguire, 1999; van Exel and de Graaf, 2005). Only a representative study could show this distribution. Furthermore, it is not possible to completely explain the identified social perspectives with variables outside the Q-sort because Q-participants are not selected in a way that they represent society (Danielson, 2009). Nevertheless, some studies use socio-economic data to partly interpret the representativeness of the perspectives found (Nijnik et al., 2008).

Q-Method is criticized for the validity of its results (Kampen and Tamás, 2013). The only existing validity criterion is its replicability: if the same instructions lead to similar results (van Exel and de Graaf, 2005). So far, no standardized Q-statements exist for any research question (Webler et al., 2009). To further reduce bias and make results more comparable among different studies, standardized Q-statements could be helpful. I suggest adapting the Q-statements I developed here, with an equal number of statements for each of the eleven CES classes that I identified, for further studies on the value of CES.

7.3.2. Limitations of this thesis

Ideally, Q-statements would be derived from interviews conducted in person in the local region being studied. However, due to time and financial limitations, I did not conduct interviews to obtain the Q-statements for the Q-sorts. Instead, I rewrote or even created own Q-statements to fit them within the CES classes and represent different perspectives.

I also identified my study Q-participants remotely, rather than in person using fieldwork. I identified potential Q-participants by searching relevant homepages and contacted them via e-mail. This way, I excluded anybody who does not have access to the internet, or is not a spokesperson of the respective groups or enlisted with his/her e-mail-address on the homepages. Travelling to the regions, finding suitable specific Q-participants and conducting the Q-sort in person would have been optimal.

In an ideal case, I would have selected the Q-participants due to their position they represent to have in the end the most diverse set of individual perspectives possible. However, my study allowed anyone who was either living in the area and/or being a wine producer in the area to take part. It would have been interesting to get Q-sorts of direct neighbors to vineyards. It was impossible to find the information who these persons would have been and how to contact them.

7.4. Recommendations

7.4.1. Classification of cultural ecosystem services

In this thesis, I used the CICES classification of CES. CICES was developed with the main purpose to fulfill “the need of some kind of accounting system for natural capital” (Haines-Young and Potschin, 2012, p. 1). Haines-Young & Potschin (2012) discuss the challenges to fit CES in CICES, because CES are often part of other ES and it is hard to differentiate between the final service and benefit of CES. Furthermore, some CES are completely non-material (e.g. *spiritual*) while others are more material (e.g. *physical*), which causes different levels of intangibility.

While working on the topic, I faced these challenges especially in the form of less accurate definitions and/or ambiguities in the use of terms in both existing research and my own work. The formulation and classification of Q-statements into CES classes highlighted this challenge, as some classes seemed very similar (e.g. *entertainment* vs. *physical* and *experiential*) and others were hard to grasp (e.g. *bequest*, *existence*). Thus, a revision of the CES in the CICES classification should be considered because such a revision would make it easier to apply CICES in real-world situations, for example in landscape planning.

In accordance with the *landscape services* idea and based on CICES, Vallés-Planells, Galiana, & Van Eetvelde (2014) have recently presented a landscape services classification (Table 14), which completely revised the cultural section of CICES and includes now not only cultural, but also social aspects. The proposed classification could serve as a model in the future as it seems well-wrought. The differentiation between the *self-fulfillment (personal)* and *social fulfillment* classes in the new classification incorporates the idea of SOP that there is an individual relationship, but also a relationship of a community with a place. CICES provides no class, which considers social aspects. Vallés-Planells et al. (2014) use a more straight forward terminology, e.g. the groups of *enjoyment* are called *passive enjoyment* and *active enjoyment*, instead of *experiential use* and *physical use* in CICES. Unfortunately, the landscape services classification has no class or group, which clearly includes *existence* and *bequest* services.

Table 14: Landscape services classification (*Vallés-Planells et al., 2014*): The classification is based on CICES. Changes compared to CICES are in bold. The CES were completely revised, with four new classes concerning cultural and social services. The social services acknowledge that landscapes provide services not only for individuals but also for groups.

Theme	Class	Group
Provisioning	Nutrition	Terrestrial plant and animal foodstuffs Freshwater plant and animal foodstuffs Marine plant and animal foodstuffs
	Material	Potable water Biotic materials Abiotic materials
	Energy	Renewable biofuels Renewable abiotic energy sources
	Daily activities	Place to live Place to work Place to move
Regulation and Maintenance	Regulation of wastes	Bioremediation Dilution and sequestration
	Flow regulation	Air flow regulation Water flow regulation Mass flow regulation
	Regulation of physical environment	Atmospheric regulation Water quality regulation Pedogenesis and soil quality regulation
	Regulation of biotic environment	Lifecycle maintenance and habitat protection Pest and disease control Gene pool protection
	Regulation of the spatial structure	Connection of spaces Buffer disturbing use Provision of spatial complexity of the place
Cultural and Social	Health	Mental health Physical health
	Enjoyment	Passive enjoyment Active enjoyment
	Self-fulfillment (personal)	Way-finding Scientific resources Didactic resources Spiritual experience Source of inspiration
	Social fulfillment	Social interactions Place identity Sense of continuity

7.4.2. Possible future research: the social-ecological system perspective

A change of land use can decrease the resilience of a social-ecological system (SES). Most SES research focuses on material aspects of systems, and less on social components (Crane, 2010). However, a land use change, which maintains the ecological and material resilience, can heavily influence communities and their values. Cultural and symbolic changes can cause the passing of a threshold, so that the SES moves into a new state with consequences for “how individuals and cultures may define themselves and their interactions with the world around them” (Adger et al., 2009, p. 349).

Especially the English case, as an emerging wine-producing area, could be an interesting study area for further research from this perspective. English wine production is growing thanks to improving climate conditions for winegrowing and economic benefits because English wine is and especially will

be in the future a booming economic sector. At present, the expansion rate of wine-producing area does not pose a major threat to English biodiversity, because the total area is still relatively small. Yet, social components in England could be greatly influenced. My results indicate that overall, English participants value vineyard landscapes less than Californians, and that they only slightly value 'heritage' or 'symbolic' services of these landscapes. Thus, I can predict that the English are critical about the expansion of vineyard landscapes. Further work could investigate how such attitudes/values might affect the social system from a SES perspective

8. Conclusion

The aim of this thesis has been to explore ES in vineyard landscapes, with a special focus on how people perceive CES connected to these landscapes in England and California. In existing literature, research has mainly dealt with *regulating and maintenance*, and *provisioning* ES from an ecological perspective. I have identified four different perspectives on CES for each case.

Concerning the different CES classes, moral and ethical concerns are widespread, because all perspectives have positively assessed *bequest* services. In contrast, as all perspectives have negatively valued *spiritual* services, they only play a marginal role in people's perceptions of CES in vineyard landscapes. Many residents cherish free time activities connected to wine production, with most wine producers prioritizing wine production over *entertainment* services.

My results illustrate that wine producers and residents hold different perspectives on vineyard landscapes. This confirms the ideas of SOP that not only time and place affect perceptions, but that experiences in and with the landscapes form place attachment.

Among the wine producers, in both cases there was one group that presented itself as wine experts, emphasizing aspects such as terroir or the uniqueness of wine. Furthermore, some of the people who benefit most from the currently existing landscape fear land use change. In the English case, this was a group of residents, while in the Californian case, a group of wine producers felt afraid of such a change. Yet, the number of years people lived in the area surprisingly seemed not to be the determining factor behind this perspective.

Although the fear of land use change was not determined by residence time, the importance of the vineyard landscape for the social and individual identity of the surveyed people varied depending how long-standing and widespread wine production in the area was. Californian perspectives highly ranked *heritage* and *symbolic* services while English perspectives valued neither. If wine production rapidly increases in some English regions, *symbolic* services might be higher valued than today in the future, while *heritage* services might still be not valued.

My findings show that it is pivotal that ES researchers not only acknowledge the existence of CES, but also incorporate CES more in their research. CES differ from the other ES, and thus, ES researchers must accept different, less quantitative methods and strategies to assess and value them such as Q-Method. Without this, a major part of the services ecosystems provide for humans is ignored.

The findings show the importance of awareness about the different perspectives in landscape planning. I showed that different perspectives exist among users and beneficiaries of landscapes, but also within the same group of people, like wine producers. The attention to these perspectives is important because if they are not kept in mind, people can become displeased and frustrated, and thus neglect or even oppose regional development. Decision-makers and planners should give special attention to the groups that fear land use changes and their effects on society, in order to plan for a development that preserves the most highly locally valued cultural services, even as a landscape inevitably evolve.

9. References

- Abson, D.J., Termansen, M., 2011. Valuing ecosystem services in terms of ecological risks and returns. *Conserv. Biol.* 25, 250–258. doi:10.1111/j.1523-1739.2010.01623.x
- Addams, H., Proops, J., 2000a. Introduction, in: Addams, H., Proops, J. (Eds.), *Social Discourse and Environmental Policy: An Application of Q Methodology*. Edward Elgar, Cheltenham, UK; Northampton, MA, USA.
- Addams, H., Proops, J. (Eds.), 2000b. *Social Discourse and Environmental Policy: An Application of Q Methodology*. Edward Elgar, Cheltenham, UK; Northampton, MA, USA.
- Addison, P., Baauw, A.H., Groenewald, G.A., 2013. An initial investigation of the effects of mulch layers on soil-dwelling arthropod assemblages in vineyards. *South African J. Enol. Vitic.* 34, 266–271.
- Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D.R., Naess, L.O., Wolf, J., Wreford, A., 2009. Are there social limits to adaptation to climate change? *Clim. Change* 93, 335–354. doi:10.1007/s10584-008-9520-z
- Agbenyega, O., Burgess, P.J., Cook, M., Morris, J., 2009. Application of an ecosystem function framework to perceptions of community woodlands. *Land use policy* 26, 551–557. doi:10.1016/j.landusepol.2008.08.011
- Alvesson, M., Sköldbberg, K., 2009. *Reflexive Methodology: New Vistas for Qualitative Research*, Second Edi. ed. SAGE, Los Angeles, London, New Delhi, Singapore, Washington DC.
- Ardoin, N.M., Schuh, J.S., Gould, R.K., 2012. Exploring the dimensions of place: a confirmatory factor analysis of data from three ecoregional sites. *Environ. Educ. Res.* 18, 583–607. doi:10.1080/13504622.2011.640930
- Backhaus, K., Erichson, B., Plinke, W., Weiber, R., 2003. *Multivariate Analysemethoden: Eine anwendungsorientierte Einführung*, 10., neu b. ed. Springer Verlag, Berlin Heidelberg New York.
- Barmaz, S., Potts, S.G., Vighi, M., 2010. A novel method for assessing risks to pollinators from plant protection products using honeybees as a model species. *Ecotoxicology* 19, 1347–1359.
- Barry, J., Proops, J., 1999. Seeking sustainability discourses with Q methodology. *Ecol. Econ.* 28, 337–345. doi:10.1016/S0921-8009(98)00053-6
- BBC, 2013. English wine: Is sparkling wine better in England than France? [WWW Document]. *BBC News Mag.* URL <http://www.bbc.com/news/magazine-23008300> (accessed 5.12.14).

