A night sky filled with stars and the aurora borealis, with a wooden bench in the foreground.

# Operationalising spatial quality for PPGIS

The case of the Lauwersmeer area  
development process

## Colophon

<b>Title</b>	Operationalising spatial quality for PPGIS. The case of the Lauwersmeer area development process
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## **Abstract**

In the Netherlands, massive landscape transformations are needed. To facilitate this, the Dutch national government has written a National Environmental Vision, in which improving spatial quality is a central aim. However, a definition of what makes a space qualitative or not, is lacking. Additionally, due to the term's subjectiveness, different users tend to have different views on what makes a particular organisation of space qualitative. Thus, public participation is needed to include the viewpoints of different users. A possible approach for identifying an area's perceived spatial quality is the use of online PPGIS, as PPGIS can potentially solve the problems of traditional participation. So far there has not been an evaluation in the literature of how the tool performs specifically for grasping spatial quality. Therefore, this paper discusses the concept of spatial quality and studies how it can be operationalised for use in PPGIS. Moreover, this combination of spatial quality and PPGIS is put to the test in the Lauwersmeer area development process to identify who is reached when using PPGIS and evaluating how the tool's results can contribute to landscape transformation.

Within the Lauwersmeer case study, methodological triangulation was used. This includes participatory observation, participatory mapping (PPGIS) and expert interviews. It was found that, despite limitations, the Hooimeijer matrix, which distinguishes three values – use, experiential, and future value – and four societal interests – economic, social, ecological, and cultural – provides a good base for understanding spatial quality. Furthermore, using PPGIS for identifying an area's spatial quality leads to a visual, complete, and useful overview the Lauwersmeer area's spatial quality, based on which recommendations for landscape transformation can be made. Moreover, PPGIS can aid the participation process by helping to reach a larger audience that includes groups that are not normally included, which in the case of the Lauwersmeer area development process is done by including the area's visitors. However, in this case, the use of PPGIS does not solve other problems related to traditional participation, as the most represented respondent is still the highly educated middle-aged man. PPGIS can thus enable public participation by mapping citizen's views on spatial quality in landscape transformation processes in multiple ways. Firstly, by including a larger audience in the participation process. And secondly, by providing useful, complete, visual overview of a landscape's subjective spatial quality, which then can form the basis for objective goals in landscape transformation. Based on the results of this study, it is recommended to apply PPGIS for identifying spatial quality in the very beginning of the landscape transformation process. Additionally, further research is recommended on how this methodology performs in other case studies.

## **Key words**

PPGIS; spatial quality; landscape transformation

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## List of abbreviations and terms

BOVI	Blauwe Omgevingsvisie	Blue Environmental Vision
Bkl	Besluit kwaliteit leefomgeving	Quality of the Living Environment Decree
BZK	Binnenlandse Zaken en Koninkrijksrelaties	Internal Affairs and Kingdom Relations
GIS		Geographical Information Systems
KRW	Kaderrichtlijn Water	Water Framework Directive
NOVI	Nationale omgevingsvisie	National Environmental Vision
	Nota over de Ruimtelijke Ordening	Memorandum on Spatial Planning
	Nota Ruimte	Memorandum on Spatial Planning
	Omgevingswet	Environment & Planning Act
PKB	Planologische Kernbeslissing	Key planning decision
PPGIS		Public Participation GIS
RPD	Rijksplanologische Dienst	National Planning Service
SVIR	Structuurvisie Infrastructuur en Ruimte	Structural Vision Infrastructure and Space
	Tracéwet	Route Act
Wabo	Wet algemene bepalingen bestuursrecht	Act of General Provisions for Environmental Law
Wro	Wet Ruimtelijke Ordening	Spatial Planning Act

# 1. Introduction

## 1.1. Problem statement and research gaps

In the Netherlands, we live with more than 17 million people on about 41.000 km<sup>2</sup>, meaning space is scarce. The Dutch government identified the need to build a million new houses, develop a circular economy, generate space for sustainable energy, transition to circular agriculture, and adapt to climate change. Thus, massive landscape transformations, which are led by decentral and the central government, are needed. To facilitate this, the Dutch national government has written a National Environmental Vision (in Dutch: Nationale Omgevingsvisie, abbreviated with 'NOVI'). The NOVI aims to provide a sustainable perspective for our future living environment. And achieving an environment in which inhabitants feel and appreciate a high-quality living environment is considered key. Therefore, 'spatial quality' has been put front and centre of the NOVI and the subsequent programs 'Beautiful Netherlands' and 'National Environmental Vision Extra' (in Dutch 'Mooi Nederland' and 'Nationale Omgevingsvisie Extra') the latter of which is abbreviated with 'NOVEX' (Ministerie van BZK, 2020; Over De Nationale Omgevingsvisie - Ontwerp NOVI, n.d.).

In Dutch spatial planning, the term 'spatial quality' is often used. However, it remains an ambiguous concept, as a definition of what makes a space qualitative or not, is lacking (Khan et al., 2014; Moulaert et al., 2013). Additionally, due to the term's subjectiveness, different users tend to have different views on what makes a particular organisation of space qualitative (Kahn et al., 2014). Therefore, when identifying the spatial quality of an area, it is important to operationalise the term and consider the viewpoints of different users. Therefore, the public should participate in projects where spatial quality is concerned.

Public participation is widely viewed as an important component of environmental policy and climate adaptation, especially in the context of spatial planning (Green, 2010; Few et al., 2006). In most European countries, it is the norm for the public to have a right to participate in local governance, including land use planning (Jankowski et al., 2022; European Committee of the Regions, 2019). This is not only a normative idea, but also a pragmatic one, as public input can provide valuable information to increase and complement expert knowledge and lead to more sustainable solutions (Kahila-Tani et al., 2016; Jankowski et al., 2022). And, in many projects that were successful in achieving an increased spatial quality, time and space was given to participation processes (AT Osborne, 2021). Thus, hearing regional interests in early participation seems to be one important precondition for successful strengthening of spatial quality (ibid).

Currently, in-person participation techniques such as public hearings are often used. However, such participation methods face temporal and locational restraints, limiting the number and diversity of participants (Jankowski et al., 2022; Kahila-Tani et al., 2016). Therefore, there is room for new approaches. In the NOVI, the Dutch national government argues that digitalisation can offer solutions for the landscape transformations required by making new and far-reaching forms of citizen participation possible (Ministerie van BZK, 2020).

A possible approach therefore is the use of online Public Participation Geographical Information Systems (PPGIS) (Green, 2010; Few et al., 2006; Dunn, 2007). Geographical Information Systems (GIS) have been widely used to address environmental concerns and issues in spatial planning. PPGIS was already coined in 1996 and was created to involve the public more actively in planning and decision-making processes (Green, 2010; Dunn, 2007).

More recently, internet based PPGIS tools, such as Maptionnaire (see for more information <http://maptionnaire.com/>), have opened the potential for public participation online as well (Green, 2010; Kahila-Tani, 2015). Such forms of PPGIS can for example provide planners with information on local resident's values and valuations of a landscape (Fagerholm et al., 2019; Laatikainen et al., 2017; Jankowski et al., 2022). Furthermore, it allows stakeholders to participate in the data collection irrespective of their locational and temporal restraints, potentially solving the problems of traditional participation methods (Jankowski et al., 2022).

Although PPGIS has already been studied within many contexts for over 25 years, there still exists doubt whether (online) PPGIS reaches a more diverse public than traditional participation (Brown, 2017; Jankowski, 2022; Brown & Kyttä, 2018). Furthermore, although participatory mapping is considered a powerful tool for capturing values (Laatikainen et al., 2017; Fagerholm et al., 2019; Brown et al., 2020), there has not been an evaluation in the literature of how the tool performs specifically for grasping spatial quality.

## **1.2. Research objectives and research questions**

The objective of this study is twofold. It aims to apply a PPGIS tool for identifying the spatial quality of a landscape. And it aims to assess whether PPGIS has added value to the participation process. It does so by applying PPGIS and the concept of spatial quality to the Lauwersmeer area development process.

This area lies in the north of the Netherlands on the Groningen-Frisian border and consists of Lauwersmeer national park and its 'husk' (figure 1). Large scale landscape transformation is needed in the future due to challenges related, among others, to climate change, transitioning to sustainable agricultural and fishery and a circular economy, and nature development. The Steering Committee Lauwersmeer, led by the Province of Groningen and Waterboard Noorderzijlvest is currently working on a future agenda in which all (to be) identified challenges are bundled. This future agenda will form the basis for the area's landscape transformation.

Within this context, the following research question will be studied:

*'How can PPGIS enable public participation by mapping citizen's views on spatial quality in landscape transformation processes?'*

To answer this question, the following sub questions have been formulated:

- SQ1** What is spatial quality and how can it be operationalized for PPGIS?
- SQ2** Who is reached when applying PPGIS for identifying spatial quality in the Lauwersmeer case?
- SQ3** How do the PPGIS results contribute to the Lauwersmeer area development process?



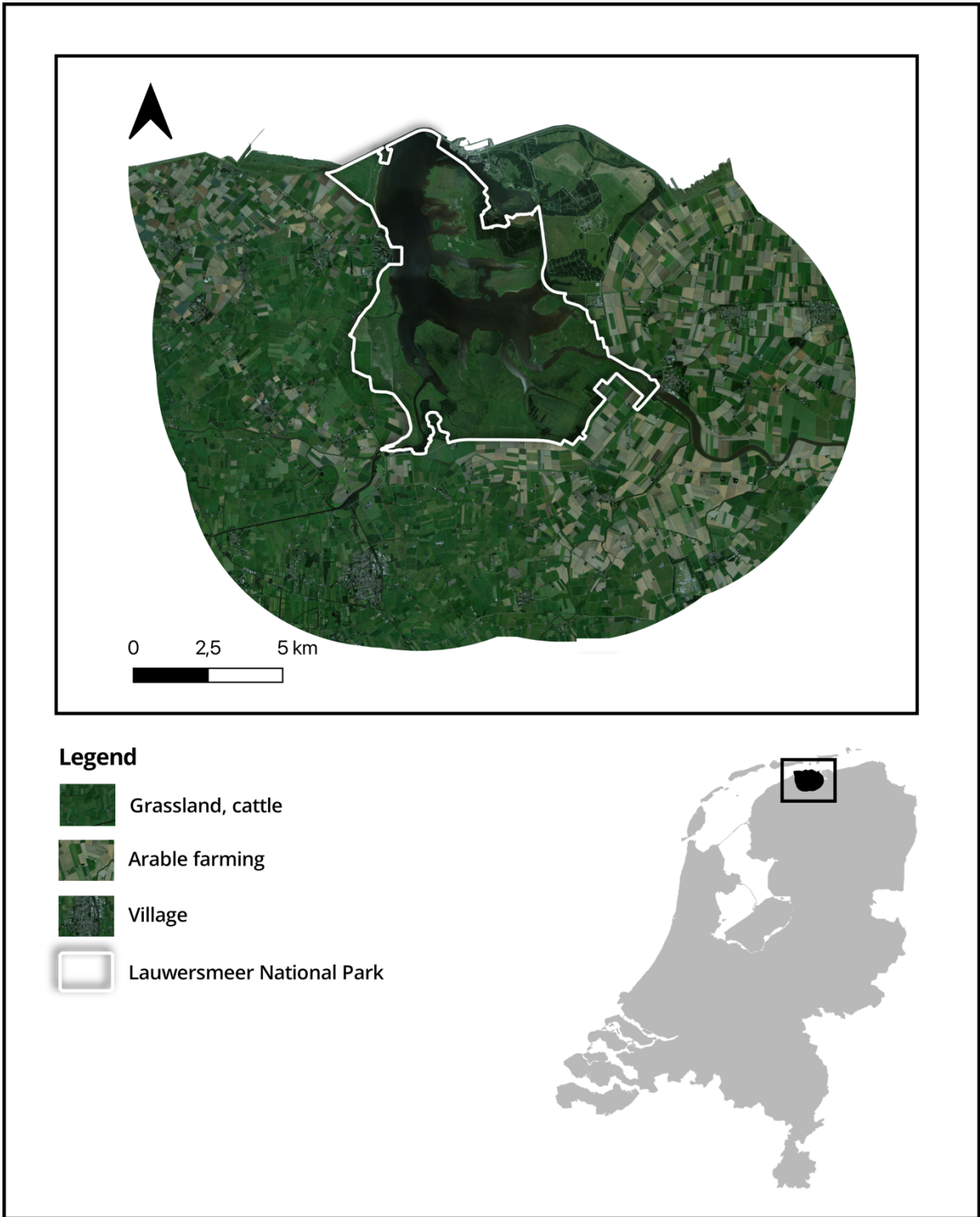


Figure 1. Location of the Lauwersmeer area in the Netherlands. Made by author using QGIS 3.2.8. and Affinity Designer.

**1.3. Theoretical approach**

The main theoretical contribution of this thesis lies in operationalizing the spatial quality concept to make it useable for PPGIS and capturing citizen’s perspectives on spatial quality values in the context of Dutch landscape transformation processes. To come to an understanding of what spatial quality means in the context of Dutch spatial planning, this history is explored using grey literature and policy documents (e.g. Ministerie van BZK, 2020;

*Over De Nationale Omgevingsvisie - Ontwerp NOVI*, n.d; AT Osborne, 2021; Dauvellier, 1991; VROM-raad, 2011; Ten Cate, 2016). Additionally, spatial quality and closely related concepts in the literature are investigated. This involves summarising and evaluating existing literature on the topic (Knopf, 2006), which helps identify relevant theories, their interrelationships, and the extent of previous research conducted (Fink, 2019). Additionally, the literature review enables the positioning of this research within the existing academic literature (Van Wee & Banister, 2015). The search engines Smartcat, Scopus and Google Scholar were used to find academic sources. These were supplemented with literature identified within the RuiKwaLab research program (see for more information <https://www.rug.nl/research/ursi/ruikwalab/>). The principle of snowballing, using the reference list of papers to identify additional papers, helped to attain more literature (Wohlin, 2014). Among the search terms used are 'spatial quality', 'landscape quality', 'landscape change', 'landscape', 'public participation', 'e-participation', 'PPGIS', 'PPGIS participation', 'participatory mapping' and 'factors influencing participation'. The theories and methods used in these strands of (grey) literature are used to operationalise spatial quality for use in PPGIS (sub question 1).

#### **1.4. Methodological approach**

This study will take a mixed methods approach. Firstly, a single case study of the Lauwersmeer area development process will be undertaken to answer sub questions 2 and 3. This case was selected using an information-oriented approach, which means that the case was selected based on the expectations about its information content (Flyvbjerg, 2006). Within this case study, methodological triangulation was used. Triangulation can be used to increase the credibility and validity of research findings and helps overcome fundamental biases arising from the use of a single method (Noble & Heale, 2019). The methods included participatory observation, participatory mapping, and expert interviews. Using participant observation, data is gathered by participating in the work sessions of the steering committee and attending a participation evening to which Lauwersmeer area residents and entrepreneurs are invited. This method is used to help understand the context of the research (the Lauwersmeer area); position the term spatial quality in the normal participation trajectory of the waterboard and province; and provide a context to which the PPGIS method and outcomes can be compared. For participatory mapping, the Maptionnaire platform was used. The maptionnaire consists of three parts. One in which respondents are asked to identify the overall spatial quality of the area based upon the operationalisation of the term as identified in the conceptual framework. Another in which respondents can pin locations on a map contributing or detracting from the area's spatial quality. Plus, a part in which respondents are asked about their socio-demographic and geographical background. Lastly, semi-structured expert interviews are used to evaluate the spatial quality operationalisation and research results and judge whether these add to the Lauwersmeer area development process. The experts are identified by virtue of their specific knowledge and their position in the Lauwersmeer area development process (Döringer, 2021).

#### **1.5. Scientific and societal relevance**

This study contributes to the scientific debate by concretising the concept of spatial quality and operationalising it for the use of PPGIS tools. Furthermore, it addresses a PPGIS research gap by identifying who participates when PPGIS is applied versus traditional participation methods in the Lauwersmeer area process (see for example Khan et al., 2014; Moulaert et al., 2013; Daniel, 2021; Janssen-Jansen et al., 2009; Oudes & Stremke, 2021 & Hooijmeijer et al.,

2001 for spatial quality – and Jankowski et al., 2022; Kahila-Tani et al., 2016; Fagerholm et al., 2019; Laatikainen et al., 2017; Brown, 2017; Brown & Kyttä, 2018; Green, 2010; Few et al., 2006; Dunn, 2007; Kleinhans et al., 2015; Lin & Kant, 2021 for PPGIS and e-participation). Additionally, this study is societally relevant by addressing the implications of the NOVI and the Omgevingswet (Environment & Planning Act) which is due to come into effect in January 2024 (Ministerie van OCW, 2023; Rijksdienst voor het Cultureel Erfgoed et al., 2020). As mentioned, in the NOVI, spatial quality is a core principle in tackling landscape transformation and digital participation methods can offer solutions by making new and far-reaching forms of citizen participation possible (Ministerie van BZK, 2020). This study improves the knowledge of how spatial quality can be addressed in area development processes, while at the same times providing an example of how digitalisation can be used in the participatory process. In doing so, this study can potentially lead to a tool for (decentral) governments to use when implementing NOVI principles in their landscape transformation projects. Additionally, online PPGIS has the potential to increase public participation in general, as it allows stakeholders to participate in the data collection irrespective of their locational and temporal constraints (Jankowski et al., 2022). Thus, potentially providing a larger public with a way to influence decision-making in landscape transformation processes.

#### **1.6. Outline**

This thesis comprises six chapters. Core concepts, the history of spatial quality in Dutch spatial planning and the operationalisation of the term for PPGIS are elaborated on in the theoretical framework in chapter 2. Chapter 3 further defines the case selection, methodologies, and ethical considerations. In chapter 4, the PPGIS results are presented, which are discussed and reflected upon in chapter 5. The thesis is concluded in chapter 6.

## 2. Towards understanding spatial quality and operationalising it for PPGIS

### 2.1. Spatial Quality

#### 2.1.1. The history of spatial quality in Dutch national policy

What quality is, is commonly disputed and often difficult to put into words. Yet, either implicitly or explicitly, a qualitative pursuit has always been recognisable in Dutch national policy (VROM Raad, 2011). Already in the design phase (in 1956) of the first Spatial Planning Act (Wet Ruimtelijke Ordening or 'Wro'), which came into effect in 1965, quality was assigned as one of the core tasks of spatial planning. At that time, quality was described as, 'a whole as harmonious as possible' and 'a balance that is as favourable as possible for the community' (VROM-raad, 2011; Van der Ree, 2000 p. 100). The definition of quality evolved in every key planning decision (Planologische Kernbeslissing or 'PKB') made since then. In the First Memorandum on Spatial Planning (Nota over de Ruimtelijke Ordening, 1960) quality was defined more as social quality than spatial quality. Spatial intervention by the government was about how the given environment can better serve human prosperity and human happiness (VROM-raad, 2011; Van der Ree, 2000). In the Second Memorandum (1966), quality became a more reciprocal concept, in which adjustment of both space and society was important. The environment was seen as more than just functional and subservient to society. Quality was about achieving a clean, pleasant, recognisable whole that contains strong symbolic power. More explicit qualitative values, such as diversity, the relationship between old and new and good design were mentioned in the Second Memorandum as well. This trend was continued in the Third Memorandum (1973) (VROM-raad, 2011).

After the flowering of PKBs in the 1970s, spatial planning underwent a period of stagnation and reorientation. Public and political interest weakened. The economy of the Netherlands was in a trough and spatial planning was struggling. There were strong doubts in politics about the government-controlled makeability of society. Criticism of the planning system increased: it was seen as too complicated, too abstract, too remote from the citizen, and having a contestable division of powers. The question arose whether the attention given to procedures in PKBs threatened to undermine the substantive added value of spatial planning. Did spatial planning have added value, or was it no more than the careful mutual coordination of various sectoral space claims, with compromise as the final product (Dauvellier, 1991; VROM-raad, 2011)? In response to this, the National Planning Service (Rijksplanologische Dienst – RPD) was eagerly looking for a spatial story. It was believed that the old key terms of coordination and consideration had become obsolete as leading concepts, and 'spatial quality' was proposed as the new core concept. With the help of this concept, spatial planning was to express a new vision with substantive involvement. The term was elaborated on in the following years and it made its formal debut in 1988 in the draft-PKB of the Fourth Memorandum on Spatial Planning (ibid). In this memorandum, spatial quality is proposed as a framework based on Vitruvius's values of *Firmitas* (strength), *Utilitas* (utility) and *Venustas* (beauty). It consists of three components: 'Gebruikswaarde' (use value), 'Toekomstwaarde' (future value) and 'Belevingswaarde' (experiential value) (Dauvellier, 1991; VROM-raad, 2011; Hooimeijer et al., 2001; AT Osborne, 2021).

Since then, spatial quality has played varying roles in Dutch spatial planning. In the Nota Ruimte (Memorandum on Spatial Planning), which replaced the Fourth Memorandum in 2006, spatial quality was still identified as an important aim:

*'The main objective of the national spatial policy is to (1) create space for the various space demanding functions in a sustainable and efficient manner, (2) to guarantee and improve the quality of life in the Netherlands, and (3) improve the spatial quality of urban and rural areas, paying special attention to creating the right conditions for the application of developmental planning.'*

- Ministerie van VROM et al., 2006 p. 18

Additionally, in the 'Room for the River'-PKB, which was introduced in 2007, the accommodation of higher flood levels was combined as a dual objective with the improvement of spatial quality of the riverine areas (Busscher et al., 2019). However, with the introduction of the Structural Vision Infrastructure and Space (SVIR – Structuurvisie Infrastructuur en Ruimte) in 2012, spatial quality lost its star role in spatial planning policy. The concept was not a core objective of national policy anymore and only kept its place as an objective for riverine areas (Ministerie van I&M, 2012).

Currently, spatial quality is making a comeback. In the Omgevingswet (Environment & Planning Act) that is planned to come into force in January 2024, spatial quality is a central aim (Ministerie van OCW, 2023; Rijksdienst voor het Cultureel Erfgoed et al., 2020). The NOVI, which is an instrument under the new law, anticipates its entry into force, as it currently comes out under the existing Wro as a structural vision (*Over De Nationale Omgevingsvisie - Ontwerp NOVI*, n.d.). Two programs provide substance to the NOVI, namely NOVEX and Mooi Nederland. Within the NOVEX-program, the Dutch provinces will work together with the national government, municipalities, and water boards to see how national tasks and goals can be combined with their regional plans. Furthermore, sixteen NOVEX areas have been designated where major spatial transitions require a separate development perspective, which the region and national government will draw up together. The plans for these sixteen areas will be included in the spatial proposal that the provinces will submit after the summer of 2023. The NOVI principles are applied when fitting in the assignments and spatial quality is paramount. This has been laid down in the Mooi Nederland-program, in which national prospects are combined with area-oriented design concepts, to enhance spatial quality in the Netherlands (Ministerie van BZK & Afdeling VRO, 2022a; 2022b).

In the NOVI, 'omgevingskwaliteit' is the key concept. It is defined as follows: omgevingskwaliteit = ruimtelijke kwaliteit + milieukwaliteit (Ministerie van BZK, 2020). This means environmental quality (surroundings) = spatial quality + environmental quality (natural environment/sustainability). According to Ten Cate (2016), the attempt to capture environmental quality in formulas ignores the fact that environmental quality cannot be the result of a sum. Moreover, the Vitruvian definition of spatial quality from the Fourth Memorandum on Spatial Planning already includes the natural environmental aspect. However, Ten Cate (ibid) argues that there are three differences between environmental quality and spatial quality regardless. The first difference is in the linkage of an initiative with interests that are outside the primary goal of the initiator. For example, "a highway can have a high spatial quality if it is functionally and robustly designed, so that it can also accommodate the growth of traffic, and if it is attractively designed. But a road only gets environmental quality if the interests that play a role in the vicinity of the road are included in the design" (Ten Cate, 2016, p. 6.). The second difference between environmental quality and spatial quality has to do with the actors involved, as environmental quality cannot be achieved without involving the environment in the project. Spatial quality can be achieved

using the traditional project triangle of initiator, government, and professionals, according to Ten Cate (ibid). And third, environmental quality differs from spatial quality because the former is always about the quality of public space, while spatial quality can also be narrowed down to the quality of the object itself. It is therefore conceivable that a functional building has a good spatial quality, while it still detracts from the environmental quality. Interestingly, in the 'Mooi Nederland'-program, the term spatial quality is used, rather than environmental quality (Ministerie van BZK & Afdeling VRO, 2022a). However, it is noted that: "The quality of the physical living environment is central to the Mooi Nederland programme. In line with the Quality of the Living Environment Decree [Besluit kwaliteit leefomgeving or 'Bkl'], we use the terms spatial quality and environmental quality interchangeably based on a coherent approach that ensures that all relevant interests are included in the policy and decision-making process from the outset" (Ministerie van BZK & Afdeling VRO, 2022a, p. 9).

### **2.1.2. Making sense of spatial quality**

As illustrated in chapter 2.1.1., the term 'spatial quality' is often used in Dutch spatial planning. However, it remains an ambiguous concept, and is therefore difficult to operationalise. At the same time, strengthening spatial quality requires consensus on its definition, along with the establishment of objectives, norms, and criteria, through an interactive process that encourages diverse perspectives and opinions from people with different backgrounds (Healey, 2003; Hartman et al., 2016). Multiple authors have tried to draw a line between the many definitions and characteristics of spatial quality. What emerges is the distinction between the different aspects of quality. Janssen-Jansen et al. (2009) explain this as follows: we can understand space as a physical system that can perform several functions. We, objectively and subjectively, assign values to these functions, and thus to the space. Therefore, quality is connected to our value expectation on the one hand and the extent to which the space delivers this value on the other.