- Beckert, J., Rössel, J., Schenk, P., 2014. Wine as a Cultural Product: Symbolic Capital and Price Formation in the Wine Field (No. 14/2), MPIfG Discussion Paper. Cologne.
- Bradley, T., 2013. The Purpose and Practicalities of Landscape Character Assessments in Development Management. *J. Irish Plan. Inst.* 138–166.
- Brodthorn, S., Klonsky, K., Tourte, L., 2006. Farmer goals and management styles: Implications for advancing biologically based agriculture. *Agric. Syst.* 89, 90–105.
doi:10.1016/j.agsy.2005.08.005
- Brown, S.R., 1980. *Political Subjectivity: Applications of Q Methodology in Political Science.* Yale University Press, New Haven and London.
- Bryman, A., 2004. *Social Research Methods, 2nd Editio. ed.* Oxford University Press, Oxford.
- Casado-Arzuaga, I., Madariaga, I., Onaindia, M., 2013. Perception, demand and user contribution to ecosystem services in the Bilbao Metropolitan Greenbelt. *J. Environ. Manage.* 129, 33–43. doi:10.1016/j.jenvman.2013.05.059
- CDFA, 2013. *California Grape Acreage Report 2012 Crop.* Sacramento, CA.
- Celette, F., Gary, C., 2013. Dynamics of water and nitrogen stress along the grapevine cycle as affected by cover cropping. *Eur. J. Agron.* 45, 142–152.
- Chan, K.M.A., Guerry, A.D., Balvanera, P., Klain, S., Satterfield, T., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B.S., Hannahs, N., Levine, J., Norton, B., Ruckelshaus, M., Russell, R., Tam, J., Woodside, U., 2012a. Where are Cultural and Social in Ecosystem Services ? A Framework for Constructive Engagement. *Bioscience* 62, 744–756.
doi:10.1525/bio.2012.62.8.7
- Chan, K.M.A., Satterfield, T., Goldstein, J., 2012b. Rethinking ecosystem services to better address and navigate cultural values. *Ecol. Econ.* 74, 8–18.
doi:10.1016/j.ecolecon.2011.11.011
- Council of Europe, 2000. *European Landscape Convention.*
- Crane, T., 2010. Of Models and Meanings: Cultural Resilience in Social-Ecological Systems. *Ecol. Soc.* 15.
- Daniel, T.C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J.W., Chan, K.M.A., Costanza, R., Elmqvist, T., Flint, C.G., Gobster, P.H., Grêt-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R.G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., Taczanowska, K., Tam, J., von der Dunk, A., 2012. Contributions of cultural services to the ecosystem services agenda. *Proc. Natl. Acad. Sci. U. S. A.* 109, 8812–9.
doi:10.1073/pnas.1114773109
- Danielson, S., 2009. Q Method and Surveys: Three Ways to Combine Q and R. *Field methods* 21. doi:10.1177/1525822X09332082

- Danne, A., Thomson, L.J., Sharley, D.J., Penfold, C.M., Hoffmann, A.A., 2010. Effects of native grass cover crops on beneficial and pest invertebrates in Australian vineyards. *Environ. Entomol.* 39, 970–978.
- De Groot, R.S., Wilson, M., Boumans, R.M., 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecol. Econ.* 41, 393–408. doi:10.1016/S0921-8009(02)00089-7
- English Wine Producers, 2013. A few Facts and Figures about English and Welsh Vines and Vineyards.
- European Commission, 2013. Green Infrastructure: Enhancing Europe’s Natural Capital. European Commission.
- Fagerholm, N., Käyhkö, N., 2009. Participatory mapping and geographical patterns of the social landscape values of rural communities in Zanzibar , Tanzania. *Fennia* 187, 43–60.
- Farber, S.C., Costanza, R., Wilson, M., 2002. Economic and ecological concepts for valuing ecosystem services. *Ecol. Econ.* 41, 375–392. doi:10.1016/S0921-8009(02)00088-5
- Fezzi, C., Bateman, I., Askew, T., Munday, P., Pascual, U., Sen, A., Harwood, A., 2014. Valuing Provisioning Ecosystem Services in Agriculture: The Impact of Climate Change on Food Production in the United Kingdom. *Environ. Resour. Econ.* 57, 197–214. doi:10.1007/s10640-013-9663-x
- Fiedler, A.K., Landis, D.A., Wratten, S.D., 2008. Maximizing ecosystem services from conservation biological control: The role of habitat management. *Biol. Control* 45, 254–271. doi:10.1016/j.biocontrol.2007.12.009
- Forbes, S.L., Cohen, D.A., Cullen, R., Wratten, S.D., Fountain, J., 2009. Consumer attitudes regarding environmentally sustainable wine: an exploratory study of the New Zealand marketplace. *J. Clean. Prod.* 17, 1195–1199. doi:10.1016/j.jclepro.2009.04.008
- Gaigher, R., Samways, M.J., 2010. Surface-active arthropods in organic vineyards, integrated vineyards and natural habitat in the Cape Floristic Region. *J. Insect Conserv.* 14, 595–605.
- Galliano, S.J., Loeffler, G.M., 1999. Place assessment: How people define ecosystems. Portland, OR.
- García-Llorente, M., Martín-López, B., Iñiesta-Arandia, I., López-Santiago, C. a., Aguilera, P. a., Montes, C., 2012. The role of multi-functionality in social preferences toward semi-arid rural landscapes: An ecosystem service approach. *Environ. Sci. Policy* 19-20, 136–146. doi:10.1016/j.envsci.2012.01.006
- Gibbons, S., Mourato, S., Resende, G.M., 2014. The Amenity Value of English Nature: A Hedonic Price Approach. *Environ. Resour. Econ.* 57, 175–196. doi:10.1007/s10640-013-9664-9

- Gillespie, M., Wratten, S.D., 2012. The importance of viticultural landscape features and ecosystem service enhancement for native butterflies in New Zealand vineyards. *J. Insect Conserv.* 16, 13–23.
- Gómez-Baggethun, E., de Groot, R.S., Lomas, P.L., Montes, C., 2010. The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. *Ecol. Econ.* 69, 1209–1218. doi:10.1016/j.ecolecon.2009.11.007
- Gómez-Baggethun, E., Ruiz-Pérez, M., 2011. Economic valuation and the commodification of ecosystem services. *Prog. Phys. Geogr.* 35, 613–628. doi:10.1177/0309133311421708
- Goode, J., 2005. *The Science of Wine: From Vine to Glass*. University of California Press, Berkeley and Los Angeles, California.
- Haines-Young, R.H., Potschin, M., 2012. *Common International Classification of Ecosystem Services (CICES): Consultation on Version 4, August-December 2012*. EEA Framework Contract No.
- Hauck, J., Görg, C., Varjopuro, R., Ratamáki, O., Jax, K., 2013. Benefits and limitations of the ecosystem services concept in environmental policy and decision making: Some stakeholder perspectives. *Environ. Sci. Policy* 25, 13–21. doi:10.1016/j.envsci.2012.08.001
- Hermann, A., Schleifer, S., Wrbka, T., 2011. The Concept of Ecosystem Services Regarding Landscape Research : A Review. *Living Rev. Landsc. Res.* 5.
- Hogg, B.N., Daane, K.M., 2011. Ecosystem services in the face of invasion: The persistence of native and nonnative spiders in an agricultural landscape. *Ecol. Appl.* 21, 565–576.
- Jacometti, M.A., Wratten, S.D., Walter, M., 2007. Management of understorey to reduce the primary inoculum of *Botrytis cinerea*: Enhancing ecosystem services in vineyards. *Biol. Control* 40, 57–64.
- Jedlicka, J.A., Greenberg, R., Letourneau, D.K., 2011. Avian conservation practices strengthen ecosystem services in California vineyards. *PLoS One* 6, e27347. doi:10.1371/journal.pone.0027347
- Jenkins, G.J., Murphy, J.M., Sexton, D.M.H., Lowe, J.A., Jones, P., Kilsby, C.G., 2009. *UK Climate Projections: Briefing report*. Exeter, UK.
- Kampen, J.K., Tamás, P., 2013. Overly ambitious: contributions and current status of Q methodology. *Qual. Quant.* doi:10.1007/s11135-013-9944-z
- Kerr, G.N., Swaffield, S.R., 2007. *Amenity Values of Spring Fed Streams and Rivers in Canterbury, New Zealand: A Methodological Exploration*. Lincoln.
- Kross, S.M., Tylianakis, J.M., Nelson, X.J., 2012. Effects of Introducing Threatened Falcons into Vineyards on Abundance of Passeriformes and Bird Damage to Grapes. *Conserv. Biol.* 26, 142–149.

- Lukacs, H. a., Ardoin, N.M., 2013. The Relationship of Place Re-Making and Watershed Group Participation in Appalachia. *Soc. Nat. Resour.* 1–15. doi:10.1080/08941920.2013.840876
- Mace, G.M., Norris, K., Fitter, A.H., 2012. Biodiversity and ecosystem services: a multilayered relationship. *Trends Ecol. Evol.* 27, 19–26. doi:10.1016/j.tree.2011.08.006
- Malinga, R., Gordon, L.J., Lindborg, R., Jewitt, G., 2013. Using Participatory Scenario Planning to Identify Ecosystem Services in. *Ecol. Soc.* 18. doi:10.5751/ES-05494-180410
- Martín-López, B., Iniesta-Arandia, I., García-Llorente, M., Palomo, I., Casado-Arzuaga, I., Amo, D.G. Del, Gómez-Baggethun, E., Oteros-Rozas, E., Palacios-Agundez, I., Willaarts, B., González, J. a, Santos-Martín, F., Onaindia, M., López-Santiago, C., Montes, C., 2012. Uncovering ecosystem service bundles through social preferences. *PLoS One* 7, e38970. doi:10.1371/journal.pone.0038970
- Milcu, A.I., Hanspach, J., Abson, D., Fischer, J., 2013. Cultural Ecosystem Services : A Literature Review and Prospects for Future Research. *Ecol. Soc.* 18.
- Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: General Synthesis.* Washington DC.
- Nash, M.A., Hoffmann, A.A., Thomson, L.J., 2010. Identifying signature of chemical applications on indigenous and invasive nontarget arthropod communities in vineyards. *Ecol. Appl.* 20, 1693–1703.
- Navrátil, J., Pícha, K., Knotek, J., Kucera, T., Navrátilová, J., Rajchard, J., 2013. Comparison of Attractiveness of Tourist Sites for Ecotourism and Mass Tourism: The Case of Waters in Mountainous Protected Areas. *Tour. An Int. Multidiscip. J. Tour.* 8, 35–51.
- Nelson, E., Mendoza, G., Regetz, J., Polasky, S., Tallis, H., Cameron, D.R., Chan, K.M.A., Daily, G.C., Goldstein, J., Kareiva, P.M., 2009. Modeling multiple ecosystem services, biodiversity conservation, commodity production, and tradeoffs at landscape scales. *Front. Ecol. Environ.* 7, 4–11.
- Nijnik, M., Nijnik, A., Bergsma, E., Matthews, R., 2013. Heterogeneity of experts' opinion regarding opportunities and challenges of tackling deforestation in the tropics: a Q methodology application. *Mitig. Adapt. Strateg. Glob. Chang.* doi:10.1007/s11027-013-9529-0
- Nijnik, M., Zahvoyska, L., Nijnik, A., Ode, A., 2008. Public evaluation of landscape content and change: Several examples from Europe. *Land use policy* 26, 77–86. doi:10.1016/j.landusepol.2008.03.001
- Norton, L.R., Inwood, H., Crowe, A., Baker, A., 2012. Trialling a method to quantify the “cultural services” of the English landscape using Countryside Survey data. *Land use policy* 29, 449–455. doi:10.1016/j.landusepol.2011.09.002
- NZWine, 2013. Annual Report 2013. New Zealand.

- NZWine, n.d. Towards 100% sustainability [WWW Document]. URL <http://www.nzwine.com/sustainability/towards-100-sustainability-1/> (accessed 3.27.14).
- OPERAs, 2013. Welcome to OPERAs [WWW Document]. URL <http://operas-project.eu/> (accessed 12.4.13).
- Orenstein, D., 2013. More than Language Is Needed in Valuing Ecosystem Services. *Bioscience* 63, 913. doi:10.1525/bio.2013.63.12.17
- Orre-Gordon, S., Jacometti, M., Tompkins, J., Wratten, S.D., 2013. Viticulture can be Modified to Provide Multiple Ecosystem Services, in: Wratten, S., Sandhu, H., Cullen, R., Constanza, R. (Eds.), *Ecosystem Services in Agricultural and Urban Landscapes*. Wiley-Blackwell, pp. 43–57. doi:10.1002/9781118506271
- Oteros-Rozas, E., Martín-López, B., González, J. a., Plieninger, T., López, C.A., Montes, C., 2013. Socio-cultural valuation of ecosystem services in a transhumance social-ecological network. *Reg. Environ. Chang.* doi:10.1007/s10113-013-0571-y
- Plieninger, T., Bieling, C., Ohnesorge, B., Schaich, H., Schleyer, C., Wolff, F., 2013. Exploring Futures of Ecosystem Services in Cultural Landscapes through Participatory Scenario Development in the Swabian Alb , Germany. *Ecol. Soc.* 18.
- Potschin, M.B., Haines-Young, R.H., 2011. Ecosystem services: Exploring a geographical perspective. *Prog. Phys. Geogr.* 35, 575–594. doi:10.1177/0309133311423172
- R Core Team, 2013. *R: A language and environment for statistical computing*.
- Raymond, C.M., Bryan, B. a., MacDonald, D.H., Cast, A., Strathearn, S., Grandgirard, A., Kalivas, T., 2009. Mapping community values for natural capital and ecosystem services. *Ecol. Econ.* 68, 1301–1315. doi:10.1016/j.ecolecon.2008.12.006
- Rey Benayas, J.M., Newton, A.C., Diaz, A., Bullock, J.M., 2009. Enhancement of biodiversity and ecosystem services by ecological restoration: a meta-analysis. *Science* 325, 1121–4. doi:10.1126/science.1172460
- Ritchie, C., Elliott, G., Flynn, M., 2010. Buying wine on promotion is trading-up in UK supermarkets: A case study in Wales and Northern Ireland. *Int. J. Wine Bus. Res.* 22, 102–121. doi:10.1108/17511061011061685
- Robbins, P., Krueger, R., 2000. Beyond Bias? The Promise and Limits of Q Method in Human Geography. *Prof. Geogr.* 52, 636–648. doi:10.1111/0033-0124.00252
- Robinson, J., 2001. *Concise Wine Companion*. Oxford University Press, Oxford.
- Rocchi, B., Gabbai, M., 2013. Territorial identity as a competitive advantage in wine marketing : a case study. *J. Wine Res.* 4, 291–310. doi:10.1080/09571264.2013.837382

- Sandhu, H.S., Nidumolu, U., Sandhu, S., 2012. Assessing Risks and Opportunities Arising from Ecosystem Change in Primary Industries Using Ecosystem-Based Business Risk Analysis Tool. *Hum. Ecol. Risk Assess.* 18, 47–68.
- Satz, D., Gould, R.K., Chan, K.M.A., Guerry, A., Norton, B., Satterfield, T., Halpern, B.S., Levine, J., Woodside, U., Hannahs, N., Basurto, X., Klain, S., 2013. The Challenges of Incorporating Cultural Ecosystem Services into Environmental Assessment. *Ambio* 42, 675–684. doi:10.1007/s13280-013-0386-6
- Schaich, H., Bieling, C., Plieninger, T., 2010. Linking Ecosystem Services with Cultural Landscape Research. *GAIA - Ecol. Perspect. Sci. Humanit. Econ.* 19, 269–277.
- Schröter, M., van der Zanden, E.H., van Oudenhoven, A.P.E., Remme, R.P., Serna-Chavez, H.M., de Groot, R.S., Opdam, P., 2014. Ecosystem services as a contested concept: a synthesis of critique and counter-arguments. *Conserv. Lett.* 1–23. doi:10.1111/conl.12091.
- Scopus, 2014. Scopus - the largest abstract and citation database on peer-reviewed literature [WWW Document]. URL <http://www.elsevier.com/online-tools/scopus> (accessed 2.26.14).
- Selman, P., 2008. What do we mean by sustainable landscape ? *Sustain. Sci. Pract. Policy* 4, 23–28.
- Simoncini, R., 2011. Governance objectives and instruments, ecosystem management and biodiversity conservation: The Chianti case study. *Reg. Environ. Chang.* 11, 29–44.
- Smith, D.E., Mitry, D.J., 2007. Cultural Convergence : Consumer Behavioral Changes in the European. *J. Wine Res.* 18, 107–112. doi:10.1080/09571260701660870
- Stedman, R.C., 2002. Toward a Social Psychology of Place: Predicting Behavior from Place-Based Cognitions, Attitude, and Identity. *Environ. Behav.* 34, 561–581. doi:10.1177/0013916502034005001
- Stedman, R.C., 2003. Sense of Place and Forest Science: Toward a Program of Quantitative Research. *For. Sci.* 49, 822 – 829.
- Steelman, T.A., Maguire, L.A., 1999. Perspectives : Q-Methodology in National Forest Management. *J. Policy Anal. Manag.* 18, 361–388.
- Swanwick, C., 2009. Society’s attitudes to and preferences for land and landscape. *Land use policy* 26, S62–S75. doi:10.1016/j.landusepol.2009.08.025
- Swedeen, P., 2006. Post-normal science in practice: A Q study of the potential for sustainable forestry in Washington State, USA. *Ecol. Econ.* 57, 190–208. doi:10.1016/j.ecolecon.2005.04.003
- TEEB, 2010. The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations, in: Kumar, P. (Ed.), Earthscan, London and Washington.

- Termorshuizen, J.W., Opdam, P., 2009. Landscape services as a bridge between landscape ecology and sustainable development. *Landsc. Ecol.* 24, 1037–1052. doi:10.1007/s10980-008-9314-8
- The Research Box, 2009. Experiencing Landscapes: capturing the “cultural services” and “experiential qualities” of landscapeu, recep-enelc.net. Cheltenham.
- Tompkins, J.-M., 2010. Ecosystem services provided by native New Zealand plants in vineyards. Lincoln University Christchurch.
- Tompkins, J.-M., Wratten, S.D., Simpson, M., 2012. Enhancing Ecosystem Services in Australasian Vineyards for Sustainability and Profit, in: Bostanian, N.J., Vincent, C., Isaacs, R. (Eds.), *Arthropod Management in Vineyards: Pests, Approaches, and Future Directions*. Springer, Dordrecht Heidelberg New York London. doi:10.1007/978-94-007-4032-7
- Trentelman, C.K., 2009. Place Attachment and Community Attachment: A Primer Grounded in the Lived Experience of a Community Sociologist. *Soc. Nat. Resour.* 22, 191–210. doi:10.1080/08941920802191712
- UKVA, 2012a. UKVA Sustainability Project: Identifying and benchmarking current practice in environmental, economic and social sustainability for English Wine producers that will form a baseline to drive improvement across the industry.
- UKVA, 2012b. UKVA Vineyard Statistics.
- Vallés-Planells, M., Galiana, F., Van Eetvelde, V., 2014. A Classification of Landscape Services to Support Local Landscape Planning. *Ecol. Soc.* 19, 44. doi:10.5751/ES-06251-190144
- Van Exel, J., de Graaf, G., 2005. Q methodology : A sneak preview.
- Viers, J.H., Williams, J.N., Nicholas, K.A., Barbosa, O., Kotzé, I., Spence, L., Webb, L.B., Merenlender, A., Reynolds, M., 2013. Vinecology: Pairing wine with nature. *Conserv. Lett.* 6, 287–299.
- Webler, T., Danielson, S., Tuler, S., 2009. Using Q Method to Reveal Social Perspectives in Environmental Research. Greenfield MA.
- Williams, J.N., Hollander, A.D., O’Geen, A.T., Thrupp, L.A., Hanifin, R., Steenwerth, K., McGourty, G., Jackson, L.E., 2011. Assessment of carbon in woody plants and soil across a vineyard-woodland landscape. *Carbon Balance Manag.* 6.
- Wine Institute, 2012. California Wine Profile 2012. San Fransisco, CA.
- Wine Institute, 2013. US / California Wine Production [WWW Document]. URL <http://www.wineinstitute.org/resources/statistics/article83> (accessed 3.27.13).