The different values we can assign to a space according to Janssen-Jansen et al. (2009) relate to Vitruvius' framework of future value, use value, and experiential value proposed in the Fourth Memorandum. Future value is about sustainability, extensibility, and customizability. Use value concerns the efficiency and functionality of the space. And experiential value is about diversity, identity, recognizability and meaning (Dauvellier, 1991; VROM-raad, 2011; Hooimeijer et al., 2001; AT Osborne, 2021). Due to the subjectiveness of these values, different users, professional and even research communities tend to have different views on what makes a particular organisation of space qualitative (Kahn et al., 2014). The term 'spatial quality' than can be seen as just connected to the experience of people, or to a spatial component of the living environment. It can also be placed in the context of sustainable development, in which the understanding of all spatial aspects in an area is central (Janssen-Jansen et al., 2009). The latter corresponds to Ten Cate's (2016) vision on environmental quality and is operationalised when values are assigned to space instead of objects, and different actors and interests are considered. Spatial quality therefore becomes a concept that indicates the relationship between space and the human user (Daniel, 2001). That relationship is established through the use and experience of space and can be distinguished by different interests (Janssen-Jansen et al., 2009; Kahn et al., 2014; Hooimeijer et al., 2001).

### **2.1.3. The 'space' in spatial quality and landscape change**

The 'space' in spatial quality refers to and can be operationalised as 'landscape' (Janssen-

Jansen et al., 2009). Landscape, in turn, can be defined in the context of human spatial interaction. 'Landschap' is the Dutch word for landscape and dates to medieval times. In Germanic languages, 'land' originally referred to a cultivated and worked piece of land, but later came to signify much larger areas like regions or nation-states. The suffix '-schap' means 'the condition of', 'the organization of', or 'that which belongs to'. Therefore, 'landschap' or landscape can be understood as everything that belongs to an organized piece of land (Spek et al., 2015). The term thus highlights the interdependence between nature and culture, or space and the human users.

Considering the immense landscape transformations needed in the Netherlands as identified in the NOVI (Ministerie van BZK, 2020; Oudes & Stremke, 2020; AT Osborne, 2021), the need for spatial quality identified in this same NOVI can be understood through the concept of landscape change. In area development, the landscape is adapted when it is believed that it no longer functions properly, or because it is anticipated that it will not function properly in the future. It is expected that after physical adjustments are made, the area will better maintain its value or become more valuable (Termorshuizen & Opdam, 2009; Janssen-Jansen et al., 2009). Enhancing the value of a landscape through change involves identifying landscape functions and understanding how these relate to ecological, social, and economic interests (Termorshuizen & Opdam, 2009). Additionally, it requires establishing targets (Termorshuizen et al., 2007), which can be done using the intersubjective nature of spatial quality (Janssen-Jansen et al., 2007).

## **2.2. Spatial quality and public participation**

### **2.2.1. The intersubjective nature of spatial quality**

In landscape planning and management, the aesthetic aspects and beauty of landscapes are considered essential (Wartmann et al., 2021). Therefore, researchers often discuss individual factors related to spatial quality, such as views, isolation, and contact (Pacheco & Wyckmans, 2013); the use and organization of space (Rapport, 1970; Segers et al., 2013); and the experiential aspects of the built environment (Key & Gross, 2021). However, one concept in particular bears similarities to spatial quality: landscape quality.

Landscape quality is a measure of how excellent the aesthetics of a landscape are, relative to other landscapes (Daniel, 2001). It is assessed through various indicators, including ecological, economic, visual, social, and historic and cultural values (Cassatella & Peano, 2011; Sowińska-Świerkosz & Chmielewski, 2016). Two main approaches can be taken when assessing the landscape quality of an area: the objectivist and the subjectivist approach. Lothian (1999) first introduced this differentiation. In the objectivist approach, professionals classify and assess landscape quality, which they view as inherent to the landscape (e.g., Fairclough et al., 2018; Le Dû-Blayo, 2018; Swanwick, 2002; 2012; Swanwick & Fairclough, 2018; Van Eetvelde & Antrop, 2009). The subjectivist approach is reflected in research studies that measure respondents' preferences for landscapes and how physical landscape characteristics contribute to their perceived quality. This approach views landscape quality as a result of the interaction between an observer of a landscape and the landscape itself (e.g., Daniel et al., 1977; Herzog & Bosley, 1992; Kaplan & Herbert, 1987; Kaplan & Kaplan, 1989; Zube & Pitt, 1981; Wartmann et al., 2021). Daniel (2001) suggests that these paradigms can be integrated into a more balanced view: the socio-cultural paradigm. In this new approach, the assessment of landscape quality involves both expert evaluations and perception-based

methods. This way, the biophysical qualities of the landscape as well as the role of culture, society and individual preferences is considered.

Janssen-Jansen et al. (2009) adapt the landscape quality discourses to the concept of spatial quality. They propose a definition of spatial quality that reconciles the objectivist and subjectivist paradigms. Like Daniel (2001), they consider spatial quality as an intersubjective concept that incorporates both objective and subjective features. Subjective spatial quality is related to personal preferences, culture, and time. Objective spatial quality is formed by objectives, norms and criteria that can be enforced and serve to maintain a certain, measurable, level of spatial quality (Janssen-Jansen et al., 2009). The intersubjectivity then lies in the process of moving from subjective preferences to objective goals: individual preferences need to be morphed into a shared agreement of what the spatial quality of an area is, and how it should be improved (ibid).

As different users tend to have different value expectations of landscapes including a variety of actors in assessing subjective spatial quality is key in managing landscape change (Janssen-Jansen et al., 2009; Kahn et al., 2014). Furthermore, an inclusive approach leads to a more holistic understanding of the situation and challenges at hand. Additionally, by engaging local stakeholders, valuable local knowledge can be integrated with expert knowledge, leading to more informed decision-making and citizens that are more satisfied with government responsiveness (Stringer et al., 2006; Innes, 2004; Brown & Chin, 2013). Overall, considering a diverse range of perspectives in assessing subjective spatial quality and leveraging the insights of local stakeholders contributes to the establishment of more effective goals and thus a better objective spatial quality. Consequently, this approach reduces the risk of failure in landscape change projects (Janssen-Jansen et al., 2009; Couix & Gonzalo-Turpin, 2015).

### **2.2.2. Public participation in (Dutch) spatial planning**

Public participation is about securing active involvement of a broad range of stakeholders in decision-making and action (Few et al., 2005). Other terms used are public involvement, public engagement, or civil society engagement. Generally, public participation is about communication among various groups with the aim of sharing power. It involves the inclusion of individuals or groups who are not typically involved in decision-making processes (Newig & Kvarda, 2012; Kahila-Tani, 2015). Therefore, participation should strive to ensure representation of all individuals and groups with legitimate interests, and thus a broad range of stakeholders (ibid).

In most Western democracies, public participation is widely acknowledged as a fundamental democratic right. There is often a growing commitment to expanding its role. As a result, public participation has become an integral part of urban planning practices in many countries (Healey, 1992; Kahila-Tani, 2015). Additional to the reasons mentioned in chapter 2.2.1., public participation should be practised as it promotes fairness and justice and lends legitimacy to decisions. Furthermore, it is mandated by law in many countries (Innes, 2004).

In the current situation in the Netherlands, there is a modest form of public participation mandated under the Wro and the Act of General Provisions of Environmental Law (Wet algemene bepalingen omgevingsrecht – ‘Wabo’). This generally occurs when plans are already in an advanced stage. At this moment, the early active involvement of citizens is only regulated in the Tracéwet (Route Act) and applies only to the construction of new infrastructure of national importance. The upcoming Omgevingswet aims to facilitate



participation specifically in the early stage of plan preparation of planning projects in general (Van den Broek et al., 2016; *Participatie in De Omgevingswet*, n.d.; Ministerie van I&W, 2023).

## **2.3. PPGIS**

### **2.3.1. PPGIS, a new form of participation**

Public participation is a cornerstone of democracy (Innes, 2004; Healey, 1992; Kahila-Tani, 2015; Kleinhans et al., 2015). Over the years, researchers in urban planning have explored various approaches to enhance collaboration, communication, and interaction between ‘experts’ and the general public in the planning process (e.g. Friedmann, 1973; Healey, 1992; 1997; Rydin, & Pennington 2000; Brownill & Parker, 2010).

As mentioned in chapter 1, GIS has been widely used to address environmental concerns and issues in spatial planning. Usually, GIS is used by experts to capture, manage, analyse, and visualise geographical data on maps. However, over the years a specialised form of GIS emerged in which different (end-)users and communities were combined with GIS. This specialisation is known under different names such as Participatory GIS (PGIS), Community integrated GIS, Participatory Mapping (PM) and Public Participation GIS (PPGIS) (Green, 2010; Dunn, 2007).

The term PPGIS was already coined in 1996. Like the more traditional forms of participation, the tool was created as an approach to enhance collaboration, communication, and interactions between ‘experts’ and the public. The aim was to involve local stakeholders more actively in planning and decision-making processes (Green, 2010; Dunn, 2007). More recently, internet based PPGIS tools, such as Maptionnaire (see for more information <http://maptionnaire.com/>), have opened the potential for public participation online as well (Green, 2010; Kahila-Tani, 2015). From here on, the terms PPGIS and participatory mapping will refer to the online versions.

### **2.3.2. The PP in PPGIS: traditional participation vs participatory mapping**

Traditional methods of citizen participation, developed since the 1960s, encompass a range of tools and techniques such as referenda, public hearings, surveys, conferences, town hall meetings, advisory committees, and focus groups (Kleinhans et al., 2015). However, these methods often reach only a small group of participants (Lin & Kant, 2021). Additionally, the image that often prevails is that the people participating in political and planning activities are mostly highly educated middle-aged white men, while minorities and people with low income hardly participate (Dezeure et al., 2008). This image is supported by research in which sociodemographic characteristics such as age, gender, race, income, education and employment status are found to influence responses (e.g., Hooghe 1999; Verba et al., 1995; Zúñiga & Valenzuela, 2011; Di Gennaro & Dutton 2006; Rosenstone & Hansen, 1993).

Such criticism has prompted policymakers and researchers to explore digital options as potential solutions to these challenges. Take for example the encouragement of digital participation in the NOVI (Ministerie van BZK, 2020). Additionally, scholars have been studying how the internet can affect public participation (e.g., Zúñiga & Valenzuela, 2011; Di Gennaro & Dutton 2006; Tolbert & McNeal, 2003; Vicente & Novo, 2014). The idea is that internet-based methods do not require physical presence at a specific time and location and are therefore not subject to temporal and locational constraints, as traditional, face-to-face participation methods are (Jankowski et al., 2022; Kahila-Tani et al., 2016; Kleinhans et al., 2015; Lin & Kant, 2021). Additionally, digital participation does not require one to speak up in

a group about one's opinions (Kahila-Tani, 2015). Therefore, digital methods have the potential to reach a wider, more diverse, and younger group of participants, and include marginalised groups of people. Thus, potentially solving the problem of traditional forms of participation (Jankowski et al., 2022; Van Dijk, 2017). However, research on this topic is inconclusive (Jankowski et al., 2022; Vicente & Novo, 2014). Some studies find that once equal internet access is realised, the traditional factors become irrelevant to explain participation. Other research, however, finds that these factors are important predictors of online participation as well (Vicente & Novo, 2014).

Although many forms of online participation are possible, some scholars have argued for the use of online PPGIS as a possible approach (e.g. Green, 2010; Kahila-Tani, 2015; Fagerholm et al., 2019; Jankowski et al., 2022). As, additional to the overall advantages of online participation, PPGIS, and GIS in general, allows the visual rather than textual representation of spatial analysis through maps, it enables the sharing of spatial information with all stakeholders in a more effective way. This can also lead to more informed decision-making (Kleinhans et al., 2015).

### **2.3.3. Spatial quality, PPGIS and landscape transformation**

As argued previously, landscape change requires goal setting, which can be done through intersubjective spatial quality (Termorshuizen et al., 2007; Termorshuizen & Opdam, 2009; Janssen-Jansen et al., 2009). In this process, the viewpoints of different users should be considered, leading to a participation process (Kahn et al., 2014).

Although there has not been an evaluation in the literature off how participatory mapping performs specifically for grasping spatial quality, PPGIS is considered a powerful tool for capturing local actors' values. As it allows respondents to map their experiences and related values (Fagerholm et al., 2019; Laatikainen et al., 2017; Jankowski et al., 2022; Kahila-Tani et al., 2016; Brown et al., 2010). Mapped values can be linked to the core values of spatial quality. Moreover, respondents' interests can be translated to the societal interests linked with spatial quality (economic, social, ecological, and cultural interests (Hooimeijer et al., 2001)). Thus, PPGIS, combined with spatial quality, can potentially aid in landscape transformation, by supporting the participation process and identifying a landscape's subjective spatial quality, which is the first step.

## **2.4. Operationalising spatial quality for PPGIS**

### **2.4.1. The Hooimeijer matrix**

Hooimeijer et al. (2001) proposed a matrix for spatial quality, including the three Vitruvian values and four social interests (figure 2). The starting point for this matrix is the conceptualisation of environmental quality for the individual human being by Jacobs (2000). Jacobs (2000) summarises the theory of Maslow into four levels of human need and combines it with an indication of the quality of the living environment (Jacobs, 2000; Hooimeijer et al., 2001):

- Biological level: existence, healthy living environment, food and water, but also biodiversity.
- Social level: doing, functioning and economy, desired social interaction, possibilities for group feeling and expression of group culture.
- Psychological level: experiencing, doing justice to individual differences, opportunities for personality development and beauty perception.

- Metaphysical level: contemplation, different worlds, symbolism, unknowable properties.

Hooimeijer et al. (2001) argue that spatial quality is not primarily about the needs of individuals, but about the consideration of societal interests. Therefore, they distil the following societal interests from Jacobs' (2000) analysis: economic efficiency, social justice, ecological sustainability, and cultural identity. Consequently, spatial quality is defined by aspects that correspond to both the Vitruvian values and the societal interests involved. (Hooimeijer et al., 2001; Oudes & Stremke, 2020). Due to the inclusion of societal interests, the relationship between space and the human user – which is how spatial quality is defined in chapter 2.1.2. – becomes clearer than when only using Vitruvian values. Additionally, including societal interests makes the operationalisation of spatial quality similar to that of landscape quality. As explained in chapter 2.2.1., landscape quality is assessed through ecological, economic, visual and social, and historic and cultural values (Cassatella & Peano, 2011; Sowińska-Świerkosz & Chmielewski, 2016) and forms the basis for the notion of intersubjective spatial quality (Janssen-Jansen et al., 2009). Moreover, as it aims to move from individual to societal interest (Hooimeijer et al., 2001), the Hooimeijer matrix captures this same intersubjective aspect. Therefore, the operationalisation of spatial quality for use in PPGIS will be based upon the Hooimeijer matrix.

↓ Vitruvian Value	Societal Interest →			
	Economic	Social	Ecological	Cultural
Use Value				
Experiential Value				
Future Value				

Figure 2. The Hooimeijer matrix, a framework for operationalising spatial quality (source: Hooimeijer et al., 2001; Oudes & Stremke, 2020).

#### 2.4.2. Filling in the matrix

Although the Hooimeijer frameworks provide a base on which spatial quality can be operationalised for the use in PPGIS, the meaning of each cell is not entirely clear. Therefore, to fill in the matrix, aspects mentioned in the literature that relate to spatial quality are identified and sorted based on the Vitruvian value's they represent (see table 1). Next, these aspects are ordered according to the societal interests they relate to. Table 2 provides an overview of the aspects and how they have been placed in the Hooimeijer matrix. A pattern than emerges based on which the meaning of each cell in the matrix can be explained. These meanings are presented in table 3 and form the operationalisation of spatial quality for PPGIS, as well as this study's conceptual framework. Since PPGIS captures respondents' perceptions,

the results of PPGIS combined with the Hooimeijer matrix will indicate the *subjective* spatial quality of the Lauwersmeer area (Fagerholm et al., 2019; Janssen-Jansen et al., 2009).

Note that for the economic experiential value, the visibility of water (Bakx et al., 2023) and visual diversity (Bakx et al., 2023; Pacheco & Wyckmans, 2013; Dauvellier, 1991) are not included in the description in table 3. This is because although these factors indicate economic experiential value, they are not inherent to this aspect of spatial quality. Another important thing to note is the distinction between how natural resources are referred to in the social and ecological future values. In social future value, it is about the sustainable *use* of natural resources, while ecological future value is about the ability of the system to *provide* these resources. Lastly, notice the use of the word ‘resilience’ in the description of economic future value. Economic resilience is about the (regional) economy’s ability to withstand or recover from economic shock or disturbance, if necessary, by undergoing change (Simmie & Martin, 2010; Martin & Sunley, 2015). This therefore summarises flexibility, manageability, renewal, and robustness.

For practical purposes, the meanings of each cell are rephrased in Dutch and accompanied by an example (see Appendix A for both the Dutch and English version). These descriptions are used in the Maptionnaire. First, respondents are asked to which extent each value is present in the Lauwersmeer area in their experience. Based on this, the Hooimeijer matrix can be filled in for the Lauwersmeer area. Next, respondents are asked to identify points in the landscape which they think contribute to or detract from the area’s spatial quality. For each point they are asked to which values it contributes or detracts. This step is based on how PPGIS is often used in research surrounding landscape valuation (e.g., Laatikainen et al., 2017; Fagerholm et al., 2019; Brown et al., 2020). Additionally, the mapped points lead to map-based results which would theoretically help indicate the sub-areas that need to be addressed in the landscape transformation process as well as what type of spatial quality should be focused on.

In the next chapter, the PPGIS-method as described above will be elaborated on. The other methods used in this study will be explained in chapter 3 as well.

Table 1. Aspects to spatial quality as identified in the literature

	<b>Aspect</b>	<b>Description</b>	<b>Source</b>
<b>Use value</b>	Access	The possibility to enter different parts of the landscape.	Bakx et al. (2023); Hooimeijer et al. (2001); Klijn et al. (2013)
	Accessibility	The location or accessibility of the landscape.	Hooimeijer et al. (2001); Klijn et al. (2013)
	(Allocation) efficiency	The landscape has access to certain resources.	Hooimeijer et al. (2001); Busscher et al. (2019); Moulaert et al. (2013)
	Choice	Have electives or the ability / freedom to choose.	Hooimeijer et al. (2001)
	Desiccation	Lowered groundwater level.	Hooimeijer et al. (2001)
	Division	The fair distribution of the costs and benefits associated with the development and management of the landscape.	Hooimeijer et al. (2001); Moulaert et al. (2013)
	Encounters	Encounters between individuals and (sub)cultures.	Hooimeijer et al. (2001)
	External effects	The landscape accommodates one or more functions that may or may not contradict or reinforce each other. These “external effects” can be both positive and negative. An important feature of externalities is that they are not priced and not traded through the market.	Hooimeijer et al. (2001)
	Fragmentation / (ecological) networks	The extent to which different habitats / areas are connected.	Hooimeijer et al. (2001); Bakx et al. (2023); Dauvellier (1991); Moulaert et al (2013) – economic sense
	Freedom of choice	Freedom of choice for the individual based on a multi-cultural society that leads to diversity of space and variety of places for meeting others.	Hooimeijer et al. (2001)
	Hydraulic effectiveness	The effectiveness of a structure and its surrounding space.	Busscher et al. (2019); Klijn et al. (2013)
	Multi-actor	Multiple actors are involved in plan making.	Mouart et al. (2013); Hooimeijer et al. (2001)
	Multi-purpose / mixed funtions	The extent to which the landscape can be used for different functions.	Bakx et al. (2023); Hooimeijer et al. (2001); Moulaert et al. (2013)
Participation	The participation of diverse social groups in decision-making about the landscape.	Hooimeijer et al. (2001)	

	Pollution	Contamination of the soil, air, groundwater and surface water.	Hooimeijer et al. (2001)
	Recreation	Strengthen recreational use.	Dauvellier (1991); Hooimeijer (2001)
	Usability	Ease of use of the landscape.	Busscher et al. (2019)
	Safety, nuisance	The protection of landscape users against dangerous situations, such as floods and traffic accidents.	Bakx et al. (2023); Hooimeijer et al. (2001)
	Variety/diversity	Diversity in (sub)cultures and variety in landscape use by different (sub)cultures. And respecting differences between people.	Hooimeijer et al. (2001); Dauvellier (1991)
<b>Experiential value</b>	Attractiveness	Recreational attractiveness; using diversity for liveliness.	Hooimeijer et al. (2001)
	Beauty	Beauty in an aesthetic sense. As well as the area not being polluted ('schoonheid' in Dutch). Furthermore, beauty can be linked to cultural identity.	Hooimeijer et al. (2001)
	Connectedness	Having a close relationship with the environment.	Hooimeijer et al. (2001)
	Contrast	Contrast within and between landscapes.	Hooimeijer et al. (2001); Dauvellier (1991)
	Health	The landscape is deemed to be healthy for the user / visitor.	Hooimeijer et al. (2001)
	Unity	Landscape features seem to fit together and together form a whole.	Bakx et al. (2023); Dauvellier (1991)
	Smell and sound	The presence of pleasant and/or unpleasant odors and/or sound.	Bakx et al. (2023)
	Landscape history	The visibility of historical landscape features.	Bakx et al. (2023)
	Landscape qualities	Taking into account existing landscape qualities (such landform, water and vegetation) in new design.	Klijn et al. (2013)
	Naturalness	The extent to which the landscape has a natural appearance.	Bakx et al. (2023)
	Openness / spaciousness	The ability to look far and see the landscape at a glance.	Bakx et al. (2023); Hooimeijer et al. (2001)
	Image	Public opinion and how this influences the local economy.	Hooimeijer et al. (2001); Assink & Groenendijk (2009)
	Individuality	The presence of (regionally) distinctive landscape features.	Bakx et al. (2023); Hooimeijer et al. (2001)

	(In)equality	Spatial-social justice; combating inequality between social groups and regions.	Hooimeijer et al. (2001)
	Social safety	The protection of landscape users against dangerous situations.	Hooimeijer et al. (2001)
	Tranquility	Silence and relaxation.	Hooimeijer et al. (2001)
	Well-keptness	The extent to which the landscape looks well-kept.	Bakx et al. (2023)
	Visual diversity	The variety of visual landscape features.	Bakx et al. (2023); Pacheco & Wyckmans (2013); Dauvellier (1991)
	Visibility of water	The visibility of water and water dynamics in the landscape.	Bakx et al. (2023)
<b>Future value</b>	Abiotic quality	The quality of soil, water and air.	Bakx et al. (2023)
	Agglomeration	Composition of functions aimed at collaboration and growth of (urban) networks.	Hooimeijer et al. (2001); Dauvellier (1991)
	Biodiversity	The variety of species in the landscape.	Bakx et al. (2023)
	Containment	The process of resource concentration on broadly accessible locations.	Hooimeijer et al. (2001)
	Cultures of poverty	Preventing cultures of poverty.	Hooimeijer et al. (2001)
	Cumulative attractiveness	Attractiveness based upon multiple landscape characteristics.	Hooimeijer et al. (2001)
	Ecosystems	A well-working ecosystem.	Hooimeijer et al. (2001)
	Flexibility	The extent to which the landscape can adapt to changes in the future.	Bakx et al. (2023); Hooimeijer et al. (2001); Klijn et al. (2013)
	Heritage	The presence of cultural-historical features.	Hooimeijer et al. (2001); Klijn et al. (2013); AT Osborne (2021)
	Integration	The extent to which new elements are integrated within the existing landscape.	Hooimeijer et al. (2001); Klijn et al. (2013); Moulaert et al. (2013)
	Manageability	The extent to which the landscape can be managed in the future at an acceptable cost.	Bakx et al. (2023); Klijn et al. (2013)
	Natural processes	The presence of local natural processes such as erosion, sedimentation, and groundwater flows.	Bakx et al. (2023)
	Renewal	Renewal and development.	Hooimeijer et al. (2001)

	Robustness	The extent to which the landscape can withstand changes in the future.	Bakx et al. (2023); Busscher et al. (2019); Hooimeijer et al. (2001); Klijn et al. (2013)
	Stocks	A “stock” can be defined as a natural resource that fulfills or could fulfill a function in society in the future. The following stocks can be distinguished: raw materials; energy carriers; water, soil and air; biodiversity; space.	Hooimeijer et al. (2001)
	Sustainability	Sustainable land use.	AT Osborne (2021); Dauverllier (1991)
	Zoning	Zoning of functions supports spatial structure.	Dauverllier (1991)

Table 2. Aspects of spatial quality and their position in the Hooimeijer matrix.

	<b>Economic</b>	<b>Social</b>	<b>Ecological</b>	<b>Cultural</b>
<b>Use Value</b>	Accessibility Allocative efficiency External effects Fragmentation Multi-purpose	Access Choice Division Participation	Desiccation Fragmentation Hydraulic effectiveness Pollution Safety, nuisance	Encounters Freedom of choice Recreation Variety/diversity
<b>Experiential Value</b>	Attractivity Image Visibility of water Visual diversity	Connectedness (In)equality Safety	Beauty Health Landscape qualities Naturalness Spaciousness Tranquility	Beauty Contrast Individuality Landscape history Smell and sound Unity Well-keptness
<b>Future Value</b>	Agglomeration Cumulative attraction Flexibility Manageability Renewal Robustness	Abiotic qualities Containment Cultures of poverty Sustainability	Abiotic qualities Ecosystems Biodiversity Natural processes Stocks Zoning	Heritage Integration Renewal



Table 3. Conceptual Framework: How each interaction between Vitruvian value and societal interest can be operationalised to come to an overall operationalisation of spatial quality.

	<b>Economic</b>	<b>Social</b>	<b>Ecological</b>	<b>Cultural</b>
<b>Use Value</b>	The extent to which diverse economic functions are accessible, connected and complement each other.	The extent to which the area is equally accessible to different societal groups combined with the extent to which costs and benefits related to the area are distributed in a fair way. Meaning everyone can chose to participate in the area.	The extent to which the ecological functioning of the area contributes to the use of the area. Safety, and the limitation of nuisance, desiccation, and fragmentation are important in this regard.	The extent to which there is room for a variety of cultural and recreational activities. And the extent to which these activities lead to encounters between people from different backgrounds and subsequently contribute to cultural enrichment.
<b>Experiential Value</b>	The extent to which an attractive experience or image contributes to the market position of the area / translates to profit.	The extent to which one feels safe in, connected with and equal to (people in) the environment.	The extent to which beauty, tranquillity, naturalness, reduction of (health) risks and other ecological features contribute to a positive experience.	The extent to which the area has its own cultural identity, and the extent to which this is linked to spatial diversity and landscape history.
<b>Future Value</b>	The extent to which there is the possibility of economic growth and the extent to which the area is resilient (i.e. can resist or adapt to change).	The extent to which (local and regional) inequality is counteracted. And the extent to which current resources are used sustainably (to ensure equal access in the future).	The extent to which the natural processes in the area function well, i.e., ensure a future supply to resources.	The extent to which there is heritage. And the extent to which the area is renewed, and new elements are integrated in the current landscape.

### 3. Methodology

#### 3.1. Study Design

In this study, a mixed methods approach was taken (figure 3). To assess the operationalisation of spatial quality as identified in the previous chapter and to answer sub questions 2 and 3, a single case study of the Lauwersmeer area development process was undertaken. Within this case study, methodological triangulation was used to gain a more in-depth understanding. Triangulation can be used to increase the credibility and validity of research findings and helps overcome fundamental biases arising from the use of a single method (Noble & Heale, 2019). The methods included participatory observation, participatory mapping, including a survey, and expert interviews.

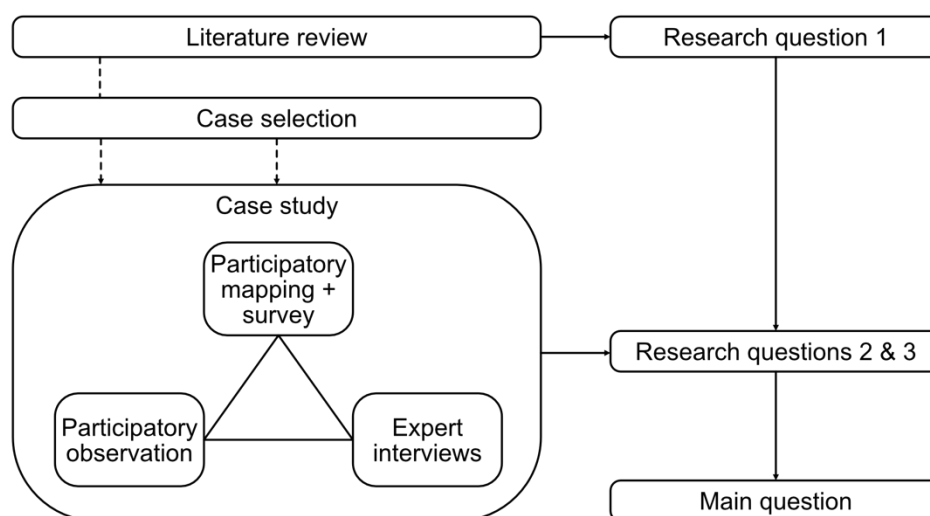


Figure 3. Study design (made by author).

#### 3.2. Case study selection and the Lauwersmeer case

##### 3.2.1. Case study selection

The objective of this study is to gain in-depth understanding of the concept of spatial quality and how it can be operationalised for the use in PPGIS. Additionally, and perhaps most importantly, it aims to understand how this combination can add to (public participation in) Dutch planning practice. With the latter objective in mind, an information-oriented case selection took place, which means that the case was selected based on the expectations about its information content (Flyvbjerg, 2006). This led to three criteria. First, the case must be a landscape transformation process led by a Dutch governmental organisation, as the concept of spatial quality was operationalised in this context (see previous chapter). Secondly, spatial quality must play a role in this planning process. Third, the governmental organisation must consent to the research and provide the researcher with a level of academic freedom, as to not disturb or influence the outcome of this study. On a practical note, the case is preferably located in the north of the Netherlands, due to time and travel constraints.

Based on these criteria the Lauwersmeer area development process (in Dutch: Gebiedsproces Lauwersmeer) was selected. This process is led by waterboard Noorderzijlvest and the province of Groningen. Both governmental institutions have policy putting spatial

quality in a central position, as well as public participation (Waterschap Noorderzijlvest, 2021; Provincie Groningen, 2022; n.d.).

### **3.2.2. The Lauwersmeer area development process**

Although waterboards are exempt from creating an Environmental Vision (Informatiepunt Leefomgeving, n.d.), waterboard Noorderzijlvest has developed a Blue Environmental Vision (BOVi), focusing on the spatial quality of the northern Netherlands, in the spirit of the emerging Environmental & Planning Act (Omgevingswet – see for more information <https://www.rijksoverheid.nl/onderwerpen/omgevingswet>) and the already implemented NOVI (Waterschap Noorderzijlvest, 2021). Furthermore, following the same law, the waterboard has emphasized the importance of public participation (ibid). The province of Groningen has also taken steps. As required of a province, they have formulated a Provincial Environmental Vision (Provincie Groningen, 2022). Additionally, the Program for Heritage, Spatial Quality, and Landscape (Abbreviated to ERL – Provincie Groningen, n.d.), and a quality guide (see for more information [kwaliteitsgidsgroningen.nl](http://kwaliteitsgidsgroningen.nl)) were developed. Like the waterboard, the province emphasises public participation and spatial quality. When it comes to spatial quality the primary perspective is illustrated as: “The spatial quality of our province is largely determined by its heritage and landscape” (Provincie Groningen, n.d.). Despite these visions, programs, and ambitions, both parties still do not have a complete understanding of the concept of 'spatial quality' and how to effectively apply it, for example, in the Lauwersmeer area development process.

As mentioned, the Lauwersmeer area development process revolves around the Lauwersmeer national park and its husk (figure 1). This area lies in the north of the Netherlands on the Groningen-Frisian border. Until 1969, the Lauwersmeer (Lauwers Lake) was called the Lauwerszee (Lauwers Sea). It was part of the Wadden sea, and tides had free reign. In 1969, after the 1953 North Sea Flood, this inlet was closed off from the Wadden sea, out of fear of flooding. Initially, this closure led to a lifeless area, as marine creatures died. However, soon after, the first plants and animals established themselves in this new area. Over the years, a number of (sometimes very rare) species have settled here, resulting in a diverse landscape. In less than fifty years, nature transformed the Lauwersmeer area into a species-rich nature reserve, which officially became a national park in 2003 (Natuur & Landschap - Nationaal Park Lauwersmeer, 2023).

The area is now part of a Natura2000 nature reserve and a Dark Sky Park as well, and it borders the Unesco world heritage area of the Wadden sea. Furthermore, the Lauwersmeer is an important link in the storage and drainage of water from Groningen, Fryslân and Drenthe. In addition to nature, the area is used for agricultural, recreational and defence activities, and the port of Lauwersoog is part of the area as well. Challenges associated with this multifaceted land use and related laws and guidelines, such as the Water Framework Directive, occur. Think of dike reinforcement, nature development, improving darkness, improving fish migration, re-establishing the fresh- and saltwater connection, making the fishery and agriculture sustainable, improving the overall economy, and attracting more tourists.

These challenges, as well as many more still to be identified, will be bundled in the ‘future agenda’ containing assignments for the development of the Lauwersmeer area for the coming years. The Steering Committee Lauwersmeer was established to create this agenda. Eight parties participate in this steering committee, namely: the province of Fryslân, province of Groningen, Wetterskip Fryslân, waterboard Noorderzijlvest, the municipalities of

Noardeast-Fryslân and Het Hogeland, Staatsbosbeheer and Rijkswaterstaat. The committee is split into two teams. The first team is chaired by waterboard Noorderzijlvest and works on the themes water, nature and climate. The second team is chaired by the province of Groningen and works on the themes National Park, sustainably economy and tourism. The aim is to tackle the identified challenges in such a way that the spatial quality will be maintained or improved along the way. Therefore, identifying what the area's spatial quality is, is important. Additionally, it is important to identify what types of qualities can be improved as well as where the quality is located.

Although the Lauwersmeer area development process is not strictly geographically delineated, the case was delineated using a 11-kilometre radius around National Park Lauwersmeer for the purpose of this study. This radius was established in consultation with the province of Groningen and waterboard Noorderzijlvest; and based on the wish to look at the area from a holistic point of view. Furthermore, the waterboard and province found it was important to include within the radius the villages that, in their view, share the Lauwersmeer area identity. This includes Leens, which is located 11 kilometres from the national park.

### **3.2. Participatory observation**

Within the case study, multiple methods were used, the first of which is participatory observation (Becker, 1958). Through my work at SAC Groningen (a student-run consultancy firm), I was hired to handle the project secretariat of the Lauwersmeer area process. My main tasks as project secretary involved attending meetings and working sessions of both teams of the steering committee, as well as their joint sessions, and taking minutes. I was assigned this task only after reaching an agreement that I would use the Lauwersmeer area process as a case study, so it did not influence the case selection. However, the waterboard, province, SAC Groningen, and I have agreed that I can use the observations I make during my work as input for this research. Furthermore, all parties involved were made aware of the research. As a participant observer, I have thus gathered data by participating in the work sessions of the steering committee. Furthermore, I have attended a participation evening to which Lauwersmeer area residents and entrepreneurs were invited. This method was used to help understand the context of the research (the Lauwersmeer area); position the term spatial quality in the normal participation trajectory of the waterboard and province; and provide a context to which the PPGIS method and outcomes can be compared.

### **3.3. Participatory mapping and survey: Maptionnaire**

This study was conducted using participatory mapping combined with a survey, using the Maptionnaire platform. The Maptionnaire platform is a tool for online PPGIS (for more information see <https://www.maptionnaire.com>). Respondents were first asked to identify whether they lived in the Lauwersmeer area, owned a business there or visited the area and fill in their year of birth and gender. Next, a section followed in which respondents were asked to indicate to what extent they thought each value related to spatial quality is present in the Lauwersmeer area. On a map, one could pin locations that represent spots they value in the landscape. After each pin, the respondent was asked about what activities they undertake at this location, why they value the mapped point and to which aspect of spatial quality it contributes. The last part of the questionnaire consists of questions about respondents' personal information, such as work sector, income, as well as their self-estimated knowledge of the area. The questionnaire can be viewed in Appendices B (original) and C (English translation). This method was used to identify the spatial quality of the Lauwersmeer area

and provide a background to review the operationalisation of spatial quality as introduced in chapter two, and thus help answer the first sub question. Furthermore, as participants were asked about their background making a respondent profile answers the second sub question.

The data was collected between the 7<sup>th</sup> of June and the 7<sup>th</sup> of July 2023 and covers residents and entrepreneurs of the Lauwersmeer area, as well as visitors. The survey was spread via email, the National Park Lauwersmeer webpage, and using flyers and business cards. Email invitations were sent to entrepreneurs included on the contact list of Waterboard Noorderzijlvest and the province of Groningen. Flyers and business cards were spread in key public places such as libraries, beaches, parking lots, main streets, local businesses, and during a participation event. As one of the ideas behind PPGIS is that participants can join the public participation process in their own time and at the location they wish for, participants were not asked to fill in the Maptionnaire immediately and together with the researcher, as is sometimes done with (offline) surveys.

The survey and obtained geodata have been analysed using QGIS 3.28.1, Microsoft Excel and SPSS 29. The overall spatial quality of the Lauwersmeer area has been assessed using the first part of the survey, in which participants were asked to score the extent to which each spatial quality aspect is present in the Lauwersmeer area on a five-point Likert scale. For each variable, the mode was taken as a measure of central tendency and used to fill in the Hooimeijer matrix. Furthermore, a place-based database, based on the points the respondents have mapped, has been created. The spatial patterns of perceived positive as well as negative points were analysed first using QGIS. Using Nearest Neighbour statistics (Ebdon, 1985), random distribution and data clustering was explored. Next DBSCAN clustering was used to identify which areas contributed both positively and negatively to each aspect of the spatial quality of the Lauwersmeer area. Clusters were operationalised as a minimum of five mapped points within 750 metres Euclidian distance. These were then visualised using the Minimum Bounding Box (Convex hull) tool. Additionally, a respondent profile was made and the effects of relevant factors in the profile such as income, gender, educational level, and area knowledge were assessed using chi-square tests and spearman rank's coefficient respectively in Microsoft Excel, as well as chi-square, spearman rank's coefficient and Fisher's exact test in SPSS 29.

To assess whether the used method is successful, the PPGIS response and completion rates are important. The response rate is calculated in Microsoft Excel as a percentage of the Maptionnaire page visitors. On July 7<sup>th</sup>, 171 people had visited the Maptionnaire. 113 people filled in the survey. The response rate therefore is 66,1%. To put this in perspective, Wu et al. (2022) found that the average online survey response rate in published research is 44,1%. Furthermore, Fosnacht et al. (2017) found that surveys with a sample size smaller than 500 need 20-25% response rates to provide fairly confident estimates. Additionally, 60 respondents completed the entire PPGIS survey, making the completion rate 53,1%. It was found that 71 respondents (62,8%) finished the first section of the survey - identifying the extent to which the twelve spatial quality aspects were present in the area.

### **3.4. Expert interviews**

The final method involves three expert interviews. The experts were identified by virtue of their specific knowledge and their position in the Lauwersmeer area development process (Döringer, 2021). As the people interviewed are part of the Lauwersmeer area development process and have been involved in the area for many years, they have extensive knowledge on the Lauwersmeer area, as well as the area development process and the inner workings of

Waterboard Noorderzijvest and the Province of Groningen. The type of knowledge they have differs, as the experts have different functions within the waterboard and province: technical water manager, stakeholder manager and project leader.

The interviews were semi-structured. The experts were presented the operationalisation of spatial quality as well as the PPGIS results. The purpose of the interview was to evaluate the research results as well as the process. The aim was to identify whether spatial quality and PPGIS can contribute to the Lauwersmeer area development process specifically and (decentral) government-led planning projects in general. Furthermore, the interviews led to more insight into the Lauwersmeer area thus and helped with identifying an explanation for the PPGIS results, such as the filled in Hooimeijer matrices and the identified clusters that contribute positively and negatively to the spatial quality in the area. These qualitative results can thus be used to answer the third sub question as well as contribute to the discussion of the first two questions. The interview guide can be viewed in Appendix D.

To analyse the interview results, the interviews were first transcribed. The transcripts were carefully read multiple times, while notes were made, to identify patterns, themes, and recurring ideas. This process helped illuminate the participant's perspectives and expertise (Burnard, 1991).

### **3.5. Ethical considerations**

#### **3.5.1. Participatory observation**

As project secretary, my main task was taking minutes. This role aligned well with my role as researcher, as I did not influence the process, but merely observed and noted down what was said. It helped me gain a deeper insight in the workings of the area development process as well as the workings of the waterboard and province, and in a lesser extent, that of other participating parties. As the people attending the working sessions sometimes varied, I introduced myself and my double role at the beginning of each session to make sure everyone attending was aware of the research. This was true for the participatory evening as well.

Due to the nature of this research, role disclosure did not interfere with the area development process during the participatory observation events. The objective was to gain a deeper understanding of spatial quality and how, using PPGIS, this can contribute to the area development process. This meant participants could speak and do their work freely. What contributes to this, is that participant's identities will not be disclosed. Furthermore, as the future agenda is yet to be published, the specific challenges identified and their locations will not be shared in this report, as to not interfere with the area development process or cause any harm or discomfort to the parties involved. As mentioned, this method was only used to help gain understanding of the Lauwersmeer area; the area development process; the position the term spatial quality plays in it; and the normal participation trajectory. As well as providing a context to which the PPGIS method and outcomes can be compared. All unnecessary data gathered will be discarded.

#### **3.5.2. Maptionnaire & expert interviews**

Ensuring transparency regarding the intentions, objectives, and data-related procedures is a crucial aspect of this research. Therefore, the Maptionnaire was prefaced by an informed consent form. Respondents were informed about the research and their rights, and formally asked to 'sign' an agreement – by checking a box – about the data collection, storage, and analysis. Data collected was anonymous. Respondents were automatically assigned a random

code, and sensitive information such as IP-addresses and names were not collected. An optional question was asked in which respondents could indicate the four numbers of their postal code. These postal areas are quite large however, and therefore do not infringe on the respondent's privacy. Furthermore, respondents could fill in their email address at the end of the survey to either be informed on the results of the research by the researcher or be added to the waterboard's and province's list of contacts to keep informed of the developments in the Lauwersmeer area. For each option, respondents could check a box. Collected email addresses are handled confidentially and with care. They are stored in a password protected environment, will not be used for any other purpose than indicated by the respondent, and will be removed as soon as the research has finished – in the case the respondent wishes to be informed on the results – or when the respondent indicates toward the waterboard or province that they wish to be removed from the list. All other collected data is stored and analysed in a password protected environment as well.

The qualitative data collected is stored and analysed in a password protected environment as well. Like the survey, the participants were informed about the research and their rights and formally asked to sign a participation agreement, and the qualitative results were anonymised. Furthermore, the (anonymised) full transcripts will only be made available to the supervisors of this research, as they need to assess the quality. In this paper, only excerpts will appear. Additionally, the experts interviewed are given the option to read and provide feedback on the working version of this paper to ensure their words are not wrongly interpreted in the final version.

## **4. Results: Spatial quality and PPGIS in the Lauwersmeer area development process**

### **4.1. Context**

As the space in spatial quality can be operationalised as landscape (Janssen-Jansen et al., 2009), the landscape history of the Lauwersmeer area provides the context for the results. The soil types found in the National Park west and south of the lake are flats, mudflats, and reclaimed salt marshes, while on the east, uncultivated sandy soils are found. The husk is made up of reclaimed salt marshes of different ages. In these areas, mounds called ‘terpen’ (Frisian side) and ‘wierden’ (Groningen side) are found. These mounds were constructed from the 5<sup>th</sup> century BC onwards to be able to safely live on the not yet reclaimed salt marshes. Later, from around 1000 AD onwards, dikes were built, and the first polders were created. These dikes and mounds are still visible in the landscape. For example, the village of Ulrum is located on a mound, and many dikes still exist (Provincie Groningen & Groninger Gemeenten, n.d. (a); n.d. (b); Provincie Fryslân, 2021; n.d.; Landschappen van Noord-Nederland, n.d.).

Additionally, other important area characteristics, such as agricultural activities and fishery, are influenced by the landscape. For example, on the higher sandy soils of the salt marshes arable farming is found, while the lower lying salt marsh plains are characterised by grassland and cattle (Provincie Fryslân, 2021; PBL, n.d.; TNO, n.d.). Furthermore, around 1850, there were several fishing villages in the area, such as Paesens-Moddergat, Dokkumer Nieuwe Zijlen and Zoutkamp. The construction of the railway from Winsum to Zoutkamp in 1921, which made it possible to transport the fish by train, benefited the fishing industry in Zoutkamp, while others dwindled. After the closure of the Lauwerszee in 1969, the villages were seaports no more, and the thriving fishery of Zoutkamp moved to the new harbour of Lauwersoog (Vereniging Dorpsbelangen Zoutkamp, 2021; Visersvereniging Hulp in Nood, n.d.). In the same year, the new village of Lauwersoog was built (ErfgoedCMS, 2013).

Since then, the Lauwersmeer area has developed into a recreational and touristic area known for nature tourism and water sports. Campsites and holiday villages such as Camping Lauwersoog (now Siblu Lauwersoog), Suyderoogh and Esonstad emerged. Walking and cycling routes and viewing towers were created (Lauwerszee werd Lauwersmeer in 1969, n.d.; Visit Groningen, n.d.), and webpages such as [np-lauwersmeer.nl](http://np-lauwersmeer.nl), [visitgroningen.nl](http://visitgroningen.nl) and [eropuitinfriesland.nl](http://eropuitinfriesland.nl) promote nature tourism and boating in the area.

### **4.2. Sample representation and respondent profile**

To understand how PPGIS can enable public participation in landscape transformation processes, it is important to investigate who is reached in the Lauwersmeer case, and whether the sample provides a good representation of the population. For this purpose, two tables have been created.

Table 4 provides a respondent profile for inhabitants and entrepreneurs. This profile is accompanied with an estimation of a population profile, based on CBS Statline (2023) data about municipalities Het Hogeland and Noardeast-Fryslân. The sample representation for men and women is quite reasonable, with women a little underrepresented. Furthermore, respondents reached are most often within 45 to 64 years of age. This category, as well as age group 25 – 44 is overrepresented. What stands out the most however, is the large difference between sample and population educational level. Those with an MBO educational level – A Dutch secondary education that has multiple levels, varying from a lower to average



educational level – are severely underrepresented. While those with a higher educational level (HBO and WO) are very overrepresented. Furthermore, note that the most indicated income level is ‘average’ and that inhabitants and entrepreneurs never indicated to have no or limited area knowledge.

Very few respondents filled in the figures of their postal codes. Therefore, the spatial representation of the sample as well as the representation of the visitor sample cannot be checked. An additional limitation is that for visitors an estimation of the population cannot be made. Therefore, table 5 only provides a respondent profile. What is interesting however, it that men make up the majority of responding visitors. Additionally, responding visitors are more often middle-aged than the entrepreneurs and inhabitants reached in this study. And, although the educational profile is very similar, visitors more often indicate a high self-assessed income. The self-assessed area knowledge of visitors is good, but less so than that of inhabitants and entrepreneurs.

Table 4. Respondent profile for inhabitants and entrepreneurs

	Variable	Value	Sample percentage	Population percentage*
<b>Inhabitants &amp; Entrepreneurs</b> N = 31	Gender N = 42	Male Female Other / prefer not to say	51,61% 45,16% 3,23%	50,22% 49,78% -
	Age N = 41	<25 25 – 44 45 – 64 65+	2,44% 31,71% 48,78% 17,07%	6,84% 25,58% 36,26% 30,32%
	Education N = 19	Primary and / or secondary school <b>MBO</b> <b>HBO and / or WO</b>	15,79% 10,53% 73,68%	- 55,93% 44,07%
	Self-assessed income N = 18	Low Average High	5,56% 61,11% 33,36%	
	Self-assessed area knowledge N = 19	<b>No knowledge</b> <b>Limited knowledge</b> Average knowledge Good knowledge Extensive knowledge	- - 36,84% 42,11% 21,05%	

\* Based upon the municipalities of Het Hogeland and Noardeast-Fryslân. These boundaries are not the same as the 11 km buffer around Lauwersmeer National Park. Source: CBS StatLine, 2023.

Table 5. Respondent profile for visitors

	Variable	Value	Sample percentage
Visitors N = 40	Gender N = 59	<b>Male</b> Female Other / prefer not to say	<b>67,50%</b> 32,50% -
	Age N = 59	<25 25 – 44 45 – 64 65+	3,39% 20,34% 62,71% 13,56%
	Education N = 29	Primary and / or secondary school MBO <b>HBO and / or WO</b>	17,24% 10,34% <b>72,41%</b>
	Self-assessed income N = 24	Low Average <b>High</b>	4,17% 50% <b>45,83%</b>
	Self-assessed area knowledge N = 30	No knowledge Limited knowledge Average knowledge <b>Good knowledge</b> Extensive knowledge	10% 10% 26,67% <b>43,33%</b> 10%

### 4.3. The spatial quality of the Lauwersmeer area

#### 4.3.1. Filling in the Hooimeijer matrix

Figure 4 represents the perceived spatial quality of the Lauwersmeer area. The matrix is filled in using the data obtained in asking the respondents to rate the presence of each value in the Lauwersmeer area on a 5-point Likert scale. The colours are based on the mode for each value. For ecological experiential value the mode was 'highly present', which is the highest possible ranking. This is represented in the matrix by the darkest green colour. The mode for both social and cultural future value was 'neutral' and is represented by white. Cultural use value has a shared mode of 'neutral' and 'present' and is therefore coloured in the lightest shade of green, indicating a slightly positive outcome. All other aspects of spatial quality were perceived to be present in the area. These results are represented by a medium shade of green.

What stands out is that there are no pink values present in the matrix, which would represent a mode of either 'absent' or 'highly absent'. The absence of pink thus indicates that the sample does not perceive any values to be absent.

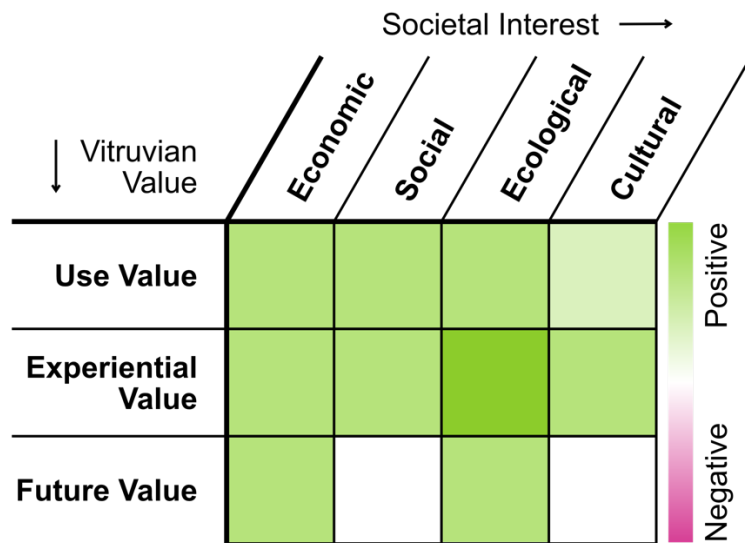


Figure 4. Matrix representing the perceived spatial quality of the Lauwersmeer area (Made by author and based on Hooimeijer et al., 2001 and Oudes & Stremke, 2021).

#### 4.3.2. Spatial quality on the map

To further grasp the subjective spatial quality of the area, respondents were asked to map places they perceive contribute to or detract from the spatial quality. For each value, a layer of points contributing to and a layer of points detracting from the spatial quality was added to QGIS 3.2.8. For each layer, NN Statistics was used to analyse whether the points were randomly distributed or not. It was found that the positive point layers show clustering for all four use values, the ecological experiential value and contributing to spatial quality in general (all positive layers combined) (Appendix E). For locations detracting from the area's spatial quality, clustering was only found for all negative layers combined (See Appendix F). The clusters were then identified using DBSCAN clustering and summarised in table 6. For visual purposes, hand-drawn versions of the clusters are presented in figure 5 (See Appendix G for original output).