Wine Institute, 2014a. California Wine Sales Grow 3% by Volume and 5% by Value in the U.S. in 2013 [WWW Document]. URL <http://www.wineinstitute.org/resources/pressroom/04242014> (accessed 5.4.14).

Wine Institute, 2014b. California Wine Exports Reach All-Time High in 2013 [WWW Document]. URL <http://www.wineinstitute.org/resources/pressroom/02262014> (accessed 3.27.13).

Wine Standards Board, 2013. UK Vineyard Stats.

Woolley, J.T., Mccginnis, M.V., 2000. The Conflicting Discourses of Restoration. *Soc. Nat. Resour.* 13, 339–357. doi:10.1080/089419200279009

10. Annexes:

10.1. Annex 1: Search terms for literature review

Class	search terms
Cultivated crops	yield*, grape*, grape leaves, grapevine leaves, crop*, table, grape*, crop load*, grape berr*, berry growth, fruit, grape maturity, yield component*, fruit composition, cultivated crop*, wine grape*
Fibres and other materials from plants, algae and animals for direct use or processing	pruning, grape seed*, grape skin*, MegaPurple, color additive*, wood, Ravaz index
Materials from plants, algae and animals for agricultural use	pomace
Filtration/sequestration/storage/accumulation by ecosystems	carbon storage, carbon sequestration, filtration, sequestration, storage, accumulation, GHG, greenhouse gas, N2O, nitrous oxide, sulfur, nitrogen deposition*, fertilizer*, spray, pesticide*, salinization, soil salinity, salt accumulation
Mediation of smell/noise/visual impacts	zoning, spatial planning, smell impact, noise impact, visual impact, noise, smell, visual, planning, land use planning, highway, tractor noise, sulfur smell, harvest, crush smell, landscape, view, viewshed, preservation, sound cannon*, reflectors to scare away birds
Mass stabilisation and control of erosion rates	soil conservation, soil loss*, cultivation practice*, mass stabilization, erosion, erosion rate, erosion model, alternate row cultivation, row cultivation, disking, mowing, ripping, liming, tree removal, run off, erosivity, land terrac*, native vegetation removal, vegetation removal, cover crop, mass flow, tractor*, machinery
Hydrological cycle and water flow maintenance	Fraction of Transpirable Soil Water, FTSW, infiltration, water deficit, water relations, hydraulics, run off, soil moisture, irrigation, fish AND flows, ecolog* flow*, water security, water stress
Flood protection	flooding, landscape, buffer zone, setback, flood control, flood protection, wet feet, drainage
Ventilation and transpiration	evapotranspiration, ventilation, transpiration, hydrometer, photosynthesis, ecophysiology
Pollination and seed dispersal	insect*, pollination, seed dispersal, bee, bird*, starling*, arthropod, finch*, cover crop, wind pollination, turkey*, sound cannons*
Maintaining nursery populations and habitats	diversity, biodiversity, nursery population, habitat, germplasm, biological resource, gene pool
Pest control	cover crop, pest*, pest control*, rodent control*, beneficial predator*, bird box*, owl box*, raptor box*, nest box*, integrated pest management*, IPM, native plant*, natural enemy, pest management, pesticide, biological control, arthropod, rodent*, insecticide*, phylloxera, nematode*
Disease control	red blotch, botrytis, fungal, herbicide, phomopsis, disease*, fungicide*, disorder*, eutypa, biological control, fanleaf, mulch, leafroll, corky bark disease
Weathering processes	soil fertility, nutrient*, soil structure, in situ soil, soil biological activity, nutrient uptake, mineral*, soil quality,

	weathering process*
Decomposition and fixing processes	microbe*, fungi, soil arthropod*, arthropod, mulch, worm*, legume*, nitrogen fixing, soil quality, decomposition, fixing process*
Micro and regional climate regulation	latent heat, transpiration, temperature, climat* regulation, shade, remote sensing, hydrologic cycle, micro climate, regional climate
Experiential use of plants, animals and land-/seascapes in different environmental settings	wine tasting, picnic*, eating grape leaves, drink* wine, dolmade*, birding, bird watch*, employment, hot air, balloon ride, limousin* tour*, gourmet tourism, cable car
Physical use of land-/seascapes in different environmental settings	biking, hiking, horseback rid*, padding, walking
Scientific	climate change, enology, experiment*, trial, treatment, research, precision viticulture, scientific
Educational	winemaking, winegrowing, wine seminar, school, university, college, education, tasting room, environmental education
Heritage, cultural	family winery, tradition, charm, traditional, historical, identity, sense of place, social capital, heritage, local food cultural
Entertainment	wedding*, entertainment, bachel* part*, winery tour, wine tasting, concert, theatre, music, movie*, film festival, festival, harvest festival, contest, vintage festival, wine, queen, wine event*, tourism, agritourism, agrotourism, wine cave, wine tourism, wine tour*, visit, day trip
Aesthetic	beauty, scenery, landscape, winescape, vineyard row,, aesthetic, mustard, poppies, inspiration, wildflower, seasonal change, leaf change, foliage change, view, photography, art, gallery
Symbolic	representation, appellation, symbolic, social cohesion, terroir, uniqueness, AVA, American Viticultural Area, DOC, denomination origine controlle, denominazione di origine controllata, AOC, Appellation d'origine contrôlée, emblem*
Sacred and/or religious	wedding, yoga, meditation, retreat, spiritual, sacred, religious, religion, earth, mother earth, nature, inspiration, culture
Existence	view, land use, option value, existence, nature conservation, landscape
Bequest	family farming, family winery, inter-generational, stewardship, land ethic, bequest, care

10.2. Annex 2: Comparison of (selected) Q-studies on environmental issues

Authors	Title	Publication	Year	Place	Topic	# of Q-statements	Scale	# of Q-sorts	# of factors
Lynch, A. H, Adler, C. E. & Howard, N. C.	Policy diffusion in arid Basin water management: a Q method approach in the Murray–Darling Basin, Australia	<i>Regional Environmental Change</i>	2014	Australia	perspectives on expert advice, subsidiarity and local knowledge for water management	27	-4 to +4	37	4
Navrátil, J., Pícha, K., Knotek, J., Kucera, T., Navrátilová, J., & Rajchard, J.	Comparison of Attractiveness of Tourist Sites for Ecotourism and Mass Tourism: The Case of Waters in Mountainous Protected Areas	<i>Tourismos: An International Multidisciplinary Journal of Tourism</i>	2013	South Bohemia (Czech Republic)	water-enhanced tourist attractions	48	-4 to +4	195	3
Nijnik, M., Nijnik, A., Bergsma, E., & Matthews, R.	Heterogeneity of experts' opinion regarding opportunities and challenges of tackling deforestation in the tropics: a Q methodology application.	<i>Mitigation and Adaptation Strategies for Global Change.</i>	2013	not site-specific	experts' attitudes towards REDD+	41	-5 to +5	19	4
Cairns, R., Sallu, S.M., & Goodman, S.	Questioning calls to consensus in conservation: a Q study of conservation discourses on Galapagos	<i>Environmental Conservation</i>	2013	Galapagos, Ecuador	whether a shared vision of Galapagos and conservation measures taken is either achievable or desirable	52	-4 to +4	33	3
Cairns, R. C.	Understanding Science in Conservation: A Q Method Approach on the Galapagos Islands	<i>Conservation and Society</i>	2012	Galapagos, Ecuador	perspectives on the science/ conservation interface currently held by scientists and conservation managers working on Galapagos Islands	34	-4 to +4	27	4

Bischof, B. G.	Negotiating uncertainty: Framing attitudes, prioritizing issues, and finding consensus in the coral reef environment management "crisis."	<i>Ocean & Coastal Management</i>	2010	not clear (probably USA)	attitudes among coral reef science and conservation professional network on coral reef management	43	-5 to +5	31	4
Frantzi, S., Carter, N. T., & Lovett, J. C.	Exploring discourses on international environmental regime effectiveness with Q methodology: a case study of the Mediterranean Action Plan.	<i>Journal of Environmental Management</i>	2009	not site-specific	discourses on the effectiveness of UNEPs Mediterranean Action Plan	44	-4 to +4	25	4
Nijnik, M., Zahvoyska, L., Nijnik, A., & Ode, A.	Public evaluation of landscape content and change: Several examples from Europe	<i>Land Use Policy</i>	2008	Scotland	public values and preferences on the role of woodlands for a multi-functional future of landscapes			28	6
Davies, B. B., & Hodge, I. D.	Exploring environmental perspectives in lowland agriculture: A Q methodology study in East Anglia, UK.	<i>Ecological Economics</i>	2007	East Anglia, UK	attitude of UK arable and mixed lowland farmers regarding the appropriate way of environmental management of agricultural land	33	-4 to +4	102	5
Kerr, G. N., & Swaffield, S. R.	Amenity Values of Spring Fed Streams and Rivers in Canterbury, New Zealand: A Methodological Exploration		2007	New Zealand		30	-4 to +4	26	3
Swedeen, P.	Post-normal science in practice: A Q study of the potential for sustainable forestry in Washington State, USA	<i>Ecological Economics</i>	2006	Washington State, USA	perspectives on forest management	64	-4 to +4	30	3
Brodts, S., Klonsky, K., & Tourte, L.	Farmer goals and management styles: Implications for advancing biologically based agriculture	<i>Agricultural Systems</i>	2006	USA	different management styles of almond and wine growers	48	-5 to +5	40	3

Fairweather, J., & Swaffield, S.	Visitor experiences of Kaikoura, New Zealand: an interpretative study using photographs of landscapes and Q method.	<i>Tourism Management</i>	2001	New Zealand	visitor experience of landscape	30	-4 to +4	66	5
Steelman, T. A., & Maguire, L. A.	Perspectives : Q-Methodology in National Forest Management.	<i>Journal of Policy Analysis and Management</i>	1999	USA	participants viewpoint on National Forest Management	55	-4 to +4	147 sent out, 87 returned, 68 useable	3
Barry, J., & Proops, J.	Seeking sustainability discourses with Q methodology.	<i>Ecological Economics</i>	1999	UK	attitude of members of Local Employment and Trading Systems (LETS)	36	-4 to +4	25	4
Mashkina, O.	Measuring Attitudinal Diversity through Q-analysis—an illustration of a research approach	<i>L. Carlsson & M.-O. Olsson (Eds.), Initial Analyses of the Institutional Framework of the Russian Forest Sector.</i>	1998	Siberia	attitude of forest managers towards forest management	23	-3 to +3	4	2

10.3. Annex 3: Q-Method (detailed explanation)

In the following Q-Method, its underlying assumptions and its proceeding is explained. Chapter 4.3. in the thesis is an adapted version of the following text.