For the Lauwersoog harbour and holiday village, the cluster found was manually split into two, based on geography (points being located in the harbour or not) and attributes (activities linked with the harbour or the holiday village and beaches). These clusters contribute to as well as detract from the Lauwersmeer area's spatial quality, and are therefore represented in figure 5 in a striped pattern. Furthermore, two extra clusters are added to the table in grey, and to the map in pink. These clusters are made up of three points instead of the minimum of five (see chapter 3.3.). Due to their small size, they contribute less to the overall spatial quality of the Lauwersmeer area. They are added however, as they do give insight into how respondents understand each value of spatial quality. This will be elaborated on in chapter 5.3.2.

Table 6. Cluster locations of areas contributing to and detracting from the Lauwersmeer area's spatial quality

<b>Cluster location</b>	<b>Value it contributes to</b>
Harbour Lauwersoog*	Economic use value Social use value Ecological use value Cultural use value Ecological experiential value
Lauwersoog holiday village*	Economic use value Social use value Ecological use value Cultural use value Ecological experiential value
Zoutkamp	Economic use value Social use value Cultural use value
Ballastplaatsbos	Social use value Ecological use value
Ezumakeeg	Ecological use value Ecological experiential value
Lake islands	Ecological experiential value
Anjum	Social use value
Diepsterbos-Zomerhuisbos	Ecological experiential value

\* This cluster detracts from the overall spatial quality of the area as well.

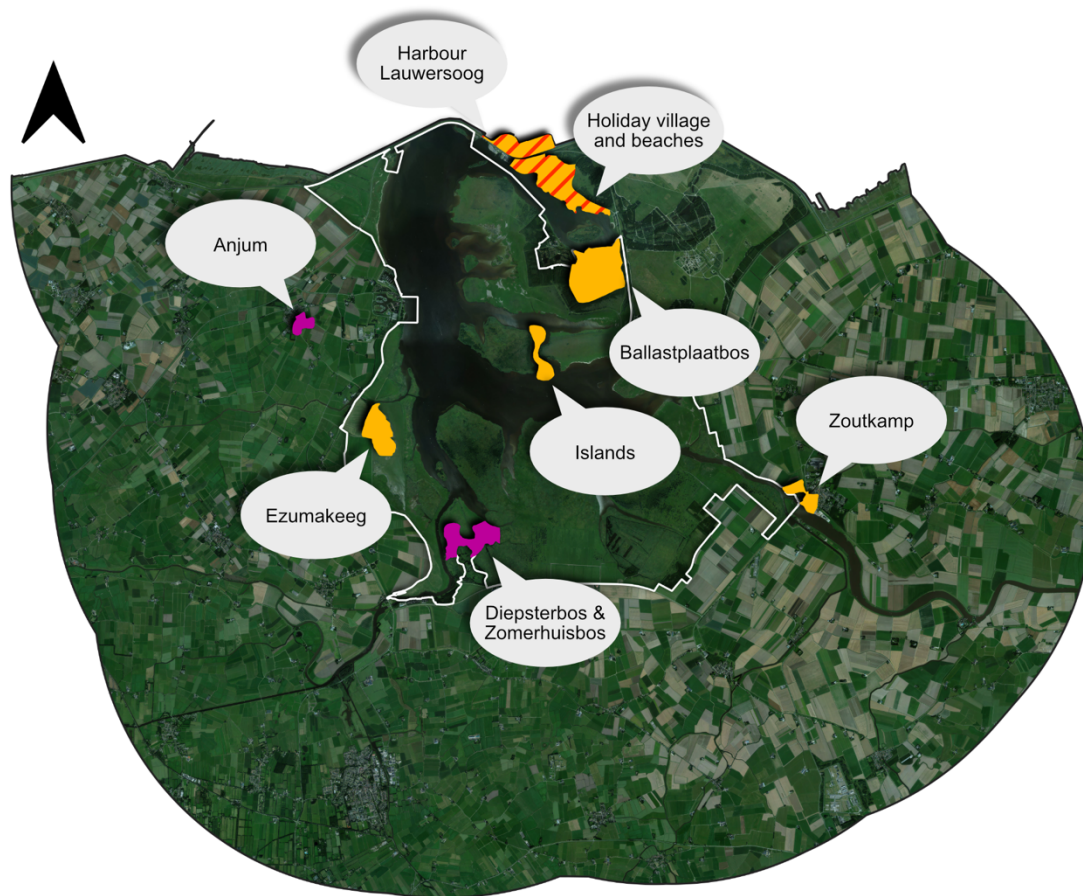


Figure 5. Clusters visualising the spatial quality on the map. Made by author in QGIS 3.2.8. and Affinity Designer.

As shown in table 6, for the negatively mapped points, clustering was found in the Harbour area and the Lauwersoog holiday village. Note that, although these areas detract from the overall spatial quality of the area, they cannot be pinned to a specific type of spatial quality. However, respondents were asked to shortly explain why the mapped point is negative. In the answers some trends can be seen. The Lauwersoog Harbour is often perceived as ugly. Mostly due to carparking (top left of figure 6) which does not 'fit into the landscape' and the industrial buildings (figure 6, top right). Due to the harbour's industrial character, the area can be quite unpleasant in the evening. For the holiday village (figure 7), it was indicated that the beaches are not clean, and the water quality suffers from blue-green algae. Furthermore, there are too many chalets, and too many or too little camp sites – depending on the respondent. Another respondent indicated: *'The preservation of the campsite is the preservation of nature lovers and therefore inherent to nature conservation. Enter into a dialogue with the organization to maintain cultural and social quality in the area. This can be done by moving the meeting place to the core of the area'*. This indicates that, although the holiday village currently has a negative effect on the spatial quality of the Lauwersmeer area, it has positive effects too, and can be transformed into a solely positive area.



Figure 6. Impression of the Lauwersoog Harbour. Source: Google Streetview.



Figure 7. Impression of the holiday village & strandweg beaches cluster. Sources: Google Streetview & Lana Banana (2020) (bottom left).

Both places house clusters of points contributing to the spatial quality of the Lauwersmeer area as well. As the Lauwersoog Harbour is located on the seaside of the dike in the north of the Lauwersmeer area, the view of the Waddensea is an important contributor to the spatial

quality of the area (bottom left, figure 6). Furthermore, the port houses restaurants and cafés and is the departure point for the boat to the island Schiermonnikoog. Additionally, it is an important work facility for fishery, as it houses a fish auction. The catering industry thrives as well, with the port being a popular place to lunch, have a coffee or eat a freshly caught fish. The area attracts quite a few tourists and is therefore a vibrant place. Due to these attributes, the harbour is perceived as contributing positively to the economic, social, ecological, and cultural use values of the Lauwersmeer area, as well as the ecological experiential value (see table 6).

As indicated in table 6, the Lauwersoog holiday village contributes to the same aspects of spatial quality as the harbour. Respondents indicate that the holiday village and the nearby beaches function as an entrance gate to Lake Lauwersmeer. As mentioned earlier, the holiday village attracts tourists with an interest in water and nature. Additionally, it provides opportunities for cycling, walking, boating, enjoying water sports and meeting new and other people.

Other places contributing to the spatial quality of the Lauwersmeer area are Zoutkamp, Ballastplaatbos, Ezumakeeg, and the small islands in the lake. The village of Zoutkamp (figure 8) is perceived as a beautiful village where the fisherman identity characterising the Lauwersmeer area is still alive. As with Lauwersoog, Zoutkamp functions as an entrance gate to the lake and indirectly to the Waddensea. Additionally, respondents indicate that the village features important facilities. Due to these characteristics, Zoutkamp contributes to the economic, social, and cultural use values of the spatial quality of the Lauwersmeer area (table 6).



Figure 8. Impression of Zoutkamp. Sources: Carlo (2023) (top left), De Canicula (2021) (top right), Google Streetview (bottom).

The Ballastplaatbos (figure 9) is located in the east of the Lauwersmeer National Park (figure 5). Here, the forest meets the water and a wide-open landscape. The area features beautiful

walking routes and houses the Lauwersnest activity centre, which functions as a meeting place and allows for a variety of activities. These attributes lead to the Ballastplaatsbos contributing to the social and ecological use values of the Lauwersmeer area.



Figure 9. Impression of Lauwersnest and Ballastplaatsbos. Sources: Nationaal Park (2023) (top left), staatsbosbeheer (n.d.) (top right), Horns (n.d.) (bottom left and middle), Visit Groningen (n.d.) (bottom right).

A place contributing to the ecological use and experiential values of the area is Ezumakeeg (figure 10). Ezumakeeg is mostly valued for its birding viewpoint. The beautiful scenery, the opportunity to observe bird migration and bird breeding are often mentioned. It therefore contributes to the ecological use and experiential values of the Lauwersmeer area.



Figure 10. Ezumakeeg and the viewing point. Sources: Swart (2016) (left) & Visit Friesland (n.d.) (right).



The lake islands (figure 11) are only accessible by boat and are therefore valued for their tranquility. The beautiful scenery and views as well as rich nature at this location is perceived to contribute to the ecological experiential value of the Lauwersmeer area spatial quality.



Figure 11. Islands of the Lauwersmeer. Source: Rijksdienst voor het Cultureel Erfgoed (n.d.).

As mentioned, additional clusters were found when adjusting the minimum number of points for a cluster to three. The village of Anjum (figure 12) was indicated to contribute to social use value, due to its facilities at which one can meet other people. The Diepsterbos-Zomerhuisbos area was found to contribute to the ecological experiential value of the Lauwersmeer area, due to the views. In this area, two viewpoints are allocated (figure 13).



Figure 8. Impression of Anjum. Sources: PLUS Rosier (n.d.) (left) & Google Streetview (others).



Figure 13. Viewingpoints of the Diepsterbos and Zomerhuisbos. Sources: Vogelkijkhut.nl (n.d.) (left) & Uitkijktorens.nl (2023) (right).

#### 4.4. The influence of the respondent profile on the perceived spatial quality of the Lauwersmeer area

As chapter 2 argues, the viewpoints of different users should be considered due to the intersubjective nature of spatial quality (Kahn et al., 2014; Janssen-Jansen et al., 2009). It is therefore interesting to evaluate the views of different subgroups in the sample.

The matrices in figures 14 and 15 represent the spatial quality as perceived by visitors and inhabitants and entrepreneurs, respectively. Again, there are no pink values present in the matrices, indicating that no aspect of spatial quality was perceived to be absent by either group. However, the matrices show differences in the perception of spatial quality in multiple categories. Both economic experiential value and ecological future value were perceived to be present by visitors, while they were perceived as neutral by inhabitants and entrepreneurs. This is the other way around for cultural use value. Cultural future value is perceived by inhabitant and entrepreneurs as ‘neutral’ the same number of times as ‘present’. The mode for visitors however is ‘neutral’.

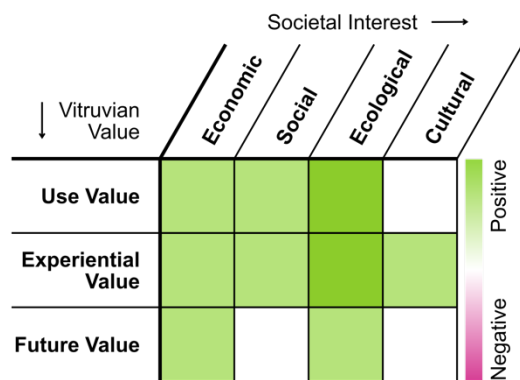


Figure 14. Matrix representing the spatial quality as perceived by respondents visiting the area.

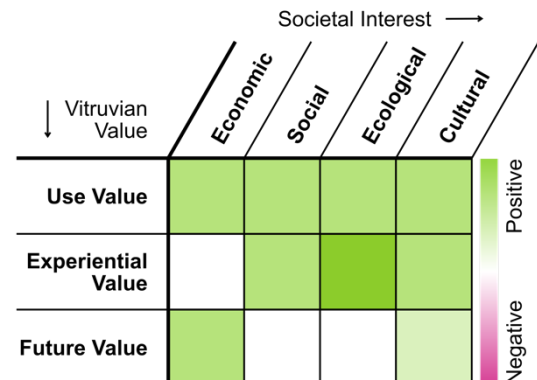


Figure 15. Matrix representing the spatial quality as perceived by inhabitants and entrepreneurs.

As the matrices are only based on the modes, it is important to statistically test whether the differences between the matrices are significant. This is only the case for ecological future value (see appendix H) . The chi-square test in table 7 illustrates that, with 95 percent certainty, there is an association between being an inhabitant or entrepreneur of the Lauwersmeer area or being a visitor and the perceived presence of ecological future value in the Lauwersmeer area ( $\alpha = 0.05$  and  $p = 0.043$ ). Combined with the matrices, it can be concluded that visitors perceive ecological future value more often to be present than inhabitants and entrepreneurs.

Table 7. Pearson Chi-Square test of presence of ecological future value as perceived by inhabitants and entrepreneurs versus visitors

Chi-Square Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.095 <sup>a</sup>	1	.043
N of Valid Cases	71		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.04.

As illustrated in chapter 4.2., there are more factors relevant when it comes to the respondent profile. It is therefore worthwhile to test the correlation between these factors and the perceived presence of spatial quality in the Lauwersmeer area. For the variables age, education and income, no effect or correlation was found. However, for area knowledge and gender a correlation was found with certain aspects of spatial quality (Appendix I).

To test the correlation between area knowledge and the perceived presence of spatial quality, a Spearman's rank test was executed for each category. As tables 8, 9, and 10 illustrate, with a 95 percent confidence interval, there is a correlation present between area knowledge and the perceived presence of ecological use value, social experiential value and cultural future value ( $\alpha = 0.05$  and  $p = 0.031$  ;  $0.049$  ;  $0.049$  respectively). However, these correlations are weak, as the correlation coefficients are 0.308, 0.283, and 0.282 respectively.

Table 8. Spearman's rho - Ecological use value and self-assessed area knowledge

Correlations

		Ecological use value	Self-assessed area knowledge
Spearman's rho Ecological use value	Correlation Coefficient	1.000	.308*
	Sig. (2-tailed)	.	.031
	N	88	49
Self-assessed area knowledge	Correlation Coefficient	.308*	1.000
	Sig. (2-tailed)	.031	.
	N	49	49

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 9. Spearman's rho - Social experiential value and self-assessed area knowledge

Correlations			Social experiential value	Self-assessed area knowledge
Spearman's rho Social experiential value	Correlation Coefficient		1.000	.283*
	Sig. (2-tailed)		.	.049
	N		77	49
Self-assessed area knowledge	Correlation Coefficient		.283*	1.000
	Sig. (2-tailed)		.049	.
	N		49	49

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 10. Spearman's rho - Cultural future value and self-assessed area knowledge

Correlations			Cultural future value	Self-assessed area knowledge
Spearman's rho Cultural future value	Correlation Coefficient		1.000	.282*
	Sig. (2-tailed)		.	.049
	N		71	49
Self-assessed knowledge	Correlation Coefficient		.282*	1.000
	Sig. (2-tailed)		.049	.
	N		49	49

\*. Correlation is significant at the 0.05 level (2-tailed).

The association between gender and the perceived presence of spatial quality was tested using Pearson's chi-square test and Fisher's exact test. The latter was used when cells with an expected count of less than 5 were present.

With a 95 percent confidence interval, there is an association between gender and the perceived presence of ecological experiential value ( $\alpha = 0.05$  and  $p = 0.039$ , based on Fisher's exact; see tables 11 and 12). With the same confidence, it was found that there is an association between gender and ecological future value as well ( $\alpha = 0.05$  and  $p = 0.001$ , based on chi-square; see 13 and 14). In both cases, men perceived the value as present more often than expected and women less often.

Table 11. Ecological experiential value and gender crosstabulation

Ecological experiential value * Gender Crosstabulation Count		Gender		
		Male	Female	Total
exp.	Absent/Neutral	3	7	10
	Present	43	22	65
Total		46	29	75

Table 12. Fisher's exact test - ecological experiential value and gender

Chi-Square Tests – ecological experiential value					
	Value	df	Asymptotic Significance (2-Exact sided)	Sig. (2-Exact sided)	Sig. (1- sided)
Pearson Chi-Square	4.777 <sup>a</sup>	1	.029		
Continuity Correction <sup>b</sup>	3.374	1	.066		
Likelihood Ratio	4.666	1	.031		
Fisher's Exact Test				.039	.035
Linear-by-Linear Association	4.713	1	.030		
N of Valid Cases	75				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.87.

b. Computed only for a 2x2 table

Table 13. Ecological future value and gender crosstabulation

Ecological future value * Gender Crosstabulation Count		Gender		
		Male	Female	Total
ecol.fut.	Absent/Neutral	8	15	23
	Present	35	12	47
Total		43	27	70

Table 14. Chi-square test - ecological future value and gender

Chi-Square Tests – ecological future value					
	Value	df	Asymptotic Significance (2-Exact sided)	Sig. (2-Exact sided)	Sig. (1- sided)
Pearson Chi-Square	10.265 <sup>a</sup>	1	.001		
Continuity Correction <sup>b</sup>	8.658	1	.003		
Likelihood Ratio	10.229	1	.001		
Fisher's Exact Test				.002	.002
Linear-by-Linear Association	10.118	1	.001		
N of Valid Cases	70				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.87.

b. Computed only for a 2x2 table

## 5. Discussing PPGIS and spatial quality

In this chapter, the results will be discussed with the help of literature as well as expert interviews. The expert interviews aid in giving a more complete answer to the first two sub questions, as well as provide an answer to the third. Table 15 provides an overview of the interviewed experts and their functions.

Table 15. Overview of expert functions

Expert 1	Stakeholder manager
Expert 2	Project leader
Expert 3	Program strategist

### 5.1. The Hooimeijer matrix, a good base for operationalising spatial quality for PPGIS?

Before discussing the results chapter of this study, it is important to reflect upon their base: the Hooimeijer matrix as the operationalisation of spatial quality.

One of the main take-aways from the expert interviews was a critique upon the matrix's division of themes: economic, social, ecological, and cultural. From the perspective of the waterboard's tasks, this is not a very helpful division:

#### Expert 3

*"I get the economic theme. I also understand the ecology one, although I did not always find the descriptions of each cell appropriate. But the cultural and social themes I found a bit... Falling by the wayside."*

Waterboards are tasked with the regulation the water level, ensuring water quality, and maintaining dikes and waterways (Ministerie van Algemene Zaken, 2021). In the view of the third expert, these tasks touch on the economic and ecological themes. For example, in the Lauwersmeer area in which fishery is an important industry, ensuring and improving water quality is a task that is closely related to ecology and economy. The expert considers the social and cultural aspects to be less so part of the waterboard's responsibilities.

Furthermore, the above quote indicates that from the waterboard's perspective, the contents of the ecological theme does not fit the waterboard's practice well. This is due to a dichotomy between water management and nature management. The waterboard's responsibility is water management. This does include managing nature in and around the water as well (ibid). However, the management and development of national parks and natura-2000 areas as well as landscape development in general and creating policies and visions related to nature and nature development fall under the responsibility of the provinces (Ministerie van BZK, 2021). Furthermore, parties such as Staatsbosbeheer (government agency) and Natuurmonumenten (private organisation) take the responsibility for nature management and development (*Over de organisatie van Staatsbosbeheer*. (n.d.); *Ochtend Natuur*, n.d.). Therefore, although the results indicate that the ecological use value is present, it is not clear for the waterboard why that is and what it means for their work. Do respondents perceive that the area's water system functions safely or do respondents perceive the habitats are well connected? The latter of which is not a task for the waterboard, but for the province, Staatsbosbeheer and Natuurmomenten. Even in the Lauwersmeer area

development process, in which these parties work together in team 1 on the theme's water, nature and climate, these tasks are separated:

### **Expert 3**

*"I had a little trouble with the themes. [...] How we [team 1: water, nature and climate] are now building and working on the future agenda, for example, is nature, water quality and ecology on the one hand [within one sub-team] and water safety, flooding, water quantity on the other [within a second sub-team]."*

Another important finding relates to the broadness and versatility of each spatial quality value. For example, on the surface, cultural use value is about the abundance of recreational activities. But on a deeper level, it is also about freedom of choice, encounters between different groups of people, diversity, and how these factors contribute to cultural enrichment. This makes descriptions used for each cell difficult to understand and subsequently difficult to use in practice. This might be why respondents that did not finish the maptionnaire, mostly dropped out in the first section (see chapter 3.3.). Therefore, the experts point out that they would tend to use the *felt* understanding of the term spatial quality and ask more concrete and specific questions relating to (known) problems at hand, rather than use the matrix as is done in this study:

### **Expert 2**

*"I would have done it much simpler myself. [...] Use the term spatial quality in the sense of 'What do you think is a nice place in the area? What do you find less beautiful places in the area? What do you miss that in the area? Or what you appreciate in the area?' And then you could ask specifically about that. For example, using follow-up questions about restaurants or sufficient dining facilities. I would just ask a very specific question about that. Instead of... I think in your study that is part of economic experiential value..."*

This way of questioning leads to an ability of the government agency to steer toward certain themes (societal interests). On the one hand, this can help provide more focus to the maptionnaire, leading to respondents helping to solve a specific problem related to spatial quality that the government agency wishes to address. If, for example, it is known that there are challenges in an area that are related to poverty, the government agency in question can choose to focus on the social theme, as battling cultures of poverty are part of social future value. In doing so, social spatial quality as a whole could be improved. On the other hand, choosing which themes to tackle before engaging in public participation could lead to important issues being ignored, as local knowledge about these issues is not inventoried. Furthermore, there are interdependencies between the themes (e.g. fishery is related to both ecological and economical societal interests). Asking respondents about the full spectrum of spatial quality as introduced by the Hooimeijer matrix thus provides a more complete overview of spatial quality in general, as well as each theme separately.

A possible route to go would be to not use the descriptions made for each value but provide respondents with an overview of the matrix in which key aspects are summed up (see table 2). This way there is room for a more felt understanding of the concept while at the same time providing boundaries for each individual value and making sure all relevant aspects are included in the understanding of both the government agency and the respondents. Like

the current maptionnaire design, the presence of each cell of the matrix can then be rated on a 5-point Likert scale.

Despite these limitations to the Hooimeijer matrix and subsequent value descriptions, the experts do agree that the matrix is a good base for operationalising spatial quality. For example, when it comes to working integrally:

### **Expert 3**

*“At the same time, we want to work integrally. I don't want to present those things [water and nature management] sectorally either, do I? The sum of everything [ecological use value] is green. Yeah, so that's a positive.”*

Furthermore, the Hooimeijer matrix is viewed positively when it comes to the differentiation between use, experience, and future value:

### **Expert 3**

*“What I do like is the distinction between the use, experience, and future value. And I think you have a nice palette of the present and the future. As well as ratio on the one hand and feeling on the other, so to speak. I think that's nice. It covers the load well.”*

## **5.2. The contribution of PPGIS to participation processes**

This section elaborates on the public participation aspect of PPGIS by reflecting on the PPGIS method and discussing the respondent profile as presented in chapter 4.2.

As reflected upon in chapter 2.3.2., traditional methods such as public hearings, townhall meeting and focus groups often only reach a small group of participants. While with the use of online participation methods a larger group of people can be reached (Lin & Kant, 2021). In the case of the Lauwersmeer area development process, this is true. Less than 25 entrepreneurs and inhabitants were present at the participation evening. The amount of people reached using the maptionnaire is higher than that. As described in chapter 3.3., 113 people filled in at least part of the survey, of which 71 finished the first section and 60 completed the entire PPGIS survey. Experts were positive as well:

### **Expert 3**

*“I actually think that is quite a lot.”*

### **Expert 2**

*“I really don't think the quantities are bad. No, I think it's really positive.”*

Additionally, it was argued that PPGIS has a potential to reach a wider, more diverse, and younger group of participants than traditional participation methods (Jankowski et al., 2022; Van Dijk, 2017). An important question therefore is whether the respondent profile is different to the image that often prevails about the highly educated middle-aged man participating (Dezeure et al., 2008).

When it comes to age, the categories 25 – 44 and 45 – 64 are overrepresented, while 65+ and under 25 are underrepresented (see table 4). As children aged under 16 years old were excluded from this research, the underrepresentation of the group younger than 25 years of age is not surprising. Furthermore, using digital participation methods means



participants need to possess some digital skill. As age is closely related to the digital divide or internet literacy (Van Dijk, 2017; Barraket et al., 2016), this could be the reason those aged 65 and over are underrepresented. It should be noted that although people aged 25 – 44 years of age are overrepresented as well, the middle-aged category is overrepresented, and represented, the most. Additionally, for visitors, the middle-aged category is represented the most as well (see table 5).

The experts indicate how this compares to other participation methods used by their organisations:

#### **Expert 1**

*“Look, we use different types of participation of course. With the sounding board group, we really reach the entrepreneurs and organisations in the area. Those are aged between thirty and 55. [...] The working people, so to say. [...] But if we do something with residents, then we reach those that are 65 plus, or sixty plus. So, this [respondent profile] looks a bit young.”*

#### **Expert 2**

*“[the younger group] doesn't come forward, does it? But if you look at the surveys that we've done [different research in the area]... I think it's totally consistent with that.”*

Thus, it might be that with PPGIS, in terms of age, a similar audience is reached as with the use of surveys. This audience does seem to be a little bit younger than when using face-to-face participation methods in the Lauwersmeer area. However, the overall reached group is still middle-aged.

Another factor associated with participation is educational level (Dezeure et al., 2008). In this study, those with an MBO educational level are severely underrepresented. While those with a higher educational level (HBO and WO) are very overrepresented. This seems to be the case as well for visitors, as the sample numbers are quite similar. In this case, this might have something to do with the difficulty of the descriptions of spatial quality:

#### **Expert 2**

*“I thought the approach [the descriptions as based on the matrix] was quite scientific. And respondents, well, they aren't scientists.”*

However, the sample having a higher educational level than the population is often the case in PPGIS research (e.g. Laatikainen et al., 2015; Engen et al., 2018; Garcia et al., 2020; Gottwald et al., 2016). As with age, this might be due to a digital divide (Van Dijk, 2017; Garcia et al., 2020). Although the reasons are not entirely clear, in the Lauwersmeer case the use of PPGIS does not lead to an equal representation of educational levels.

For gender, the sample represents the estimated population of inhabitants and entrepreneurs quite well, with women being a little bit underrepresented (45,16% in the sample vs. 49,78% in the population). There is a notable difference with the visitors' sample, in which women are highly underrepresented.

Thus, the image of the participant as a highly educated middle-aged man (Dezeure et al., 2008) is true when applying PPGIS in the Lauwersmeer area development process as well. Especially when including visitors. For inhabitants and residents, the gender gap seems to be closed, or at the very least closing.

Although the use of PPGIS does not lead to a more *diverse* audience in terms of socio-demographic factors, the use of PPGIS still contributes to the participation process. Namely, due to the opportunity it provides to reach more people and thus a *broader* audience. In the Lauwersmeer case, this was done by including visitors:

#### **Expert 1**

*"I really think this is an addition to [the participation process] because you have inquired much more widely among both entrepreneurs [and inhabitants] and visitors. We have really chosen... 'we have to have this group around the table'. While you have inquired very broadly and also retrieved [information] from a very broad group of people. [...] So, they [traditional participation and online PPGIS] complement each other nicely."*

### **5.3. Discussing the Lauwersmeer area's spatial quality**

#### **5.3.1. Interpreting the matrices**

As shown in chapters 4.3.1. and 4.4., the matrix has been filled in multiple times. Once for the spatial quality as perceived by all respondents, once for visitors, and once for the inhabitants and entrepreneurs. As mentioned, what comes to mind first when viewing the filled in matrices, is that none of the values are perceived to be absent. From this, it can be concluded that the overall perceived spatial quality of the Lauwersmeer area is positive.

The second thing that stands out, is that in the combined matrix, both social and cultural future value are perceived neutrally. This can be interpreted in multiple ways. Either these values are neither perceivably absent nor perceivably present, or respondents had difficulty understanding these values' descriptions. The first one however, seems to be the most appropriate interpretation in this case, as the matrix was based on results from respondents that filled in the entire first section and did not drop out. Additionally, experts note that the future is hard to estimate or predict:

#### **Expert 1**

*"I think people often find that [assessing how it will be in the future] is the most difficult part. You could also see that in those sessions with inhabitants and entrepreneurs. They know very well about 'now' and what should be changed now. But yeah. If you look a little further in time, at those major challenges, how does that affect you?"*

#### **Expert 3**

*"Especially as a visitor you will not have a good grasp of such issues [how the areas future will look like]."*

Not having a good grasp of certain issues might also be the reason why in the visitors' matrix, the cultural use value is perceived as neutral. While at the same time, the ecological use and future values are perceived as more present by visitors than by locals. As, the tourism industry in the area is geared toward nature recreation:

#### **Expert 1**

*"So that's what visitors come for, right? [...] They don't come for culture, they come for nature."*

Additionally, the multifaceted nature of the cultural use value (see chapter 5.1.) potentially makes it harder for visitors to judge the presence of this value. Although visitors use the recreational facilities available in the area, they are not able to perceive whether these activities lead to cultural enrichment, due to their short stay. Inhabitants and entrepreneurs on the other hand can perceive this cultural enrichment over time, especially because the Lauwersmeer area has slowly developed into a recreational and touristic area since the closure of the Lauwerszee in 1969 (Lauwerszee werd Lauwersmeer in 1969, n.d.; Visit Groningen, n.d.). Therefore, locals and especially tourism entrepreneurs, of which many were present at the participation evening, might have perceived the cultural effects of this transition over time. Furthermore, according to the first expert, the difference between the perception of cultural and ecological values between visitors and inhabitants is influenced by inhabitants looking at the Lauwersmeer area from a broader perspective than visitors:

#### **Expert 1**

*“I think it is also very important how people simply experience their own living environment, because they are residents and people in this area. What I find striking about this is that... There is quite a large nature challenge, also in this area. Also, for the future, but also now, indeed because of a decline in ecological diversity. And what I think when I see this [the different matrices] is that visitors really come here for that nature, so they also have a much better view of that. A resident, they live here, they work here, and therefore also have a different focus. In that sense, they also look much more broadly at the area, and they think ‘yes, nature is also another aspect that plays a role here’.”*

That inhabitants and entrepreneurs view the ecological future value as neutral, does therefore not mean that locals observe an ecological decline or stagnation. Especially when it comes to the Lauwersmeer national park and natura2000 area, decline or stagnation are not an issue (Natuur & Landschap - Nationaal Park Lauwersmeer, 2023). The interpretation of expert 1 – the ecological future value might simply not be of as much importance as other interests – thus seems to be the most logical explanation. Another quote indicates this:

#### **Expert 1**

*“There is a lot of opposition from the area against all kinds of nature measures. Think about the reed trial, how much resistance there was from the area. That also had all kinds of other reasons, but that also has to do with an area of interest.”*

In the expert interviews, the reed trial emerged as important background information. The reed trial was a trial from natura2000 for which the provinces are responsible. The idea was to do a six-week trial in which the water level was temporarily raised to see the effect of that on reed growth. As well as letting the area get used to a more dynamic water level management. However, there was great resistance from the public, who were demonstrating against the reed trial. To prevent a similar situation from happening when a similar conflict started to emerge over the chloride standard that follows the Water Framework Directive, the waterboard started an area development process. In this process, the aim was to help the divide between agriculture and the public on the one hand and nature on the other fade away. The current area development process followed.

When comparing the matrices for visitors and inhabitants and entrepreneurs, the first expert sees the same sentiment, in which there still is resistance against nature measures. The third expert however, based on the combined matrix and the overall positive sentiment toward ecological spatial quality, states:

### **Expert 3**

*“It is very clear that there are no negative aspects at all. And that's because of the current area process, I think. In any case, it is the value of information [given to the public] which I think we see here. There really is a kind of a momentum of uhm... It looks good. Currently, there is no [sentiment] of ‘the government coming along, and this has to be done and that must be done’. As it has been a few years ago, of course, with the reed trial. Well, that was really uh... Well, I don't see that sentiment here, in this result.”*

What is important to note is that although there are multiple differences between the matrices, the only difference in spatial quality as perceived by visitors versus entrepreneurs and inhabitants is that of the ecological future value (see chapter 4.4.) Visitors perceive the ecological future value to be present more often than inhabitants or entrepreneurs. What is interesting however is that men perceive the presence of ecological use value and ecological future value more often than women (see also chapter 4.4.). As men are overrepresented in the visitor sample, it might be that the relationship found between the perceived presence of ecological future value and being a visitor or local is influenced by gender.

There are however correlations between self-assessed area knowledge and the perceived spatial quality. An increase in area knowledge is statistically related to the perceived presence of ecological use value, social experiential value and cultural future value. Although these relationships are weak, an attempt at explaining them will be undertaken.

The relationship between area knowledge and the perceived presence of ecological use value can be explained given the history of the area. Due to the closure of the Lauwers Sea and subsequent creation of the lake for safety reasons (Natuur & Landschap - Nationaal Park Lauwersmeer, 2023), it might be that people that know the area well are more aware of the current ecological functioning of the area. As well as how this contributes to the area's safety and the rare nature found here (ibid). Therefore, they may perceive the presence of ecological use value more than others.

The social experiential dimension of spatial quality can be interpreted as place attachment – the bonding that occurs between individuals and their meaningful environments (Scannell & Gifford, 2010) – because this value is about feeling connected to and safe in an environment, as well as equal to the people in this environment. When it comes to place attachment, there is only a limited amount of accumulated knowledge on whether factors are an antecedent or a consequence of place attachment (Korpela, 2012). Therefore, it is possible to interpret the causality of the positive relationship between perceived social experiential value and self-assessed area knowledge in two ways. Namely, either, as one gets to know the area better, one feels more connected to it, or, as one feels more connected to the area and its people, one gets to know the area better.

Cultural future value is about the extent to which there is heritage present in the area, as well as the extent to which new elements are integrated in the current landscape. It is likely that people with more area knowledge spend more time in the area. They therefore might be more familiar with both the area's heritage as well as how, over the years, new elements have been integrated in the landscape. Therefore, they might be able to better estimate the future

cultural spatial quality of the area. As this relationship applies to people with a better area knowledge, it is likely that returning visitors develop a broader view of the Lauwersmeer area as well. Over time, they may not just visit the area for its nature, as indicated by the experts, but for its culture as well.

Overall, this section illustrates the importance of the inclusion of different viewpoints when determining an area's subjective spatial quality, as the background of respondents influences how they perceive the area's quality. This can be due to a recent event colouring the respondent's focus (e.g., the reed trial), or due to socio-demographic factors and geographical origin.

### **5.3.2. Interpreting the clusters**

In this section, the clusters presented in chapter 4.3.2. will be discussed. When interpreting the clusters, it is important to keep in mind the Hooimeijer matrix and whether each description has been understood. Therefore, an important observation is that the cluster's spatial quality value does not always match with the activities undertaken here or the substantiation added by the respondents.

Take for example the Ballastplaatsbos cluster. Respondents mentioned that the Lauwersnest activity centre is located here and that they would meet other people here, would cycle or walk in the area, or undertake different activities at the centre. Furthermore, the Ballastplaatsbos was described as a combination of forest, water, and a wide-open landscape, meeting each other. From this, one would think that the cluster would appear for the cultural use value (recreation and encounters) and the ecological experiential value (the beauty of the landscape). The cluster however only appeared for social and ecological use value. It is not necessarily a surprise that these values could also be linked to the area, because different habitats are connected (ecological use value) and the abundance of well accessible cycling paths (social use value). However, it is a surprise that the other values are not linked to the cluster, given the other information obtained from the respondents. Another surprising cluster was that of the village of Anjum. Specifically, the mentioning of the supermarket. This facility was not valued because you can buy groceries here, but because it is a place to meet other locals. Therefore, it seems that the supermarket plays an important role in place attachment and would thus be linked to social experiential value (Scannell & Gifford, 2010; see chapter 5.3.1.). The cluster however is linked to social use value, which is about access and an equal division of costs and benefits.

Additionally, it is notable that only the different use values and the ecological experiential value are clustered. It is comprehensible that future values are likely to be difficult to attach to the current landscape, and therefore do not form clusters. The lack of mapped experiential value clusters, however, is surprising. For example, due to the many cafés and restaurants in the Lauwersoog harbour that serve freshly caught fish with a view of the Waddensea, it was expected that economic experiential value would have been clustered here, which it is not.

These examples provide ground to question whether respondents have understood each value's description. As it seems that respondents might have mixed up the cultural and social themes and the use and experiential values. It is likely that respondents understood each separate value when each was presented to them separately (see chapter 5.2.1.), as is the case in the first section of the maptionnaire. But that they started to mix up the different meanings when asked to assign one or multiple values from the list to each mapped point. Again, operationalising spatial quality using table 2 rather than table 3 (using aspects for each

value rather than descriptions) may lead to better results, as this gives the respondents a more concise overview.

When it comes to the locations of the mapped clusters, the first thing that stands out is that although the Lauwersmeer area has been defined by an 11-kilometre buffer around the national park, the identified clusters are located either within or closely next to the national park (see figure 5). One of the challenges previously identified by the parties working on the future agenda, is the need for a better connection between the national park and the surrounding area, both in term of infrastructure, but as well in terms of connectedness. The experts interpret the pattern of clusters identified by this study as a confirmation of this:

### **Expert 2**

*“We have said in the future agenda that you should do something with a kind of landscape plan, right? So, then you do not only look at the national park itself, but also at the husk around it and see which elements from this shell, for example landscape elements and cultural-historical elements, you could emphasize or improve. And you should also look in that shell at route structures between the villages and the Lauwersmeer itself, don't you? I think that would be very valuable, especially now that I see that the husk around the park is not mentioned.”*

### **Expert 3**

*“It [the absence of clusters in the husk] does say something about the Lauwersmeer area: that is focuses on the Lauwersmeer itself. .... And that people apparently do not feel directly connected to Lauwersmeer. So, like 'I'm not putting down a positive point of the Lauwersmeer area here [village in the shell], even though I do experience positive spatial quality here [because it does not relate to the lake]'.”*

However, the second expert made an important note about another possible reason why this pattern might emerge:

### **Expert 2**

*“It may also be because you have some kind of colour scheme in your map [two lines, one surrounding the National Park, and one indicating the whole area, including the husk]. I don't know if it would've made a difference, but if you only had one outer line surrounding the whole area, ... than the area also looks bigger, right?”*

Thus, the use of two lines that was meant to make clear to respondents how the Lauwersmeer area was defined in this study, might have influenced the outcomes.

The experts think that the connection with the Wadden sea is also something that needs to be improved. Not only physically, as is the long-term plan with a new fresh- and saltwater transition that is planned in the context of the Water Framework Directive (Waterschap Noorderzijlvest, 2021a). But the experienced connection as well. This is not a new idea. In 2020, bleachers were built on the sea dike as part of the project ‘Rondje Lauwersmeer’, in which the 43-kilometre-long cycling and walking route around the lake has been upgraded (Waddentribune open voor wandelaars, 2020). The idea behind the bleachers was to connect the sea to the area. Additionally, education of both visitors and inhabitants about the Lauwersmeer's historical connection to the sea is planned to be increased. Respondents did mention the connection to the Wadden sea for the Lauwesooig Harbour cluster, from which the boat to the island of Schiermonnikoog departs. Additional to the boat,

the view of the sea and the importance of this cluster for fishery were mentioned. But given the area's history and location, the number of times the Wadden sea was mentioned is considered scant:

### **Expert 1**

*"...It [the scantness of mentioning of the Waddensea at other places than the harbour] strikes me, because we are very busy with good examples of how the Lauwersmeer can be better connected to the Wadden sea. For nature especially, but also in terms of economic use. But there is also a clear division, also on the map. This is salt water, that is fresh water. But there are many opportunities to improve that. So, when I look to the future I think, 'maybe we should pay more attention to that in this area as well'. How the lake can be connected the broad improvement of the Wadden sea as well. Like the fresh- and saltwater transition. ... But we also do all sorts of things for recreation on the dike, with grandstands and cycle paths. And it strikes me that nothing is mentioned about that."*

Additional to the cluster pattern, each cluster location was discussed with the experts. Overall, the clusters and locations were recognisable for the experts. However, the experts thought some were missing. The missing cluster locations are visualised in figure 16 by the red circles. For example, the Esonstad holiday village (see figure 17) was not mentioned enough to form a cluster. This is remarkable, as this location provides many facilities to both visitors and inhabitants. Additionally, the second expert remarked:

### **Expert 2**

*"I think you can really have opinions about it [Esonstad]. You have people who love Esonstad, with its historicising character. While on the other hand, people are sometimes horrified by that style, because it is actually fake. I expected something about that, but you don't have a cluster there at all. [...] But that can also say something about the people who completed the survey, and the visitors to Esonstad. [...] I think the tourist here is different from the rest of the area? Landal Suyderoog, for example, is very different. The nature tourist really visits that park. I can also imagine that even more nature enthusiasts will flock there. Than Esonstad is a slightly different target group. [...] And you don't have to leave the park. Almost. You have the pool there, and many activities and facilities in and around Esonstad."*

Esonstad might not be mapped because the visitors here do not really leave the park and go discover what the Lauwersmeer area has to offer. With such limited area knowledge, it is difficult to fill in the maptionnaire.

According to the experts, another area important area missing a cluster is the Marnewaard (see figure 18). This is a military training ground, which is open for recreation when the military is not training. This is quite a large area which is characterized by extensively used grassland, contrary to the often intensively used grassland in the Netherlands. The area therefore harbours bird species that struggle to survive in other agricultural rural areas, such skylarks, Montagu's harriers, rough-legged buzzards and short-eared owls (Marnehuizen, n.d.; Nature Today Netherlands, 2013). Due to these special characteristics, it is quite interesting that this area has not been mapped. Explanations could be:

### Expert 1

*“But it [the absence of a cluster] doesn’t really surprise me. The military approaches the Marnewaard as a kind of... How do you say that? Shielded area. Which happens to officially also have a recreational function. [...] I think this shows that their strategy [toward the public] does work.”*

### Expert 3

*“And what this [the absence of a cluster] is evidence for is that this area [Marnewaard] has not been properly developed at all. It actually doesn’t fit in with the National Park at all. [The Marnewaard] is isolated from its surroundings and is not really very accessible.”*



Figure 16. Missing clusters (circled in red) as identified by experts. Made by author using QGIS 3.2.8. and Affinity Designer.





Figure 97. Impression of holiday park Esonstad. Source: Landal GreenParks (n.d.)



Figure 18. Impression of the Marnewaard. Sources: Ontdek Noord Groningen (n.d.) (left) & Omroep het Hogeland (2023) (right)

To summarise, future values are not only hard to judge, but also difficult to map. Furthermore, respondents might have mixed up the social and cultural themes as well as the use and experiential values. However, the locations of the clusters still seem to indicate that the public either does not perceive the husk to be part of the Lauwersmeer area or that the husk is not properly connected to the national park. Although the cluster locations might be influenced by the line on the map indicating the national park. Additionally, it seems the Waddensea is not well-connected to the lake also. Furthermore, the experts do recognise the clusters and their locations. But noted that it is interesting that Esonstad and Marnewaard are not clustered.

#### 5.4. The contribution of the results to the Lauwersmeer area development process

It is interesting to reflect upon the expert interviews, the Lauwersmeer area development process, and the position of spatial quality in this process in the light of chapters 2.1.3. and 2.2.2. In these chapters, the landscape change process and the intersubjective nature of spatial quality were introduced. In summary, these chapters argued that to enhance the value of landscape through change, it is necessary to establish targets (Termorshuizen et al., 2007).

This involves understanding how landscape functions relate to ecological, social, and economic interests (Termorshuizen & Opdam, 2009). Cultural interests can be added to this (Hooimeijer et al., 2001). These interests, as well as the values that need to be enhanced through landscape change are captured in the spatial quality operationalisation based on the Hooimeijer matrix. Janssen-Jansen et al. (2009) add to this the process of how one comes to establish the necessary targets for landscape change. They consider spatial quality to be an intersubjective concept that incorporates both subjective and objective features. The subjective aspect is related to personal preferences, culture, and time. And is thus about spatial quality as perceived by individuals. This is what has been aimed to capture in this study by using PPGIS. The objective aspect than is achieved by setting objectives, norms, and criteria that can be enforced. These criteria serve to maintain a certain, measurable, level of spatial quality. In Lauwersmeer case, the objectives will be set in the future agenda (ibid). The intersubjectivity than lies in the process of moving from subjective preferences (the spatial quality identified in this study) to objective goals (ibid). In the case of the Lauwersmeer area development process, the objective goals for landscape transformation are the goals set in the future agenda. Individual preferences need to be morphed into a shared agreement of what the spatial quality of an area is, and how it should be improved (ibid). The original set up of this research than was to contribute to the contents of the future agenda. However, the sessions in which (the first version of) the future agenda has been established took place prior to and during this research.

To sketch the latest stages of the Lauwersmeer area development process: The Steering Committee Lauwersmeer is bundling challenges that must be addressed in a future agenda. The steering committee aims to work integrally, and eight different parties – waterboards, provinces, municipalities, and nature organisations – work together to now identify and later solve these challenges. The committee is mostly split into two teams, one focusing on water, nature, and climate, and one focusing on national park, sustainable economy, and tourism. In two expert sessions, these teams came together to sketch out the first version of the future agenda. In a participation evening, this version has been fed back to the public. Feedback from the public in turn will be fed back to the steering committee soon, at which point the future agenda can be finalised, and again be communicated back to the public.

From the perspective of landscape change through spatial quality, this research should have been executed prior to the expert sessions, as this study identified the subjective spatial quality of the Lauwersmeer area. Although experts were not explicitly presented with this thought, they were asked how they thought this research contributes to the future agenda and Lauwersmeer area development process in general. Their answers do point toward confirmation, as they think the study results provide a good overview of the current spatial quality:

#### **Expert 2**

*“...Now you have a kind of baseline measurement [of perceived spatial quality].”*

#### **Expert 1**

*“People have mainly looked at the experiential value or the use value of the current situation and it is difficult for them to look at that future value. And the future agenda is about the future. But I think [these results] are very valuable for properly describing the current situation. And what do we do as specialists, ... we look very much from the 'future' box. And*

*this really gives, well, the economic and ecological experiential [and use] value of the residents and visitors and entrepreneurs of this area. We really didn't get that with that future agenda."*

The above quote also demonstrates that the ability of the public to judge future values is questioned (see also chapter 5.3.), as well as the idea that judging future values is a role for the specialist. This discourse might explain why in the Lauwersmeer area process, experts took the initiative to set the future agenda, which was assessed by the public in later stages.

The roll of the expert as the being the one who interprets the area's future values and the one that sets the targets for landscape change can be questioned. Oudes & Stremke (2020) performed a literature review on spatial quality three in large-scale landscape transformation projects. The literature showed that spatial quality was addressed in all three cases using use value, experiential value, and future value. However, the latter received the least attention. Furthermore, participation was limited in these cases, and participation strategies were somewhat limited to consultation and informing (ibid). Thus, even in expert-led landscape change processes, future value seems to be neglected.

Overall, future value seems to be neglected in this research and the future agenda is already almost finished. This limits the practical implications of this research to the future agenda and Lauwersmeer area development process. However, experts did see a role of this research in the area development process as well as for other applications. It was mentioned that the results provide a full and useful overview of the perceived spatial quality of the Lauwersmeer area on the basis of which advice for landscape transformation can be given:

**Expert 1**

*"This [combination of PPGIS and spatial quality] is of course ideally suited to be able to work area-oriented."*

**Expert 1**

*"These [explanations of the results as reflected upon in the expert interview] are also perfect advice that you could give [to the Lauwersmeer area development process parties]."*

Additionally, this study can be used in the future to evaluate whether the Lauwersmeer area development process has been successful:

**Expert 2**

*"Suppose you are working on executing the future agenda and you pick a number of points from it, and you make a landscape plan accordingly and then execute that within the husk [of the Lauwersmeer area]. How will it be in ten years? You would conduct your research again and reflect on whether the changes have made a difference [in the overall perceived spatial quality of the Lauwersmeer area]."*

Furthermore, the ability to ask locational questions using PPGIS as well as the subsequent map-based results are seen as powerful, both in general and when it comes to letting the public think along with specific problems:

**Expert 2**

*"It's great that you now have insight into it [responses] on maps, otherwise we often just have insight into what has been said in text. That's the big difference [between PPGIS and*

traditional participation methods or surveys] *actually. And that does add something. ... Which areas are mentioned most often? Both positively and negatively. That's what I find most interesting about the results.*"

### **Expert 3**

*"What we talked about is that you kind of steer them [the public] in solution directions. For example, 'Where do you want that building to go?' you can let them think along with that."*

The core of this discussion is that the Hooijmeijer matrix has limitations when it comes to applicability in practice. Additionally, the subsequent operationalisation of spatial quality used in this study is complex. This may have led to lower response rates as well as mix-ups, as respondents may have mixed up the social and cultural themes as well as the use and experiential values. Furthermore, future values are not only hard to judge, but also difficult to map. However, the use of PPGIS for identifying subjective spatial quality, leads to a good overview of the Lauwersmeer area's spatial quality. For the Lauwersmeer case, it can be concluded that the overall spatial quality is good. Moreover, PPGIS helps identify the multiple places in the Lauwersmeer that contribute to this spatial quality, as well as the places that detract from it. Mapped subjective spatial quality therefore helps to tackle an area development process from an area-oriented and integral perspective, and based on the results advice on landscape transformation can be given. For example, the locations of the clusters still indicate that landscape development is needed in the husk, to better connect it to the national park. Moreover, the mapped subjective spatial quality can serve as a baseline on which to refer to when evaluating the area development process. Most importantly, Although the use of PPGIS does not lead to a more diverse audience in terms of socio-demographic factors, the use of PPGIS still contributes to the participation process. Namely, due to the opportunity it provides to reach more people and thus a broader audience. The importance of this emphasized by the fact that not only socio-demographic factors influence perceived spatial quality. Geographic origin and self-assessed area knowledge influence which values are perceived to be present in the area as well.

## 6. Concluding remarks

### 6.1. Answering the main research question

In this study spatial quality is operationalised in the context of the landscape transformations needed in the Netherlands, as identified in the NOVI. Therefore, the operationalisation relates to the notion of intersubjective spatial quality as introduced by Janssen-Jansen et al. (2009). They argue that subjective landscape values as perceived by landscape users need to be morphed into objective goals for landscape transformation based on shared agreement. As different users tend to have different value expectations of landscapes, including a variety of actors in assessing subjective spatial quality is key in managing landscape change (Janssen-Jansen et al., 2009; Kahn et al., 2014). However, to further understand what spatial quality is, or which (perceived) landscape values relate to it, an operationalisation of the concept is needed. This study uses the matrix introduced by Hooimeijer et al. (2001). The Hooimeijer matrix makes a distinction between values – use, experiential, and future value – and societal interests – economic, social, ecological, and cultural. This results in twelve different values. Each of which was provided a description based on aspects to spatial quality mentioned in the literature.

The current operationalisation is limited due to the use of descriptions for each spatial quality value, as this leads to lengthy and difficult to understand questions for respondents. Despite these limitations however, using the Hooimeijer matrix as a base for operationalising spatial quality is helpful, as the distinction between use, experience, and future value provides a nice palette of the present and the future, as well as ration on the one hand and feeling on the other. Additionally, the inclusion of the four societal interests provides a good base for working integral and area-oriented, although the current value meanings lead to some confusion for institutions on whose responsibility it is to improve a certain value. Therefore, the matrix can be taken as a base for operationalising spatial quality. If needed, adjustments than can be made to the matrix to better fit the reality of planning practice. Furthermore, respondents can be presented with the matrix of table 2, rather than table 3, as using aspects for each value rather than descriptions may lead to better results, because this gives the respondents a more concise overview.

Moreover, the use of the spatial quality concept combined with PPGIS can aid landscape transformation processes, as this method provides a good overview of an area's current subjective spatial quality. First, the Hooimeijer matrix can provide a concise and clear overview of an area's overall spatial quality as perceived by the public. Then, using PPGIS, this matrix can be substantiated on by capturing the landscape elements that contribute to or detract from this spatial quality, which are visualised by mapped clusters. This visualisation of an area's spatial quality can be used, according to experts, to give advice on landscape transformation or to evaluate the success of a landscape transformation project as it has finished (by conducting a second study and evaluating whether the perceived spatial quality has improved).