10.3.1. Introduction into Q-Method

Q-Method is used to reveal people's perspective on a certain topic. Q-Method is a qualitative approach using factor analysis to identify social perspectives. The method is suitable to illuminate wicked problems (Nijnik et al., 2013), hence, researchers have used Q-Method for a variety of environmental studies (Annex 2). An assumption of Q-Method is that there are only a certain number of distinct perspectives on each topic (Barry and Proops, 1999; van Exel and de Graaf, 2005). A reason to use Q-Method is that the participants (Q-participants) can give their personal subjective view on a topic since they sort a number of given statements (Q-statement) in a forced normal distribution (Q-sort). Simultaneously, Q-participants' Q-sorts, which represent their views, can be compared thanks to the fact that the Q-statements are the same (Danielson, 2009).

In the 1930's, the British physicist and psychologist William Stephenson developed Q-Method to study people's beliefs and attitudes towards a topic (Brown, 1980). In 1980, Steven Brown published his book 'Political Subjectivity – Applications of Q Methodology in Political Science', which is until today the definitive book for researchers using Q-Method (Webler et al., 2009). Nowadays, Q-Method is used to illuminate topics in various research fields like environmental science, ecological economics, cultural science, policy and decision-making (Webler et al., 2009).

A Q-study consists out of four steps. First, the researcher needs to identify a topic and the group of people, whose perspectives on the topic s/he is interested in. Next, Q-statements must be retrieved from either interviews or existing literature, which represent the possible range of views on a topic. Once a number of Q-statements are selected, Q-participants that represent the broadest possible view on the topic are asked to conduct Q-sorts, where they sort the Q-statements in a forced normal distribution. In the end, a factor analysis helps to reveal a distinct number of social perspectives on the researched topic. The found patterns help to understand different perspectives on a certain topic (van Exel and de Graaf, 2005).

10.3.2. Q-statements

The identification and selection of the Q-statements are crucial for Q-Method. The researcher must consider as many as possible perspectives on the topic. This can be done by analyzing existing

literature such as newspapers, home pages, records, papers, articles and so on, or by conducting interviews with key stakeholders (Webler et al., 2009).

Q-statements should be motivated by various backgrounds and neither over- nor underrepresent particular perspectives (Steelman and Maguire, 1999; Webler et al., 2009). It is helpful to first identify as many as possible potential Q-statements and reduce the number in a second step. Strategic sampling using categories for possible Q-statements and selecting a small number out of each category is a good way to make sure that selected Q-statements cover the whole range of perspectives. To limit bias, Q-statements can be taken literally from the discourse because they then represent the writers' or speakers' opinion and the research does not influence them.

Good Q-statements are short and self-explanatory, similar to survey questions. At the same time, they allow a certain degree of interpretation of the Q-participants because it is important to allow subjectivity (Webler et al., 2009).

Overall, the selection of the Q-statements is a "methodological value judgment" (Webler et al., 2009, p.11) and "remains more an art than a science" (Brown, 1980, p. 186).

10.3.3. Conduct Q-sort

Q-participants

As Q-researchers want to reveal different perspectives on a topic, a criterion for selecting Q-participants is not that they represent the distribution of perspectives in society, but the range of perspectives (Webler et al., 2009). This means that they are intentionally selected and not randomly. Nijnik et al. (2013) propose politicians, citizens, scientists, civil society and business representatives as relevant Q-participants for environmental science studies. There should be fewer Q-participants than Q-statements and in normal cases a ratio of 1:3 is favored (Webler et al., 2009). Analyzing published studies using Q-Method (Annex 2), it is striking that most studies have more Q-sorts than given by the ratio.

Q-sorts

The Q-participants are asked to rank the Q-statements in a forced normal distribution which helps to reveal the Q-participant's preferences (Webler et al., 2009). Q-sorts are self-referential because the Q-statements are ranked relative to each other according to Q-participants' perspective (Swedeen, 2006; Woolley and Mccginnis, 2000). After completing the Q-sorts, Q-participants can overlook their Q-sort and change the position of Q-statements if they wish (van Exel and de Graaf, 2005).

10.3.4. Factor analysis

The objective of Q-method is to reveal key perspectives on a certain topic. This is achieved through factor analysis, which correlates the rankings of the Q-statements to produce factors, which represent ideal Q-statement rankings of the perspectives. A factor analysis is for some an objective method (Brown, 1980), whereas others find especially the identification of the numbers of factors a subjective interference of the researcher (Backhaus et al., 2003). In Q-Method, either Centroid analysis, or Principal Component Analysis (PCA) is used to calculate the factors. PCA is the more often used method in factor analysis (Webler et al., 2009) and helps to condense variables (Q-sorts) into a certain amount of components (factors) by calculating the correlations of the variables and ascribing them to these components according to their correlations (Backhaus et al., 2003).

The analysis part of a Q-study has five steps: decision on the number of factors, PCA, allocation of Q-sorts to identified factors, identification of Q-statement rankings of each factor, and allocation of Q-statements to the ranking categories.

Number of factors

A common method to identify the number of factors is to extract the amount of factors that have an eigenvalue > 1 (Kaisers criterion) (Backhaus et al., 2003; Brown, 1980). An additional best-practice criterion is to have at least three Q-sorts in each factor (Webler et al., 2009). However, in the end the researcher decides on how many different factors are identified.

Principal component analysis

In Q-Method, either Centroid analysis, or Principal Component Analysis is used to calculate the factors. A varimax rotation of the factors helps to get “a mathematically precise solution” (Brown, 1980, p. 224). The resulting factors indicate that there are certain orders of values and beliefs that are shared among different people (Webler et al., 2009). They help to understand different perspectives on a certain topic (van Exel and de Graaf, 2005).

Assignment of Q-sorts to factors

In most cases, the revealed factors do not fit 100% with any of the given Q-sorts. To show how similar the factors are with each Q-sorts factor loadings are calculated. The higher the factor loading, the better does the Q-sort fit the factor. The Q-sort with the highest loading factor ‘defines’ the pattern (Webler et al., 2009). The factor loadings can attain values between +1.0 to -1.0 with +1.0 indicating that factor and Q-sort completely concur and with -1.0 opposing each other. Researchers

use different minimum levels of factor loadings (often between +0.3 and +0.5 (Addams and Proops, 2000b; Backhaus et al., 2003)) to assign a Q-sort to a factor and to express significance. The researcher assigns each Q-sort to a factor by using its factor loading.

Extraction of Q-statement ranking

With the computed factor scores, for each factor the ranking of the Q-statements of an ideal representative of the factor can be identified. The ranking positions can be assigned to the categorical values used in the Q-sort (e.g. -4 to +4).

10.3.5. Advantages

A reason to use Q-Method is that the Q-participants can give their personal subjective view on something. Simultaneously, the resulting Q-sorts of all Q-participants can be compared due to the fact that the statements are the same (Danielson, 2009; Webler et al., 2009). This can be of advantage for policy-making as issues that are similarly perceived by various social perspectives can be identified as well as issues that are extremely different understood (Barry and Proops, 1999).

10.3.6. Limitations

Q-Method does not depict the distribution of the revealed social perspectives in the society (Danielson, 2009; Kerr and Swaffield, 2007; Steelman and Maguire, 1999; van Exel and de Graaf, 2005). Only a representative study could show this distribution. Furthermore, it is not possible to explain the identified social perspectives completely with variables outside the Q-sort because Q-s are not selected in a way that they represent society (Danielson, 2009). Nevertheless, some studies use socio-economic data for a partly interpretation of the found patterns (Nijnik et al., 2008).

So far, there are no standardized Q-statements for any research question (Wებler et al., 2009). To further reduce bias and make results more comparable among different studies, standardized Q-statements could be helpful.

The Q-Method can be criticized for the reliability of its results. It is important that it is replicable: same instruction lead to similar results (van Exel and de Graaf, 2005).

10.3.7. Epistemology of Q-method

Q-Method is not revealing the 'one true' subjective perspective, but allows various perspectives on a topic (Robbins and Krueger, 2000). Different authors have assigned Q-Method to different epistemologies:

- anti-essentialist (Robbins and Krueger, 2000),
- critical-post modernism (Webler et al., 2009)
- post-normal science (Swedeen, 2006).

10.4. Annex 4: Screenshot of digital version of newspaper article in Sonoma Index Tribune (local newspaper in Sonoma, CA)

26.4.2014

Sonoma Index-Tribune | Sonoma News, Entertainment, Sports, Real Estate, Events, Photos, Sonoma, CA

Sonoma Index-Tribune

Survey on vineyard culture

Monday, March 24, 2014 3:34 PM

By Index-Tribune Report

Gefällt mir 57 Tweet 0 +1 0

Editor, Index-Tribune:

I am a master's student at Lund University, Sweden, and I am writing my master's thesis with the working title, "More than wine – cultural ecosystem services in vineyards." I am recruiting participants for a study to understand how local residents view vineyards in California, England and New Zealand.