PPGIS also provides opportunities for landscape transformation processes in term of participation. It was argued that including a variety of actors in assessing subjective spatial quality is key in identifying spatial quality and managing landscape change (Janssen-Jansen et al., 2009; Kahn et al., 2014). Therefore, public participation is needed. Traditional participation methods however often reach a limited number of people and are subject to problems regarding the representation of different societal groups (Kleinmans et al., 2015).

Therefore, PPGIS is applied for identifying spatial quality in this study, as this method is theorised to solve the problems of traditional participation by reaching a larger and more diverse audience (Jankowski et al., 2022; Kahila-Tani et al., 2016; Lin & Kant, 2021). However, it was found that when applying PPGIS for identifying spatial quality in the Lauwersmeer area, an audience is reached that is similar to the image of the highly educated middle-aged man that participates in traditional participation methods (Dezeure et al., 2008). This is especially true when including the visitor sample, as for visitors, respondents were more often male. Whereas, in the sample for inhabitants and entrepreneurs, this gender gap is less present. Despite these limitations, it was found that the PPGIS method still contributes to the participation process due to its ability to reach a larger audience that includes people that are not always included. In this case, that is the inclusion of visitors of the Lauwersmeer area in the area development process.

PPGIS can thus enable public participation by mapping citizen's views on spatial quality in landscape transformation processes in multiple ways. Firstly, by including a larger audience in the participation process. And secondly, by providing a useful, complete, visual overview of a landscape's subjective spatial quality, which then form the basis for objective goals in landscape transformation.

## **6.2. Policy recommendations**

Although the results of this study provide a good and useful overview of the Lauwersmeer area's perceived spatial quality, it was found that the contribution to the Lauwersmeer area development process will be limited. This can be explained by the fact that this study identifies *subjective* spatial quality, while the Lauwersmeer steering committee is already working on the *objective* spatial quality by setting goals for landscape transformation in the area's future agenda. A policy recommendation based on the results of this study and following the NOVI, is to use PPGIS for identifying spatial quality as the first step in landscape transformation processes. This can then be followed up with another participation opportunity, in which experts and the public can morph the findings into objective goals for landscape transformation, based on the model presented by Janssen-Jansen et al. (2009).

## **6.3. Theoretical and methodological reflection**

### **6.3.1. Limitations to the analysis**

As has been touched upon in different chapters of this paper, there are limitations to the analysis. Firstly, the lack of data on the origin of respondents prohibited the evaluation of the spatial representation of the sample, which is relevant for more than just population representation reasons. During the area development process expert sessions and participation session, it became clear that on the Groningen side of the Lauwersmeer, more facilities exist. It might therefore be that Frisians have a different perspective on the Lauwersmeer area's spatial quality than people from Groningen. This cannot be tested in this study.

Secondly, there are limitations to the operationalisation of spatial quality. The aim of providing descriptions to each type of spatial quality was to add to the understanding of the term spatial quality and add to the existing body of literature, as well as making each aspect easier to grasp for respondents. Although the first part of this aim might be achieved – ultimately, it is for other scholars to judge this – the second part of the aim seems to be

missed, as reflected upon earlier. Future research can test whether using the matrix with keywords leads to better results. Another option would be to use offline PPGIS additionally to online PPGIS, this way spatial quality values can be explained to respondents in case they have questions.

Third, due to the limited time frame of this study, an informed decision had to be made on which experts to interview. These experts had leading roles in the Lauwersmeer area development process. However, it would have been interesting to include an expert from a nature organisation, as their perspective on spatial quality may be different. Like the technical water management view, they may want to introduce a separate ecological value focussing on nature. It is also expected that they would want to include nature values from the perspective of nature, rather than people experiencing nature as is the case when operationalising spatial quality from a subjective point of view as has been done in this study.

### **6.3.2. Contribution to the scientific debate**

This study contributes to the scientific debate by discussing the operationalisation of spatial quality using descriptions of each value of the Hooimeijer matrix (see table 3) and setting this operationalisation in the perspective of intersubjective spatial quality (Janssen-Jansen et al., 2009). By doing so, this study adds to the work of Hooimeijer et al. (2001) and Janssen-Jansen et al. (2009). Furthermore, this study contributes to the scientific debate by offering a definition of what makes a space qualitative or not. Which, according to Kahn et al. (2014), is lacking. Moreover, this study does not only offer a definition of spatial quality, but also a tool for mapping an area's subjective spatial quality. By using PPGIS for mapping the perceived spatial quality, this study adds to the body of literature discussing the possibilities and limitations of PPGIS and other e-participation methods as well. It was shown that, although using PPGIS for identifying spatial quality in the Lauwersmeer area development process does not lead to a more diverse audience, it does lead to a broader audience being included. This adds to research such as that of Jankowski et al., (2022); Green, (2010); Few et al., (2006); Dunn, (2007); Kleinhans et al., (2015); and Lin & Kant, (2021). Furthermore, the visual character of PPGIS was shown to be suitable for identifying spatial quality as well, which adds to research that discusses the power of PPGIS for capturing landscape values, such as that of Kahila-Tani et al., (2016); Fagerholm et al., (2019); Laatikainen et al., (2017); Brown, (2017); and Brown & Kyttä, (2018).

### **6.4. Suggestions for further research**

Based on the results and reflections, recommendations for future research can be made. Firstly, it is recommended that similar research will be done using different case studies, to provide a more conclusive and generalised answer to the main research question and discover whether PPGIS for identifying spatial quality provides the same opportunities for landscape development and participation elsewhere. For example, as differences were found in the respondent profile between visitors and inhabitants and entrepreneurs, a conclusive answer to 'who is reached when applying PPGIS for identifying spatial quality?' has not been found yet. To help fill this research gap, future research can be done applying this methodology in different regions or landscape transformation projects.

Additionally, it was found that the descriptions of the twelve values of spatial quality are not optimal, leading to the idea that using the Hooimeijer matrix combined with a short explanation of each cell's meaning using key words, might lead to better results (see table 2 as an example). Therefore, in future research, this hypothesis can be tested.

## **6.5. Personal reflections by the author**

Writing a master thesis is a long and difficult process. It started with a clear idea. During the bachelor thesis, an interest for PPGIS was discovered. Additionally, it was found that PPGIS is not applied much in the real-world yet. However, it had been used in research and in the bachelor theses to assess perceived landscape values. This brought on the idea that it would be interesting to assess its power when it comes to perceived spatial quality. The challenge, however, was to find a decentral governmental organisation like a waterboard, province or municipality that agreed with this vision and subsequent research questions. Additionally, that organisation had to be working on an area process in which spatial quality played a role in the timeframe in which my research had to take place. Moreover, this governmental organisation had to agree to let me execute my research. Britta Restemeyer, one of my supervisors, lend me her network to find such an organisation. Which after a few months of emailing different parties (done by both me and Britta), led to Waterboard Noorderzijlvest. They in turn, introduced me to the Province of Groningen as well. Due to this long process, I was quickly behind on my research planning. Additionally, due to my work, I had less time to spend on my research than was needed. Therefore, the deadline was extended, leading to me to writing this reflection in August 2023.

As one can image, this research process has taught me a lot about time management. Additionally, lessons were learned on setting priorities, as I quit my job in July to able to fully focus on finishing this thesis over the summer. Moreover, I learned to value taking a break. Not only because breaks are nice, but also because they help provide the energy and inspiration needed to carry on with the long and difficult process that is writing a master thesis.



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## Appendices

### Appendix A. Descriptions of spatial quality and accompanied examples used in the Maptionnaire

#### Part A – Original Version (Dutch)

	<b>Economische doelmatigheid</b>	<b>Sociale Rechtvaardigheid</b>	<b>Ecologische duurzaamheid</b>	<b>Culturele identiteit</b>
<b>Gebruik</b>	<p><b>Economische gebruikswaarde</b> gaat over de mate waarin voldoende verschillende economische functies in het gebied elkaar aanvullen of versterken. Bijvoorbeeld, naast de camping die u bezoekt, staan een ijssalon en een restaurant. Voor u vullen deze functies elkaar goed aan en u mist niet nog een andere service.</p>	<p><b>Sociale gebruikswaarde</b> gaat over de mate waarin het gebied toegankelijk is voor elk individu. Bijvoorbeeld, u heeft toegang tot het gebied en verschillende activiteiten in het gebied, zoals zeilen. Of als rolstoelgebruiker kunt u de voetpaden goed gebruiken.</p>	<p><b>Ecologische gebruikswaarde</b> gaat over de mate waarin het gebied te gebruiken is, omdat de natuurlijke processen dit mogelijk maken. Bijvoorbeeld, u kunt veilig en prettig wonen in het Lauwersmeergebied, omdat u geen last heeft van (extreme) overlast door overstromingen of droogte. Of u kunt uw boerenbedrijf voeren, doordat er voldoende zoet water aanwezig is.</p>	<p><b>Culturele gebruikswaarde</b> gaat over de mate waarin er ruimte is in het gebied voor recreatieve en culturele activiteiten die leiden tot ontmoetingen tussen mensen. Bijvoorbeeld, u ontmoet mensen tijdens uw bezoek de bibliotheek of u kunt kiezen uit veel verschillende sportverenigingen om u bij aan te sluiten.</p>

<p style="text-align: center;"><b>Beleving</b></p>	<p><b>Economische belevingswaarde</b> gaat over de mate waarin de economisch activiteit in het gebied verbeterd wordt doordat de belevingswaarde hoog is. Bijvoorbeeld, omdat het imago van het haventje goed is, betaalt u graag meer om hier een kopje koffie te drinken. De beleving maakt dat een kopje koffie hier meer waard is voor u dan elders.</p>	<p><b>Sociale belevingswaarde</b> gaat over de mate waarin men zich sociaal veilig voelt, verbonden met de mensen om zich heen en geen hinder ervaart van anderen. Bijvoorbeeld, u als bewoner ervaart geen hinder van bezoekers van het Lauwersmeergebied. Verder voelt u zich fijn in de buurt waar u woont en voelt u zich verbonden met de mensen uit uw dorp.</p>	<p><b>Ecologische belevingswaarde</b> gaat over de mate waarin de ecologie van het gebied bijdraagt aan uw ervaring van het gebied. Bijvoorbeeld, u vindt de natuur mooi of houdt van de rust die u ervaart op het water of in het bos. Het kan ook zijn dat de schone lucht bijdraagt aan uw gezondheid.</p>	<p><b>Culturele belevingswaarde</b> gaat over de mate waarin het gebied een eigen culturele identiteit heeft en de mate waarin u deze terugziet in de 'eigenheid' van de omgeving. U kunt bijvoorbeeld een dorp herkennen aan een specifieke bouwstijl. Of de identiteit van de omgeving is verbonden met de watersport, wat te zien is aan de vele zeilboten. Denk ook aan natuurlijke elementen, zoals een grote karakteristieke eik, of een inheems koeienras.</p>
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Toekomst</b></p>	<p><b>Economische toekomstwaarde</b> gaat over de mate waarin de economisch activiteit in het gebied toekomstbestendig is. Kenmerken hiervoor zijn de mate waarin het gebied verbonden is met de omgeving en de mate waarin (de mensen in) het gebied in staat zijn zich aan te passen aan of te verzetten tegen veranderingen als dit nodig is. Bijvoorbeeld, doordat het Lauwersmeergebied goed verbonden is met de omgeving, komt u als bezoeker vaker terug. Of u als ondernemer investeert in nieuwe vormen van recreatie, omdat u ervaart dat er daarvoor ruimte is.</p>	<p><b>Sociale toekomstwaarde</b> gaat over de mate waarin lokale en regionale ongelijkheid wordt bestreden, waardoor er sprake is van sociale rechtvaardigheid in de toekomst. Bijvoorbeeld, de prijzen voor huizen of activiteiten in het Lauwersmeergebied blijven betaalbaar voor iedereen. En er wordt gewerkt om paden toegankelijk te maken of te houden voor iedereen.</p>	<p><b>Ecologische toekomstwaarde</b> gaat over de mate waarin natuurlijke voorraden (zoals de voorraad zoet water en de voorraad schone lucht) in stand gehouden of verbeterd worden. Bijvoorbeeld, er is weinig luchtvervuiling en de waterkwaliteit wordt verbeterd.</p>	<p><b>Culturele toekomstwaarde</b> gaat over de mate waarin er erfgoed aanwezig is in een gebied, en de mate waarin nieuwe elementen goed ingepast worden in het huidige landschap. Bijvoorbeeld, er zijn monumentale panden aanwezig, en wanneer er huizen worden gebouwd, worden deze gebouwd in een stijl die past bij het dorp.</p>
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**Part B – English translation**

	<b>Economic</b>	<b>Social</b>	<b>Ecological</b>	<b>Cultural</b>
<b>Use</b>	<p><b>Economic Use Value</b> concerns the extent to which various economic functions in the area complement or strengthen each other. For example, next to the campsite you visit, there is an ice cream parlor and a restaurant. For you, these functions complement each other well, and you don't miss any other service.</p>	<p><b>Social Use Value</b> pertains to the extent to which the area is accessible to each individual. For example, you have access to the area and various activities in the area, such as sailing. Or as a wheelchair user, you can use the footpaths effectively.</p>	<p><b>Ecological Use Value</b> concerns the extent to which the area can be used due to natural processes allowing for it. For example, you can live safely and comfortably in the Lauwersmeer area because you are not affected by (extreme) flooding or drought. Or you can run your farming business due to the presence of sufficient fresh water.</p>	<p><b>Cultural Use Value</b> pertains to the extent to which there is space in the area for recreational and cultural activities that lead to interactions between people. For example, you meet people during your visit to the library, or you have various sports clubs to choose from to join.</p>
<b>Experiential</b>	<p><b>Economic Experience Value</b> concerns the extent to which economic activity in the area is enhanced due to a high experience value. For instance, because the harbor's image is positive, you're willing to</p>	<p><b>Social Experience Value</b> pertains to the extent to which individuals feel socially safe, connected to those around them, and don't experience hindrance from others. For example, as a resident, you don't feel</p>	<p><b>Ecological Experience Value</b> concerns the extent to which the area's ecology contributes to your overall experience. For example, you find the natural surroundings beautiful or enjoy the tranquility you experience on</p>	<p><b>Cultural Experience Value</b> pertains to the extent to which the area possesses a unique cultural identity, and to what degree you perceive this in the distinctiveness of the environment. For instance, you might</p>

	<p>pay more for a cup of coffee there. The experience makes a cup of coffee more valuable to you here than elsewhere.</p>	<p>bothered by visitors to the Lauwersmeer area. Furthermore, you feel comfortable in your neighborhood and connected to the people in your village.</p>	<p>the water or in the forest. Clean air might also contribute to your well-being.</p>	<p>recognize a village by its specific architectural style. Alternatively, the area's identity might be associated with water sports, evident in the numerous sailboats. Think also about natural elements, like a significant characteristic oak tree or a native breed of cattle.</p>
<p><b>Future</b></p>	<p><b>Economic Future Value</b> pertains to the extent to which economic activity in the area is future-proof. Characteristics include the area's connection to its surroundings and the ability of people in the area to adapt to or resist changes as needed. For instance, because the Lauwersmeer area is well-connected to its</p>	<p><b>Social Future Value</b> pertains to the extent to which local and regional inequality is addressed, resulting in social justice in the future. For example, prices for houses or activities in the Lauwersmeer area remain affordable for everyone, and efforts are made to make or keep paths accessible for all.</p>	<p><b>Ecological Future Value</b> concerns the extent to which natural resources (such as the supply of fresh water and clean air) are conserved or improved. For example, there is little air pollution, and water quality is improved.</p>	<p><b>Cultural Future Value</b> pertains to the extent to which heritage is present in an area, and the degree to which new elements are integrated well into the existing landscape. For example, there are historic buildings present, and when new houses are constructed, they are built in a style that suits the village.</p>

	surroundings, you, as a visitor, come back more frequently. Or as a entrepreneur, you invest in new forms of recreation due to perceived opportunities.			
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## **Ruimtelijke Kwaliteit in het Lauwersmeergebied**

Vanwege de stijgende zeespiegel en extremer weer zal er in de toekomst veel veranderen in het Lauwersmeergebied. Waterschap Noorderzijlvest en Provincie Groningen willen hierbij verder kijken dan waterveiligheid. Daarom wordt er onderzoek gedaan naar de ruimtelijke kwaliteit in het gebied en hoe u die ervaart. Zo krijgen we meer inzicht in de kwaliteit die in het gebied aanwezig is en in welke deelgebieden we de kwaliteit zouden kunnen verbeteren in de toekomst, wanneer we werken aan de bescherming van het gebied tegen klimaatverandering. Door mee te doen aan dit onderzoek helpt u de toekomstagenda voor het Lauwersmeergebied te bepalen.

Verder helpt u door mee te doen aan dit onderzoek mij, Marie-Anne Prosman, met afstuderen aan de Faculteit Ruimtelijke Wetenschappen van de Rijksuniversiteit Groningen.

### **Hoe werkt het?**

In deze vragenlijst kunt u als bewoner, ondernemer of bezoeker van het Lauwersmeergebied delen wat voor soort landschap van waarde is voor u. Op de kaart kunt u aangeven welke delen van het gebied u gebruikt, bezoekt of belangrijk vindt voor de toekomst. Over uzelf en de door u aangegeven punten worden vervolgens wat vragen gesteld. Het duurt ongeveer 10 tot 15 minuten om de vragenlijst in te vullen.

Gegevensbescherming en een zorgvuldige omgang met data is essentieel voor wetenschappelijk onderzoek. Uw antwoorden worden vertrouwelijk behandeld, veilig opgeslagen en zijn alleen toegankelijk voor de onderzoeker die bij dit project betrokken is.

Door deel te nemen aan dit onderzoek geeft u aan dat u begrijpt dat:

- uw deelname geheel vrijwillig is;
- uw gegevens vertrouwelijk worden behandeld, o.a. doordat de data anoniem is;
- er geen naar u herleidbare uitkomsten gepubliceerd worden;
- de uitkomsten van de enquête gebruikt kunnen worden in een master thesis, rapporten en presentaties;
- de verstrekte gegevens veilig worden opgeslagen in een wachtwoord beveiligde omgeving.

Ik ben 16 jaar of ouder.

Ik heb bovenstaande informatie gelezen en ga akkoord met deelname aan dit onderzoek.

Voor vragen of opmerkingen kunt u contact opnemen met mij, Marie-Anne Prosman. [m.a.prosman@student.rug.nl](mailto:m.a.prosman@student.rug.nl)



Veel plezier!



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In dit onderzoek willen we het Lauwersmeer breed benaderen. Daarom hebben we het, als we het hebben over het Lauwersmeergebied, over het gebied binnen de rode dikke lijn. De groene smalle omlijning geeft aan wat de grenzen zijn van het nationale park.

Bent u ondernemer, bewoner of bezoeker van het Lauwersmeergebied? Hiermee wordt het gebied binnen de rode dikke lijn bedoelt.

- Ondernemer
- Bewoner
- Bezoeker

In welk jaar bent u geboren?

Wat is uw geslacht?

- Man
- Vrouw
- Ik identificeer mij anders
- Wil ik liever niet zeggen

---

Ruimtelijke kwaliteit is een intuïtief en breed begrip. Om beter te begrijpen over wat voor soort kwaliteiten het Lauwersmeergebied beschikt, hebben we onderscheid gemaakt in verschillende waarden die met ruimtelijke kwaliteit te maken hebben. De komende vragen gaan daarom over de verschillende waarden die u aan het Lauwersmeergebied verbindt.

Op de volgende drie pagina's volgen er omschrijvingen van verschillende soorten waarden in drie categorieën: gebruik, beleving en toekomst. *Lees de omschrijvingen goed.*

Na elke omschrijving geeft u aan in hoeverre u vindt dat deze waarde aanwezig is in het Lauwersmeergebied.

---

### Gebruikswaarde

Er volgen nu omschrijvingen van de vier gebruikswaarden die ruimtelijke kwaliteit beïnvloeden. *Lees de omschrijvingen goed.*

Na elke omschrijving geeft u aan in hoeverre u vindt dat deze waarde aanwezig is in het Lauwersmeergebied.

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**Economische gebruikswaarde** gaat over de mate waarin voldoende verschillende economische functies in het gebied elkaar aanvullen of versterken.

Bijvoorbeeld, naast de camping die u bezoekt, staan een ijssalon en een restaurant. Voor u vullen deze functies elkaar goed aan en u mist niet nog een andere service.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Sociale gebruikswaarde** gaat over de mate waarin het gebied toegankelijk is voor elk individu.

Bijvoorbeeld, u heeft toegang tot het gebied en verschillende activiteiten in het gebied, zoals zeilen. Of als rolstoelgebruiker kunt u de voetpaden goed gebruiken.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Ecologische gebruikswaarde** gaat over de mate waarin het gebied te gebruiken is, omdat de natuurlijke processen dit mogelijk maken.

Bijvoorbeeld, u kunt veilig en prettig wonen in het Lauwersmeergebied, omdat u geen last heeft van (extreme) overlast door overstromingen of droogte. Of u kunt uw boerenbedrijf voeren, doordat er voldoende zoet water aanwezig is.

- Zeer afwezig
- Afwezig
- Neutraal
- Aanwezig

- Zeer aanwezig
- 

**Culture gebruikswaarde** gaat over de mate waarin er ruimte is in het gebied voor recreatieve en culturele activiteiten die leiden tot ontmoetingen tussen mensen.

Bijvoorbeeld, u ontmoet mensen tijdens uw bezoek de bibliotheek of u kunt kiezen uit veel verschillende sportverenigingen om u bij aan te sluiten.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

#### *Belevingswaarde*

Er volgen nu omschrijvingen van de vier belevingswaarden die ruimtelijke kwaliteit beïnvloeden. *Lees de omschrijvingen goed.*

Na elke omschrijving geeft u aan in hoeverre u vindt dat deze waarde aanwezig is in het Lauwersmeergebied.

---

**Economische belevingswaarde** gaat over de mate waarin de economische activiteit in het gebied verbeterd wordt doordat de belevingswaarde hoog is.

Bijvoorbeeld, omdat het imago van het haventje goed is, betaalt u graag meer om hier een kopje koffie te drinken. De beleving maakt dat een kopje koffie hier meer waard is voor u dan elders.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Sociale belevingswaarde** gaat over de mate waarin men zich sociaal veilig voelt, verbonden met de mensen om zich heen en geen hinder ervaart van anderen.

Bijvoorbeeld, u als bewoner ervaart geen hinder van bezoekers van het Lauwersmeergebied. Verder voelt u zich fijn in de buurt waar u woont en voelt u zich verbonden met de mensen uit uw dorp.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Ecologische belevingswaarde** gaat over de mate waarin de ecologie van het gebied bijdraagt aan uw ervaring van het gebied.

Bijvoorbeeld, u vindt de natuur mooi of houdt van de rust die u ervaart op het water of in het bos. Het kan ook zijn dat de schone lucht bijdraagt aan uw gezondheid.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Culturele belevingswaarde** gaat over de mate waarin het gebied een eigen culturele identiteit heeft en de mate waarin u deze terugziet in de 'eigenheid' van de omgeving.

U kunt bijvoorbeeld een dorp herkennen aan een specifieke bouwstijl. Of de identiteit van de omgeving is verbonden met de watersport, wat te zien is aan de vele zeilboten. Denk ook aan natuurlijke elementen, zoals een grote karakteristieke eik, of een inheems koeienras.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

*Toekomstwaarde*

Er volgen nu omschrijvingen van de vier toekomstwaarden die ruimtelijke kwaliteit beïnvloeden. *Lees de omschrijvingen goed.*

Na elke omschrijving geeft u aan in hoeverre u vindt dat deze waarde aanwezig is in het Lauwersmeergebied.

---

**Economische toekomstwaarde** gaat over de mate waarin de economisch activiteit in het gebied toekomstbestendig is. Kenmerken hiervoor zijn de mate waarin het gebied verbonden is met de omgeving en de mate waarin (de mensen in) het gebied in staat zijn zich aan te passen aan of te verzetten tegen veranderingen als dit nodig is.

Bijvoorbeeld, doordat het Lauwersmeergebied goed verbonden is met de omgeving, komt u als bezoeker vaker terug. Of u als ondernemer investeert in nieuwe vormen van recreatie, omdat u ervaart dat er daarvoor ruimte is.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Sociale toekomstwaarde** gaat over de mate waarin lokale en regionale ongelijkheid wordt bestreden, waardoor er sprake is van sociale rechtvaardigheid in de toekomst.

Bijvoorbeeld, de prijzen voor huizen of activiteiten in het Lauwersmeergebied blijven betaalbaar voor iedereen. En er wordt gewerkt om paden toegankelijk te maken of te houden voor iedereen.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Ecologische toekomstwaarde** gaat over de mate waarin natuurlijke voorraden (zoals de voorraad zoet water en de voorraad schone lucht) in stand gehouden of verbeterd worden.

Bijvoorbeeld, er is weinig luchtvervuiling en de waterkwaliteit wordt verbeterd.

- Zeer afwezig
  - Afwezig
  - Neutraal
  - Aanwezig
  - Zeer aanwezig
- 

**Culturele toekomstwaarde** gaat over de mate waarin er erfgoed aanwezig is in een gebied, en de mate waarin nieuwe elementen goed ingepast worden in het huidige landschap.

Bijvoorbeeld, er zijn monumentale panden aanwezig, en wanneer er huizen worden gebouwd, worden deze gebouwd in een stijl die past bij het dorp.

- Zeer afwezig
- Afwezig
- Neutraal
- Aanwezig
- Zeer aanwezig

---

Indien u nog iets kwijt wilt over het begrip 'ruimtelijke kwaliteit' of de ruimtelijke kwaliteit van het Lauwersmeergebied, kunt u het ons laten weten in het tekstvak hieronder.