Participants should be either local residents, and/or working in local administration, local businesses, housing sector, agricultural sector, tourism, nature conservation in the above mentioned areas, and/or actively involved in the local wine industry (as winegrowers, winemakers, winery owners, etc.).

To participate in the study, you will be asked to sort a variety of statements on a web page according to how closely they fit your personal views.

There are no right or wrong answers. Your answers will be used to understand groups of perspectives on the values that local wine producers and residents place on vineyards. Your participation will take about 20 to 25 minutes.

Your answers and your e-mail address will be treated confidentially. Please send your data by Thursday, March 27th, at the latest.

To participate, please click on this link: <http://application.qsoftware.com/user/KlaraJWinkler/>.

Copies of my thesis will be shared with anyone interested. Feel free to post the link on your social media pages and to contact me by email: klara.j.winkler@gmail.com.

Klara J. Winkler

Lund, Sweden

10.5. Annex 5: 30 articles on ecosystem services in vineyard landscapes

Author(s)	Year	Name	Journal	Keywords	topic	focus on ES	provisi- oning ES	regul- ating ES	CES	none	usage of ecosystem services
Addison, P; Baauw, A H; Groenewald, G A	2013	An initial investigation of the effects of mulch layers on soil-dwelling arthropod assemblages in vineyards	<i>South African Journal of Enology and Viticulture</i>	pitfall traps, insects, Collembola, Formicidae, straw, compost, woodchips, ecosystem services	use of mulch in vineyards and its effects on arthropods			x			Integrated Pest Management reduces chemical input and supports the use of ecosystem services
Celette, F.; Gary, C.	2013	Dynamics of water and nitrogen stress along the grapevine cycle as affected by cover cropping	<i>European Journal of Agronomy</i>	Fraction of Transpirable Soil Water (FTSW), Nitrogen Nutrition Index (NNI), indicator, stress, water–nitrogen interaction, vitis vinifera L.	water and nitrogen stress for vine due to cover crops			x			cover crops in vineyards to induce ecosystem services
Glavan, M.; Pintar, M.; Volk, M.	2013	Land use change in a 200-year period and its effect on blue and green water flow in two Slovenian Mediterranean catchments-lessons for the future	<i>Hydrological Processes</i>	historical land use change, green water, blue water, SWAT model	effects of land use change on water availability						water related ecosystem services rely on water flows; trade-off between water use and water protection
Shackelford, G.; Steward, P.R.; Benton, T.G.; Kunin, W.E.; Potts, S.G.; Biesmeijer, J.C.; Sait, S.M.	2013	Comparison of pollinators and natural enemies: A meta-analysis of landscape and local effects on abundance and richness in crops	<i>Biological Reviews</i>	ecosystem service, pollination, pest control, pest regulation, biological control, abundance, richness, diversity, stability, complexity	trade-offs between pollinators and pest-control			x			agromanagement: provide multiple ecosystem services --> need to know how as very little information on interaction between different

											services
Viers, J.H.; Williams, J.N.; Nicholas, K.A.; Barbosa, O.; Kotzé, I.; Spence, L.; Webb, L.B.; Merenlender, A.; Reynolds, M.	2013	Vinecology: Pairing wine with nature	<i>Conservation Letters</i>	new world Mediterranean, vineyard, footprint, winelands, working landscapes, best practices, viticulture	combine ecology and viticulture		x	x			right management can provide full range of ecosystem services
Gillespie, M; Wratten, S D	2012	The importance of viticultural landscape features and ecosystem service enhancement for native butterflies in New Zealand vineyards	<i>Journal of Insect Conservation</i>	conservation, host plants, lycaena salustius, nectar, vegetation, zizina oxleyi	return native vegetation in agro system vineyard, effects on biodiversity			x	x		ecosystem services as endangered by monocultures as vineyards, need to improve
Kross, S M; Tylianakis, J M; Nelson, X J	2012	Effects of Introducing Threatened Falcons into Vineyards on Abundance of Passeriformes and Bird Damage to Grapes	<i>Conservation Biology</i>	biological control, ecosystem service, IPM, pest management, raptors, threatened species	falcons as predators for birds, help to increase yield as they scare away/ eat birds	x	x	x			just as keyword
Nandy, S; Kumar Das, A	2012	Comparing tree diversity and population structure between a traditional agroforestry system and natural forests of Barak valley, Northeast India	<i>International Journal of Biodiversity Science, Ecosystems Services and Management</i>	diversity, population structure, <i>Paan jhum</i> , traditional agroforestry, Khasi tribes, conservations	tree diversity between different forest kinds					x	forest are valued due to its ecosystem services

Sandhu, H; Nidumolu, U; Sandhu, S	2012	Assessing Risks and Opportunities Arising from Ecosystem Change in Primary Industries Using Ecosystem-Based Business Risk Analysis Tool	<i>Human and Ecological Risk Assessment</i>	agribusiness, business risks and opportunities, ecological modeling, ecosystem services.	degradation of ecosystem services can pose risk to agrobusiness			x			ecosystem services as analysis tool for better management
Albert, Christian; von Haaren, Christina; Galler, Carolin	2012	Ecosystem services - Old wine in new bottles or an incentive for German landscape planning? [Ökosystemdienstleistungen - Alter Wein in neuen Schläuchen oder ein Impuls für die Landschaftsplanung?] *	<i>Naturschutz und Landschaftsplanung</i>								
Chong, C.-S.; Thomson, L J; Hoffmann, A A	2011	High diversity of ants in Australian vineyards	<i>Australian Journal of Entomology</i>	agroecosystem, conservation, Formicidae, invasive ant, richness	diversity of ants in Australian vineyards			x			ant diversity in vineyards could potentially contribute to ecosystem services
Galbreath, J	2011	To What Extent is Business Responding to Climate Change? Evidence from a Global Wine Producer	<i>Journal of Business Ethics</i>	adaptive, Australia, climate change, greenhouse gas emissions, mitigative, strategy, sustainability, wine	adaption to cc in wine industry					x	ecosystem services change due to climate change, effects on wine industry that depend on ecosystem services
Hogg, B N; Daane, K M	2011	Diversity and invasion within a predator community: Impacts on herbivore suppression	<i>Journal of Applied Ecology</i>	Araneae, biodiversity, cannibalism, Cheiracanthium, intraguild predation, invasive species,	exotic predator can provide more ecosystem services but threaten native biodiversity			x			ecosystem services as a goal of agroecosystem management

				niche partitioning, predator diversity							
Hogg, B N; Daane, K M	2011	Ecosystem services in the face of invasion: The persistence of native and nonnative spiders in an agricultural landscape	<i>Ecological Applications</i>	agroecosystems, Araneae, biodiversity, Cheiracanthium spp., ecosystem services, habitat diversity, habitat fragmentation, invasive species, Napa County, California, USA, Miturgidae; predator diversity, vineyards	natural species more in natural habitat and not so much in agrosystems, which can easier be invaded by exotic species			x			limited ecosystem services by intact natural habitat when agricultural landscapes are invaded by exotic species
Jedlicka, J.A.; Greenberg, R.; Letourneau, D.K.	2011	Avian conservation practices strengthen ecosystem services in California vineyards	<i>PLoS ONE</i>		strengthening of insectivorous birds	x		x			pest control as ecosystem services
Monteiro, A.T.; Fava, F.; Hiltbrunner, E.; Della Marianna, G.; Bocchi, S.	2011	Assessment of land cover changes and spatial drivers behind loss of permanent meadows in the lowlands of Italian Alps	<i>Landscape and Urban Planning</i>	land cover/land use changes, meadows loss; GIS-based logistic regression, aerial photographs, Italian Alps	meadow loss in the lowland Alps					x	meadows provide unique ecosystem services
Ripoche, A.; Rellier, J.-P.; Martin-Clouaire, R.; Paré, N.; Biarnès, A.; Gary, C.	2011	Modelling adaptive management of intercropping in vineyards to satisfy agronomic and environmental performances under Mediterranean climate	<i>Environmental Modelling and Software</i>	adaptive management, climate variability, cover crop, ecosystem services, flexibility, grapevine water status, modeling, soil surface management	simulation model for adaptive intercrop management			x			trade-off between agricultural production and ecosystem services

Simoncini, R	2011	Governance objectives and instruments, ecosystem management and biodiversity conservation: The Chianti case study	<i>Regional Environmental Change</i>	rural development, governance objectives, Ecosystem services, public goods, policy instruments	methodological approach to analyze impacts of agriculture and rural policies in agro-ecosystems		x	x			not only provisioning services important, but also regulating
Williams, J.N.; Hollander, A.D.; O'Geen, A.T.; Thrupp, L.A.; Hanifin, R.; Steenwerth, K.; McGourty, G.; Jackson, L.E.	2011	Assessment of carbon in woody plants and soil across a vineyard-woodland landscape	<i>Carbon Balance and Management</i>	aboveground carbon, agriculture, allometric equation, biodiversity, ecosystem services, GIS, habitat, organic farming, sequestration, soil carbon	carbon storage in vineyards and woodlands			x			management crucial for ecosystem services provisioning
Barmaz, S.; Potts, S.G.; Vighi, M.	2010	A novel method for assessing risks to pollinators from plant protection products using honeybees as a model species	<i>Ecotoxicology</i>	pollinators, pesticide, risk assessment, procedure	risk to pollinators from pesticides			x			pollination as an important ecosystem services
Danne, A.; Thomson, L.J.; Sharley, D.J.; Penfold, C.M.; Hoffmann, A.A.	2010	Effects of native grass cover crops on beneficial and pest invertebrates in Australian vineyards	<i>Environmental Entomology</i>	cover crops, natural enemies, vineyards, native grass, saltbush	native cover crops to support pest control and other ecosystem services	x		x			pest control and other ecosystem services supported by cover crops
Gaigher, R; Samways, M J	2010	Surface-active arthropods in organic vineyards, integrated vineyards and natural habitat in the Cape Floristic Region	<i>Journal of Insect Conservation</i>	biodynamic farming, ecosystem services, arthropod conservation, integrated farming, soil surface fauna, sustainable	effects of vineyard management on arthropods			x			just as keyword