---

#### *Positieve plaatsen*

**Op deze kaart gaat u invullen welke plaatsen belangrijk zijn voor u. Oftewel, plaatsen die *positief* bijdragen aan de ruimtelijke kwaliteit in het Lauwersmeergebied.**

Denk hierbij aan plaatsen die u bezoekt, gebruikt of speciaal vindt. Bijvoorbeeld, uw favoriete plekje tijdens een wandel- of vaarroute, plekken waar uw (landbouw)bedrijf van afhankelijk is, uw favoriete uitzichtpunt, of waar de meeste vogels vliegen. Het gaat erom dat u de plekken die u aangeeft waardeert omdat u ze gebruikt, beleeft of belangrijk vindt voor de toekomst.

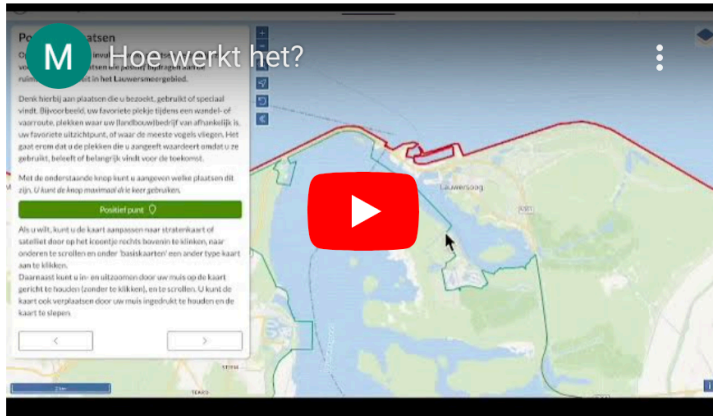
Met de onderstaande knop kunt u aangeven welke plaatsen dit zijn. *U kunt de knop maximaal drie keer gebruiken.*

**Positief punt**

Als u wilt, kunt u de kaart aanpassen naar stratenkaart of satelliet door op het icoontje rechts bovenin te klikken, naar onderen te scrollen en onder 'basiskaarten' een ander type kaart aan te klikken.

Daarnaast kunt u in- en uitzoomen door uw muis op de kaart gericht te houden (zonder te klikken), en te scrollen. U kunt de kaart ook verplaatsen door uw muis ingedrukt te houden en de kaart te slepen.

Hieronder vindt u een video die laat zien hoe dit werkt.



## POP-UP: Positief punt

Omschrijf de fysieke eigenschappen van deze plek in één woord (of een paar woorden).  
Bijvoorbeeld: stroompje; bos; uitzichtpunt; grasland; etc.

Wat doet u op deze plek?

- Andere mensen ontmoeten
- Bedrijfsactiviteiten in de horeca / toerisme
- Bedrijfsactiviteiten in de landbouw / visserij
- Bedrijfsactiviteiten in een andere branche
- Bezoek aan een dorp/dorpen in het Lauwersmeergebied
- Fietsen / wandelen / zwemmen / vissen / spelen / varen / vogels kijken (recreatie)
- Horecabezoek
- Natuur- / waterbeheer
- Natuurstudie
- Tijdelijk verblijf / wonen\*
- Zitten / picknicken
- Anders

Indien u 'anders' heeft geantwoord, kunt u hier kort omschrijven wat u bedoelt.

**\*Let op! Wanneer u wonen ingevuld heeft als activiteit is het belangrijk om te weten dat deze informatie niet gebruikt wordt om uw adres te achterhalen. Verder bent u niet verplicht deze optie te kiezen, en kunt u een minder exacte locatie kiezen om uw pin neer te zetten.**

Hoe waardeert u deze plek?

- Een beetje positief
- Redelijk positief
- Positief

- Zeer positief
- Uiterst positief

Aan welke waarden draagt deze plek bij? Scroll naar onderen voor een herhaling van de uitleg over de verschillende waarden.

- Economische gebruikswaarde
- Sociale gebruikswaarde
- Ecologische gebruikswaarde
- Culturele gebruikswaarde
- Economische belevingswaarde
- Sociale belevingswaarde
- Ecologische belevingswaarde
- Culturele belevingswaarde
- Economische toekomstwaarde
- Sociale toekomstwaarde
- Ecologische toekomstwaarde
- Culture toekomstwaarde

Wilt u nog iets kwijt over dit punt in het landschap?

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### Gebruikswaarden

**Economische gebruikswaarde** gaat over de mate waarin voldoende verschillende economische functies in het gebied elkaar aanvullen of versterken. Bijvoorbeeld, naast de camping die u bezoekt, staan een ijssalon en een restaurant. Voor u vullen deze functies elkaar goed aan en u mist niet nog een andere service.

**Sociale gebruikswaarde** gaat over de mate waarin het gebied toegankelijk is voor elk individu. Bijvoorbeeld, u heeft toegang tot het gebied en verschillende activiteiten in het gebied, zoals zeilen. Of als rolstoelgebruiker kunt u de voetpaden goed gebruiken.

**Ecologische gebruikswaarde** gaat over de mate waarin het gebied te gebruiken is, omdat de natuurlijke processen dit mogelijk maken. Bijvoorbeeld, u kunt veilig en prettig wonen in het Lauwersmeergebied, omdat u geen last heeft van (extreme) overlast door overstromingen of droogte. Of u kunt uw boerenbedrijf voeren, doordat er voldoende zoet water aanwezig is.

**Culture gebruikswaarde** gaat over de mate waarin er ruimte is in het gebied voor recreatieve en culturele activiteiten die leiden tot ontmoetingen tussen mensen. Bijvoorbeeld, u ontmoet mensen tijdens uw bezoek de bibliotheek of u kunt kiezen uit veel verschillende sportverenigingen om u bij aan te sluiten.

### Belevingswaarden

**Economische belevingswaarde** gaat over de mate waarin de economisch activiteit in het gebied verbeterd wordt doordat de belevingswaarde hoog is. Bijvoorbeeld, omdat



het imago van het haventje goed is, betaalt u graag meer om hier een kopje koffie te drinken. De beleving maakt dat een kopje koffie hier meer waard is voor u dan elders.

**Sociale belevingswaarde** gaat over de mate waarin men zich sociaal veilig voelt, verbonden met de mensen om zich heen en geen hinder ervaart van anderen. Bijvoorbeeld, u als bewoner ervaart geen hinder van bezoekers van het Lauwersmeergebied. Verder voelt u zich fijn in de buurt waar u woont en voelt u zich verbonden met de mensen uit uw dorp.

**Ecologische belevingswaarde** gaat over de mate waarin de ecologie van het gebied bijdraagt aan uw ervaring van het gebied. Bijvoorbeeld, u vindt de natuur mooi of houdt van de rust die u ervaart op het water of in het bos. Het kan ook zijn dat de schone lucht bijdraagt aan uw gezondheid.

**Culturele belevingswaarde** gaat over de mate waarin het gebied een eigen culturele identiteit heeft en de mate waarin u deze terugziet in de 'eigenheid' van de omgeving. U kunt bijvoorbeeld een dorp herkennen aan een specifieke bouwstijl. Of de identiteit van de omgeving is verbonden met de watersport, wat te zien is aan de vele zeilboten. Denk ook aan natuurlijke elementen, zoals een grote karakteristieke eik, of een inheems koeienras.

## **Toekomstwaarden**

**Economische toekomstwaarde** gaat over de mate waarin de economisch activiteit in het gebied toekomstbestendig is. Kenmerken hiervoor zijn de mate waarin het gebied verbonden is met de omgeving en de mate waarin (de mensen in) het gebied in staat zijn zich aan te passen aan of te verzetten tegen veranderingen als dit nodig is. Bijvoorbeeld, doordat het Lauwersmeergebied goed verbonden is met de omgeving, komt u als bezoeker vaker terug. Of u als ondernemer investeert in nieuwe vormen van recreatie, omdat u ervaart dat er daarvoor ruimte is.

**Sociale toekomstwaarde** gaat over de mate waarin lokale en regionale ongelijkheid wordt bestreden, waardoor er sprake is van sociale rechtvaardigheid in de toekomst. Bijvoorbeeld, de prijzen voor huizen of activiteiten in het Lauwersmeergebied blijven betaalbaar voor iedereen. En er wordt gewerkt om paden toegankelijk te maken of te houden voor iedereen.

**Ecologische toekomstwaarde** gaat over de mate waarin natuurlijke voorraden (zoals de voorraad zoet water en de voorraad schone lucht) in stand gehouden of verbeterd worden. Bijvoorbeeld, er is weinig luchtvervuiling en de waterkwaliteit wordt verbeterd.

**Culturele toekomstwaarde** gaat over de mate waarin er erfgoed aanwezig is in een gebied, en de mate waarin nieuwe elementen goed ingepast worden in het huidige landschap. Bijvoorbeeld, er zijn monumentale panden aanwezig, en wanneer er huizen worden gebouwd, worden deze gebouwd in een stijl die past bij het dorp.

---

### Negatieve plaatsen

Op deze kaart gaat u invullen welke plaatsen volgens u juist *niet* bijdragen aan de ruimtelijke kwaliteit in het Lauwersmeergebied.

Denk hierbij aan plaatsen waarvan u vindt dat er wat verbeterd moet worden. Bijvoorbeeld, de plek waar u niet meer kunt zwemmen vanwege blauwalg, het weiland waar nog maar weinig weidevogels komen, het uitzicht dat verstoort is, de grond die verzilt is, of het water dat vervuild is.

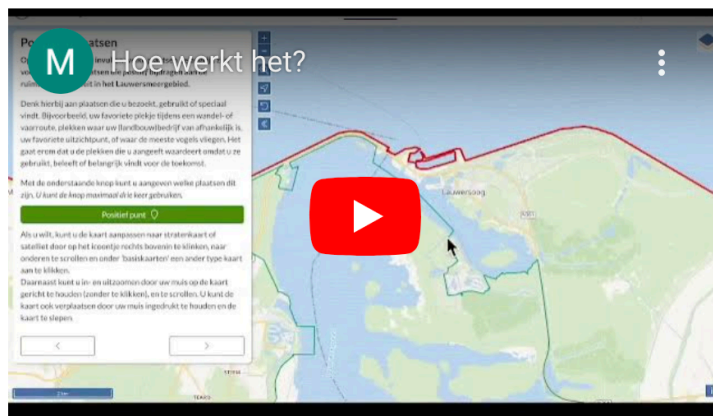
Met de onderstaande knop kunt u aangeven welke plaatsen dit zijn. *U kunt de knop maximaal drie keer gebruiken.*

### Negatief punt

Als u wilt, kunt u de kaart aanpassen naar stratenkaart of satelliet door op het icoontje rechts bovenin te klikken, naar onderen te scrollen en onder 'basiskaarten' een ander type kaart aan te klikken.

Daarnaast kunt u in- en uitzoomen door uw muis op de kaart gericht te houden (zonder te klikken), en te scrollen. U kunt de kaart ook verplaatsen door uw muis ingedrukt te houden en de kaart te slepen.

Hieronder vindt u een video die laat zien hoe dit werkt.



---

### POP-UP: Negatief punt

Omschrijf de fysieke eigenschappen van deze plek in één woord (of een paar woorden).  
Bijvoorbeeld: stroompje; bos; uitzichtpunt; grasland; etc.

Wat doet u op deze plek?

- Andere mensen ontmoeten
- Bedrijfsactiviteiten in de horeca / toerisme
- Bedrijfsactiviteiten in de landbouw / visserij
- Bedrijfsactiviteiten in een andere branche
- Bezoek aan een dorp/dorpen in het Lauwersmeergebied
- Fietsen / wandelen / zwemmen / vissen / spelen / varen / vogels kijken (recreatie)
- Horecabezoek
- Natuur- / waterbeheer
- Natuurstudie
- Tijdelijk verblijf / wonen\*
- Zitten / picknicken
- Anders

Indien u 'anders' heeft geantwoord, kunt u hier kort omschrijven wat u bedoelt.

**\*Let op! Wanneer u wonen ingevuld heeft als activiteit is het belangrijk om te weten dat deze informatie niet gebruikt wordt om uw adres te achterhalen. Verder bent u niet verplicht deze optie te kiezen, en kunt u een minder exacte locatie kiezen om uw pin neer te zetten.**

Hoe waardeert u deze plek?

- Een beetje negatief
- Redelijk negatief
- Negatief
- Zeer negatief
- Uiterst negatief

Welke waarden mist u op deze plek? Scroll naar onderen voor een herhaling van de uitleg over de verschillende waarden.

- Economische gebruikswaarde
- Sociale gebruikswaarde
- Ecologische gebruikswaarde
- Culturele gebruikswaarde
- Economische belevingswaarde
- Sociale belevingswaarde
- Ecologische belevingswaarde
- Culturele belevingswaarde
- Economische toekomstwaarde
- Sociale toekomstwaarde
- Ecologische toekomstwaarde
- Culture toekomstwaarde

Hoe kunnen we van dit negatieve punt een positief punt maken?

Wilt u nog iets kwijt over dit punt in het landschap?

---

## Gebruikswaarden

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**Ecologische gebruikswaarde** gaat over de mate waarin het gebied te gebruiken is, omdat de natuurlijke processen dit mogelijk maken. Bijvoorbeeld, u kunt veilig en prettig wonen in het Lauwersmeergebied, omdat u geen last heeft van (extreme) overlast door overstromingen of droogte. Of u kunt uw boerenbedrijf voeren, doordat er voldoende zoet water aanwezig is.

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## Belevingswaarden

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U kunt bijvoorbeeld een dorp herkennen aan een specifieke bouwstijl. Of de identiteit van de omgeving is verbonden met de watersport, wat te zien is aan de vele zeilboten. Denk ook aan natuurlijke elementen, zoals een grote karakteristieke eik, of een inheems koeienras.

### Toekomstwaarden

**Economische toekomstwaarde** gaat over de mate waarin de economisch activiteit in het gebied toekomstbestendig is. Kenmerken hiervoor zijn de mate waarin het gebied verbonden is met de omgeving en de mate waarin (de mensen in) het gebied in staat zijn zich aan te passen aan of te verzetten tegen veranderingen als dit nodig is. Bijvoorbeeld, doordat het Lauwersmeergebied goed verbonden is met de omgeving, komt u als bezoeker vaker terug. Of u als ondernemer investeert in nieuwe vormen van recreatie, omdat u ervaart dat er daarvoor ruimte is.

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-----  
Om te onderzoeken wie we bereiken met deze online vragenlijst, stellen we u een aantal vragen over uzelf.

Hoe schat u uw kennis van het Lauwersmeergebied in?

- Geen kennis
- Beperkte kennis
- Gemiddelde kennis
- Goede kennis
- Uitgebreide kennis

Wat zijn de cijfers van uw postcode?

Wat is uw hoogst behaalde opleidingsniveau?

In welke sector werkt u?

Indien u 'anders' heeft geantwoord, kunt u hier kort omschrijven wat u bedoelt.

Hoe schat u uw inkomensniveau in?

- Laag
- Gemiddeld
- Hoog

---


*Bedankt voor het invullen van deze interactieve vragenlijst!*


Door mee te doen heeft u geholpen de toekomstagenda voor het Lauwersmeer te bepalen. Ook heeft u de onderzoeker geholpen met afstuderen aan de Faculteit Ruimtelijke Wetenschappen van de Rijksuniversiteit Groningen.

**Wilt u nog meer bijdragen aan dit onderzoek? Deel dan deze questionnaire met familie, vrienden en collega's!**

 Deel op Facebook

 Deel op Twitter

 Deel op LinkedIn

 Deel op Reddit

Wilt u op de hoogte gehouden worden?

Ja, ik wil door de onderzoeker op de hoogte gehouden worden van de resultaten van dit onderzoek.

Ja, ik wil door Waterschap Noorderzijlvest en Provincie Groningen op de hoogte gehouden worden van de verdere ontwikkelingen in het Lauwersmeergebied.

Indien u één of beide opties aangevinkt heeft, kunt u hieronder uw emailadres achterlaten.

## **Appendix C. Maptionnaire: Survey + participatory mapping (English translation)**

### **Spatial Quality in the Lauwersmeer Area**

Due to rising sea levels and more extreme weather conditions, significant changes are expected in the Lauwersmeer area in the future. The Noorderzijlvest Water Board and the Province of Groningen intend to consider more than just water safety in this regard. Therefore, research is being conducted into the spatial quality of the area and how you perceive it. This will provide us with greater insight into the existing quality within the area and which specific areas could potentially be improved in the future as we work on protecting the region against climate change. By participating in this research, you are helping to shape the future agenda for the Lauwersmeer area.

Furthermore, by participating in this research, you are assisting me, Marie-Anne Prosman, in completing my studies at the Faculty of Spatial Sciences at the University of Groningen.

### **How does it work?**

In this questionnaire, as a resident, business owner, or visitor of the Lauwersmeer area, you can share what type of landscape is valuable to you. On the map, you can indicate which parts of the area you use, visit, or consider important for the future. Some questions will follow about yourself and the points you've indicated. It will take approximately 10 to 15 minutes to complete the questionnaire.

### **Data Protection and Careful Data Handling**

Data protection and careful handling of information are essential for scientific research. Your answers will be treated confidentially, securely stored, and accessible only to the researcher involved in this project.

By participating in this research, you indicate that you understand:

- Your participation is entirely voluntary.
- Your data will be treated confidentially, including anonymizing the data.
- No identifiable outcomes related to you will be published.
- The survey results may be used in a master's thesis, reports, and presentations.
- The provided data will be securely stored in a password-protected environment

**0 I am 16 years old or older.**

**0 I have read the above information and agree to participate in this research.**

For questions or comments, you can contact me, Marie-Anne Prosman, at [m.a.prosman@student.rug.nl](mailto:m.a.prosman@student.rug.nl).

Enjoy!



---

In this research, we aim to take a broad approach to the Lauwersmeer area. Therefore, when we refer to the Lauwersmeer area, we are talking about the region within the thick red line. The narrow green outline indicates the boundaries of the national park.

Are you an entrepreneur, resident, or visitor of the Lauwersmeer area? By this, we mean the area within the thick red line.

- 0 Entrepreneur
- 0 Resident
- 0 Visitor

In which year were you born?

What is your gender?

- j Male
- j Female
- j I identify differently
- j Prefer not to say

---

Spatial quality is an intuitive and broad concept. To better understand the qualities of the Lauwersmeer area, we have distinguished various values related to spatial quality. The following questions are about the different values you associate with the Lauwersmeer area.

**On the next three pages, you'll find descriptions of different types of values in three categories: use, experience, and future. Please read the descriptions carefully. After each description, indicate to what extent you believe this value is present in the Lauwersmeer area.**

---

### *Use value*

**Descriptions of the four values of use that influence spatial quality follow. Read the descriptions carefully. After each description, indicate to what extent you believe this value is present in the Lauwersmeer area.**

**Economic Use Value** concerns the extent to which various economic functions in the area complement or strengthen each other. For example, next to the campsite you visit, there is



an ice cream parlor and a restaurant. For you, these functions complement each other well, and you don't miss any other service.

- Very absent
- Absent
- Neutral
- Present
- Very present

**Social Use Value** pertains to the extent to which the area is accessible to each individual. For example, you have access to the area and various activities in the area, such as sailing. Or as a wheelchair user, you can use the footpaths effectively.

- Very absent
- Absent
- Neutral
- Present
- Very present

**Ecological Use Value** concerns the extent to which the area can be used due to natural processes allowing for it. For example, you can live safely and comfortably in the Lauwersmeer area because you are not affected by (extreme) flooding or drought. Or you can run your farming business due to the presence of sufficient fresh water.

- Very absent
- Absent
- Neutral
- Present
- Very present

**Cultural Use Value** pertains to the extent to which there is space in the area for recreational and cultural activities that lead to interactions between people. For example, you meet people during your visit to the library, or you have various sports clubs to choose from to join.

- Very absent
- Absent
- Neutral
- Present
- Very present

---

### ***Experiential value***

**Descriptions of the four values of experience that influence spatial quality follow. Read the descriptions carefully. After each description, indicate to what extent you believe this value is present in the Lauwersmeer area.**

**Economic Experience Value** concerns the extent to which economic activity in the area is enhanced due to a high experience value. For instance, because the harbor's image is positive, you're willing to pay more for a cup of coffee there. The experience makes a cup of coffee more valuable to you here than elsewhere.

- j Very absent
- j Absent
- j Neutral
- j Present
- j Very present

**Social Experience Value** pertains to the extent to which individuals feel socially safe, connected to those around them, and don't experience hindrance from others. For example, as a resident, you don't feel bothered by visitors to the Lauwersmeer area. Furthermore, you feel comfortable in your neighborhood and connected to the people in your village.

- j Very absent
- j Absent
- j Neutral
- j Present
- j Very present

**Ecological Experience Value** concerns the extent to which the area's ecology contributes to your overall experience. For example, you find the natural surroundings beautiful or enjoy the tranquility you experience on the water or in the forest. Clean air might also contribute to your well-being.

- j Very absent
- j Absent
- j Neutral
- j Present
- j Very present

**Cultural Experience Value** pertains to the extent to which the area possesses a unique cultural identity, and to what degree you perceive this in the distinctiveness of the environment. For instance, you might recognize a village by its specific architectural style. Alternatively, the area's identity might be associated with water sports, evident in the numerous sailboats. Think also about natural elements, like a significant characteristic oak tree or a native breed of cattle.

- j Very absent
- j Absent
- j Neutral
- j Present
- j Very present

### ***Future value***

**Descriptions of the four values of the future that influence spatial quality follow. Read the descriptions carefully. After each description, indicate to what extent you believe this value is present in the Lauwersmeer area.**

**Economic Future Value** pertains to the extent to which economic activity in the area is future-proof. Characteristics include the area's connection to its surroundings and the ability of people in the area to adapt to or resist changes as needed. For instance, because the Lauwersmeer area is well-connected to its surroundings, you, as a visitor, come back more frequently. Or as an entrepreneur, you invest in new forms of recreation due to perceived opportunities.

- i Very absent
- i Absent
- i Neutral
- i Present
- i Very present

**Social Future Value** pertains to the extent to which local and regional inequality is addressed, resulting in social justice in the future. For example, prices for houses or activities in the Lauwersmeer area remain affordable for everyone, and efforts are made to make or keep paths accessible for all.

- i Very absent
- i Absent
- i Neutral
- i Present
- i Very present

**Ecological Future Value** concerns the extent to which natural resources (such as the supply of fresh water and clean air) are conserved or improved. For example, there is little air pollution, and water quality is improved.

- i Very absent
- i Absent
- i Neutral
- i Present
- i Very present

**Cultural Future Value** pertains to the extent to which heritage is present in an area, and the degree to which new elements are integrated well into the existing landscape. For example, there are historic buildings present, and when new houses are constructed, they are built in a style that suits the village.

- i Very absent
- i Absent
- i Neutral
- i Present
- i Very present

---

**If you have anything else to share about the concept of 'spatial quality' or the spatial quality of the Lauwersmeer area, please let us know in the text box below.**

---

## Positive Locations

**On this map, you will indicate which places are important to you. These are places that positively contribute to the spatial quality in the Lauwersmeer area.**

Think of places you visit, use, or find special. For example, your favorite spot during a walking or boating route, places your (agricultural) business depends on, your favorite viewpoint, or where most birds fly. The goal is to identify places that you appreciate because you use them, experience them, or consider them important for the future.

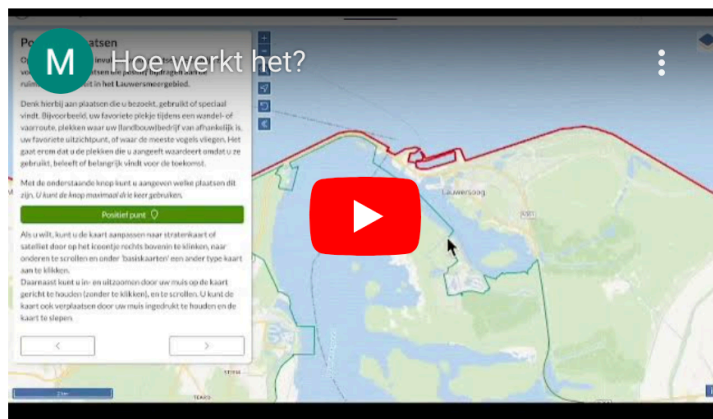
With the button below, you can indicate which places these are. You can use the button up to three times.

### Positief punt

If you wish, you can adjust the map to a street map or satellite view by clicking on the icon in the upper right corner, scrolling down, and selecting a different type of map under 'base maps'.

Additionally, you can zoom in and out by hovering your mouse over the map (without clicking) and scrolling. You can also move the map by holding down your mouse and dragging it.

Below you'll find a video that demonstrates how this works.



---

## POP-UP: Positive Point

Describe the physical characteristics of this place in one word (or a few words). For example: stream; forest; viewpoint; grassland; etc.

What do you do at this place?

- Meet other people
- Business activities in hospitality/tourism

- Business activities in agriculture/fishing
- Business activities in another industry
- Visit to a village/villages in the Lauwersmeer area
- Cycling / hiking / swimming / fishing / playing / boating / birdwatching (recreation)
- Visiting a restaurant
- Nature / water management
- Nature study
- Temporary stay / living\*
- Sitting / picnicking
- Other

If you answered 'other', briefly describe what you mean here.

\*Note! When you've indicated living as an activity, please be aware that this information is not used to determine your address. Furthermore, you're not obliged to choose this option and can select a less precise location to place your pin.

How do you value this place?

- A little positive
- Reasonably positive
- Positive
- Very positive
- Extremely positive

To which values does this place contribute? Scroll down for a repetition of the explanation about the different values.

- Economic use value
- Social use value
- Ecological use value
- Cultural use value
- Economic experience value
- Social experience value
- Ecological experience value
- Cultural experience value
- Economic future value
- Social future value
- Ecological future value
- Cultural future value

Is there anything else you'd like to add about this landscape point?

## **Value Definitions**

### **Use values**

Economic use value is about the extent to which various economic functions in the area complement or strengthen each other. For example, next to the campsite you visit, there's an

ice cream parlor and a restaurant. For you, these functions complement each other well, and you don't miss another service.

Social use value is about the extent to which the area is accessible to each individual. For instance, you have access to the area and various activities, like sailing. Or as a wheelchair user, you can use the footpaths effectively.