				agriculture							
Nash, M A; Hoffmann, A A; Thomson, L J	2010	Identifying signature of chemical applications on indigenous and invasive nontarget arthropod communities in vineyards	<i>Ecological Applications</i>	beneficial insect, chemical impact, community response, International Organization for Biological and Integrated Control (IOBC), invasive, invertebrate, Ommatoiulus moreletti, pesticide, South Australia, vineyard	influence of pesticides on arthropods			x			arthropods provide ecosystem services
Petrosillo, I; Zaccarelli, N; Zurlini, G	2010	Multi-scale vulnerability of natural capital in a panarchy of social-ecological landscapes	<i>Ecological Complexity</i>	vulnerability, multi-scale assessment, ecosystem, service provider	different scales and layers of human land-use as ecosystem disturbance					x	landscape as ecosystem service provider
Barnes, A.M.; Wratten, S.D.; Sandhu, H.S.°	2009	Harnessing biodiversity to improve vineyard sustainability	<i>Outlooks on Pest Management</i>								
Fiedler, Anna K.; Landis, Doug A.; Wratten, Steve D.	2008	Maximizing ecosystem services from conservation biological control: The role of habitat management	<i>Biological Control</i>	biodiversity conservation, biological control, ecological restoration, ecosystem services, native plants	how habitat management can help to increase ecosystem services	x		x	x		
Niccolucci, V; Galli, A; Kitzes, J; Pulselli, R M; Borsa, S; Marchettini, N	2008	Ecological Footprint analysis applied to the production of two Italian wines	<i>Agriculture, Ecosystems and Environment</i>	Ecological Footprint, wine, organic production, sustainable farming, sensitivity, actual vs. global hectare	ecological footprint of organic and non-organic wine					x	big ecological footprint means greater stress on ecosystem services

Frank, S.D.; Wratten, S.D.; Sandhu, H.S.; Shrewsbury, P.M.	2007	Video analysis to determine how habitat strata affects predator diversity and predation of <i>Epiphyas postvittana</i> (Lepidoptera: Tortricidae) in a vineyard	<i>Biological Control</i>	biological control, habitat structure, predator activity, leafroller behavior, dermaptera, <i>ForWcula auricularia</i> , Video recording	arthropod pest predator and its habitat			x			predator contribute to pest control = ecosystem services
Jacometti, M.A.; Wratten, S.D.; Walter, M.	2007	Management of understorey to reduce the primary inoculum of <i>Botrytis cinerea</i> : Enhancing ecosystem services in vineyards	<i>Biological Control</i>	<i>otrytis cinerea</i> ; primary inoculum, mulch, conservation biological control, vine debris, soil biological activity, debris degradation	mulch for disease reduction and decomposition improvement			x			

* not written in English

° not accessible

10.6. Annex 6: Overview of hits of literature search conducted with Scopus

Section	Class	# of search terms	total # of publications	total # of publications without too broad search terms	duplicates	unique publications	Ratio double articles/ # of search terms	Ratio unique articles/ # of search terms
Provisioning	Cultivated crops	15	13297	4024	1036	2937	69	196
	Fibres and other materials from plants, algae and animals for direct use or processing	7	1209	1209	76	1133	11	162
	Materials from plants, algae and animals for agricultural use	1	149	149	149	149	149	149
Total provisioning services		3	14655	5382	1261	4219	420	1406
Regulation & Maintenance	Filtration/sequestration /storage/accumulation by ecosystems	18	2724	2724	353	2371	20	132
	Mediation of smell/noise/visual impacts	21	1989	1502	95	1407	5	67
	Mass stabilisation and control of erosion rates	23	544	544	173	371	8	16
	Hydrological cycle and water flow maintenance	13	925	925	281	644	22	50
	Flood protection	8	339	339	10	329	1	41
	Ventilation and transpiration	6	456	453	84	369	14	62
	Pollination and seed dispersal	12	892	899	78	821	7	69
	Maintaining nursery populations and habitats	7	1008	1008	177	831	25	119
	Pest control	21	2630	2630	1339	2630	64	125
	Disease control	14	3984	3984	1048	2936	75	210

	Weathering processes	9	859	859	129	730	14	81
	Decomposition and fixing processes	11	1204	1204	32	1172	3	107
	Micro and regional climate regulation	9	1800	1695	58	1637	6	182
Total regulating & maintenance services		3	19354	18766	3857	16248	297	1250
Cultural	Experiential use of plants, animals and land-/seascapes in different environmental settings	12	134	134	0	134	0	10
	Physical use of land-/seascapes in different environmental settings	5	8	8	0	8	0	1
	Scientific	8	5160	2947	300	2647	23	204
	Educational	9	1358	1358	68	1290	5	99
	Heritage, cultural	11	1485	1485	205	1280	16	98
	Entertainment	24	390	390	172	218	13	17
	Aesthetic	17	722	393	14	379	1	29
	Symbolic	13	406	406	43	363	3	28
	Sacred and/or religious	13	1493	77	12	65	1	5
	Existence	6	957	957	104	853	8	66
Bequest	7	92	15	0	15	0	1	
Total cultural services		11	12205	8170	1075	7252	98	558

10.7. Annex 7: Codification of Q-statements

Thesis code	Working code	Multiplier factor	CES	Q-statement
A1	S14	+	aesthetic	The vineyards in my region contribute to make it one of the nation's exceptional natural landscapes.
A2	S27	+	aesthetic	The inspiring views in vineyards are unique.
A3	S3	+	aesthetic	Vineyards inspire art.
A4	S32	+	aesthetic	Vineyards show the structure of the underlying landscape in a beautiful way.
B1	S10	+	bequest	I owe a lot to the environment in vineyards.
B2	S11	+	bequest	Wine producers have a duty to conserve soil, water resources and the living nature for the next generation.
B3	S23	+	bequest	Wine producers are the stewards of a tradition created by previous generations with the task to preserve the vineyards into the future.
B4	S34	+	bequest	Vineyards have a value in themselves.
D1	S17	+	educational	Learning to produce wine means learning that there is so much more than textbooks can ever say.
D2	S18	+	educational	A vineyard teaches you that nature is important for humans.
D3	S33	+	educational	During a visit to a vineyard, people can learn a lot about wine production as well as about wine.
D4	S44	+	educational	Wine production can increase consumer interest in where food comes from and how it is grown.
N1	S1	-	entertainment	Wine producers have a greater responsibility to produce wine than to provide an arena for recreational activities.
N2	S26	+	entertainment	On the whole, tourists attracted by vineyards benefit my region.
N3	S35	+	entertainment	Whether people want to just turn up and enjoy the beautiful countryside, or come en masse for a fully-tutored tour, tasting (and buying) wine with a dedicated and knowledgeable tour guide, they are welcome to visit vineyards.
N4	S9	+	entertainment	Vineyards attract valuable entertainment activities like festivals and balloon rides.
E1	S20	+	existence	Natural protected areas should be established in places where nature deserves the most protection, regardless of the effects on wine production.
E2	S21	-	existence	Vineyards detract from the natural beauty of the countryside.
E3	S30	+	existence	Vineyards provide a big benefit to society that is not provided elsewhere.
E4	S39	+	existence	I enjoy the natural beauty of vineyards.
X1	S12	+	experiential	Vineyards contribute to a special food culture that can be experienced in local shops and restaurants.
X2	S19	+	experiential	A vineyard is a valuable place to experience nature.
X3	S31	+	experiential	You can taste and enjoy in wine the changing nuances of season, place and vineyard parcel.
X4	S8	+	experiential	Wine tastings are valuable to experience a vineyard.
H1	S16	+	heritage	For wine producers in my region, wine production is not only an occupation, but also a way of life and a cultural tradition that should be preserved.
H2	S2	+	heritage	The change away from traditional land use in my region ultimately weakens local traditions and identity.
H3	S4	-	heritage	Most people living in my region simply are not interested in vineyards.
H4	S6	+	heritage	My region has decades of experience dedicated to perfecting the art of crafting fine wines.
P1	S24	+	physical	Vineyards are a great setting for cycling.

P2	S25	+	physical	Harvesting grapes at vintage is enjoyable work.
P3	S42	+	physical	Wine growing areas offer the opportunity to explore the surrounding countryside through walking or hiking on nearby trails.
P4	S5	+	physical	Horseback riding near vineyards is a fun activity.
C1	S28	+	scientific	Science, not emotional reactions, must serve as the foundation for wine production.
C2	S37	-	scientific	Expert knowledge of producing excellent wines is created by following traditional wine producing methods.
C3	S41	-	scientific	Experience in wine production teaches much more than being in school.
C4	S43	+	scientific	More holistic scientific analysis is required to fully understand the challenges facing wine production and point to appropriate solutions.
S1	S13	+	spiritual	When you are out in the vineyards, you realize where humankind really and truly comes from and what life is really and truly about.
S2	S15	+	spiritual	Vineyard areas help to fulfill spiritual needs.
S3	S29	+	spiritual	Being in the vineyards connects me to a larger spirit.
S4	S40	+	spiritual	Weddings in vineyards celebrate the special nature of vineyards.
Y1	S22	-	symbolic	I prefer the view of a natural landscape to vineyards.
Y2	S36	+	symbolic	Wine should be a bit like a fingerprint taken from the land – a unique expression of what the grapevine can achieve.
Y3	S38	+	symbolic	My region has a unique wine producing tradition.
Y4	S7	+	symbolic	Changing the traditional land use in my region would mean that we destroy a part of ourselves.

10.8. Annex 8: Preliminary information and results for New Zealand wine production

Since an earlier research question also included New Zealand, I also contacted wine producers and residents there.

10.8.1. Wine production in New Zealand

Winegrowing areas cover nearly the full length of New Zealand. There is a differences between the North and South Island with, respectively, warmer and cooler climatic conditions. Wine production has mainly increased for the last 50 years (Robinson, 2001). New Zealand produces mainly white wines and almost 70% of its production is exported (NZWine, 2013). In 2013, there were 698 wineries and 833 growers in New Zealand. In average the growing area per grower is 42.3 ha. Most growers produced less than 200,000 l wine per year. For the last decade, producing area and wine production, have nearly constantly increased. The New Zealand wine industry tries to emphasize aspects of sustainability. For example, around 94% of winegrowing area is certified with the independtily audited certificate “Sustainable Winegrowing New Zealand” and the aim is to have 20% of organic wine production by 2020 (NZWine, n.d.).