Ecological use value is about the extent to which the area is usable due to natural processes. For example, you can live safely and comfortably in the Lauwersmeer area because you are not affected by (extreme) flooding or drought. Or you can run your farming business due to the presence of sufficient fresh water.

Cultural use value is about the extent to which the area provides space for recreational and cultural activities that lead to interactions between people. For example, you meet people during your visit to the library, or you have various sports clubs to choose from to join.

### **Experiential Values**

Economic experience value is about how economic activity in the area is improved due to a high experience value. For example, because the harbor's image is positive, you're willing to pay more for a cup of coffee there. The experience makes a cup of coffee more valuable to you here than elsewhere.

Social experience value is about how individuals feel socially safe, connected to those around them, and don't experience hindrance from others. For example, as a resident, you don't feel bothered by visitors to the Lauwersmeer area. Furthermore, you feel comfortable in your neighborhood and connected to the people in your village.

Ecological experience value is about how the area's ecology contributes to your overall experience. For example, you find the natural surroundings beautiful or enjoy the tranquility you experience on the water or in the forest. Clean air might also contribute to your well-being.

Cultural experience value is about the extent to which the area possesses a unique cultural identity, and to what degree you perceive this in the distinctiveness of the environment. For instance, you might recognize a village by its specific architectural style. Alternatively, the area's identity might be associated with water sports, evident in the numerous sailboats. Think also about natural elements, like a significant characteristic oak tree or a native breed of cattle.

### **Future Values**

Economic future value is about the extent to which economic activity in the area is future-proof. Characteristics include the area's connection to its surroundings and the ability of people in the area to adapt to or resist changes as needed. For instance, because the Lauwersmeer area is well-connected to its surroundings, you, as a visitor, come back more frequently. Or as an entrepreneur, you invest in new forms of recreation due to perceived opportunities.

Social future value is about the extent to which local and regional inequality is addressed, resulting in social justice in the future. For example, prices for houses or activities in the Lauwersmeer area remain affordable for everyone, and efforts are made to make or keep paths accessible for all.

Ecological future value is about the extent to which natural resources (such as the supply of fresh water and clean air) are conserved or improved. For example, there is little air pollution, and water quality is improved.

Cultural future value is about the extent to which heritage is present in an area, and the degree to which new elements are integrated well into the existing landscape. For example, there are historic buildings present, and when new houses are constructed, they are built in a style that suits the village.

---

### ***Negative Locations***

**On this map, you will indicate which places you believe do not contribute positively to the spatial quality of the Lauwersmeer area.**

Consider places where you think improvements are needed. For example, the location where swimming is no longer possible due to blue-green algae, the meadow where few meadow birds visit, the disrupted view, the salt-affected soil, or the polluted water.

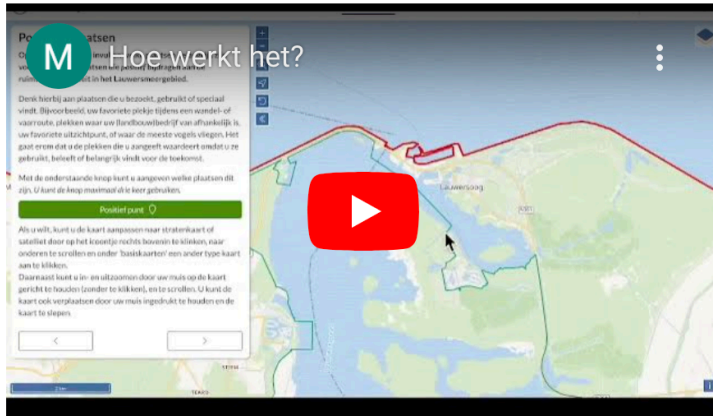
You can use the button below to mark these places. You can use the button up to three times.

Negatief punt

If you wish, you can adjust the map to a street map or satellite view by clicking the icon in the top right corner, scrolling down, and selecting a different type of map under "base maps."

Additionally, you can zoom in and out by hovering your mouse over the map (without clicking) and scrolling. You can also move the map by holding down your mouse and dragging it.

Below, you'll find a video that demonstrates how this works.



### **POP-UP: Negative Point**

Describe the physical characteristics of this location in one word (or a few words). For example: stream; forest; viewpoint; grassland, etc.

What do you do at this place?

- Meet other people
- Business activities in hospitality/tourism
- Business activities in agriculture/fishing
- Business activities in another industry
- Visit to a village/villages in the Lauwersmeer area
- Cycling / hiking / swimming / fishing / playing / boating / birdwatching (recreation)
- Visiting a restaurant
- Nature / water management
- Nature study
- Temporary stay / living\*
- Sitting / picnicking
- Other

If you answered 'other', briefly describe what you mean here.

\*Note! When you've indicated living as an activity, please be aware that this information is not used to determine your address. Furthermore, you're not obliged to choose this option and can select a less precise location to place your pin.

How do you rate this location?

- | Slightly negative
- | Moderately negative
- | Negative
- | Very negative
- | Extremely negative



What values do you miss at this location? Scroll down for a repetition of the explanation about the different values

- Economic use value
- Social use value
- Ecological use value
- Cultural use value
- Economic experience value
- Social experience value
- Ecological experience value
- Cultural experience value
- Economic future value
- Social future value
- Ecological future value
- Cultural future value

How can we turn this negative point into a positive one?

Do you have anything else to add about this point in the landscape?

## **Descriptions**

### **Use values**

Economic utility value refers to the extent to which various economic functions in the area complement or strengthen each other. For example, next to the campsite you visit, there's an ice cream parlor and a restaurant. These functions complement each other well for you, and you don't miss any other service.

Social utility value relates to how accessible the area is for each individual. For instance, you have access to the area and various activities such as sailing. Or, as a wheelchair user, you can easily use the footpaths.

Ecological utility value refers to the extent to which the area is usable due to natural processes. For example, you can live safely and comfortably in the Lauwersmeer area because you're not affected by (extreme) flooding or drought. Or you can run your farming business because there's enough freshwater available.

Cultural utility value pertains to the extent to which there's room in the area for recreational and cultural activities that lead to interactions between people. For example, you meet people during your visit to the library or have a variety of sports clubs to join.

### **Experiential Values**

Economic experiential value involves how the economic activity in the area is enhanced by high experiential value. For instance, due to the positive image of the harbor, you're willing to pay more for a cup of coffee here. The experience makes a cup of coffee more valuable to you here than elsewhere.

Social experiential value relates to how socially secure one feels, connected to the people around them, and not bothered by others. For example, as a resident, you don't feel disturbed by visitors to the Lauwersmeer area. Moreover, you feel comfortable in your neighborhood and connected to the people in your village.

Ecological experiential value concerns how the ecology of the area contributes to your experience of the place. For instance, you find the nature beautiful or enjoy the tranquility you experience on the water or in the forest. It could also be that the clean air contributes to your health.

Cultural experiential value deals with the extent to which the area has its own cultural identity and the degree to which you see this in the uniqueness of the environment. For example, you can recognize a village by a specific architectural style. Or the environment's identity is tied to water sports, as evidenced by the many sailboats. Think also of natural elements, like a large characteristic oak tree or a native breed of cows.

### **Future Values**

Economic future value concerns the extent to which economic activity in the area is future-proof. Features for this include how well the area is connected to the surroundings and the ability of people in the area to adapt to or resist changes when necessary. For instance, because the Lauwersmeer area is well connected to the surroundings, you, as a visitor, come back more often. Or as an entrepreneur, you invest in new forms of recreation because you see room for it.

Social future value relates to the extent to which local and regional inequality is countered, leading to social justice in the future. For example, housing or activity prices in the Lauwersmeer area remain affordable for everyone. Efforts are made to make or keep paths accessible for everyone.

Ecological future value pertains to the extent to which natural resources (such as freshwater and clean air) are maintained or improved. For instance, there's little air pollution, and water quality is enhanced.

Cultural future value involves the extent to which heritage is present in an area and how new elements are well integrated into the current landscape. For example, there are historic buildings present, and when houses are built, they're constructed in a style that suits the village.

---

**To determine who we are reaching with this online questionnaire, we ask you a few questions about yourself.**

### **How do you assess your knowledge of the Lauwersmeer area?**

- No knowledge
- Limited knowledge

- | Average knowledge
- | Good knowledge
- | Extensive knowledge

**What are the digits of your postal code?**

**What is your highest level of education achieved?**

**In which sector do you work?**

If you answered 'other,' you can briefly describe what you mean here.

**How do you assess your income level?**

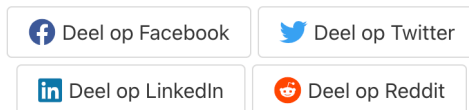
- | Low
- | Average
- | High

---

**Thank you for completing this interactive questionnaire!**

By participating, you have helped shape the future agenda for the Lauwersmeer. You have also assisted the researcher in graduating from the Faculty of Spatial Sciences at the University of Groningen.

**Would you like to contribute more to this research? Then share this questionnaire with family, friends, and colleagues!**



**Would you like to be kept informed?**

0 Yes, I would like to be kept informed of the results of this research by the researcher.

0 Yes, I would like to be kept informed by Waterschap Noorderzijlvest and the Province of Groningen about further developments in the Lauwersmeer area.

If you have selected one or both options, you can leave your email address below.

## Appendix D – Semi-structured interview guide

- A. What do you think about the operationalisation of spatial quality as used in this study?
- Is the operationalisation and subsequent definition useful from the perspective of your organisation?
  - Does it add to your understanding of spatial quality?
  - How can the operationalisation and subsequent descriptions be improved?
- B. What do you think about the design of the maptionnaire?
- How can the questions be improved?
- C. What do you think about the amount and type of people reached?
- How does this compare to the amount and type of people reached when using your organisation's usual participation methods?
- D. How do you interpret the filled in matrix?
- Are the results what you would expect?
- E. How do you interpret the identified clusters?
- How do interpret the pattern of clusters?
  - Are these results what you would expect?
  - Are there any missing clusters?
- F. Do these results provide you with extra insight in the (spatial quality of) the Lauwersmeer area?
- And why/how...
- G. Do the results of this study contribute to the future agenda or the later phases of the Lauwersmeer area development process?
- Are the results useful? And why/how...
  - How would you use these results?

## Appendix E. Average Nearest Neighbour: QGIS output for mapped positive points

### General

Observed mean distance: 506.49847808506

Expected mean distance: 865.19360212223

Nearest neighbour index: 0.58541634710

Number of points: 111

Z-Score: -8.35611765112

P-Value: 0.000

➔ Clustered

### Economic use value

Observed mean distance: 1197.44114249550

Expected mean distance: 1643.87721564155

Nearest neighbour index: 0.72842492803

Number of points: 30

Z-Score: -2.84564954418

P-value: 0.004

➔ Clustered

### Social use value

Observed mean distance: 820.96648556474

Expected mean distance: 1353.25999805848

Nearest neighbour index: 0.60665835593

Number of points: 37

Z-Score: -4.57721880580

P-value: 0.000

➔ Clustered

### Ecological use value

Observed mean distance: 889.95548687097

Expected mean distance: 1136.44531919424

Nearest neighbour index: 0.78310453819

Number of points: 54

Z-Score: -3.04914605687

P-value: 0.002

➔ Clustered

### Cultural use value

Observed mean distance: 1144.05472314782

Expected mean distance: 1496.24789253568

Nearest neighbour index: 0.76461576244

Number of points: 29

Z-Score: -2.42497496226

P-value: 0.015

→ Clustered

Economic experiential value

Observed mean distance: 1938.04336473244

Expected mean distance: 1906.14001621035

Nearest neighbour index: 1.01673714850

Number of points: 19

Z-Score: 0.13956905979

P-value: 0.889

→ Random

Social experiential value

Observed mean distance: 1233.31262990539

Expected mean distance: 1411.70075802176

Nearest neighbour index: 0.87363601875

Number of points: 34

Z-Score: -1.40959269954

P-value: 0.159

→ Random

Ecological experiential value

Observed mean distance: 773.85194492772

Expected mean distance: 1096.55754467930

Nearest neighbour index: 0.70571029189

Number of points: 58

Z-Score: -4.28765619140

P-value: 0.000

→ Clustered

Cultural experiential value

Observed mean distance: 1651.05029915750

Expected mean distance: 1688.69487736646

Nearest neighbour index: 0.97770788630

Number of points: 21

Z-Score: -0.19543024645

P-value: 0.845

→ Random

Economic future value

Observed mean distance: 1521.94855484610

Expected mean distance: 1599.00461475916

Nearest neighbour index: 0.95180998278

Number of points: 27

Z-Score: -0.47903786866

P-value: 0.632

➔ Random

Social future value

Observed mean distance: 1586.81338273335

Expected mean distance: 1754.94171475511

Nearest neighbour index: 0.90419719891

Number of points: 22

Z-Score: -0.85964755139

P-value: 0.390

➔ Random

Ecological future value

Observed mean distance: 1224.59324775020

Expected mean distance: 1354.73273757710

Nearest neighbour index: 0.90393714847

Number of points: 38

Z-Score: -1.13286498912

P-value: 0.257

➔ Random

Cultural future value

Observed mean distance: 2089.19908495401

Expected mean distance: 2120.63930550740

Nearest neighbour index: 0.98517417815

Number of points: 18

Z-Score: -0.12033332378

P-Value: 0.904

➔ Random

## Appendix F. Average Nearest Neighbour: QGIS output for mapped negative points

### General

Observed mean distance: 1127.47503964145

Expected mean distance: 1365.64201149071

Nearest neighbour index: 0.82560072856

Number of points: 48

Z-Score: -2.31151208244

P-value: 0.021

➔ Clustered

### Economic use value

Observed mean distance: 1375.79157015224

Expected mean distance: 1536.28433543171

Nearest neighbour index: 0.89553186114

Number of points: 18

Z-Score: -0.84791241282

P-value: 0.396

➔ Random

### Social use value

Observed mean distance: 2141.10185755172

Expected mean distance: 1756.78923450747

Nearest neighbour index: 1.21875852578

Number of points: 10

Z-Score: 1.32341444567

P-value: 0.186

➔ Random

### Ecological use value

Observed mean distance: 1533.80571878894

Expected mean distance: 1289.53807660425

Nearest neighbour index: 1.18942258985

Number of points: 19

Z-Score: 1.57957209748

P-value: 0.114

➔ Random

### Cultural use value

Observed mean distance: 1982.82400988957

Expected mean distance: 1368.45069074718

Nearest neighbour index: 1.44895539408

Number of points: 8

Z-Score: 2.42928836550

P-value: 0.015

➔ Dispersed



Economic experiential value

Observed mean distance: 2203.06202635700

Expected mean distance: 1869.78984669452

Nearest neighbour index: 1.17824044785

Number of points: 7

Z-Score: 0.90216540134

P-value: 0.367

➔ Random

Social experiential value

Observed mean distance: 1905.05603041335

Expected mean distance: 1851.81844996909

Nearest neighbour index: 1.02874881198

Number of points: 9

Z-Score: 0.16499547740

P-value: 0.869

➔ Random

Ecological experiential value

Observed mean distance: 2015.82419417317

Expected mean distance: 1550.80026122999

Nearest neighbour index: 1.29986062330

Number of points: 15

Z-Score: 2.22175390308

P-value: 0.026

➔ Dispersed

Cultural experiential value

Observed mean distance: 1604.89894957716

Expected mean distance: 1095.57742443006

Nearest neighbour index: 1.46488866400

Number of points: 8

Z-Score: 2.51550295996

P-value: 0.012

➔ Dispersed

Economic future value

Observed mean distance: 2899.60845743598

Expected mean distance: 1719.28410567197

Nearest neighbour index: 1.68652083031

Number of points: 9

Z-Score: 3.94008740995

P-value: 0.000

➔ Dispersed

#### Social future value

Observed mean distance: 2141.13065765742

Expected mean distance: 1335.00974884246

Nearest neighbour index: 1.60383147727

Number of points: 7

Z-Score: 3.05629767878

P-value: 0.002

→ Dispersed

#### Ecological future value

Observed mean distance: 1863.56246378527

Expected mean distance: 1500.20748509562

Nearest neighbour index: 1.24220315010

Number of points: 11

Z-Score: 1.53676341428

P-value: 0.124

→ Random

#### Cultural future value

Observed mean distance: 2390.33700353327

Expected mean distance: 1636.51482380840

Nearest neighbour index: 1.46062655147

Number of points: 8

Z-Score: 2.49244075712

P-value: 0.013

→ Dispersed



**Appendix H – Chi square test: correlation between internal and external people on the one hand and perceived aspects of spatial quality on the other**

Economic use value

**Crosstab**

Count

		econ.gebruik		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	25	15	40
	OndernemerBewoner	17	14	31
Total		42	29	71

**Chi-Square Tests**

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.424 <sup>a</sup>	1	.515		
Continuity Correction <sup>b</sup>	.166	1	.683		
Likelihood Ratio	.424	1	.515		
Fisher's Exact Test				.628	.341
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.66.

b. Computed only for a 2x2 table

Social use value

**Crosstab**

Count

		soc.gebruik		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	25	15	40
	OndernemerBewoner	22	9	31
Total		47	24	71

**Chi-Square Tests**

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.560 <sup>a</sup>	1	.454		
Continuity Correction <sup>b</sup>	.245	1	.620		
Likelihood Ratio	.564	1	.453		
Fisher's Exact Test				.614	.311
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.48.

b. Computed only for a 2x2 table

### Ecological use value

#### Crosstab

Count

		ecol.gebruik		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	25	15	40
	OndernemerBewoner	20	11	31
Total		45	26	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.031 <sup>a</sup>	1	.861		
Continuity Correction <sup>b</sup>	.000	1	1.000		
Likelihood Ratio	.031	1	.861		
Fisher's Exact Test				1.000	.530
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.35.

b. Computed only for a 2x2 table

### Cultural use value

#### Crosstab

Count

		cult.gebruik	Total
--	--	--------------	-------

		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	12	28	40
	OndernemerBewoner	15	16	31
Total		27	44	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	2.505 <sup>a</sup>	1	.113		
Continuity Correction <sup>b</sup>	1.786	1	.181		
Likelihood Ratio	2.505	1	.114		
Fisher's Exact Test				.142	.091
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.79.

b. Computed only for a 2x2 table

#### Economic experiential value

#### Crosstab

Count

		econ.beleving		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	23	17	40
	OndernemerBewoner	14	17	31
Total		37	34	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	1.065 <sup>a</sup>	1	.302		
Continuity Correction <sup>b</sup>	.628	1	.428		
Likelihood Ratio	1.067	1	.302		
Fisher's Exact Test				.345	.214
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.85.

b. Computed only for a 2x2 table

## Social experiential value

### Crosstab

Count

		soc.beleving		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	26	14	40
	OndernemerBewoner	21	10	31
Total		47	24	71

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.059 <sup>a</sup>	1	.809		
Continuity Correction <sup>b</sup>	.000	1	1.000		
Likelihood Ratio	.059	1	.808		
Fisher's Exact Test				1.000	.506
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.48.

b. Computed only for a 2x2 table

## Ecological experiential value

### Crosstab

Count

		ecol.beleving		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	35	5	40
	OndernemerBewoner	27	4	31
Total		62	9	71

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.003 <sup>a</sup>	1	.960		
Continuity Correction <sup>b</sup>	.000	1	1.000		
Likelihood Ratio	.003	1	.960		
Fisher's Exact Test				1.000	.616
N of Valid Cases	71				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.93.

b. Computed only for a 2x2 table

### Cultural experiential value

#### Crosstab

Count

		cult.beleving		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	22	18	40
	OndernemerBewoner	18	13	31
Total		40	31	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.067 <sup>a</sup>	1	.796		
Continuity Correction <sup>b</sup>	.000	1	.986		
Likelihood Ratio	.067	1	.796		
Fisher's Exact Test				.814	.494
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.54.

b. Computed only for a 2x2 table

### Economic future value

#### Crosstab

Count



		econ.toekomst:label		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	25	15	40
	OndernemerBewoner	21	10	31
Total		46	25	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.210 <sup>a</sup>	1	.646		
Continuity Correction <sup>b</sup>	.043	1	.835		
Likelihood Ratio	.211	1	.646		
Fisher's Exact Test				.803	.419
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.92.

b. Computed only for a 2x2 table

### Social future value

#### Crosstab

Count

		soc.toekomst:label		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	12	28	40
	OndernemerBewoner	11	20	31
Total		23	48	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.240 <sup>a</sup>	1	.624		
Continuity Correction <sup>b</sup>	.055	1	.815		
Likelihood Ratio	.239	1	.625		
Fisher's Exact Test				.799	.406
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.04.

b. Computed only for a 2x2 table

### Ecological future value

#### Crosstab

Count

		ecol.toekomst:label		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	31	9	40
	OndernemerBewoner	17	14	31
Total		48	23	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	4.095 <sup>a</sup>	1	<b>.043</b>		
Continuity Correction <sup>b</sup>	3.126	1	.077		
Likelihood Ratio	4.095	1	.043		
Fisher's Exact Test				.072	.039
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.04.

b. Computed only for a 2x2 table

### Cultural future value

#### Crosstab

Count

		cult.toekomst:label		Total
		Aanwezig	Afwezig+Neutraal	
OndernemerBewonervsBezoeker	Bezoeker	14	26	40
	OndernemerBewoner	13	18	31
Total		27	44	71

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.356 <sup>a</sup>	1	.550		
Continuity Correction <sup>b</sup>	.123	1	.726		
Likelihood Ratio	.356	1	.551		
Fisher's Exact Test				.626	.362
N of Valid Cases	71				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.79.

b. Computed only for a 2x2 table

**Appendix I – Spearman’s Rank correlation: effect of area knowledge on perceived aspects of spatial quality**

*Correlations*

				econ.geb	Hoe schat u uw kennis van het Lauwersmeergebied in?
Spearman's rho	econ.geb	Correlation		1.000	-.026
		Coefficient			
		Sig. (2-tailed)		.	.860
		N		90	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation		-.026	1.000
		Coefficient			
		Sig. (2-tailed)		.860	.
		N		49	49

*Correlations*

				soc.geb	Hoe schat u uw kennis van het Lauwersmeergebied in?
Spearman's rho	soc.geb	Correlation		1.000	.233
		Coefficient			
		Sig. (2-tailed)		.	.106
		N		90	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation		.233	1.000
		Coefficient			
		Sig. (2-tailed)		.106	.
		N		49	49

*Correlations*

				ecol.geb	Hoe schat u uw kennis van het Lauwersmeergebied in?
--	--	--	--	----------	---

Spearman's rho	ecol.gcb	Correlation	1.000	.308*
		Coefficient		
		Sig. (2-tailed)	.	.031
		N	88	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation	.308*	1.000
		Coefficient		
		Sig. (2-tailed)	.031	.
		N	49	49

\*. Correlation is significant at the 0.05 level (2-tailed).

### *Correlations*

				Hoe schat u uw kennis van het Lauwersmeergebied in?
				cult.gcb
Spearman's rho	cult.gcb	Correlation	1.000	.123
		Coefficient		
		Sig. (2-tailed)	.	.400
		N	86	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation	.123	1.000
		Coefficient		
		Sig. (2-tailed)	.400	.
		N	49	49

### *Correlations*

				Hoe schat u uw kennis van het Lauwersmeergebied in?
				econ.bel
Spearman's rho	econ.bel	Correlation	1.000	.053
		Coefficient		
		Sig. (2-tailed)	.	.716
		N	78	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation	.053	1.000
		Coefficient		
		Sig. (2-tailed)	.716	.
		N	49	49

*Correlations*

				Hoe schat u uw kennis van het Lauwersmeergebied in?
				soc.bel
Spearman's rho	soc.bel	Correlation Coefficient	1.000	.283*
		Sig. (2-tailed)	.	.049
		N	77	49
		Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation Coefficient
		Sig. (2-tailed)	.049	.
		N	49	49

\*. Correlation is significant at the 0.05 level (2-tailed).

*Correlations*

				Hoe schat u uw kennis van het Lauwersmeergebied in?
				e.col.bel
Spearman's rho	e.col.bel	Correlation Coefficient	1.000	.129
		Sig. (2-tailed)	.	.378
		N	76	49
		Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation Coefficient
		Sig. (2-tailed)	.378	.
		N	49	49

*Correlations*

				Hoe schat u uw kennis van het Lauwersmeergebied in?
				cult.bel
Spearman's rho	cult.bel	Correlation Coefficient	1.000	.103

		Sig. (2-tailed)	.	.481
		N	76	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation Coefficient	.103	1.000
		Sig. (2-tailed)	.481	.
		N	49	49

*Correlations*

		Hoe schat u uw kennis van het Lauwersmeerge econ.toek bied in?		
Spearman's rho	econ.toek	Correlation	1.000	-.105
		Coefficient		
		Sig. (2-tailed)	.	.474
		N	72	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation	-.105	1.000
		Coefficient		
		Sig. (2-tailed)	.474	.
		N	49	49

*Correlations*

		Hoe schat u uw kennis van het Lauwersmeerge soc.toek bied in?		
Spearman's rho	soc.toek	Correlation	1.000	.035
		Coefficient		
		Sig. (2-tailed)	.	.809
		N	71	49
Hoe schat u uw kennis van het Lauwersmeergebied in?		Correlation	.035	1.000
		Coefficient		
		Sig. (2-tailed)	.809	.
		N	49	49

*Correlations*

			ecol.toek	Hoe schat u uw kennis van het Lauwersmeergebied in?
Spearman's rho	ecol.toek	Correlation Coefficient	1.000	.116
		Sig. (2-tailed)	.	.429
		N	71	49
		Hoe schat u uw kennis van het Lauwersmeergebied in?		
		Correlation Coefficient	.116	1.000
		Sig. (2-tailed)	.429	.
		N	49	49

### *Correlations*

			cult.toek	Hoe schat u uw kennis van het Lauwersmeergebied in?
Spearman's rho	cult.toek	Correlation Coefficient	1.000	.282*
		Sig. (2-tailed)	.	.049
		N	71	49
		Hoe schat u uw kennis van het Lauwersmeergebied in?		
		Correlation Coefficient	.282*	1.000
		Sig. (2-tailed)	.049	.
		N	49	49

\*. Correlation is significant at the 0.05 level (2-tailed).