10.8.2. New Zealand perspectives

For the case of New Zealand, only 6 Q-sorts were completed. Due to this the analysis was preliminary. Only wine producers took part in the survey. I would have expected different and more perspectives, if local residents would have taken part. One of the Q-participants confirmed this expectation: “my personal views of living and working on a vineyard verses the wider community” (Q20).

Following the Kaisers criterion, I should have identified just one perspective. Since I had six replies, I assumed that more perspectives existed and followed the rule of at least three Q-sorts in each perspective. On these grounds, I identified two preliminary perspectives, which had big overlaps in their perceptions.

- Focus
- Activities

I allocated the New Zealand Q-Sorts to the two identified perspectives: three Q-sorts in *Focus* and three in *Activities*. In addition, I assigned the Q-statements their positions in ideally conducted Q-sorts by the perspectives.

NZ perspective 1: Focus

Focus emphasized aspects of wine production. The two top-ranked Q-statements stressed duties of wine producers to conserve natural resources (B2) and to focus on wine production (N1). In addition, the perspective valued the *experiential* services gained in connection with wine like tastings (X4), terroir (X3), and special food culture (X1). It acknowledged the importance of experience for the region (N2). However, *physical use* or *entertainment* services were indifferently or negatively ranked. There was a denial of *spiritual* services of vineyards (S2/3). Nevertheless, S1 was ranked +2. The perspective was indifferent on the importance of the effects of land use change on “local traditions and identity” (H2), but did not agree with Y4. Overall, the perspective was more concerned about wine production and not so much about activities or personal connections of humans to vineyards.

Q-participants in *Focus* had worked in the wine industry on average for 13.7 years. The average time period of residence in the region was 12.3 years. They had worked for longer time in the wine industry than had lived in the area. The period of residence was thus too long to argue that the period was too short for Q-participants to emotionally connect with the region. Interestingly, the only comment received of the Q-participants in this perspective is contradicting a bit the focus of *Focus* on wine production: “Like vineyards have some meaning other than just producing grapes” (Q15). Nevertheless, this statement could be interpreted to cover Q-statements like B2, which were mainly concerned about wine production, but not only about grapes growing but the duty of wine producers to conserve natural resources.

NZ perspective 2: Activities

In *Activities*, vineyards were gateways to activities in nature. They were seen as part of nature: E4 was highest ranked, X2 second highest and X3 was ranked among the last 4 Q-statements. Recreational activities and their provision were important in *Activities*, as well as *experiential use* and *physical use* services connected to vineyards. What concerned *symbolic* and *heritage* services, the perspective identified no long standing tradition neither anxiety for land use change and a loss of identity and tradition. The two statements on land use change were ranked fourth-to-last (Y4) and last (H2). Even though wine production was attributed not a long-standing tradition (Y3, H4), local residents were interested in wine production (H3).

Q-participants in *Activities* were neither long time involved in wine production (average: 6.0 years), nor living in the region (average: 4.6 years). The Q-participant defining the perspective stated that s/he would have liked to value more +4 as both the personal benefits and benefits due to tourism and recreation were very important.

10.8.3. Comparison of New Zealand perspectives

The two perspectives I identified for the NZ case were both wine producers' perspectives. The biggest difference between the two was that *Activities* was positive about *entertainment* in vineyards and *Focus* stressed wine production.

The two perspectives ranked very similarly nearly half of all Q-statements (A2/3/4, D1/2/3, N2/3, E1, X1/3, H4, P2, C1/2/3/4, S2, Y1/3/4) and only four Q-statements with a great difference (N1, E4, P1, S3). They rated three of four Q-statements of the classes *scientific*, *aesthetic*, *educational*, and *symbolic* with no or one rank difference. For *aesthetic*, only A1 on the contribution of vineyards to "the nation's exceptional natural landscape" (A1) received ratings with a difference more than 1. In a similar way, the educational power of wine production to increase consumers' interests in food (D4) was judged. The only Q-statement with a difference of valuation of more than 1 in the *symbolic* class was the one on terroir (Y2). Concerning the extremely differently rated Q-statements: E4 and S3 were about personal relationship with vineyards, P1 was on *physical use* services and N1 on the prioritization of wine production over wine tourism. The ratings of these four Q-statements endorse the differentiation of the two perspectives concerning their attitude towards entertainment activities connected with wine production.

Both perspectives placed Y4, about the effects of land use change on the personal identity, in the -3 category. Interestingly, there was a ranking difference of 4 for H2, which was also on the effects of land use change. Y4 was more on an individual level compared to H2 that referred to "local traditions and identity" (H2). *Focus* was neutral about H2, while *Activities* negatively ranked it -4.

10.9. Annex 9: English factor scores

Q-statement	Science	Experience	Conservation	Wine Culture
A1	-1.6899	0.9949	-1.2957	0.3183
A2	-1.0802	1.2160	0.8494	0.6640
A3	-0.9677	0.5452	-0.4682	1.7765
A4	-0.4796	0.5246	0.1156	0.6440
B1	0.9948	-0.4622	-2.2953	-0.9675
B2	1.4285	-0.3825	1.6076	1.9479
B3	-0.0510	0.0808	0.3202	-0.2155
B4	0.1846	1.1964	0.4798	-0.0566
C1	1.9157	-0.8498	-0.8044	-0.5512
C2	0.2811	-0.1613	0.0380	-0.7188
C3	0.0600	-0.4086	0.0231	-0.7513
C4	1.3831	-0.4752	-2.2896	1.0262
D1	0.9113	0.2283	-0.0499	-0.8789
D2	0.7198	0.4887	-1.1232	-0.9900
D3	1.1783	1.0463	0.3460	-0.0540
D4	0.7298	1.1050	0.4677	-0.1629
E1	0.0830	-0.8985	2.0494	0.9618
E2	-0.3105	-2.2097	0.2153	-0.8177
E3	-0.9297	0.5298	0.4070	-0.6731
E4	-0.1833	1.375	-0.1342	0.5747
H1	0.1572	-1.7702	-0.1099	0.2285
H2	-0.2076	-0.9641	1.7060	-1.7968
H3	0.7456	-0.1449	0.2691	-2.0403
H4	-1.9975	-1.7467	-0.1954	0.9210
N1	0.2877	1.6472	1.8769	-1.2522
N2	0.4533	0.8486	0.9048	0.8538
N3	0.1084	1.1897	0.4797	0.0377
N4	-0.6739	-0.1486	-0.2752	2.0691
P1	-1.2008	-0.4387	0.0815	1.0217
P2	1.1963	-0.8504	-1.0941	-0.2057
P3	-0.3324	0.4459	-0.0534	0.3354
P4	-0.7241	-0.8540	-0.5458	1.0017
S1	-1.4180	0.5855	-0.5907	-1.6199
S2	-1.4742	-0.4445	-1.0975	-0.9729
S3	-1.3853	0.3408	-1.5897	-0.3356
S4	-1.2653	-0.0546	0.0237	-0.0660
X1	0.8891	0.9849	0.2064	1.0426
X2	0.7089	1.3274	-1.6976	-0.3788
X3	1.2575	-0.1848	0.1747	0.2210
X4	0.7303	1.5041	0.3038	0.6346
Y1	0.4413	-1.9030	1.3029	0.4116
Y2	1.5830	-1.5823	-0.1112	0.6957
Y3	-1.0658	-0.8372	0.0796	0.2084
Y4	-0.9918	-0.4335	1.4928	-2.0907

10.10. Annex 10: Californian factor scores

Q-statement	<i>Terroir</i>	<i>Tradition</i>	<i>Instrumental</i>	<i>Entertainment</i>
A1	-1.1306	1.3075	-0.1454	1.3329
A2	-0.5934	-0.0087	-0.0801	0.7199
A3	0.3712	-1.0231	0.0825	0.3499
A4	-0.0980	0.3938	-0.8703	0.7217
B1	0.5198	0.8979	-1.1360	-0.3214
B2	2.065	1.3242	1.6001	0.4344
B3	0.3523	1.3471	-0.3479	0.1309
B4	-0.3438	0.1838	0.1650	-0.3910
C1	-1.8097	0.9464	0.2166	-0.7015
C2	-0.4935	0.4420	-0.4412	-0.6233
C3	0.8147	-0.3758	-0.7334	-0.3633
C4	-1.0731	0.0278	0.4715	-0.4836
D1	0.7682	0.1095	-0.7704	0.9739
D2	0.1349	0.3048	-1.3312	0.2305
D3	-0.1561	0.0387	0.9080	0.9592
D4	0.3277	0.5615	0.2250	1.1980
E1	1.0921	-1.0687	2.2224	-1.3870
E2	-0.2560	-2.2469	0.3009	-2.3625
E3	-0.8015	0.5794	-1.7434	0.4849
E4	0.3803	0.5195	-0.3512	0.5214
H1	0.3116	2.1703	0.5706	-0.0485
H2	-0.9374	1.8291	0.7766	-2.1414
H3	-0.3490	-1.2246	-1.6960	-0.4042
H4	-0.6908	1.1746	1.4777	0.8383
N1	2.1306	-0.9175	0.6481	-1.1828
N2	0.1117	-0.3888	1.4959	1.5690
N3	-0.5651	-0.1553	0.5468	-0.1807
N4	-1.9237	-1.4343	0.9767	1.6664
P1	-0.8419	-1.8616	0.8718	0.3773
P2	-0.0958	-0.5580	-0.8794	-0.4473
P3	-0.4067	-0.6515	0.5990	-0.5481
P4	-0.8137	-0.8491	-0.6518	1.2316
S1	-0.2473	0.0541	-1.2698	-0.2540
S2	0.2879	-0.7836	-1.6271	-0.7364
S3	0.8712	-0.4754	-2.0115	-0.3769
S4	-1.5325	-0.8489	-0.3083	-0.1792
X1	1.2602	-0.0330	0.7452	1.4259
X2	-0.2472	0.0398	-0.9333	0.6970
X3	1.8811	-0.5258	-0.3819	0.1885
X4	0.4673	-0.0799	0.2854	0.8511
Y1	-0.1213	-1.1289	0.9513	-1.2248
Y2	2.6275	0.2944	-0.1258	0.0918
Y3	-0.6572	-0.1570	1.6043	0.0336
Y4	-0.6399	2.2500	0.0940	-2.6703